

Research on particulate matter



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This week we are working together as an international group to take a look at air and water quality. We looked into the quality of air in regio IJmond so Heemskerk, Beverwijk and Wijk aan Zee. Today we researched particulate matter in the air. In preparation of this event, we made notes during lectures about particulate matter and read articles to get familiar with the subject. This gave us some insights and a lot of general information on the subject.

Research question

Do densely built houses or houses who are further apart impact the air quality more?

Hypothesis

We think that places with densely built houses have more fine dust in the air, there are more influences like the higher number of cars that cause fine dust in a smaller space.

Data collection

Today there was a wind from the south. However, there was so little wind that it barely impacted our results. The wind had an average speed of 2-5 m/s. It was a pretty sunny day without clouds. The average temperature was 13 °C. Our plan was to bike from school to Yalou's home through a small street where the houses are close together. We chose the Van Loenenlaan. Here we could see the impact of densely built houses on air quality. When we went back to school we would take a detour and go through Binnentuin, through the street Rika Hovinkstraat to be precise. This is a house plan with big houses that are further apart. The houses there are newly built and are intended to be more durable and environmentally friendly.



The houses in the Van Loenenlaan are a little protected from the wind because they are built so close together and therefore less wind can pass through

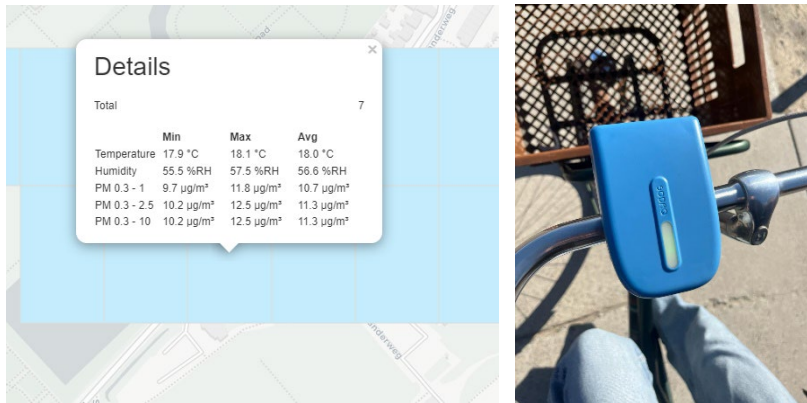
The houses in the Rita Hovinkstraat are further apart, more wind can pass through in contrast to the Van Loenenlaan.



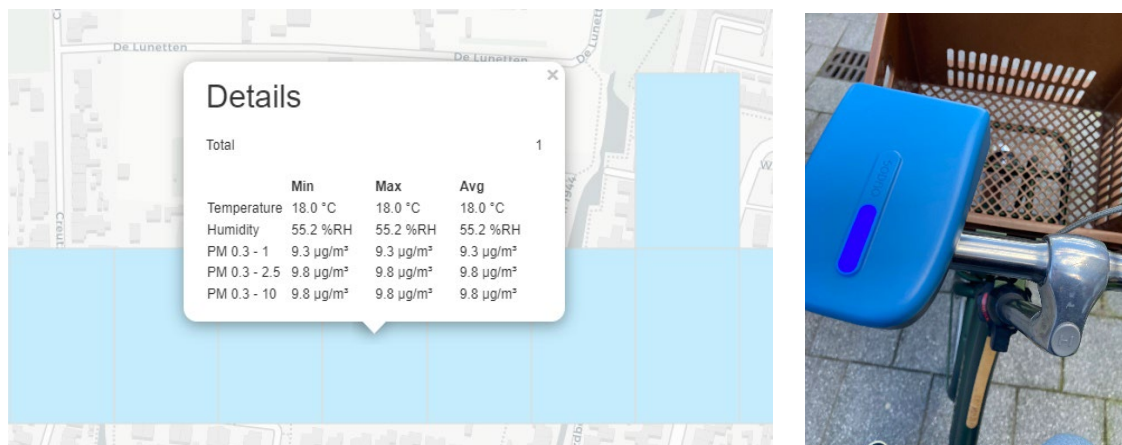
Rita Hovinkstraat is a lot closer to Tata Steel than the Van Loenenlaan. We took this into account, because there is a chance that this will impact our results.

We went to both streets with our sniffer bike, that is a device that measures the quality of air. On the right you can see what the colours on the sniffer bike mean. The higher the number, the more particulate matter is in the air. So, if the number increases, the air quality is worse.

Results



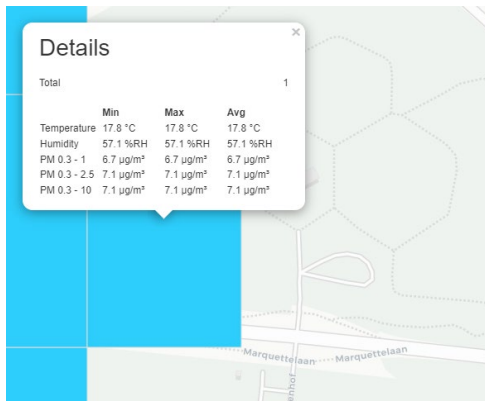
At the route through the Van Loenenlaan the device constantly stayed yellow. We measured an average of $11 \mu\text{g}/\text{m}^3$. This means that the air quality is moderate; the quality is acceptable but it can be a little risky for people who are prone to certain health problems that are caused by particulate matter. We made this measurement on 10:53 on the 14th of march in 2024.



When we entered Binnentuin our device turned blue. In the Rita Hovinkstraat this color constantly stayed the same. We measured an average of around $9.5 \mu\text{g}/\text{m}^3$. This means that the air quality is moderate and comes close to being clean. We made this measurement on 13:38 on the 14th of march in 2024.

To make our conclusion even more reliable we also looked at the air quality of another street where the houses are further apart on the 14th of march in 2024. We chose the Marquettelaan because that street is further from Tata Steel. We found out that the air quality in The

Martquettelaan was a lot better : our average level of PM was $6,9 \mu\text{g}/\text{m}^3$. This means that the air was clean.



Conclusion

Based on this information we can conclude that densely built houses impact the air quality more. The houses that are built further apart have less protection from the little wind that there was than the densely built houses. Still the air quality in the streets where the houses are further apart was a lot better than the air quality in the densely built streets. We measured relatively higher than expected in the Rita Hovinkstraat, but after some research and comparing our results to those of the Marquettelaan we can conclude that this is probably caused by Tata Steel. There is more particulate matter in the air in densely built streets because in the same amount of space there are a lot more houses. Each one of those houses probably has a car that they drive to work with everyday, that means that densely built streets have more cars in the same amount of space.

A lot of other aspects can be taken into account while making this conclusion. Because of the higher total amount of houses in densely built streets there is also more cooking, smoking and painting in the same amount of space.

Heating houses by wood also plays a big role in the difference in air quality. Of course, as expected, there is more heating in the same amount of space in densely built-up streets. In addition, heating houses with wood is cheaper than with gas. People in streets where houses are built further apart are more likely to have the money to switch to gas heating than people living in densely built streets.

We also took a lot at the air quality when the wind came from the north, east and west, but each time there was a higher number of PM measured in densely built streets. We also did the same for wind speeds, but again the densely built streets had a higher PM-level each time.