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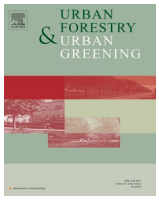

# Renaturing the city: Factors contributing to upscaling green schoolyards in Amsterdam and The Hague

Mendel Giezen *, Virginia Pellerey

*Amsterdam Institute for Social Science Research University of Amsterdam, Nieuwe Prinsengracht 160, 1018VZ, Amsterdam, Netherlands*

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ABSTRACT

To increase urban climate resilience, the renaturing of cities plays an important role. One strategy is the greening of schoolyards to increase climate resilience and bring additional benefits such as nature education and a healthy environment. While these are small projects, they could make a significant impact if they can be upscaled. With the intent of identifying the local barriers to the upscaling of green schoolyards, this research applies an upscaling framework to analyze and compare two initiatives that incentivize the greening of schoolyards by providing funds to local schools in Amsterdam and The Hague. There is not one barrier but a combination that seems to prevent upscaling, so it is a combination of factors that prevents the successful up-taking of green schoolyards: lack of environmental awareness, difficulties in acquiring monetary funds, lack of time and expertise from the demand-side, complexity of the bureaucratic processes, and lack of political will.

## 1. Introduction

As climate change pressures are increasingly felt in urban areas, local governments collaborate with citizens to develop green initiatives to increase urban climate resilience. Green spaces play an increasingly important role in reducing heat stress (Kleerekoper et al., 2012) and water nuisances such as flooding and stormwater runoff (Mguni et al., 2016). As space is limited and often of high value, the renaturing of cities is essential to achieving urban climate resilience and public spaces such as schoolyards play a crucial part. While green spaces provide economic benefit to the area as a whole, from an individual developer's economic perspective, they have less value than other uses of that same space (e.g., parking, more apartments), the potential for achieving impact remains in the public and semipublic domain (Iojă et al., 2014). However, this potential to create impact is also influenced by the potential to upscale initiatives, i.e., to stimulate their uptake, spatial growth, and replication (van Doren et al., 2016, 2018). This research looks at the barriers to scale up initiatives of renaturing by analyzing two green schoolyard projects in the Netherlands.

The greening of schoolyards is an informative case as it combines solutions to various challenges. Next to aiding the development of urban climate resilience, they also provide healthy environments for children to play in. It is well established that exposure to nature is highly beneficial to children's physical and psychological well-being (Bates et al., 2018; Chawla et al., 2014; Stevenson et al., 2020; Van Dijk-Wesselius et al., 2018). While the benefits are clear, the implementation and spread of these kinds of projects are still limited.

The article looks at two green schoolyard projects in Amsterdam and The Hague in the Netherlands. Amsterdam's municipality implements the Amsterdam Impulse Schoolpleinen, and the Groene Schoolpleinen is implemented in The Hague by the charity foundation Fonds 1818. While both projects have similar ambitions, the first is implemented by the local government, while the second is a private charity. Examining these two cases should bring forward relevant differences and similarities in barriers towards upscaling. To analyze the cases, we use the framework as developed by Van Doren et al. (van Doren et al., 2016, 2018). It distinguishes the barriers to upscaling low carbon urban initiatives in four contexts: Socio-cultural, Market, Policy, and Built and Geographical. We will adapt this framework to fit better with the particular characteristics of green schoolyards. With this approach, we aim to understand better what mechanisms influence green interventions' upscaling of schoolyards. This should contribute to improved uptake of green interventions in planning processes.

* Corresponding author.
*E-mail addresses:* m.giezen@uva.nl (M. Giezen), virginiapellerey@gmail.com (V. Pellerey).

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## 2. Literature review and framework

### 2.1. Green initiatives in resilience planning

Urban green infrastructures such as urban forestry or green roofs can help cities decrease their climate-related vulnerability and withstand climate change impacts while maintaining the urban system's functionality (Foster et al., 2011). For green infrastructures to be successful in their goal, they need to be comprehensively incorporated in the planning process. Doing this means overcoming different challenges like adapting international standards to contextual characteristics, gaining institutional support, including social aspects and achieving community cohesion, and overcoming financial risks (Meerow and Newell, 2019; Schiappacasse and Müller, 2015; Staddon et al., 2018; Zuniga-Teran et al., 2020). The role of the government is vital in achieving this. However, scholars have pointed out that both policy planning and green infrastructure management require a governance approach, where various heterogenetic parties (institutions, citizens, or local organizations) cooperate in creating cross-sector partnerships (Buijs et al., 2016). This allows each party to use its situated knowledge to ensure a green initiative's success (Aalbers and Sehested, 2018). Past successful initiatives, as the GreenSurge project, highlight the importance of combining government-led planning and bottom-up citizen participation to guarantee a site-specific approach to planning and management while also ensuring social inclusion (Pauleit et al., 2019). The development of a green schoolyard can also be considered a green initiative that promotes urban climate resilience by combining government and local schools' efforts.

### 2.2. Green schoolyards

Green schoolyards are schoolyards that include natural or environmental elements and have a limited surface of impervious materials. Through these characteristics, they provide positive contributions to urban climate resilience. They reduce the urban heat island effect through green spaces' cooling nature by reducing ground radiation and increasing air humidity (Antoniadis et al., 2018). Moreover, natural elements also affect thermal comfort through wind manipulation and shading (Cortesão et al., 2016). In doing so, green schoolyards also influence the urban climate of the surrounding areas and reduce the urban heat island effect (Antoniadis et al., 2020; Zhang et al., 2017). Besides, they also impact urban areas' water management by providing spaces for water infiltration and storage. Thus, they become part of integrated urban water management that is crucial to increase urban climate resilience (Younos et al., 2019).

Next to their contribution to urban climate resilience, green schoolyards are also associated with several physiological and psychological benefits for children (Akpinar, 2017). Concerning the physiological benefits, green schoolyards are found to increase children's vitality and physical activity (Van Dijk-Wesselius et al., 2018) and mental well-being (McCormick, 2017) (Kabisch et al., 2017). Furthermore, it has been shown that proximity to green space has benefits for children's health in general (Maas et al., 2006). They provide havens from stress and increase children's resilience to life's challenges (Chawla et al., 2014). Green spaces are related to increased attention (Van Dijk-Wesselius et al., 2018), school performance, and further academic success (Browning and Rigolon, 2019). Additionally, natural outdoor spaces increase safety perceptions (Bates et al., 2018), children report fewer peer problems and better pro-social behavior (van Dijk-Wesselius et al., 2020; Van Dijk-Wesselius et al., 2018).

In addition to the physiological and psychological effects, green schoolyards provide an accessible way for urban children to interact with nature (Lindemann-Matthies and Köhler, 2019). This interaction has been related to developing pro-environmental behaviors and attitudes in adulthood (Rosa et al., 2018). However, to experience the interaction with schoolyard nature, students need to be actively involved in the design and maintenance (Rigolon et al., 2015). The schoolyard and interaction with nature should also be integrated into the curriculum in order for the children to internalize the values of nature and the environment (Alexander and Poyyamoli, 2014; Strife, 2010). Nevertheless, this remains challenging in practice as environmental education is, in general, not part of the mandated curriculum, and there is a lack of time and expertise and concerns about children's safety and associated liability (Dyment, 2005; Waite, 2011; Wee et al., 2018). In combination with the required maintenance over long periods, these factors hinder the long-term sustainability of projects involving green infrastructure in general and green schoolyards in particular (Magnano, 2020; Molin and van den Bosch, 2014). Another factor that needs to be considered is that access to green areas is often not equally distributed among social classes and that issues of marginalization, in terms of socio-economic and environmental, are a risk (Baró et al., 2021). Green schoolyard projects can reduce this inequality if there is sufficient attention for this issue in the project setup and management.

### 2.3. Upscaling green interventions

To impact resilience and societal levels of well-being, interventions such as green schoolyards need to be able to upscale. Although the term is used in many different ways in the literature (Fastenrath et al., 2020), we define up-scaling as a process where there is an increase in uptake, growth, or replication (van Doren et al., 2016). Analytically there is a distinction between horizontal and vertical processes. The first implies that an initiative grows in terms of coverage, reach, and impact, which requires the replication, transfer, and or strengthening of initiatives (van Doren et al., 2018). The latter aims to institutionalize the practice of sustainability initiatives, creating an enabling environment for new initiatives to be developed and grow. In the context of green schoolyards, to achieve successful upscaling would mean to increase the amount of green schoolyards (horizontal upscaling) and to institutionalize their uptake by obtaining political support and promoting local or national policies.

#### 2.3.1. Description of the cases

The two projects under analysis have both been undertaken in large cities in the Netherlands, and they are both regarded as pioneers and best practices in the region. The first project is the Amsterdam Impuls Schoolpleinen (AIS), a municipality-led initiative that aimed to give an impulse to primary education schools across the city to (re) design and green their playground (AIS policy 2016−2018). The policy framework was adopted in March 2016, and it was initially implemented for the 2016−2018 period, but it has now been extended to cover the 2019−2024 period (AIS policy 2019−2024). In the period 2016−2018, the municipality provided a budget of €3 million, and subsidies were granted to 70 different schools. Subsidies in that period could reach a maximum of €50000 (AIS policy 2016−2018). For the 2019−2024 period, the municipality has made available a budget of €5.4 million, and subsidies will be provided to 15 schools per year with a maximum of €70000 (AIS policy 2019−2024). This project's goal was to provide monetary support and make the playground as publicly open as possible, and include it in the school's educational vision (Project coordinator AIS). The second project under observation is the Groene Schoolpleinen (GS) program carried out by the charity foundation Fonds 1818 in the municipality of The Hague and neighboring towns. The project was initiated in 2011 and terminated in 2016 to support schools in greening their playground to allow children living in urban areas to have better access to nature (GS meta-evaluation). A total of 187 schools, and all the schools that applied, received a monetary subsidy of a maximum of € 25000 and the opportunity to partake in workshops and various initiatives meant to support schools during the greening process (GS meta-evaluation). Inclusion of natural education in the curriculum, all parties' participation, and neighborhood involvement were praised but not required for the schools to obtain funds (GS meta-evaluation).

## 3. Research design

This research uses an adapted framework by Van Doren et al. that analyses the barriers to sustainability initiatives' upscaling (van Doren et al., 2016, 2018). While it was developed to analyze low carbon urban initiatives, the framework is generic enough to be applied to various projects without many adaptions.

The framework introduces four types of contexts in which the barriers are categorized: socio-cultural context, market context, policy context, and built and geographical context. See table 3 for their descriptions concerning green schoolyards. We introduce one extra context, the education context, to accommodate factors such as participation and inclusion in the educational curriculum to target the barriers mentioned above specific to green schoolyards. In the original framework, the energy price was also a barrier, but that plays less of a role in green spaces and has been left out.

To understand the various barriers experienced in developing green schoolyards, we apply the framework to two cases: the Amsterdam Impuls Schoolpleinen (AIS) in Amsterdam and the De Groene Scholenpleinen (GS) in The Hague and neighboring towns. The two separate projects will be described in more detail below. However, the interesting distinction between them is that they are initiated and led by two different types of actors: a public actor and a private actor. As the projects are relatively similar financially and the two areas are relatively similar, and both cities are within the same national policy context, statements should be quite reliable about the projects' organization of its potential upscaling.

Semi-structured interviews were done with seven main stakeholders. As the projects are not so big, these were the key interviews that could be done. Table 2 provides a list of the interviewees and their general roles. These interviews were around an hour and were held through video-call due to Covid-19 pandemic restrictions. All interviewees were asked questions about the points of success, points of failure, and the importance of the analytical framework's factors (see appendix 1). More specific questions were asked accordingly to the participant's specific role in the project. The interviews were analyzed by the authors using the coding software Atlas.ti and coded for the framework's factors, and additional coding was added when a finding did not fit the predefined factors. The information obtained from the interviews was supplemented by content analysis of various sources: policy frameworks, policy evaluations, and the projects' websites. These can be seen in Appendix B. As can be seen there, there is a big difference in the amount of documentation available. While this can be problematic for the comparison, it is also the result of the difference in organization between the two projects. It can also influence the potential upscaling of the projects. Combining all collected information provided a detailed picture of each project's successes and failures and helped identify all the factors that can be considered barriers to scaling-up in these two separate cases.

**Table 1**
Analytical Framework of Upscaling Factors.

| Category | Condition | Operational Definition (Source Van Doren et al., 2018, unless otherwise indicated) |
|---|---|---|
| Socio-cultural context | Environmental awareness | The level of awareness of demand-side actors on the possibilities and benefits of investing in a green schoolyard |
| | Environmental values and attitudes | The values and attitudes of demand-side actors such as concern for the environment and moral commitment |
| | Resource Capacity | The financial or informational resources and /or expertise that actors have to invest in green schoolyards and their maintenance |
| | Involvement of the community (*added on basis of analysis results) | The level of interaction between the school and the communities of parents and neighbors |
| Market context | Capital and installment costs | The design process and installment costs of green schoolyards |
| | Credit availability | Opportunities to access credit to invest in green schoolyards |
| | Skills and expertise of supply-side actors | The technical, financial, and business development skills regarding green schoolyards among supply-side actors |
| | Information availability | The level to which actors have low-cost access to good and reliable information |
| Policy context | Policy leadership | The level of political and governmental ambition regarding the greening of schoolyards |
| | Policy instruments | The regulative, financial, cooperative, and informative policy instruments |
| Built and geographical context | Built environment | The characteristics of the local built environment |
| | Geographical environment | The characteristics of the local geographical environment ( Rigolon et al., 2015) |
| Educational context | Participation | The extent to which parties are involved in the design and implementation of the green schoolyards (Van Dijk-Wesselius et al., 2018) |
| | Inclusion in the educational curriculum | The ability of teachers to include green schoolyards and nature education in the curriculum ( Stevenson et al., 2020) |

## 4. Results and discussion

This section will discuss the main findings per category as presented in the methodology section in Table 1.

### 4.1. Socio-cultural context

Respondents from both cases were highly impressed with how quickly the level of interest from schools increased. In 2011 Fonds 1818 was one of the first organizations to initiate a project supporting green schoolyards, and the original expectation was that only a small number of schools would participate. However, after the first year, the demand increased drastically. Quickly other cities also started to develop similar projects (Project coordinator Fonds 1818). Both the AIS program and the GS program share their best practices (schools that have already implemented green schoolyards) through websites and excursions to the schools. This is considered how awareness is spread most effectively (Administrator Springzaad, Supervisor NME Amsterdam). Public interest in greenery has grown considerably in the past few years, and it is reflected in the fact that many schools are interested. There were 111 applications in Amsterdam between 2016 and 2018, which shows high levels of interest on the demand-side (AIS review 2018). However, respondents also argue that most teachers are aware of green schoolyards' positive effects on children since these are directly visible when children play in nature. However, they are less conscious of the implications on climate resilience. The meta-evaluation of the GS program declares that while the website showing the best practices has been often visited, the provision of more academic articles highlighting the environmental importance of green playgrounds would be beneficial to enhance the schools' environmental values and attitudes.

Similarly, Administrator Springzaad declares that often teachers are only motivated by aesthetic reasons. However, there is an underlying problem of disconnection with nature, which can only be solved with a "larger sustainable transition for the whole society" (Administrator Springzaad). In a nutshell, in both cases, schools show high interest in

**Table 2**
List of interviewees.

| # | Case | Role | Project contribution | Date of interview |
|---|---|---|---|---|
| 1 | GS Project The Hague | Project coordinator Fonds 1818 | -Initiator of the project -project coordinator during the whole duration of the project | 20/3/20 |
| 2 | GS Project The Hague | Professor of Environmental Education | -adviser for the project coordinators -organizer of workshops for schools and teachers | 01/05/20 |
| 3 | GS Project The Hague | Springzaad | -administrator of Springzaad website, which shares knowledge for schools with green schoolyards | 29/04/20 |
| 4 | AIS Project Amsterdam | ANMEC Amsterdam | -adviser for the project coordinators -supervisor for schools intending to get a green schoolyard | 31/3/20 |
| 5 | AIS Project Amsterdam | NME Amsterdam | -supervisor for schools intending to get a green schoolyard | 08/04/20 |
| 6 | AIS Project Amsterdam | Project coordinator AIS | -project coordinator | 20/03/20 |
| 7 | AIS Project Amsterdam | Architect MakeSPace4Play | -designs and implement green schoolyards for schools | 24/03/20 |

green playgrounds because of their hands-on experience of the positive results. However, most teachers still lack environmental awareness and commitment. This leads to a situation where the whole project is dependent on one single committed player rather than on the whole team (Project coordinator AIS). This means that there is already a thin line to support the project and that there is no additional capacity to think about upscaling.

In terms of information, there are many organizations in the Netherlands independent from the funding programs which provide information on the possibilities that schools have to invest in green schoolyards. Furthermore, both projects can inform all schools in the city/region through official means of communication; thus, all schools are aware of this possibility (Project coordinator AIS).

Maintenance of the green schoolyard was another point stressed by all respondents. Both projects require schools to submit a maintenance plan for the five years following the playground's implementation (Project coordinator Fonds 1818, AIS policy 2019−2024). Maintenance plans can vary. They can include the regular hiring of a gardener, parents' help, or just children and teachers' efforts. However, most schools underestimate this part of the process, and they end up lacking enthusiasm, time, or funds for maintenance. It is estimated that €1500 to 2000 is necessary to maintain one green schoolyard every year, which is higher than the regular amount schools receive from the government (GS meta-evaluation). Therefore, schools need to find ways to raise new funds for maintenance and invest more time and effort to ensure the playground's long-term preservation. The problem here is that AIS and GS have no way to check or enforce schools to follow their maintenance plan, so if teachers and children are not enthusiastic or they do not have enough time to make sure the schoolyard is well maintained, the greenery quickly turns brown and loses most of its benefits (Administrator Springzaad, Supervisor NME Amsterdam). Maintenance is also endangered because the implementation of green schoolyards in certain schools is strongly dependent on just one motivated individual rather than the whole team, so if that one person becomes unavailable, long-term sustainment cannot be ensured (Supervisor NME Amsterdam). The identified problems with maintenance are congruent with the observations made by green schoolyard scholars (Buckley et al., 2017; Jansson et al., 2019) that maintenance is a real obstacle to sustain a green schoolyard over time.

The analysis also highlighted the relevance of another factor that was not included in the analytical framework. This is not to say that this issue has not been raised in existing literature, but it has never really been linked to green schoolyards or the scaling-up of similar initiatives. Therefore, it is important to mention so that it might be included in future studies. The additional factor concerns the involvement of the neighborhood and community around the school. There is extensive literature on the benefits of community involvement and its importance for achieving successful green initiatives and green initiatives for the community's benefits (Adjei Mensah et al., 2017; Barclay and Klotz, 2019).

Nevertheless, the school's community has been relatively ignored when it comes to studies on green schoolyards. In the visions of both the AIS and GS programs, one of the goals is to maintain the school playgrounds open even after school hours and to involve the surrounding community as much as possible during the design and implementation process (GS meta-evaluation, AIS policy 2016−2018). This can have various positive effects. First, it allows other urban citizens (not just children) to have regular access to nature. Second, it enlarges the group, which will work towards sustaining the playground over time. Third, it enlarges the circle of influence of the green schoolyards: the more people experience the green schoolyards, the more ambassadors there will be to promote similar initiatives, the more vertical scaling-up will be enhanced (Architect MakeSPace4Play). Still, in terms of neighborhood participation and involvement, the problem here is that programs providing support have no way to ensure that communities are effectively included during the process (Architect MakeSPace4Play).

Furthermore, there seems to be a significant discrepancy between different neighborhoods. Areas, where communities are more in need of access to nature, are also the areas where school playgrounds cannot be kept open due to fear of violence and vandalism (for instance, by unsupervised young adolescents) and where the community is less likely to partake in these initiatives (Advisor ANMEC). This is a significant barrier that prevents the efficient scaling-up of these projects and increases the divide between different neighborhoods across the city.

### 4.2. Market context

The GS project mid- evaluation estimated that one green schoolyard's average cost amounts to €50000 (including design and implementation). However, most schools have to pay more due to delays and unexpected issues during the construction period. This cost covers the hiring of designers, construction teams, landscapers, and gardeners. Moreover, this amount does not account for maintenance costs. This approximation of installment costs is also valid for the case of Amsterdam. Financially, all schools in the Netherlands are given by the national government €1000 a year for their playground, which is not enough to implement a green schoolyard (AIS policy 20162018).

For this reason, projects like the AIS and GS are necessary, and schools cannot implement green playgrounds by obtaining external funding. Given the meager national funding available, such installment costs are too high for schools to implement a green schoolyard without external funding opportunities. Both cases are programs that provide funding to compensate for such high installment costs. The AIS program donates a maximum of € 50000 (2016-2018) or € 70000 (2019-2024) to 15 schools each year. Thus, schools have to go through a selection process to obtain such funds (AIS 2019 review). The selection depends on a combination of criteria that are weighted: location of the school (the type of neighborhood, near a water bottleneck, distant from other green areas), the educational vision of the school, quality of the greenery plan, participation process, feasibility, and that the schoolyard is publicly accessible (AIS 2019 review). Therefore, not all schools can access these funds, and the factors to fulfill the criteria are not always under their control.

On the other hand, the Hague's GS project provides lower funding (€

25000), but all schools who have applied for the funding have also received it (Project coordinator Fonds 1818). This is not to say that there are no requirements similar to those in Amsterdam. However, Fonds 1818 often overlooks when schools do not meet some of them (especially regarding accessibility and location) (Project coordinator Fonds 1818). It is important to notice that both programs require schools to obtain other funding in different ways (the amount required is usually around 10000 €). Without it, it is stipulated, schools cannot get access to the grants. This is to make sure that "money is not given out too easily" (Administrator Springzaad) and that schools are willing to invest lots of time in their green playground. Unfortunately, this also sometimes discourages schools from applying (GS meta-evaluation). Still, data from both programs show that schools obtain such additional funding quite easily from other organizations (either private or governmental) and donations from parents and community members of the neighborhood (GS meta-evaluation, Project coordinator AIS). While respondents agree that schools generally find credit quite easily, they also mention that schools in underprivileged neighborhoods often have a more challenging time acquiring co-funding (Advisor ANMEC). It seems schools in underprivileged neighborhoods do not have the confidence that they can obtain co-funding and therefore have a priory not applied for funding. There is a lack of human resources, expertise, and support in these schools to even contemplate applying for a grant.

Respondents from both programs agree on a lack of collaboration between the two organizations that work with green schoolyards. Nonetheless, the situation is different in the two cities. In Amsterdam, there is strong collaboration between municipal bodies (NME, ANMEC), which allows the AIS project to be supported by a strong team of experts (Supervisor NME Amsterdam). In The Hague, the municipality's collaboration is significantly lower since Fonds 1818 is a private organization. However, the project leaders from Fonds 1818 obtained their skills and expertise primarily by looking at similar projects carried on in France and learning from their experience and asking suggestions to the NME when necessary (Project coordinator Fonds 1818). The two cases are also different in terms of information availability. When schools show interest in the AIS program, they are directly assigned a process director who collaborates with the school during the application, design, and implementation process (AIS policy 2019−2024). During the process, schools also receive extensive feedback from a team of experts. Therefore, it can be said that schools participating in the AIS program have adequate informational resources.

On the other hand, the GS program does not offer as much support during the application phase. Still, schools are invited to various workshops, and they are suggested to contact experts on their own initiative (GS meta-evaluation). Apart from that, respondents from both sides agree that there is high information availability on the internet regarding schools' possibilities to invest in green schoolyards (Professor of Environmental Education).

Results from the market contest really highlight the issue of the inequality in attaining financial support for both investment and maintenance. It is clear that these projects cannot do without external financing. Nevertheless, it is also increasingly clear that there is an inequality in accessing funds due to additional criteria such as co-funding. It is much easier for schools with a wealthier student population to access additional funds than those with less affluent populations. In that sense, what is put in place as a sign of commitment is actually a barrier for schools to participate. While both projects indicate that they are flexible with the rule for applications, it is unclear how many schools do not apply because of the barrier.

Similarly, the first category of schools has a lot higher chance of finding volunteers with both the skills and the time to contribute to both the maintenance of the schoolyards and the application process to acquire funds. This barrier and inequality are in line with general inequality of access to funding and institutional processes by schools in various districts, as can also be seen concerning ICT-hardware and services (Gonzales, 2016). As projects are upscaled through institutionalization, means of control such as criteria for access to funding can unintentionally become reproductions of inequality. To enable the upscaling of renaturing initiatives in an equal manner across the city, both public and private initiators and funders must consider factors that prevent particular groups' participation.

### 4.3. Policy context

The main difference between the two programs lies in the policy leadership condition. The AIS program was initiated by Amsterdam's municipality, which shows high political ambition to invest in green schoolyards (Project coordinator AIS). All respondents support this, and it is also clearly stated in all policy documents. Project coordinator AIS explains, "I think that is the main difference here [Amsterdam]: it is also a political wish." Such high political ambition is beneficial because it allows for stability: even if the municipal's budget only allows it to fund 15 schools per year, the program keeps on being renewed because of its political support and because politicians are now accountable to all schools of the city. However, the other side of the coin reveals a problem of bureaucratic complexity. Schools must obtain the approval of various boards before applying to AIS, and the AIS itself has to ask for approval from the municipal executive (AIS policy 20192024). In other words, the complex administrative scheme has been identified in multiple evaluations as a factor slowing down the process and sometimes preventing the achievement of positive results. The GS case presents the reverse situation. Since Fonds 1818 is a private organization that operates with its own money, it is not accountable to any other body. The Municipality of The Hague has supported through the NME and donates a small amount of funding to schools. However, apart from that, there is meager political ambition (GS meta-evaluation). This is proved by the fact that when the project was discontinued in 2016, it was not replaced by any municipal initiative. Being an independent organization favors Fonds 1818 with greater flexibility, less complex administrative procedures, and more face-to-face interaction between the schools and the project coordinator (Project coordinator Fonds 1818). Finally, the presence of regulatory requirements on green schoolyards (which are subject to EU regulation), such as those concerning safety or the type of equipment allowed, were not seen as problems by any respondent.

For the upscaling of greening schoolyards, political support is critical. As the municipality initiates the project in Amsterdam, it is initiated from a position of political support. This means that as long as the responsible politician remains in function and the project can be seen as a success, the program can continue, and more schoolyards can be greened. However, to prevent failure, the municipality's programs can have a heavy bureaucratic paper load for participants. If things go wrong, the potential political fallout is ample by public responses to inefficient public funds spending. However, as a private actor initiates it, the Hague project needs to find political support to upscale its initiative. Such a project is lighter on bureaucracy and, therefore, easier implemented. However, the vertical upscaling through institutionalization is more challenging as, at a certain point, a foundation is limited in both resources and support. At a specific moment, new projects will be developed and funds reallocated. At that point, if the projects are not embedded within a broader program and clear intentionality (Danford et al., 2018), the potentiality for upscaling ends.

What is also vital in both projects is the dependency on individual actors on both the initiator's side as the school side. It is often one person at the foundation or municipality that is passionately driven by the project's content and gathers support for it within the organization and outside. The project's flexibility by the private actor increases the chance that if one particular person leaves, the whole project is stopped or even dropped. The inflexibility of the policy structure of a public actor should, in general, be more resilient to the impact of one individual leaving. However, eventually, without a champion for that policy, support is likely to fade (Aarons et al., 2016). It is a paradox of continuity and change (Nasim and Sushil, 2011; Giezen, 2013). This is why it

seems crucial that projects such as the greening of schoolyards are part of a more comprehensive policy around the city's greening. This will enable continuity in the program even if one key actor leaves. Furthermore, it will also contribute to the prolonged political support. For instance, in their comparison of projects in Chicago, Paris, and Amsterdam, Flax et al. conclude that closer integration with climate resilience can support the projects' success by creating multi-scale linkages (Flax et al., 2020). This contributes to both the vertical upscaling and horizontal upscaling processes.

As resources and skills are limited within a school environment, successful implementation and upscaling depend on other actors' support in both those fields. Here, there is a clear difference between the AIS project driven by the public actor and the GS project initiated by the private fund. The Municipality of Amsterdam provided schools with access to a wide variety of experts and knowledge as there is much expertise within various departments that can be drawn upon. Fonds 1818, the private actor had less specific expertise and supported schools in contacting external experts. However, this brings with it extra cost in both money and time. As schools are limited in both aspects, the barrier to successfully implementing and maintaining the greened space is relatively high. The prolonged and sustained involvement of actors that can provide skills and knowledge is crucial in upscaling green schoolyards projects by preventing long-term failure. This relates to research findings on the role of knowledge in upscaling activities (van Doren et al., 2020). Both tacit and explicit knowledge need to be integrated into long-term practices to facilitate proper learning. The same is true for small initiatives such as green schoolyards, where the learning process needs sustained effort over a prolonged period of time. The phase after the original investment in the transformation is, therefore, crucial. Investing in interaction and learning is especially important for initiatives to upscale vertically, i.e., become the basic approach to developing green space (Aalbers and Sehested, 2018). Much burden is placed on the citizens and school board, and therefore a strong integration in support networks is crucial for these initiatives to survive.

### 4.4. Built and geographical context

Respondents from both cases agreed that the relatively minor importance of built and geographical conditions. Still, a couple of points are important to mention. First, a problem of the built environment (especially relevant in Amsterdam) is that some schools have very little outdoor space, which diminished the positive effects of the green playground (both in terms of climate resilience and positive health effects) and led to an increased potential to the natural elements (Advisor ANMEC). The second problem is that schools in underprivileged neighborhoods are less likely to be able to keep their playground open to the public after school hours (as mandatory in the funding requirements) because of worries concerning security and vandalism (Project coordinator Fonds 1818). However, this is a problem which both projects have often overcome by providing funds to schools in underprivileged neighborhoods even if they do not meet the criteria of openness to the public (Project coordinator Fonds 1818, Project coordinator AIS). A final consideration relative to the built environment is that schools with all types of playgrounds can apply for the funds (GS meta-evaluation, AIS policy 2016−2018). Geographical conditions do not appear as barriers to the scaling-up of green playgrounds. None of the respondents mentioned the weather as a possible problem. The "dirty" kids argument, as one respondent termed it (Project coordinator Fonds 1818), meaning that kids might get dirty or sick from the green playground, was briefly mentioned as an initial worry of some parents and teachers. However, it was quickly dismissed after seeing kids playing safely.

### 4.5. Educational context

Both projects require children, parents, and community members' participation during the design process to create a tight team. Including everyone's vision in the green schoolyard design is also beneficial because it leads to the development of very different playgrounds across the city that meet the demands of various segments of the population (Architect MakeSPace4Play). However, both AIS and GS do not have any way to check and ensure that this procedure is followed when the schools develop the design. It is known that some schools are too busy, so they ask other experts to take care of the design, but the organizations cannot do anything about it other than trying to assess the level of participation as one of the criteria for receiving the fund (Supervisor NME Amsterdam). The situation is similar concerning the inclusion of the green schoolyard in the educational curriculum. Respondents from both cases agree in identifying the lack of inclusion in the curriculum as one of the main problems that green schoolyards face (Professor of Environmental Education, Advisor ANMEC). Despite the considerable amount of theoretical information (from websites, books, NME) available on including nature at schools, green schoolyards are still generally not used for education. A combination of various factors causes this. First, teachers have minimal experience and little time on their hands. They cannot always get informed on the possibilities to include nature in their curriculum (Advisor ANMEC). Second, teachers do not feel confident enough since most do not receive appropriate training (Professor of Environmental Education). Third, natural education is not considered a priority because it is still not part of the official curriculum. "As long as it is not a topic on which children are tested, it is never going to be a priority" (Professor of Environmental Education). Combining all these factors prevents teachers from developing the habit of including green schoolyards in their lessons. Both the AIS and GS programs try to address this problem. Schools that apply to the AIS fund must submit a vision for including the green playground in their education, and experts also support them during the writing process (AIS policy 2019−2024).

However, once the fund has been assigned, schools are not accountable anymore, and there is no way to check on whether they are implementing their vision correctly (Advisor ANMEC). The GS policy programs state that the inclusion of the green schoolyard in the curriculum is strongly recommended but not required (GS meta-evaluation). Schools are suggested to contact experts and the NME if they need assistance, but once again, none of this is enforced once the school has received the money. Fonds 1818 also developed a website (ongroeneschoolplein.nl), where teachers can share knowledge and find material and suggestions for natural education. This website became popular quickly, not just for schools in The Hague, but for all schools in the Netherlands, and it is now still running under the supervision of the Springzaad organization. In conclusion, all respondents agree that the best way to address this problem would be to provide more regular practical training sessions for teachers to develop a habit and become confident about including nature in their lessons. However, this is not part of the project yet because it would require numerous trainers and long hours in each of the schools implementing a green schoolyard (Professor of Environmental Education).

## 5. Conclusion

The renaturing of cities is crucial in the attainment of urban climate resilience and healthy cities. Schoolyards play a small but essential role as they provide climatic benefits to the area and fulfill various educational benefits that should lead to higher general levels of environmental awareness. Using a framework by Van Doren et al. (2018), we examined two greening projects in Amsterdam and The Hague. The first is initiated, funded, and managed by the municipality, while the latter is run by a private philanthropic fund Fonds 1818. While many barriers we found were similar in both projects, the results highlighted three significant issues.

The first issue is financial inequality. Not all schools have the same access to funding as those in poorer districts have greater difficulty generating capacity and skills within their already stretched budget and staffing. The support from parents is generally less concerning their

interactions with other actors and funding bodies. Especially if there is a school's co-funding requirement, those in more impoverished areas will find the barrier too high to access the green schoolyard project. Therefore, a more general greening policy should differentiate between various actors' capacities to achieve upscaling across the whole city and especially of those semipublic spaces in poorer districts.

The second issue is the integration in support networks. Green design and maintenance are not the expertise of the schools. Therefore, access to support networks of experts is crucial. The before mentioned inequality between schools in more impoverished and more affluent areas is also true for their access to experts within their networks. Additionally, there is also inequality between the project run by a private fund and the municipality. Generally, funds have less in-house expertise and therefore are more dependent on external experts and will also guide their participants in that direction. Municipalities often have much expertise within the various departments and therefore have a potentially more accessible knowledge and expert base that can be incorporated into the project. The issue of lack of expertise is likely to be the case for most owners of semipublic spaces. Therefore, it is crucial to think about adequate and accessible support structures that remain in place after the initial redesign is finished as maintenance is a significant issue for green spaces.

The third issue is political and managerial support. There was a strong dependency on committed individuals intrinsically motivated to green their schoolyards in both the projects. However, this dependence on individuals is a risk for the continuity of the project. Therefore, it is crucial that the greening has strong political and managerial support and that it is embedded in policy structures at both the funder and the implementing school. Without this support, individuals will get frustrated in their ambitions.

This article has highlighted several key issues and provided an empirical analysis of upscaling barriers for two cases of projects aiming to green schoolyards. Research on the greening of schoolyards has primarily focused on the effects of green schoolyards, but this research hopes to bridge the field towards integrating it into a broader urban planning and governance process. Although the greening of schoolyards is only a particular case of urban greening, it does provide a starting point to think about upscaling to the greening of other (semi) public spaces. Future research should include a bigger n cross-case comparison of different (semi)public spaces and various organizational forms, enabling the development of an upscaling matrix for the greening of many different types of (semi)public spaces. An international comparative analysis might help understand the nuances in different contexts and, therefore, increase the findings' generalizability. A comparison between public, semipublic, semiprivate, and private spaces would also help our understanding of using greening strategies for creating urban climate resilience.

There is an increasing number of initiatives propagating the benefits of green schoolyards such as Green Schoolyards America, the Children and Nature Network, and Eco-Schools. A key policy takeaway of the research is that it is crucial for the long-term support and upscaling of greening projects, especially projects such as green schoolyards, to be linked to broader city policies. This could be climate resilience, biodiversity, social equality, or health, for instance. This enables long-term knowledge building and support, stable financing, and long-term political support. An example of this is the Oasis Schoolyards program that places the project explicitly into the wider contexts of Paris' resilience policy. Another example is Sofia Municipality that has an afforestation program for schoolyards in order to lessen the urban heat island effect and cool the learning environment. However, all these projects, privately or publicly initiated, have been primarily studied from an impact perspective. Particular attention needs to go to parties that have less experience in applying for funding to prevent an injustice through self-selection. It is especially in impoverished communities that the need for interaction with nature in school environments is most needed. Yet their capacities to apply for, implement and maintain a green schoolyard is also most limited. Private initiatives and municipalities should group together to ensure the long-term sustainability of green schoolyard projects. While it might be small in terms of impact, green schoolyards provide an important steppingstone and experimentation space for renaturing cities.

## Author statement

Both authors have contributed to the writing of this paper. Data collection was done by Virginia Pellerey.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Questionnaire for the interviews

*General questions*

- What is your role for the Amsterdam Impuls/Groene Scholenpleinen project?
- What is your opinion on the results that the project achieved?
- What factors contributed positively to the success of the project?
- What factors contributed negatively to the success of the project?
- What do you think are the factors that act as barriers to the development of more green schoolyards on a larger scale in Amsterdam/The Hague?

*Questions specific to the factors identified as potential barriers*

- How was the municipality involved with the project?
- Is there collaboration between the different local organizations? How does this influence the project?
- To what extent are the different parties aware of the benefits of greens schoolyards?
- Do schools have enough credit availability when creating a green schoolyard?
- Do schools have good access to information and support from experts?
- Does the supply side have good skills and expertise?
- Did characteristics of the local environment affect the outcome of the project?
- To what extent do schools participate in the design process?
- How is the maintenance carried out? Is it efficient?
- Is nature successfully included in the educational curriculum?

## Appendix B. Policy documents

| GS Project The Hague | Meta-evaluation programma GS (*Meta-evaluation program GS*) |
|---|---|
| | Groene schoolpleinen website<br>Onsgroeneschoolplein Website (*Our green schoolyard website*)<br>Fonds1818 Website |
| AIS Project Amsterdam | Beleidskader AIS 2019−2024 (*AIS policy framework 2019−2024*)<br>Beleidskader AIS 2016−2018 (*AIS policy framework 2016−2018*)<br>Voortgangsrapportage AIS 2019: Terugblik 2019 en vooruitblik 2020 *(Progres report AIS2019: review of 2019 and preview of 2020*)<br>Resultaten AIS 2017 (*Results AIS 2017*)<br>Resultaten AIS 2018 (*Results AIS 2018*)<br>Voortgangsrapportage AIS 2017 (*Progress report AIS 2017*)<br>Voortgangsrapportage AIS 2016 (*Progress report AIS 2016*)<br>Rapportage AIS 2018 en vooruitblik 2019−2024 (*Report AIS 2018 and outlook to 2019−2024*)<br>ANMEC Vergroen je eigen schoolplein handout (*ANMEC Green your schoolyard handout*) |

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