

Notes for the presentation “Planting seeds of change: a call to prioritize the greening of disadvantaged schools”

The natural way forward, Hasselt, April 23 2024

The project begins with the observation that in Belgium, where education is publicly financed and therefore nearly free, access to a quality school environment should not be determined by the socio-economic level of students. There are no students who pay more to access better education or a better environment. We suspected that this notion might be somewhat utopian and aimed to understand the extent of existing inequalities.

Given the critical role of the living environment in overall health, it's crucial to acknowledge the positive impact of green spaces on health and the detrimental effects of air pollution. Children, in particular, are a key group as exposure to nature during childhood contributes to improve cognitive development, mental health, and reduced stress levels. Moreover, children, being highly susceptible to pollution-related diseases, spend significant time at school.

Socio-environmental inequalities pose significant challenges within our societies. Vulnerable population groups often face limited access to green spaces and higher pollution levels. Furthermore, the environmental exposures that children from low socio-economic backgrounds experience at home are also present in schools.

Belgium, our study area, consists of three language-based Communities: the Flemish (Dutch-speaking), the French (French-speaking, also known as Fédération Wallonie-Bruxelles), and the German-speaking Community. Both the French and Flemish Communities are present in Brussels. These Communities oversee various competences, including education. Socio-economic and geographical data were gathered from the French and Flemish Communities for the academic year 2018-2019. Both communities compute socio-economic indexes aimed at allocating additional funding and teaching resources to schools with lower index values.

To evaluate the socioeconomic level of French community schools, we used a socioeconomic index (SEI) developed by the Fédération Wallonie-Bruxelles. For Flemish schools, Vlaanderen devised four indicators. Given the distinctiveness of the indicators employed between the two communities, it's crucial to refrain from directly comparing the results across the two.

We created environmental quality indicators, considering vegetation cover and pollution levels. High-resolution land cover data and pollution models were utilized to compute these indicators.

We described vegetation cover for various buffer sizes. High-resolution land cover data (2015, 2m spatial resolution) (Radoux et al., 2023) was employed to ascertain the percentage of greenness (%), considering trees, shrubs, open vegetation of biological interest, and grasslands, while excluding agricultural zones. To quantify the greenness within each school's environment, we computed buffer zones of 100m, 300m, 500m, 1000m, and 2000m around the school's address point. We use the address point due to the lack of reliable data to accurately assign each school to the correct building or parcel.

For pollution indicators, we used high-resolution models of air pollution levels (Lefebvre *et al.*, 2013) focusing on four pollutants: NO₂, PM_{2.5}, PM₁₀, and black carbon (BC). These models operate at a 10m resolution and provide annual average values. We calculated the 100m mean around the school's address to gauge pollution levels.

Because previous research has stressed the necessity of taking into account the rural-urban gradient, we decided to divide our study area into 3 typologies: rural (in green), urban (in yellow) and high density (in red).

To analyse the association between the school environment and the average socio-economic status of students, we conducted Spearman correlation analyses. The general conclusions we can draw are as follows:

- Schools with greater vegetation cover are associated with a higher socio-economic index.
- Polluted schools are associated with a lower socio-economic index, but polluted rural schools are associated with a higher socio-economic index.

We propose the following hypothesis to explain this inverse relationship with pollution: Rural schools that are slightly more polluted tend to be closer to small economic centres or rural towns that attract a slightly more affluent population compared to schools located in more remote rural areas, which are consequently less polluted.

A closer examination of highly dense urban areas highlighted Brussels as the most unequal city concerning both pollution and vegetation for both French-speaking and Flemish-speaking schools and Antwerpen for Flemish-speaking schools.

This analysis can inform action-oriented projects aimed at addressing environmental health inequalities. Contact with nature and green space may disproportionately benefit disadvantaged populations, attenuating the toxic effects of poverty.

In conclusion, students with lower economic status primarily study in urban areas, where they are more exposed to pollution and have limited access to green spaces compared to students with higher economic status. Identifying these students through quantitative research could facilitate action-oriented projects aimed at mitigating these inequalities.