Globe to Erasmus Report

Group 1

Foreword
This report is meant to record a step by step account of the research done to answer the research question *"In what way are the ph levels of surface bodies of rivers influenced by surrounding industry?"*. During the project, we hope to have reached a better understanding of certain aspects relating to the research question and to the geography surrounding our locations of testing. We also hope to be able to overcome any challenges that we might face on the side of communication and planning as this is a cooperative project that requires communication and planning internationally.

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Summary

For this research paper six different students from three different countries came together to work on one question. First we had to come together and discuss what the question was going to be. After we found a suitable question we started to research the components of the question. When then compiled this research to form a common census based on the data we gathered

Preface

The Globe to Erasmus project was an international project consisting in this case of three schools from the three following countries: Croatia, The Netherlands, and Poland. The students from these schools worked together in advancing their geographical knowledge. This project in particular is about the hydrosphere and the effect humans (and especially industry) have upon it. They all did research for their common goal of gaining more knowledge and succeeded in that goal

Research Question and Hypothesis

Before we started our research we needed something to research. Our topic being the hydrosphere gave us varying subjects to explore. To make to most out of the international part of what we are doing we decided to look at the differences in the three locations of research. We found out that there is a varying amount of industry in all three locations with Rotterdam being the most industrially busy and the location in Croatia being the most rural.

By combining these two factors we asked ourselves multiple questions we started off with the broad question of how is water affected by industry. We dove a little deeper and came to the question of how does industrial activity influence rivers. Eventually we settled on: In what way are the ph levels of surface bodies of rivers influenced by surrounding industry?

We hypothesised that an increase in the industrial activity in an area would cause the surface of rivers to have a lower ph level. The reason we came to this hypothesis was because we theorised that an increase in industrial activity would lead to an increase of pollution. The way we tried to measure this was by testing the ph levels of river waters in the three research locations spread out over the three countries.

Research Plan

To start off, we first had to create an exact plan of action in accordance with the research question. Under this, a list will be shown showing the research plan that the students from Rotterdam went by:

1. Find a fitting research question in accordance with the globe protocol.
2. After taking some time familiarising ourselves with the theory and the subject matter we decided on a final research question which is mentioned earlier in this report.
3. Afterwards we spoke with our colleagues in the other schools. From this discussion we came up with a plan to measure around three times per river. To see what the ph level was in each river we used the Globe Protocols to make sure we got the information in a correct way.
4. We then brought our data to our school lab to test the samples we took according to the Globe Protocol. After each result we noted it down for later use. Repeat this 3 times.
5. After we collected all our data we compiled it together into multiple graphs for a quick overview.
6. Afterwards we studied the data and analysed it which lead us to the following.

Results and Analysis

After we did our research we came to the following results[1]. The results clearly show a correlation between the amount of industry in the surrounding region and the pH levels of the surface water of rivers. It is shown through the differences in the pH levels of the rivers in Poland, Croatia, and the Netherlands.

As Rotterdam is one of Europe's most important ports, industry and its influences are abundant. This can be clearly seen in the pH level of the Maas as it is much lower than that of the rivers in Croatia and Poland, showing us that the river Maas is much more acidic.

It is also worth noting that the fact that we have multiple measurements of rivers in rural areas also assures us that human activity does certainly have an influence on the acidity of rivers. This does

[1] See Appendix

of course not necessarily mean that industrial influences are the only ones on the pH levels of the water. Other air polluting influences such as automobile exhaust fumes can also affect the pH of water through acid rain and other means. That may be another reason for why the pH levels of the rivers in Croatia and Poland are much higher than the Maas.

As a little side research project, we were also interested in how much precipitation would affect the pH levels of water. We did this by also calculating the pH level of the Maas during heavy rainfall and a day after. There was indeed an increase in the pH level of the water as can be seen in our findings of 14/03/2019 as those were our observations during heavy rainfall. We were, however, a bit surprised to witness the ph levels drop one day after having analysed the results. We expected this to happen gradually over the course of a few days, however there was a clear difference in the results of the two days.

Conclusion

Due to our findings and analysis, we feel confident enough to answer the aforementioned research question and be able to answer why this is the case. To answer the question; In what way are the ph levels of surface bodies of rivers influenced by surrounding industry? We conclude that industrial activity in an area has a rather large effect on the pH levels of water in the surrounding area while the presence of humans will always tend to leave a mark on the environment.

Evaluation and Reflection

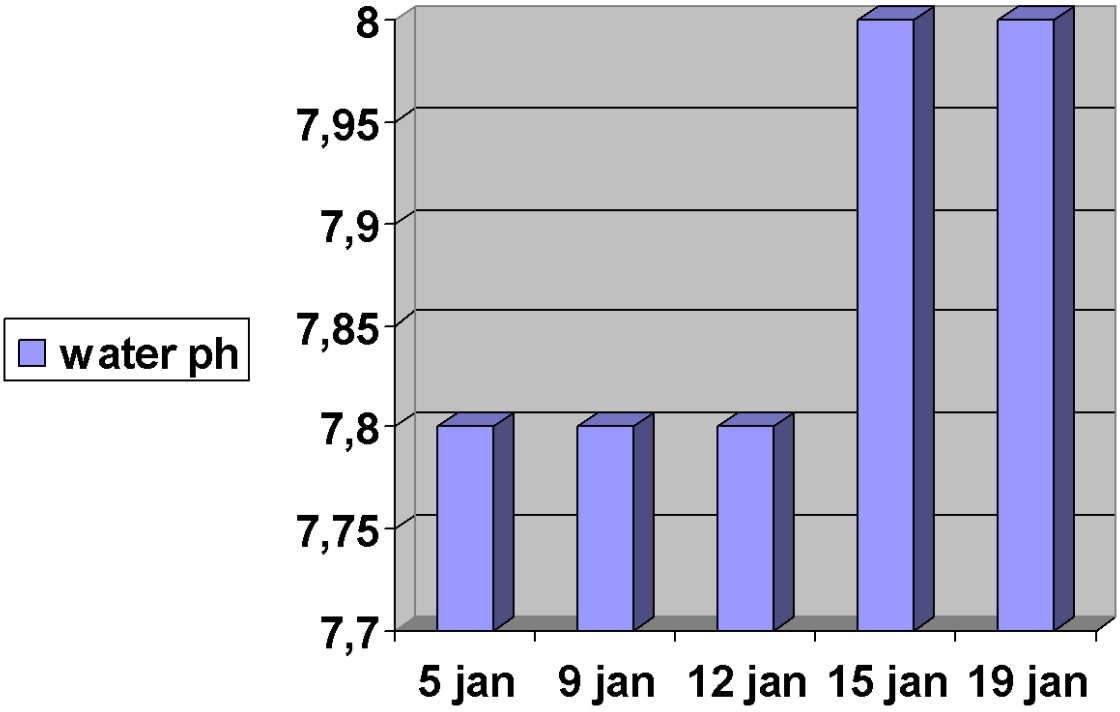
The next part of the research is the linking of the data that was gathered to the research question. In the analysis it became clear that our hypothesis was correct regarding whether or not industrial activity has an effect on the pH levels of the surface of rivers. This however doesn't tell the entire story, while there was more pollution in Rotterdam the other two locations of research also had quite acidic water. From this we could theorise that human presence tends to add acidity to the local river water as we tend to pollute the area we live in. One of our most painful regrets is, however, the fact that we didn't have any precise means of measuring the pH level and that we had to rely on pH strips and our eyes in order to find the pH levels of the water in the Maas.
During the project we definitely ran into some issues with planning. One of the main issues was that we, the Dutch students weren't able to work on the project for a long amount of time due to conflicts in our planning which we would definitely have to improve on. At the later stages, we ran into some time constraints, so we had to work much harder than we should have. Aside from the poor planning, we were able to communicate fairly well with our colleagues in Poland and Croatia, and they were fairly able to hold to their assignments. For next time, planning could definitely be improved upon and
aside from that, it was pleasurable meeting our colleagues on the other side of Europe.

Resources

- Container for sampling of water.
- pH testing tool

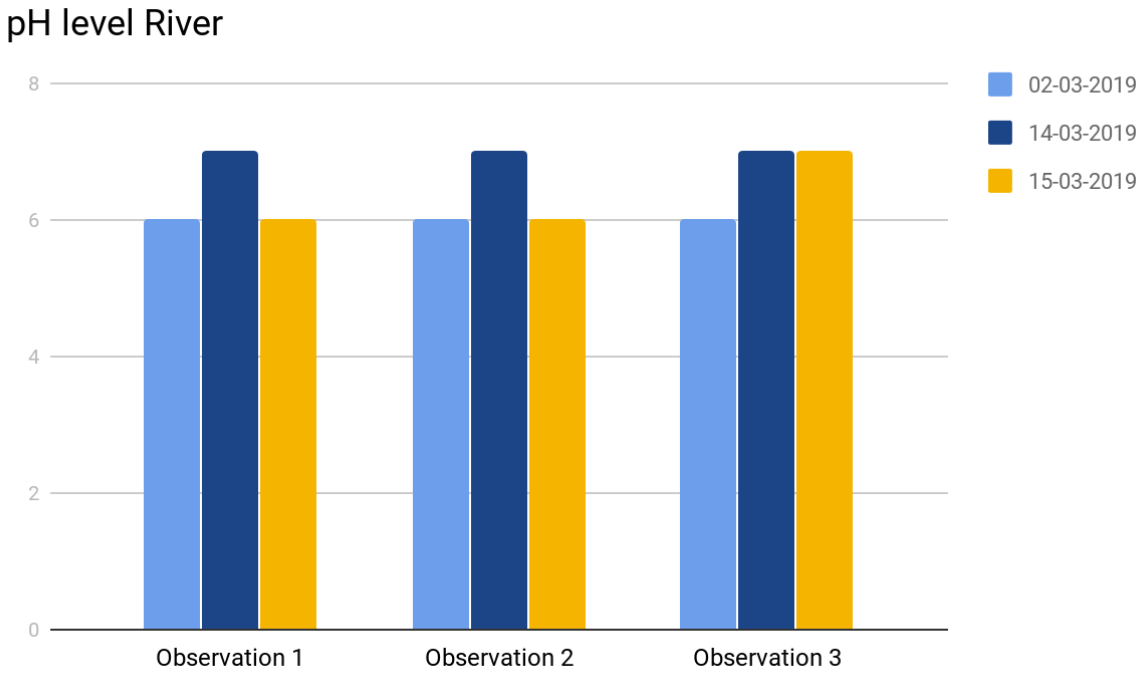
- Data recording Instruments (pen,paper, digital(laptop))
- Measuring Cup

Appendix



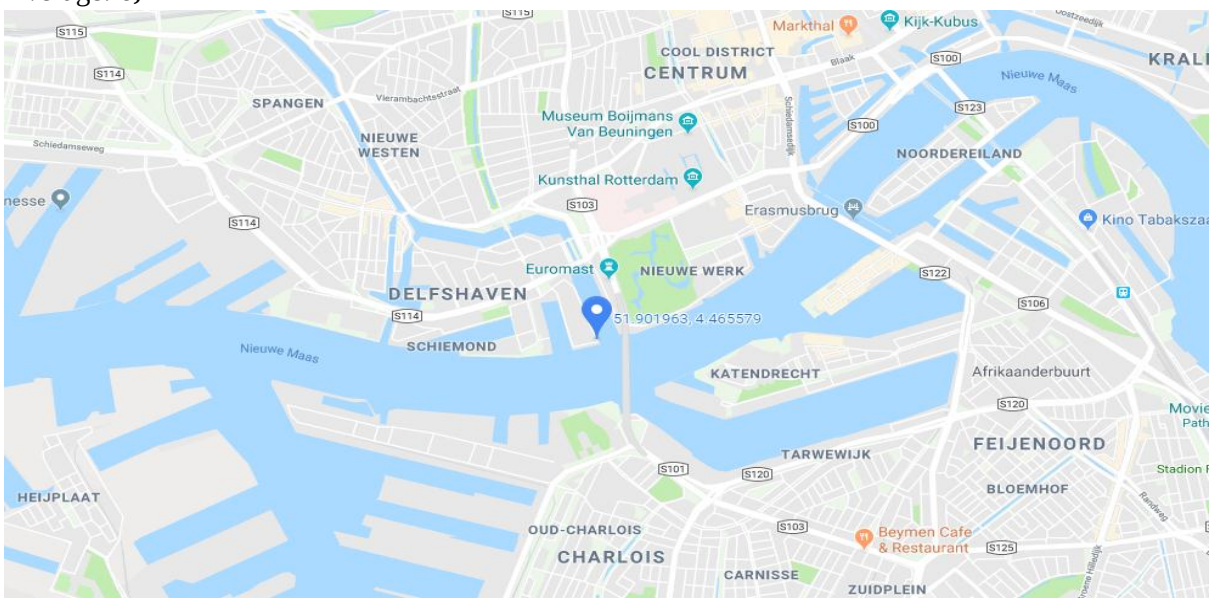
Poland
Average: **7,88**

No graph available
Croatia
Average: **7,66**



The Netherlands

Average: **6,44**



Sample Collection Point

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