Ecologische veldopdracht

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V4

On The third of April, 2018, we have been performing field work in “The Nespolder”, which is an ecosystem between the “Loetbos” and “Bergambacht”, The Netherlands. This report is about that day.

Part 1: Abiotic factors

Introduction

This part was about measuring certain abiotic factors, such as: temperature, rainfall, light intensity, pH value of soil and water and nutrient concentrations in the soil and water. We have no idea what to expect, because this is the first time that we do ecological fieldwork. We do think that the different areas of the ditch, on the side, in the middle and the bottom, show differences in these abiotic factors. According to us, the soil would contain more nutrients than the water, plants sink when they die and are broken down at the bottom of the ditch. The nutrients that are released will sink into the ground. Maybe plant growth also affects these abiotic factors, which is something we’ve been trying to research as well.

Material and methods

We measured different abiotic factors. You can find the outcomes in the table below. We used greenkits, secchi discs, depth gauges and thermometers. We also used a scoop net with a bottle underneath. We measured these factors at different locations. these are also in the table. Please note that we have not been able to measure very accurately with our equipment and therefore have an indication, every result is therefore an approximate.

This is the table of our results

place in the water	near plants	center	on the side (which was near the bottom)
light-permeability	20cm	40cm	30cm
Ph	7	7	7
[NO3 -	5 ppm = 0.0005 %	5ppm = 0.0005 %	5ppm = 0.0005 %
[PO4 3-]	4ppm = 0.0004 %	1ppm = 0.0001 %	2ppm = 0.0002 %

temperature (degree celcius)	10	9	10

Sadly, we have lost our own original data. The sheet we had written our measurements on got lost (to be precise: we let the wind carry it into the water). We did manage to borrow the data from another group that used the same area for their measurements as we did. WE have put their data in red. Black data is that which we still remember. WE think that this incident does however reduce the reliability of our research. We could have remembered our own, but incorrect data.

Below is a photograph of the site we took our measurements. Red is the area with plants, blue the center of the ditch and green is near the side (although the actual area is covered by the finger).

Conclusion and discussion

There are some factors that reduce the reliability of our research. We had only measured once, and so did the group we borrowed the data from. Because we do not have a very large test-size we have a decreased reliability since there is a chance that we have measured a random number by accident. Because we didn't measure multiple times we will start drawing conclusions on that wrong piece of data.

Abiotic factors can vary from place to place in an ecosystem. This can happen because, for example, a tree blocks sunlight and therefore creates shade. In this case the light intensity is different. The nutrients in the soil can also be influenced by, for example, an animal that had recently died. This corpse then spoils and ensures that there are more nutrients at the place of death, and therefore more plant growth. Often you can also find many more insects around a dead animal because they want to get a free meal. There are also animals with a small tolerance limit. As soon as a small abiotic factor changes, such an animal species will already disappear. All kinds of lifeforms can also differ in another ecosystem, because there there are other abiotic factors

According to https://www.bioplek.org/bioplek.html we have a good water quality in our ecosystem regarding the chemical data we showed you above. Furthermore we did notice a difference in phosphate concentration, it is higher around the plants. So plants might have influence on it after all, although you wouldn't expect it. The difference would be made equal again by processes such as diffusion. If we had the chance we would like to recreate this research and see if we get the same results. This might be the random error we talked about earlier.

Practicum 2: Aanwezige reducenten

Introduction

This part of our research was about the decomposers in the ditches we have looked at. We looked at bacteria and fungi. You can find them at the bottom of the ditch, but you can also find them at in the middle of the ditch and around the different water plants we have seen. Our goal for this practicum is that we would want to know if there is a difference in amount of decomposers at different locations in the ditch.

Materials and methods

We have researched the same locations as we have used in practicum 1. We took one sample of one drop. We did this in the petri dish, the toa put the petri dish in the stove. After a few days we looked at the decomposers which were mainly bacteria.

Results

All our findings are located in the below shown table.

	Plant	**Ground**	**Water**
Number of kolonies	150	130	100

There were 150 bacteria colonies in 50 microliter (1 drop). This would mean that there were 150:50x10^-6 = 3 million bacteria per liter water, and 300 thousand per 100ml.

The bacteria are to be found in the water do not differ from the bacteria we have found between the moss. We also do not have any material that could research the impact the different two locations have on the bacteria. However there was a difference colonies size. In the water there were fewer colonies than the amount of colonies in the ground. This is quite logical because the nitrogen cycle mainly takes place in the ground, take for instance root

nubs that produce nitrogen for the plants. In the water there are fewer plants so there will aos be fewer bacteria. You also need a lot of decomposers for the land this is because a lot of biomass is produced on land, but after a period of time it needs to be decomposed in order to be absorbed by other organisms again in the form of abiotic molecules. In the ditch you have water, there is fewer biomass because the volume where the plants could be is rather smaller, so relatively fewer plants will be there. Because of this there are fewer decomposers in the water. We have not seen a connection between the amount of fosfate between these two locations, whilst the amount of nitrogen influenced the amount of bacteria, more nitrogen = more bacteria.

Below you can see the drawings (which are a bit schematic, we've excluded some parts) of the bacteria colonies.

Conclusion and discussion

When it comes to the eye you do not see a difference in bacteria at the different locations, but when you look closely there is a small difference between the amounts of bacteria at the different locations. The next questions we could ask is, what is the cause of this population difference, one cause of this could be the difference between temperature, light intensity, nitrogen of the amount of phosphates. We can not tell with certainty that there was a difference between bacteria and fungi colonies because we are not certain if we have found any fungi.

Practicum 3: Plants in and around the ditch

Introduction

This part was about plants. Before the measurements we got information about plants.
“De planten in en om een waterpartij kun je in 5 groepen verdelen: drijvende planten, ondergedoken planten, in de bodem wortelende waterplanten (oeverplanten), moerasplanten, broekbos.”
This is more of a descriptive research, so we don’t have a real hypothesis. We've looked at what kind of plants and trees there are in the area where we have did this practical exercises.

Material and methods

We have walked around in the Nespolder/ Kwakels to research plants and trees. The amenities for this practicum are: a box for the water sample, flora, mesh bag (+ one for the water sample) and plants search cards. We have looked at the leaves of trees and plants to figure out to which plant it was.

Results

Below you will find our findings of herbaceous plant species. We have searched in the kwakels/nespolder.

Plant	**Official name**	**Group**
Waterlily	Nymphaeaceae	This plant has in the soil rooting plants and so belongs to the shore plant.
Iris pseudacorus	iris pseudacorus	This is a shore plant. The plant grows in water that is about 30 cm deep, on the shore. The carrots growing in the soil.
Greater Spearwort	ranunclus lingua	The plant grows on the waterfront and is a marsh plant. Also this plant is a little longer which also belongs to a swamp plant.
Sweet flag	acorus kalamus	The plant has a long Rhizome and grows on the riparian zone of shallow water to wet ground, so this is a swamp plant.
Cattail	typha	Also this is a swamp plant, the plant is usually in the

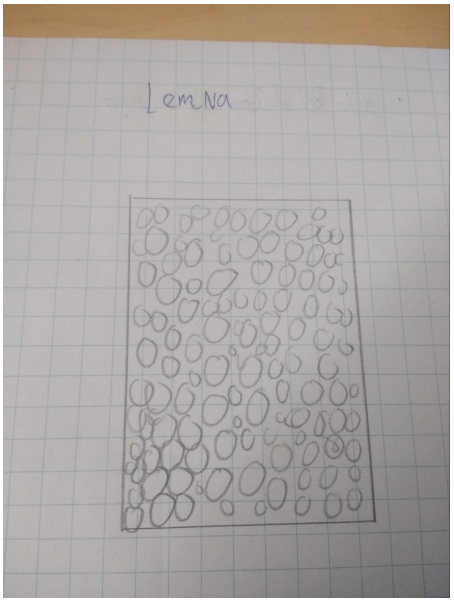
		shallow water to beside the shore side. The plant is also longer.
Waterweeds	elodea	This plant belongs to the submerged plants. they float in the water.
Commen Reed	phragmites australis	This plant is quite long and stands alone in wet ground and sometimes in shallow water, he belongs to the Marsh plant.
Lemna	lemnaceae	floating plants

Exercises

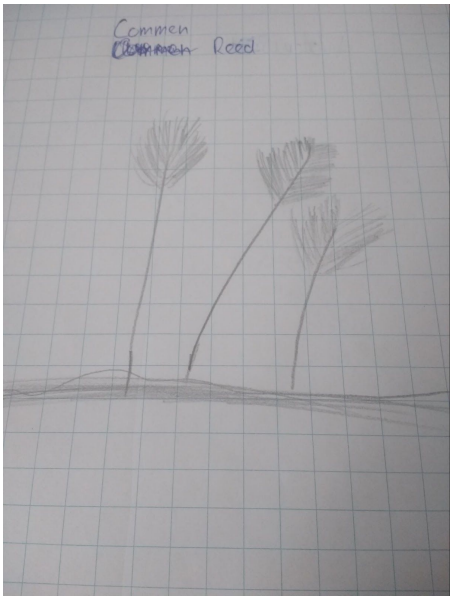
The water plague would also can belong to the oxygen plant because he carbonate turnover in carbon dioxide which he used himself.

Hier zijn tekeningen/fotos van de planten, met name van de bladeren en takken:

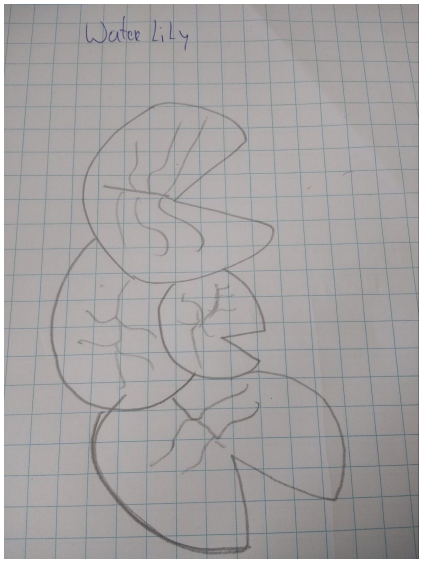
Lemna:



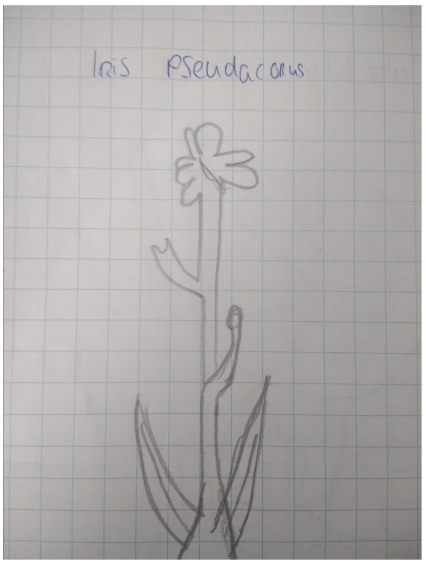
Common Reed:



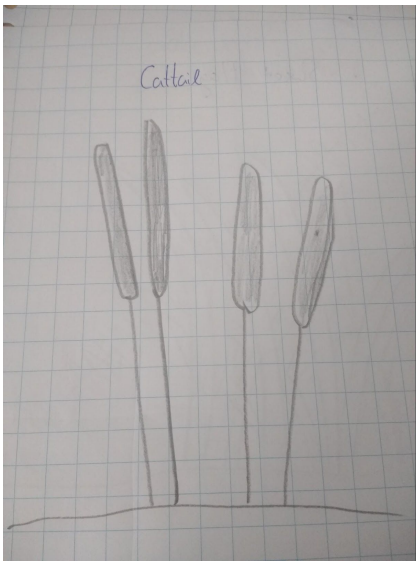
Water Lily:



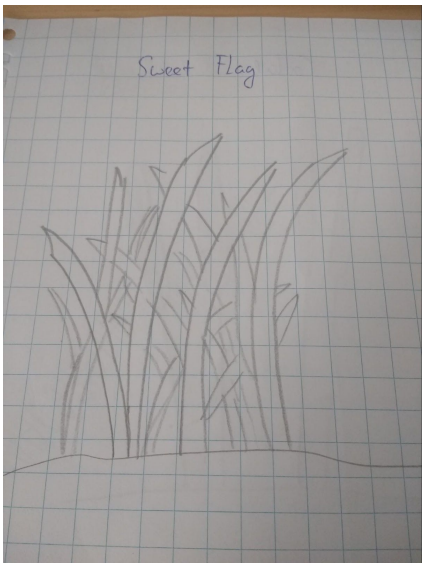
Iris Pseudacorus



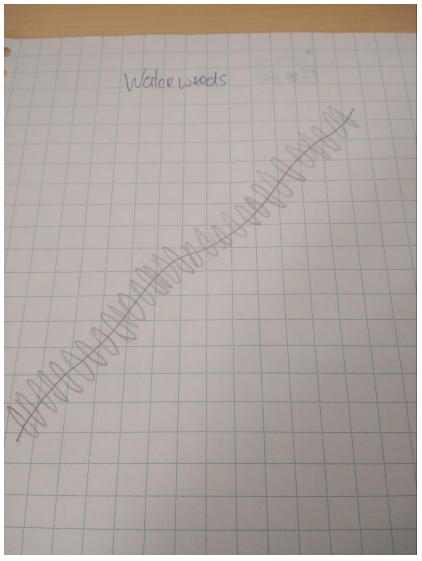
Cattail:



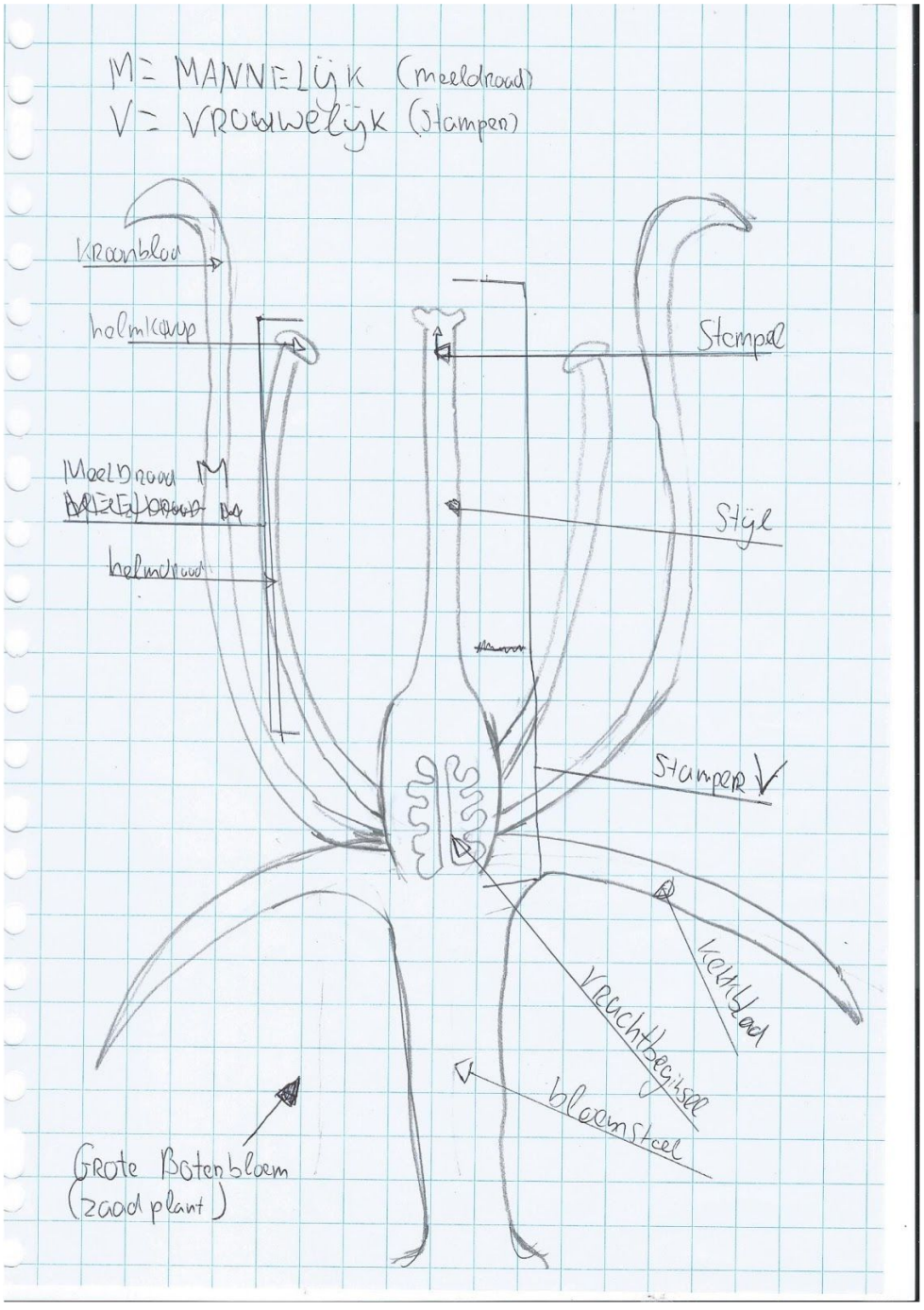
Sweet Flag:



Waterweeds:



Schematische bloeiwijze plant: Greater Spearwort



We're very sorry for the inconvenience caused by the names being in Dutch.

We have found several trees and plants in the Nespolder/Kwakels. Some were more common than others.

We have searched for:
Oak tree and birch tree; These came really uncommon for in this area.
Black-necked willow came was common because it grows on wet places at water sides and grassland. The Pollard willows trees was relatively common. They stood next to the ditch next to each other. The tree is everywhere in Netherlands, because this one doesn't specifically need something. It's often in addition to the water sides, so also in the Nespolder.
Slippery elm also stood in the Nespolder, this tree grows at watersides.
The Alder Buckthorn was uncommon, because this tree love to grow in the shadow which is not everywhere. At last we took a water sample to look for micro organisms at school.

Conclusion / exercises

Plants have an important function in ecosystems. In this ecosystem we looked at how water is consumed by plants and trees.That ensures for example that leaves start growing. This is a food source for animals such as caterpillars. And these caterpillars are eaten by birds. Plants have an important function for the ecosystem because it is at the bottom of the food chain. That means that most animals cannot survive without plants.

The larger the biodiversity in an ecosystem, the greater the chances of survival of species. For example there is a food Web in an ecosystem with 100 organisms or with 20 you'll find out that the ecosystem with 20 organisms are more vulnerable than the ecosystem with 100 organisms. This is because the ecosystem with 20 organisms are much more dependent on each other. Suppose there is a species that becomes extinct, a food source of an organism can fall away. However an ecosystem with 100 organisms are less vulnerable because there a more food sources. We have found different plants relatively quickly, we think this is a good indication to a healthy ecosystem.

The groups of plants that we have not found is an oak tree and birch tree. This could be because the trees and smaller plants are trampled by the cattle. Some plants are not resistant to the trampling of livestock, in the area where we have done our research was among other things also pasture. The plants that we have not seen, also usually grow in swamp. The nespolder/kwakels is not a swamp.

Practicum 4: presented animals

Introduction

Biodiversity also includes multiple animals. In this part we counted animals in the ditch and looked at in which part of the ditch they lived. We could catch animals with a bucket, or by using bait and to pull a landing net through the water, but than we would only catch the bigger animals. We expected mostly small animals, we only don't have any idea which

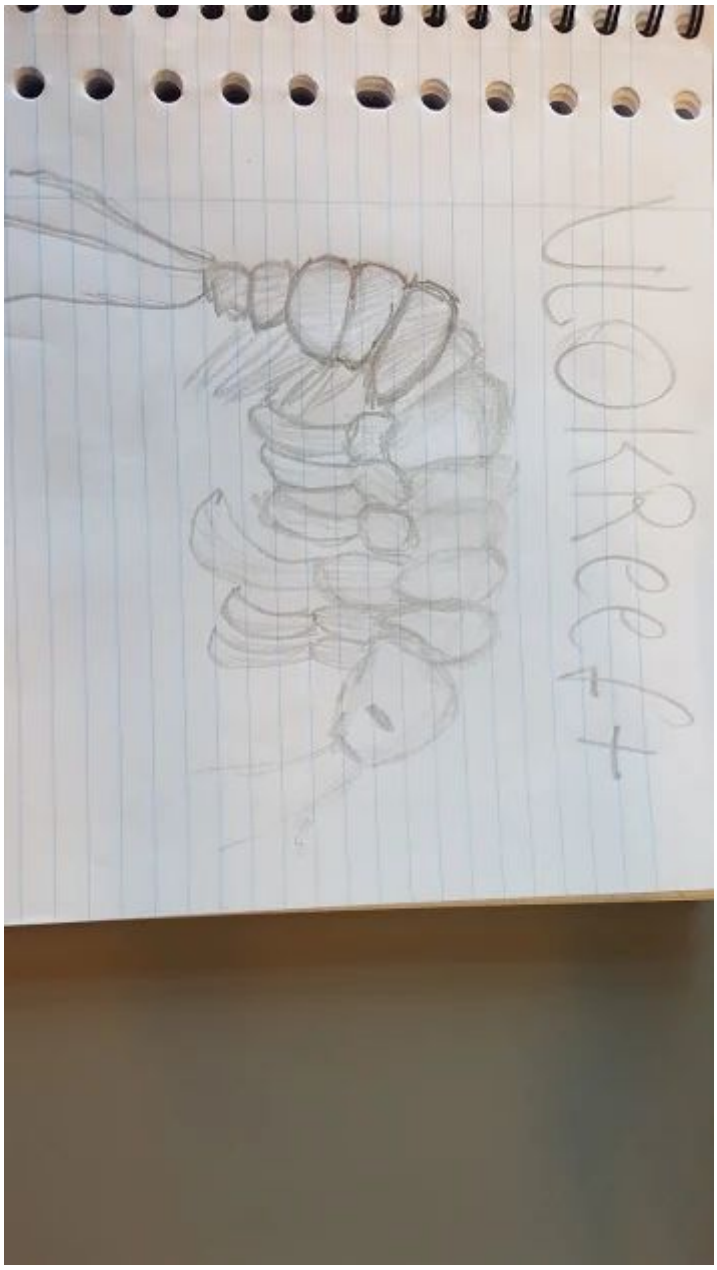
species. We think this, because the ditches are quite small, so there wouldn't be a lot of space for bigger animals. There was also not really a presence of big animals on the land in this ecosystem, this is also why we expected to find the smaller animals.

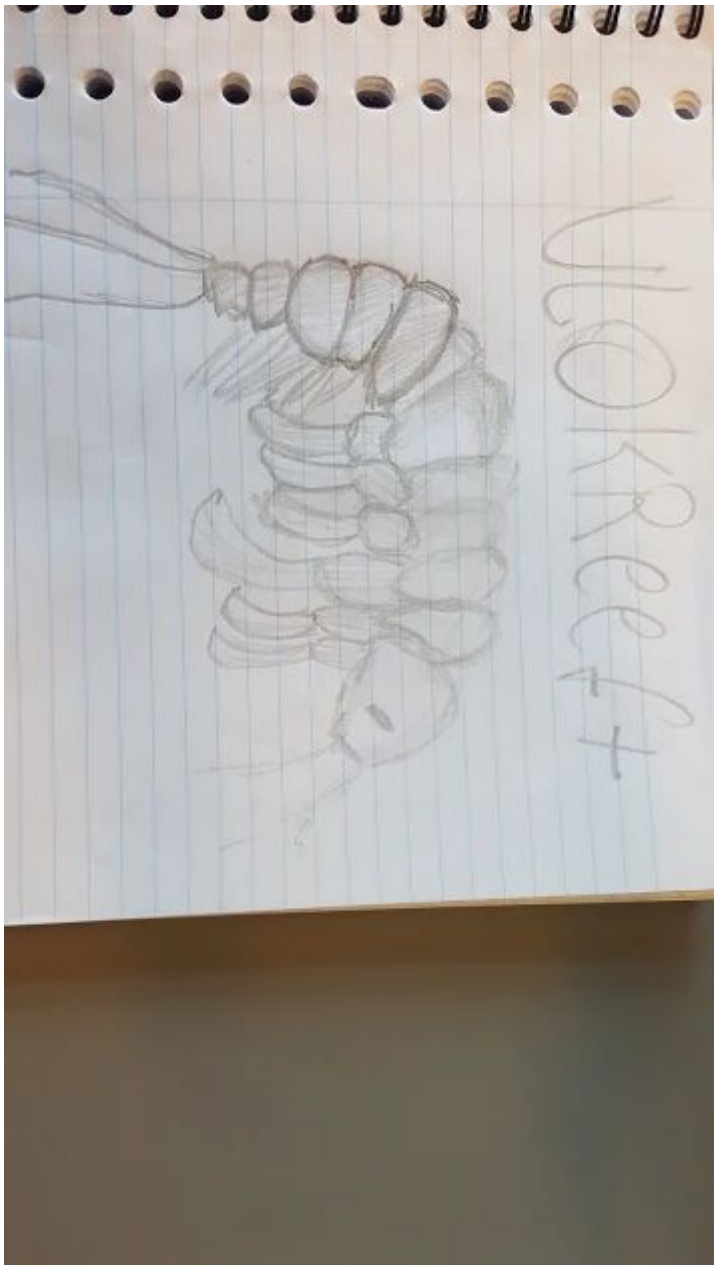
Materialen en methode

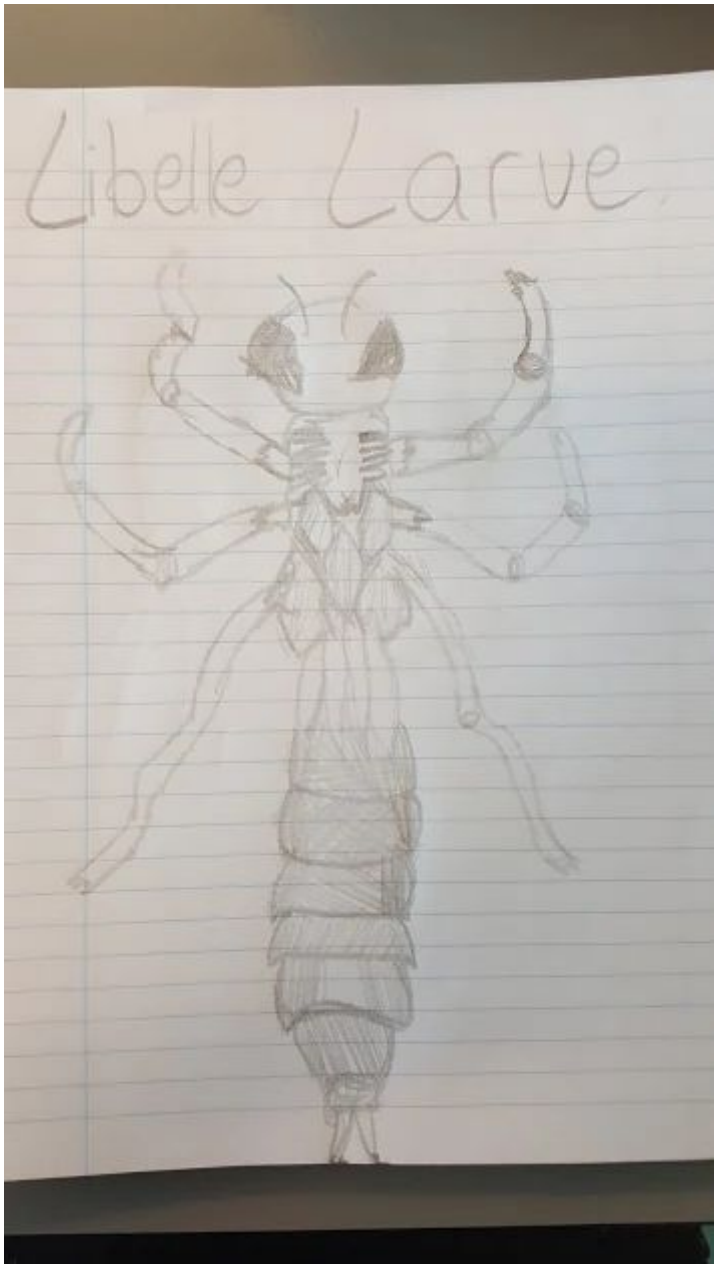
We took three samples at each location in the ditch, these are near the side (yellow), middle of the ditch (blue) and between plants (red). After that we looked at the animals that were in the samples. We used a water animal search card, white insect case and a landing net with a sample on it. We pulled the landing net through the water locations and after that we put the sample in the white case, so that we could see what kind of animals were on that location. Using the search card we found the right organisms.

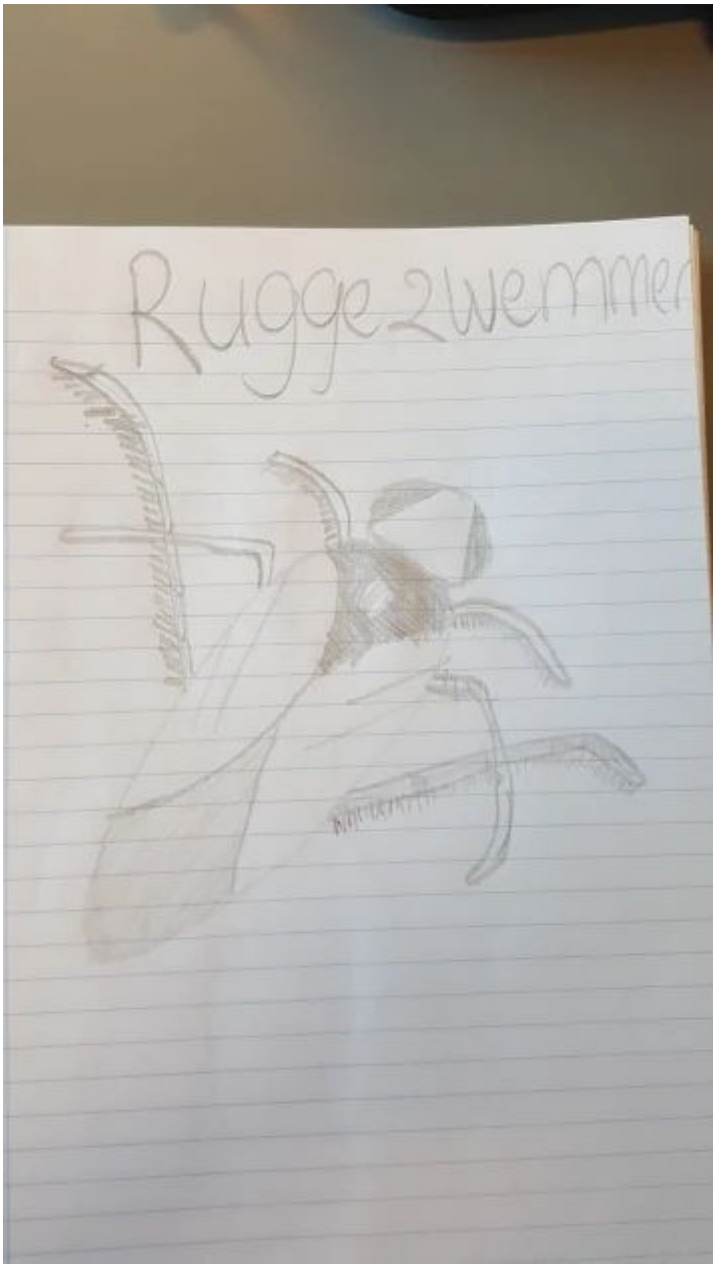
Locatie Groen	**Animals**	**Insect case 1**	**Insect case 2**	**Insect case 3**
	Amphipod	0	1	1
	Dragonfly larvae	1	0	0
	Back swimmer	3	4	4
	Strider insect	1	0	0
	Mosquito larvae	2	1	1
	Damsel larvae	0	1	1
Location blue	**Animals**	**Insect case 1**	**Insect case 2**	**Insect case 3**
	Amphipod	1	2	0
	Dragonfly larvae	1	0	1
	Back swimmer	3	2	2
	Strider insect	0	1	0

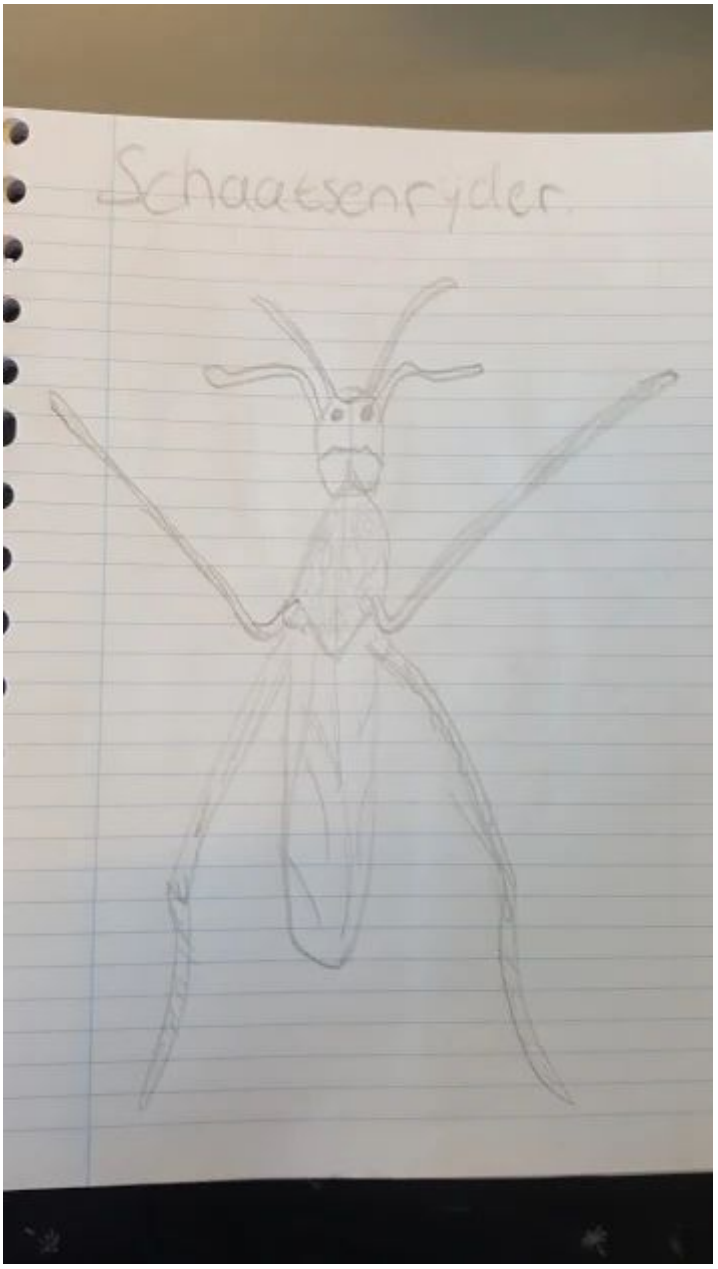
	Mosquito larvae	0	0	0
	Damsel larvae	1	2	1
Location red	**Animals**	**Insect case 1**	**Insect case 2**	**Insect case 3**
	Amphipod	1	2	2
	Dragonfly larvae	1	0	2
	Back swimmer	2	2	1
	Strider insect	0	1	0
	Mosquito larvae	1	0	1
	Damsel larvae	1	0	1

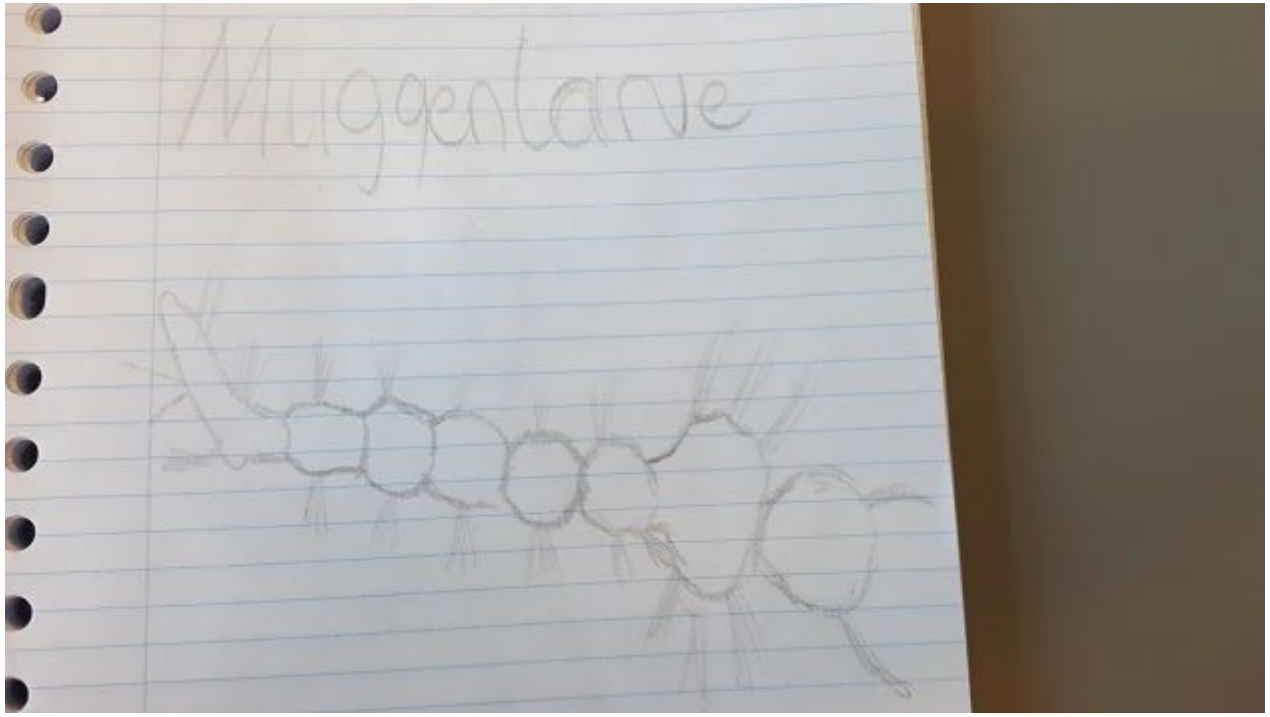

Woolkreft

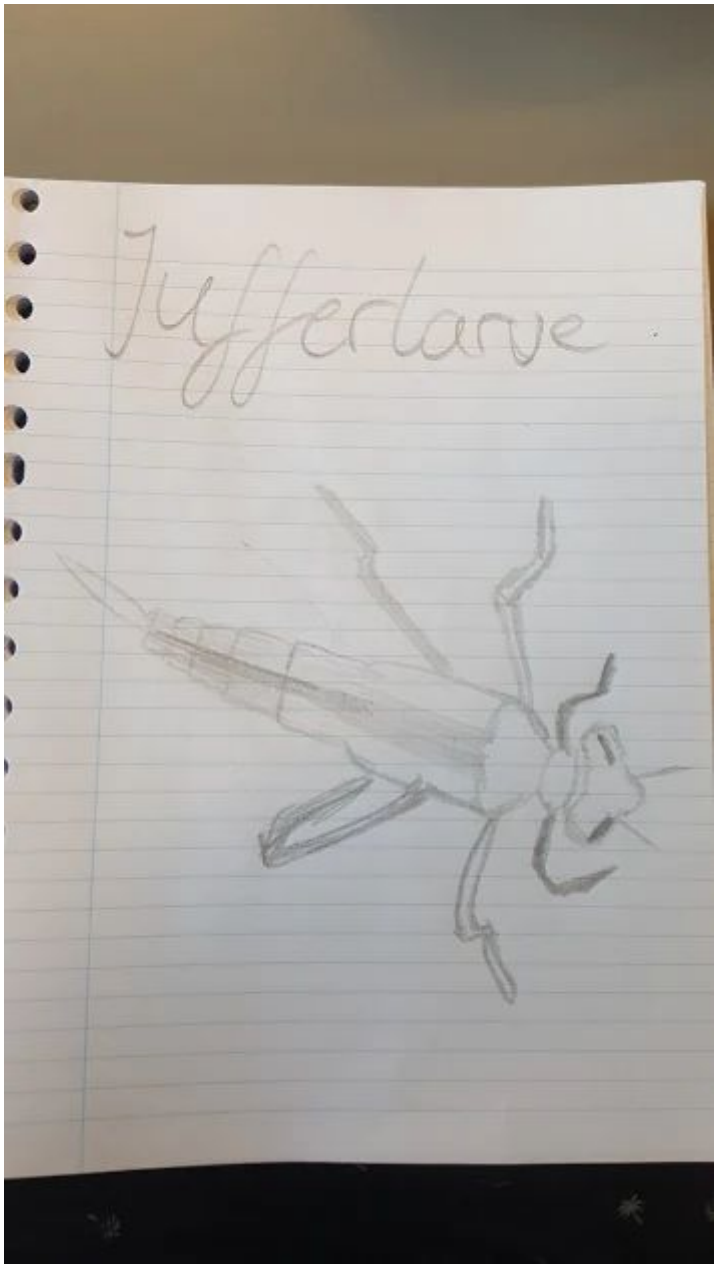

Woolkreft


Libelle Larve.


Rugge2wemmer

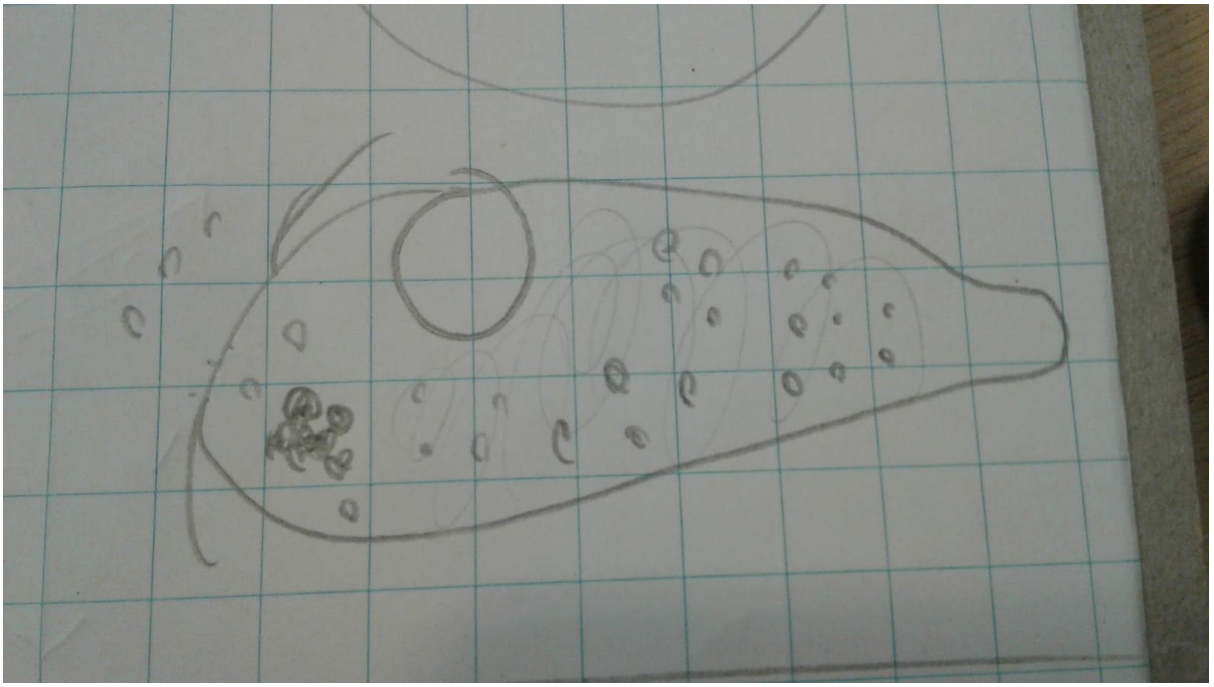

Schaatsenrijder.


Muggenlarve



In experiment 3 we have searched for micro-plants. We also found a mini animal. Beneath is a drawing of the animal we found. We think it's a paramecium. After observing the animal for a long time, we noticed the following:

- Is able to transform into a long stretched figure.
- Is able to move (locomotion)
- Sometimes makes bubbles near his head (see drawing left side)
- Has feelers that vibrate.
- Has a white greenish colour, but this could be because of turbid water.



Conclusion and discussion

The location were we founded most organisms was next to the ditch. We are not able to explain this with the information we have seen during the experiment. Something which we can explain is why there will be less larvae in the middle of the ditch, this is because the water speed is at its fastest in the middle. We founded most larvae near plants. These plants were on the waterfront. We think most plants live near the waterfront because the water isn't deep but they still have a lot of water.
The animals we have caught during our experiments, were put back on another location. The differences between a few locations aren't big enough to draw a conclusion out of it. The only thing we are able to explain is that the water speed in the middle of the ditch is faster, so you'll find less organisms there.

Waterkwaliteit d.m.v. bioplek bepalen SVP

Meting tuidens de wandeling

Tijdens onze wandeling door het weiland hebben wij ook metingen gedaan voor chemische eigenschappen van water. Deze waarden waren gelijk aan de waarden die te vinden waren in de sloot. Alleen waren er minder nitraat en fosfaat deeltjes op het weiland, dit komt omdat de fosfaten en de nitraten bij de humusdeeltjes zijn en nog niet uitgespoeld zijn. De bovenlaag was alleen maar regen.
Wij kwamen tijdens de wandeling niet heel veel verschillende dieren tegen, wij hebben overigens tijdens de wandeling ook niet echt gezocht naar verschillende dieren, wij vonden wel een worm en een dode reiger. Wij zijn wilgen tegen gekomen, wilgen "houden" van water. Ook zijn wij 2 eikenbomen tegengekomen.
Het is beter om alle abiotische factoren meerdere keren te meten omdat je dan meer betrouwbaarheid hebt.

Globe/own research

Introduction

This day we also had to carry out our own research. We thought it would be nice to investigate whether moss influences bacteria and bacteria growth. Our research question is therefore: "Does moss influence bacterial growth?" We will investigate this by taking substrate in petri dishes of soil where there is a lot of moss, and where there is little or no moss. We then put these petri dishes in the stove at school to allow the bacteria to grow.

Material and method.

We have already partly been told how we were going to investigate. But for the clarity. We want to take 6 Petri dishes with substrate. 3 of them come away from moss, and the other 3 are mossless. We do this at school in the stove and compare the few dishes after a few days.

Results

We have seen that with moss there are almost no bacteria and without moss more. We also noticed that the colonies were clustered without moss and not with moss. We also saw small black pieces in the dishes with moss. This is probably due to other moss parts that have entered the stove, and therefore also ended up on the Petri dishes. It could also be just dirt.

Conclusion / discussion

We have only used a (in our opinion) small research group. This reduces reliability because the chance of accidental errors is higher. There is also a human factor that lowers the P-value. We have counted with the naked eye, so there is a chance that we have overlooked something. From now on, we must actually do it with the microscope.

But excluding all of this, moss seems to have an influence on the amount of bacteria that can be found in the soil. We don’t know whether it has a direct effect, or an indirect effect, but it does have some influence.

De grote conclusie (practicum 1,2,3,4 en Globe)

Our main conclusion of today is that we think the ecosystem of “the nespolder” is kind of vulnerable and weak, but strong as well. We haven’t seen an extremely large biodiversity, so if one single species goes away the entire food web could collapse. But looking at the other

factors (nitrates and such) the ecosystem seems to be in a good shape. It just might not be ready for a change.

The water temperature makes sure that the animals living in the water right now have a good life. It isn't too cold and too warm. Furthermore there are enough nitrates for plants to grow on. And make some oxygen for us. Furthermore the trees don't create too much shade so several types of plants can have a place to grow. Furthermore the Ph-value is very good to, a nice 7.

Apart from this, we have learned that both biotic and abiotic factors can be quite important for creating a certain ecosystem. If one is a bit different the entire ecosystem is different.

Another thing we also learned is that you can find life, and life forms in places you wouldn't expect. We found traces of lobsters and mussels in our ecosystem. We didn't even think that'd we'd be able to find them here.

Finally, we learned that we need to use a microscope more often. We had trouble drawing up solid conclusions because we didn't look at enough things under the microscope.

Sources

Below is a list of sources we have been using for our report.

Biologieplek (for determining the water quality of our ecosystem)
https://www.bioplek.org/bioplek.html
https://www.bioplek.org/techniekkaartenbovenbouw/techniek89wateronderzoek.html

Wikipedia (we have been using this to locate the latin name of the plants and organisms)
https://nl.wikipedia.org/wiki/Waterpest
https://nl.wikipedia.org/wiki/Waterleliefamilie
https://nl.wikipedia.org/wiki/Gele_lis
https://nl.wikipedia.org/wiki/Grote_boterbloem
https://nl.wikipedia.org/wiki/Kalmoes
https://nl.wikipedia.org/wiki/Lisdodde
https://nl.wikipedia.org/wiki/Riet
https://nl.wikipedia.org/wiki/Lemnaceae