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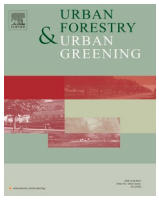

Original article

"It is not a complicated question but it is very complex" – Insights on school ground greening from practitioners

Sanna Ignell *, Björn Wiström, Anna Levinsson, Märit Jansson

Swedish University of Agricultural Sciences, SLU Alnarp, Box 190, Lomma 234 22, Sweden

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ABSTRACT

School ground vegetation supports children's health, learning, and ecosystems but faces challenges in implementation and management, with limited research addressing the entire greening process. This study investigates what green practitioners in Sweden experience as challenges when implementing and managing school ground vegetation. Expert interviews were conducted with 26 experienced practitioners and revealed issues across the implementation chain. Challenges were categorized into direct and indirect factors. Direct factors included practical concerns such as avoiding monocultures, preventing soil compaction, and differing opinions on species selection, planting size, fencing, and managing children's movement. Indirect factors focused on lack of knowledge of either the benefits of vegetation or what is needed for its establishment among the actors surrounding the respondents. Using the Policy Arrangement Approach, the study analysed how actors, rules, resources, and discourses shape implementation. The analysis highlighted the significance of regulations and the need for increased knowledge of both outdoor pedagogy and vegetation requirements.

1. Introduction

School ground vegetation plays a critical role, particularly in urban areas, in contributing to environmental quality (Ioja et al. 2014; Muvengwi et al. 2019), enhancing academic performance (Browning and Rigolon, 2019), supporting well-being (Puhakka et al. 2019), physical health, and cognitive function (van Dijk-Wesselius et al. 2018; Lindemann-Matthies and Köhler, 2019). Unlike occasional day trips, green school grounds enable daily interaction with vegetation over an extended period, which is an essential component in fostering a connection to nature (Mackay and Schmitt, 2019). Depending on how they are utilized and integrated into pedagogy, school grounds have great possibilities to provide different benefits of continuous contact with nature (Jansson et al. 2014). Additionally, the opportunity for risky play, often more prominent in connection to vegetation, has shown to be of importance for children's development (Obee et al. 2020).

Thermal comfort on school grounds is another crucial factor, impacting both children's health and potential for learning (Bäcklin et al. 2021). Vegetation can offer shade and reduce heat, creating a more comfortable environment in cities (Antoniadis et al. 2020). Moreover, school greenery supports larger environmental objectives improving urban green connectivity (Ioja et al. 2014) and facilitate species movement (Muvengwi et al. 2019).

The quality of green spaces is inherently dependent on well-suited and vital vegetation. As vegetation is subjected to varying degrees of stress during the establishment process (Grossnickle, 2005), thorough establishment practises are essential (Hirons and Percival, 2011). Establishing vegetation in urban areas is often a challenging task that depends on, among other things, the selection of species and quality, planting environment, and the handling of vegetation during transplant (Hirons and Percival, 2011; Lu et al. 2011). In urban school grounds, these difficulties are compounded by the active use of the vegetation by children, with wear and tear affecting its establishment (Jansson et al. 2014). The added hardship emphasises the need for well-functioning management when in school ground greening processes.

Moreover, the influence of school ground vegetation on children is closely linked to the management (Malone and Tranter, 2003), which is in turn significantly shaped by existing policy frameworks and governance structures (Randrup et al. 2020). These often steer the allocation of resources for the development and upkeep of green spaces, directly affecting quality and accessibility. For instance, the decision between managing green spaces internally or outsourcing (Lindholst et al. 2020) and budgetary considerations (Neal, 2016; Sekulova and Mallén, 2024) play a critical role in the overall quality of green spaces. In addition,

* Corresponding author.
E-mail address: Sanna.Ignell@slu.se (S. Ignell).

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governance of green school grounds is influenced by the level of knowledge in outdoor education among actors and the integration of green spaces into pedagogical activities (Sekulova and Mallén, 2024).

The national context and present governance structures in which each school operates may thus significantly influence school grounds. The governance structures concerning school grounds are often complex due to the multitude of actors with interests and responsibilities (Sekulova and Mallén, 2024), which is also the case for Sweden (Boverket, 2024). Policy changes in Sweden have significantly shaped the school system, with reforms like "Fria skolvalet" (Free School Choice) (Skolverket, 2003) and "Marknadsskolan" (Market-based School) (Henrekson and Wennström, 2022). These changes, associated with New Public Management (NPM) strategies (Hood, 1991, Henrekson and Wennström, 2022) have been linked to a customer-oriented dynamic between schools, parents, and students (Lewin, 2014; Åstrand, 2016), increasing pressure on teachers (Lundström, 2015; Henrekson and Wennström, 2022; Sveriges lärare, 2023).

Another change that may relate to the Swedish school system occurred in 2020 when the UN Convention on the Rights of the Child became Swedish law (Sveriges riksdag, 2018). Articles 12 and 31 are particularly relevant to school ground vegetation: Article 12 emphasizes children's right to express their views, advocating their involvement in decisions about nearby natural spaces, while Article 31 supports their right to rest, leisure, and play, supporting green environments for well-being and development.

Analyses from Statistics Sweden (SCB, 2020) show that school grounds in Sweden are shrinking, particularly in urban areas. The report also reveals a correlation between the size of a municipality and the amount of green space on school grounds, with larger population correlating with less green space. Reduction of school ground area has shown to increase wear and tear and diminishing vegetation (Jansson et al. 2021). When urban school grounds are shrinking, the already sparce vegetation is thus exposed to an increasing wear and tear which risk of more vegetation loss. General guidelines from Boverket (The Swedish National Board of Housing, Building and Planning) specifically address wear and tear and vegetation when stating:

> "The outdoor area should be spacious enough to easily and safely accommodate varying terrain and vegetation conditions without the risk of extensive wear and tear. The outdoor area should be characterized by good sunlight and shade conditions, good air quality, and good sound quality." (Boverket, 2015)

Boverket has developed guidelines concerning school ground size to be used by the municipalities (Boverket, 2015), but implementation of the guidelines still varies significantly, often only occurring under favourable conditions (Fridell and Kylin, 2024). Furthermore, the school grounds keep on shrinking in Sweden (SCB 2022), meaning that the guidelines seem to not have been enough to prompt change. This documented development makes Sweden an interesting example to study regarding school grounds.

While there is a lack of previous research on how to implement new vegetation in school grounds, there are some relevant studies. These include Gunnarsson and Gustavsson (1989) and Jansson et al. (2014), proposing that new vegetation may be protected by existing vegetation and by simple fencing that still allows some access. A few studies have also addressed school ground governance, identifying barriers to the upscaling of school ground greening projects (Giezen and Pellerey, 2021) and concluding that good governance of school grounds is complex, involves engagement of different actors and should extend beyond technical climate adaptations or pedagogical innovations (Sekulova and Mallén, 2024). There are however no studies focusing on gathering the perspectives from green practitioners regarding how to implement school ground vegetation, including both governance and technical aspects.

There is a need to develop knowledge on what affects implementation of school ground vegetation because of shrinking school grounds giving increased pressure on the vegetation, while information around this is currently scarce. School grounds are thus environments with many challenges concerning the establishment of new vegetation, making them interesting to study. Furthermore, studies of school grounds may also contribute with knowledge useful for other urban areas with risk for much wear and tear and with many involved actors, such as by mobility nodes or in small urban parks. The process of implementing and maintaining vegetation on school grounds involves multiple steps, from city planning to design and management. Consequently, a diverse range of green practitioners across different roles (e.g., landscape architects, green managers and maintenance personnel) possess valuable insight into the factors that influence the outcome (Boverket, 2024). Gathering knowledge from this group is therefore an important addition to school ground vegetation research, which has yet been done. Thus, the aim of this study is to investigate the factors affecting implementation of school ground vegetation through the perspectives of green practitioners in Sweden.

1.1. Theoretical framework

The policy arrangement approach (PAA) (Arts et al. 2006) was used to guide the study as a whole and the understanding of the results. This theory describes the interwoven dimensions of a policy arrangement and provides a way of outlining the relationship between four dimensions: (i) actors and coalitions, (ii) resources, (iii) rules of the game and (iv) discourses, where changes in one dimension affect the others (Fig. 1).

The *actors and coalitions* dimension focuses on the individuals or groups involved in a policy process and the alliances they form to pursue shared objectives. The *resource* dimension explores actors' power or influence used to achieve goals by leveraging resources like knowledge, legal tools, finances, or personal influence. Power refers to the capacity to mobilize and manage these resources to control outcomes and shape the policy agenda and is often linked to formal authority. Influence, however, is a subtler capacity to guide decisions, shape opinions, and steer discussions through persuasion, negotiation, or coalition-building. The *rules of the game* refer to the formal and informal regulations and norms that steer decisions and interactions among actors. The *discourse* dimension comprises the ideas, narratives, and perspectives held by the actors, including how they interpret problems and propose solutions.

In this study the PAA was used for an analysis of how the different dimensions interact and affect the implementation of school ground vegetation in Sweden, based on the perspectives of green practitioners. The study thereby focuses on the perspectives of one actor type in the policy arrangement, similar to for example Molin and Konijnendijk van den Bosch.

2. Methods

This interview study focuses on green practitioners who possess

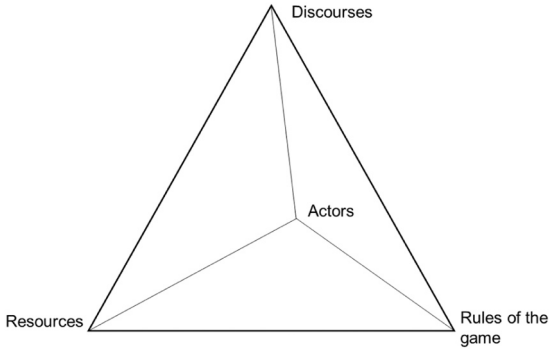

Fig. 1. The Policy Arrangement Approach tetrahedron adapted from Arts et al. (2006).

expertise and extensive experience in school ground greening in various stages of these processes in Sweden. These green practitioners were found using personal networks, university contacts, and two network e-mailing lists: one for green outdoor inspectors and another from the national network "Barn, Unga och Byggd miljö" (Children, Youth and the Built Environment). The aim was to find experienced practitioners from different parts of the implementation chain among Swedish green practitioners. Those who considered themselves having an extensive knowledge within the field, through self-assessment, were included in the study. This resulted in 26 respondents representing various stages of school ground greening, including design (n = 8), inspection (n = 4), management (n = 12), maintenance (n = 3), research and lecturing (n = 2). They primarily work in urban areas, but with locations spanning the entire country, from Malmö in the South to Umeå in the North.

The interview method was based on the expert interview approach by Meuser and Nagel (2009). An expert interview is a qualitative method that uses a topic guide to focus on an expert's specific knowledge in a particular field. An expert is herein defined as someone with specialized knowledge within their professional domain. Though this does not necessitate significant influence or authority (Bogner et al. 2018).

The interviews were conducted individually in Spring 2021, except for two instances where respondents wanted to be interviewed in pairs. They were semi-structured, guided by a topic list (see SI), allowing reflections from the respondents. The topic list was created through discussions among the authors. Due to the scarcity of similar studies on practitioners' experiences around school ground vegetation, the most viable approach was to draw from the authors' own experiences from researching vegetation and school grounds in constructing the topic list. The questions focused on technical and governance-related aspects with the aim to comprehensively capture the reality of the green practitioners. Closed questions were avoided (Meuser and Nagel, 2009), and the interviews were kept conversational, with new topics introduced as needed. At the end of each interview, the topic list was reviewed to ensure all relevant subjects were covered. This approach allowed respondents to steer the conversation towards topics they deemed important. This openness is considered crucial when conducting interviews, especially when topic lists are used flexibly (Scheibelhofer, 2008). Due to the COVID-19 pandemic, interviews were conducted via video calls, offering advantages over telephone calls by allowing observation of facial expressions and gestures which may aid interpretation during transcription (Bogner et al. 2018). Video calls also removed geographical barriers, enabling broader participation. The interviews were recorded on video, with additional notes taken on paper.

Interview analysis was conducted using NVivo (Ltd 2015). Following Meuser and Nagel (2009), only essential parts of the expert interviews were transcribed and organized into paragraphs, while unstructured sections were summarized for clarity. Non-verbal cues and tone were excluded to streamline the transcripts, and the focus was on preserving the information provided in the interviews. This approach aligns with Braun and Clarke (2012), who emphasize tailoring transcription detail to the specific analysis type. There is no universally applicable method for analysing expert interviews, though Meuser and Nagel (2009) suggest a general procedure that was used. The analysis was also guided by reflexive thematic analysis (Braun and Clarke, 2012). Codes were developed inductively as the analysis progressed, with new codes created when necessary to accommodate new topics. To maintain objectivity, reflection on own beliefs was included during the analysis, as recommended by Creswell and Miller (2000). Once all transcripts were processed, the coded paragraphs were reviewed, adjusted, and organized into overarching themes using an inductive approach (King and Brooks, 2018).

3. Results

Although the results indicate both agreement and disagreement among respondents regarding the factors affecting implementation of school ground vegetation, the respondents unanimous agree on the complexity of the situation. The respondents describe needing to consider multiple perspectives simultaneously, including safety, outdoor pedagogy, and economics, while striving for vegetation on school grounds. They also recognize the importance of vegetation and greener cities in general as well as school ground vegetation in particular. Many frequently reference the UN Convention on the Rights of the Child, reflecting their concern for children's rights.

The respondents describe challenges at every stage of the greening implementation process, from initial planning and planting to maintenance. The analysis of factors influencing the implementation of school ground vegetation formed two overarching themes: direct and indirect factors. The direct factors are practical aspects that directly influence school ground vegetation, including school ground size and design, planting specifics and species selection among more. The indirect factors are connected to governance and describe different social and organisational barriers to implementation of school ground vegetation.

4. Direct factors

Respondents agree that school grounds are an especially difficult place for vegetation establishment. A multifaceted approach is considered necessary, considering the size of the grounds, children's movement, planting strategies and design, species selection, plant size and handling of the ground (see Table 1). A common goal is to create a resilient, low-maintenance environment that can endure the demands of active schoolchildren.

4.1. The school ground composition

According to respondents, the size of the school ground, connected to children per square meter, has the greatest impact on the success of vegetation implementation. A high density of children generally results in a more intense use of the vegetation, giving a high wear and tear and compaction of the soil. Comparisons to the extreme wear and tear caused by grazing animals were common in the interviews. The rest of

Table 1
Summary of results, direct factors.

Direct factors	Key Findings
School ground composition	Small school grounds (giving many children/m^2) significantly increase wear and tear, and soil compaction. Larger areas required for sustainable vegetation.
Children's movement	Movement inevitable, opinions mixed on direction strategies. Some advocate guiding pathways; others value natural path creation by the children.
Plant placement	Vegetation survival improves further from high-activity areas. Plantings in the outer parts of the school grounds are often more successful.
Structures and usage	Existing, mature vegetation attracts children, diverting play from new plantings. Preservation of existing vegetation is important.
Soil/Substrate	Proper soil handling crucial; loosen subsoil, use structural soils if needed, or raised beds. Bark or wood chips recommended to prevent compaction.
Species selection	Durable, resilient species prioritized; mixed plantings favoured for diversity and resilience. Fast-growing species popular but mix with slow growing for long-term benefits. Species characteristics (thorns/spikes) can strategically influence movement.
Planting design	Dense, larger planting areas (≥2 m) preferred for resilience. Solitary trees need to be highly protected or planted among shrubs in larger plantings. Long, thin plantings attract problematic usage.
Plant size	Large plants preferred for visibility; smaller plants viable if densely planted and may be economically advantageous. Mixed sizes may create visual interest and resilience.
Fencing during establishment	Mixed opinions: Some see fencing as essential, others prefer dense planting, careful design, and educational strategies. Overall effectiveness debated.

the direct factors represent a necessity; without these solutions the vegetation would not survive due to excessive use.

> "The ever-present question. No, but it is absolutely central. You cannot establish anything if the area is too small."

> "But it varies with size. This issue of square metres per child has been shown to be clearly linked to how worn it becomes and how much vegetation we can actually keep alive. […] It is not just about where you plant in a space, but also that you have space to begin with. "

The respondents agree that children's movement cause inevitable wear, tear and compaction, but disagree on how to deal with it. Some believe it is futile to direct children's movements, as they often bypass designed paths. Others suggest that clear guidance and strategically placed pathways could influence movement to some extent. For instance, they recommend incorporating simple pathways within larger plantings to guide movement, especially between highly used zones. Some do not see wear and tear as solely a problem *per se,* and suggest a value in letting children create their own paths in large plantings.

There is more agreement on the need for careful placement of plantings, as activity levels vary across the school grounds. Some suggest viewing the school ground as different zones, with more vegetation on the outer edges and mainly shadowing trees near the building where activity tends to be higher. Topography also attracts high activity and may present challenges for vegetation establishment, making some respondents recommend not planting in slopes at all. A few lift the contradiction in planting vegetation where it is not used, as they want vegetation to be used by the children:

> "The chance of survival increases with the distance from the building."

Plantings along school ground fences are often perceived as successful. Leaving a small gap between the vegetation and the fence creates a tunnel where children naturally run, keeping them out of the planting area. Planting also outside of the fence and school ground, enhances this tunnel effect, providing a larger vegetational structure. Vegetation outside the fence often thrives better than inside, and together they form a robust green mass.

Structures that attract usage can divert play away from newly planted vegetation and thereby help protecting it. An example is older, functioning vegetation that attracts children more than new plantings, while also having a higher tolerance towards usage. The location of the school itself in new construction is therefore crucial, with respondents preferring sites that allow the preservation of existing, mature vegetation.

4.2. The ground

The respondents agree upon planting substrate being crucial for successful vegetation on school grounds, including proper handling of the subsoil, which they claim should be loosened before adding any substrate. Some respondents advocate for using existing soil as a more environmentally friendly option to adding new soil but that is not feasible if weed-free soil is required due to the presence of perennial weeds. To sustain a good substrate, the respondents advocate for leaving fallen leaves in the plantings to improve soil quality.

A primary concern with planting substrates is the risk of compaction, particularly in soils with high clay or peat content. To address this, some respondents suggest using structural soils, raised plant beds, or incorporating pumice to avoid compaction. Additionally, covering the soil with bark or wood chips is frequently recommended to prevent compaction and maintain moisture levels. Other protective measures include building wood pathways for children to run on and creating terraces around trees to protect their root zones from compaction.

4.3. Species

Selecting suitable plant species for school grounds is crucial for ensuring their successful establishment and survival. Many respondents highlight the struggle of finding species with characteristics that can tolerate the environment. They know what characteristics are preferred but struggle to find species that fit these. Similarities can be found among the species named in the interviews but also differences, as *Sambucus nigra* and *Ribes rubrum* were mentioned both as a good and bad species for school grounds (see Appendix 1).

Respondents emphasize that in species selection, durability and resilience should be prioritized over aesthetic appeal, focusing on plants that can withstand high levels of wear and tear and compaction. Robust and durable woody species are preferred over sensitive species and perennials, which should be placed outside heavily used areas if used at all. Careful selection reduces the need for high maintenance, for example, avoiding high bushes in front of windows or trees requiring regular trimming. The respondents agree that choosing the right species for each situation reduce the need for maintenance over time.

One respondent promotes the use of slow-growing species with tougher wood, as fast-growing species seem to be inviting to break in play, while most respondents mean that fast-growing species perform better on school grounds. However, to consider vegetational succession was mentioned as important by many respondents, to provide necessary benefits both directly after planting and many years following. Therefore, a mix of fast-and slow-growing species was preferred by many respondents.

Mixing species in plantings is widely favoured, as it provides different functions for children's use and creates a more resilient structure against diseases and plant failures or any future need for removal of individual species. While monocultures might have aesthetic value, they are only recommended for low-activity areas. Several respondents describe the goal for mixed plantings as something that resembles a forest edge.

The attractiveness of species influences how much children interact with them, which can lead to more wear and tear. Picking leaves can be harmful if done much, and, according to some respondents, larger leaves and evergreens in winter seem particularly attractive. Ring-barking of some cherry varieties can also be a problem. However, active use of vegetation was mainly seen as positive by the respondents, and the examples mentioned are where this use was detrimental to plant survival.

Characteristics of species can also be used as a way to direct children's movement and aid vegetation establishment. Several respondents point out that species with thorns and spikes can be beneficial in slowing down the speed of children, thereby limiting the risk of running through plantings.

4.4. Plantings

According to the respondents, the design of plantings on school grounds significantly impacts the survival and establishment of vegetation. To prevent children from running through newly planted areas, respondents suggest planting vegetation much denser than standard practice, creating a stronger barrier against children's movement.

Larger planting areas are favoured for their benefits in soil water retention, resistance to compaction, and overall resilience. These areas also provide a more favourable growing environment and a dynamic structure with more plants to cover for any that might die. Many recommend plantings of at least two meters in any direction. Children also seem to enjoy running within long, thin plantings or run through them when used as walls between interesting areas, often resulting in too much wear and tear and compaction. However, as space is often sparce on school grounds and large planting may pose challenges in urban areas with rat issues, several respondents want to know how large plantings need to be to support vegetation establishment.

Most respondents mentioned solitary trees as not ideal for school

grounds since they are vulnerable to wear and tear and often require high maintenance. If used, they need to be very well-protected, and respondents generally advocate for planting trees within larger groups of bushes for better protection against wear and tear and providing a larger soil volume.

4.5. Plant size

Opinions on the optimal size of plants for school grounds vary. Most respondents advocate for planting the largest sizes possible, as bigger plants are more visible and less likely to be trampled. Others suggest that smaller plants can succeed if planted in high density and protected by fencing during their establishment phase. Another argument is smaller plants being economically advantageous, allowing for the purchase of more plants.

A few respondents recommend using larger sizes for attractive species, such as fruit-bearing plants, to reduce the risk of breakage from increased wear and tear by children. Additionally, varying plant sizes can create a more visually interesting landscape, which might encourage children to notice and avoid running through the plantings. This variation can make the plantings more resilient and visually appealing from the start according to several respondents.

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4.6. Fencing off during establishment

Opinions on fencing vegetation during its establishment phase on school grounds vary. Some believe fencing is essential to protect young plants, while others argue that careful design and education can eliminate the need for barriers. This latter group suggests that dense planting while teaching children to respect vegetation can protect plants and allowing unrestricted access. Others advocate for fencing off entire sections of the school grounds to protect vegetation during its critical establishment phase, which has shown very good results. Overall, views on fencing are mixed, with some strongly for, against, or weighing the pros and cons.

5. Indirect factors

The interviews revealed the complex reality that the respondents are working in. Many different aspects connected to governance have a high impact on the respondent's ability to perform their job in the way they deem suitable (see Table 2). Actor relationships and knowledge are important influencing factors.

5.1. Actors, relations, and demands affecting indirect factors

The respondents describe interacting with two main groups of actors: those connected to the school, such as educators, principals, and parents, and those involved with the non-green aspects of the school or its grounds, such as property managers, municipal technicians, and building contractors. In the interviews, children were generally only described as recipients of the school ground developments, not as influential or powerful actors. The situation and possible conflicts for the respondents depend very much on the specific persons involved among actors and many respondents wish for less conflict and more understanding and dialogue.

> "Another example are these common snowberry shrubs (Symphoricarpus albus, eds note), which you have to consume quite a lot of to feel sick. But in some educators' eyes, it's enough to ingest one berry and then they are sick right away. And then you might as well avoid that type of plant to not have to remove it later. While other educators are fully aware that this is not so dangerous and you have to teach the children not to be there and touch too often, then it's perfectly fine. But then it becomes a bit dependent on the person."

Table 2
Summary of results, direct factors.

Indirect factors	Key Findings
Influence of schools and parents	Schools and parents significantly influence vegetation decisions, often driven by safety concerns and lack of knowledge. Engaging and informing parents might ease pressure.
Educators' interest and turnover	Educators' enthusiasm and continuity strongly impact vegetation. Frequent turnover and loss of dedicated staff negatively affect long-term vegetation planning.
Knowledge gaps (general)	Widespread lack of understanding among educators, parents, municipal workers, and contractors about vegetation benefits, establishment, and management leads to ineffective outcomes.
Risk perception	High concern for child safety leads to restrictive practices, such as removal of vegetation due to perceived risks (sharp branches, toxic plants, allergies). Risk focus has increased the last decades.
Visibility and safety	Vegetation frequently removed or thinned due to visibility requirements from educators and parents. Balancing privacy rights among the children and needs of the vegetation with safety concerns is complex.
Budget and economic constraints	Vegetation management and establishment frequently underfunded, resulting in inadequate maintenance and suboptimal planting conditions. Early consultation and prioritization of funding needed.
Knowledge and education of children	Increasing educator involvement and structured instructions in how to interact with the vegetation could reduce severe damage by children and maybe also the need for fencing.
Green practitioner expertise	Many landscape architects and green practitioners lack specialized knowledge in school ground design. More available knowledge in school ground greening is needed.
Contractor knowledge and maintenance	Poorly informed maintenance contractors frequently damage or remove vegetation due to lack of expertise. Training and clear requirements for maintenance personnel crucial.

In some municipalities the word of respondents, green practitioners, appears to weigh heavier than in others. This seems to correlate with the presence of different kinds of strategic documents that can provide arguments around school ground vegetation.

Throughout the interviews, schools and parents were often referred to as customers, with school preferences frequently shaped by parental opinions. Several respondents noted that parents are usually the source of suggestions presented to green practitioners. One respondent suggested that engaging with parents could ease the pressure on schools and thereby reduce restrictions on the outdoor environment.

> "I find that many parents are so scared of their children getting injured that they become very angry, scared, and frustrated if something happens, like a scrape or a scratch on the cheek from a branch. And then they scold the staff. And then the staff want things cleared away because they do not want to end up in that situation. And I understand that this complexity makes it very tough."

Some respondents question whether schools and parents always know what is best for school grounds, pointing to a general lack of knowledge in outdoor pedagogy. The interest level of educators in school ground vegetation also significantly impacts its future, with some practitioners hesitant to plant certain species, like fruit trees, without strong support and interest among educators. Some respondents recall a time when planting fruit-bearing species was more popular, but now there's often a desire to remove them. Some respondents mention that

sense of stewardship influences educators' willingness to protect and engage with school ground vegetation. However, it is unclear how this ownership is established, whether through participation or information. Participation or information efforts are not always successful, and problems arise when committed educators leave. Many respondents mention the high impact of losing particularly dedicated educators. One respondent linked this to the market-based school system, noting that teachers passionate about outdoor learning are highly sought after in their municipality and often get recruited by competing schools. Shifts like this are particularly challenging concerning vegetation, which requires long-term planning. The removal of mature plants, often important for a school ground, causes frustration among the respondents.

> "But I don't think people are really good at thinking long-term; they waste quite a lot of money. The thing is, you build some area, and then maybe five years go by, and you rebuild the whole area into something else. And then they want their cultivable land back or whatever it is. And then there's no space left anymore, and you say 'well, you had it five years ago' 'oh.'."

The impact of ownership on children's engagement with vegetation is also uncertain. While some feel it has a positive effect, others argue the impact is either negligible or temporary. Furthermore, the issue of student turnover adds complexity, as children typically spend only a few years at the same school.

The respondents describe a widespread lack of knowledge among other actors of the positive aspects of school ground vegetation, and about what is necessary for its establishment and survival. They face pressure to create a perfect outdoor environment but often lack the resources to do so.

> "What is required of the outdoor environment is that it should be newly established but fully grown, cosy, sheltered, and pleasant, yet at the same time completely open so that everything is visible. And there are many contradictions there. So, you have to be quite strong in what you believe in. Otherwise, you will easily be overwhelmed by everyone who comes along with their opinions."

5.2. Lack of knowledge of the positive aspects of school ground vegetation

While respondents view vegetation as beneficial for shading, water uptake, and providing opportunities for play and learning, many educators and parents perceive it as a potential risk. Some respondents note that they only get requests concerning the outdoor environment which are connected to risk. Safety concerns include plant species, layout, topography, standing water, and fencing. Unlike play equipment, natural environments lack safety measures, making it seem more dangerous according to the respondents. Vegetation is often perceived as dangerous because of sharp sticks, small branch angles, dropping branches and any presence of spikes and thorns. Standing water is often drained due to fears of drowning, also resulting in dryer soils. This focus on risk has grown considerably the last decades according to many respondents.

Visibility is another issue, as educators and parents prefer vegetation that allows clear sightlines across the school grounds. Respondents describe frustration when established vegetation must be cut down. Several reference the fact that the UN convention on the rights of the child is Swedish law and gives children right to privacy. However, schools usually have the final say, forcing the removal of established plants. Some respondents describe an approach of thinning and shaping vegetation to ensure visibility from the early planting stages to maturity, but they also note how challenging this process can be.

Perceived risks, rather than actual toxicity, often drive conflicts over poisonous species, despite the rarity of serious incidents. The species in question differ between municipalities, and uncertainty about toxicity levels adds complexity. Experienced respondents also point out that the list of banned species has expanded over time. Many respondents believe that the benefits of vegetation can justify the presence of poisonous species, depending on toxicity levels.

> "It's hard to stand up against a principal or operations manager who has had a couple of paranoid parents on them. So sometimes species are mixed up, or if they are similar species, or if they have heard that it could be dangerous."

Pollinating insects such as bees and bumblebees are also mentioned as an issue due to risk of children being stung, resulting in the restricted use of blooming and fruit-bearing species. Allergies are another factor, and most respondents describe requests of removing allergenic species.

> "I had a fault report now where they wanted to remove a tree because a student was allergic to birch pollen, and I'm like, yes but your school is located in a small forest. If I remove this tree, there will still be birch pollen anyway. […] Sure, there will be more pollen in the school ground when it stands there, but then you have no trees in the school ground. Then there is no UV protection, you have no shade, you have no tree that absorbs the excess water. Instead, you have a bare yard with just play equipment. And this child may go here for two more years, and then we have taken down a birch just for one child who goes there for two years who still has to take medication."

Some respondents note that educators are worried about children getting dirty in muddy areas, from bark chips, or staining fruit, largely due to concerns of parental complaints. To avoid mud, schools sometimes drain the ground and replace natural grass with artificial turf. Many respondents note a preference for a clean, park-like environment, where dead branches and leaves are regularly removed, especially from hard surfaces. These respondents sometimes struggle to convey that park-like environments are hard to maintain on school grounds. Several instead suggest that extensive maintenance would benefit the vegetation, the environment, and also the children by providing more loose materials for play.

Several respondents mean that a difficulty lies in addressing the pedagogical benefits of risky play, as they are treading on the pedagogical territory of educators. However, some respondents mean that if they can explain the benefits and engage in dialogue, educators and parents often become more supportive of vegetation.

> "We talked to a school that was very concerned about a very wild environment by a stormwater ditch. A fairly deep ditch with very poor visibility. And they wanted it to be culverted and all the vegetation removed because it was an unsafe environment. So we gave them the children's book 'Gropen'. And said that from an ecological perspective, we will not culvert this stormwater ditch, and there are actually values in this environment that you could take advantage of instead. And then they changed to actually wanting small tables and paths and easier access to the water. I think it's so much about background knowledge and perspective. But if you have never thought about those issues, it is quite common to think that bushes are dangerous and if you can't see the children all the time, it's an unsafe environment where you need to increase visibility."

5.3. Lack of knowledge on vegetation establishment and management

The respondents describe a widespread lack of knowledge among different actors about what it takes to establish and maintain school ground vegetation. This extends across educators, municipal workers, builders, and to some extent green practitioners, affecting different stages from planning to maintenance. As there often is limited space on school grounds and tight economy, the green practitioners are many times forced to plant vegetation in ways that are not optimal. Many respondents ask for more knowledge on what works and information for them to back their arguments on.

> "But it's also a bit unfortunate that trees die so slowly because then we can't show the result: you built a house here and I said it would

jeopardise the tree, and now you see two years later that it's dead. No, that's not the case, it takes maybe ten years. And it's the same with children. No matter how sterile and useless it is, they find a way to play. And then the teachers can say, look, they're playing, they're fine here. The children don't stop and go on strike."

Green practitioners are often undervalued and frequently not consulted early enough in project development processes according to the respondents, leading to missed opportunities for incorporating sustainable and beneficial green spaces from the outset. Similarly, when budgets are tight for new schools, vegetation costs are among the first areas to be cut, either through planned cost reductions or contractors cutting corners. This is described as a big issue by most of the respondents. Not being prioritized often leads to planting of the vegetation in sub-optimal times, such as right before the opening of a school, giving no time for undisturbed establishment, or in summer without ensuring proper watering. Compaction is also caused by machines during construction and vegetation can be degraded by mistreatment during planting and/or maintenance. This unplanned reduction of the school ground quality when new schools are built might not be discovered as the inspectors often lack green knowledge according to several respondents.

"The worst example I've seen is when they were going to plant trees in an existing lawn and just dug out just so that the tree clump could fit. I don't know if it's a lack of knowledge, or where it fails, lack of time? After all, it's 20,000 SEK wasted."

The green managers among the respondents mentioned often lacking sufficient economic means for managing school ground vegetation as well as the work force often being too small for the amount of work on their table. Many respondents mention a discrepancy in how much can be spent on the building of a new school ground and the money they get to manage it. The scarcity of municipal funds allocated for the upkeep of vegetation often leads to maintenance personnel who are ill-equipped to care for these green spaces properly. One respondent argued that an increase in knowledge among maintenance personnel might result in finding ways to manage the vegetation even under a tight economy.

"They drove over a lovely old lilac tree that's probably been there for 20 years. And the trees were established, and the children were playing there, but they just cut it down, so it was just sticks. They took down a whole rose bed as a hedge. And that's what you also have to work with, I have to work with subcontractors who don't have knowledge about our plants. And if they don't have knowledge, we end up with these disasters, they remove perennials in flower beds because they think they're weeds. It's the whole chain, it's not just that we have to plant a hardy plant in the flowerbed and keep it away from the children. We also have to keep it protected from the contractors who will be maintaining it. And we have required the foremen to be trained, but we have not required the subcontractors to be trained. So, anyone can come along and just say 'this looks a bit shabby' and cut it down."

Many respondents also note a significant gap in efforts to educate children on handling vegetation, which is crucial for its survival. Educators have a major influence on how children interact with plants, and increased involvement could solve many issues related to vegetation establishment. According to some respondents, offering more structured instruction on interacting with vegetation may lessen the need of fencing it off while it is being established. There is, at the same time, often reluctance to see these areas fenced off, often because it limits the available size of the school ground. Many respondents struggle to communicate the importance of protecting the vegetation to ensure its proper establishment.

The challenge of inadequate knowledge also extends to green practitioners. Many respondents note that school ground design is often assigned to relatively inexperienced landscape architects, who lack the necessary knowledge to grasp the complexities involved, leading to designs that prioritize aesthetics over functionality. Respondents emphasize that school grounds are among the most challenging environments to design, expressing frustration that this difficulty is not recognized by design firms. Green managers among the respondents report spending much time discussing and redesigning school grounds with landscape architects. Respondents that work with designing school grounds say that some municipal actors commissioning school ground designs, sometimes lacking a green background, prioritize cost over quality, opting for cheap materials, which further undermines the successful implementation of these green spaces. A respondent working in academia mentioned that green managers as well might stand in the way of greening processes of school grounds, reported to this respondent by people in the school sector.

Additionally, the respondents bring up their own lack of knowledge and mention the difficulty in finding reliable information on school ground vegetation design. Many have instead accumulated knowledge through experience. When neither the green manager (or similar role) nor the landscape architect possesses adequate knowledge, the result is frequently a failing school ground according to many respondents.

6. Discussion

The interviews with green practitioners underscore the difficulties of implementing school ground vegetation in Sweden. They encounter numerous actors in their work and have to handle widespread lack of knowledge. Through the lens of PAA (Arts et al. 2006), three groups of actors are involved in the context in which this interview study takes place: the green practitioners, represented by the respondents, the non-green practitioners and the users, which in this case are the school and the parents. The children are present in the interviews but only as receivers, lacking influence on the dynamics of the PAA.

In this study the results were categorised as either direct or indirect factors. Although different, these are highly intertwined, and this interconnectedness is an important result of this study. Smaller school grounds, along with high child density, result in increased wear and tear, making vegetation establishment more challenging (Jansson et al. 2021). The respondents emphasized that this, along with soil compaction, is the most critical factor affecting vegetation growth. The direct factors represent the different ways they deal with these issues. The knowledge around these direct factors can be seen as resources (Arts et al. 2006) that green practitioners have.

The interviews show that the possibility for green practitioners to implement their knowledge is often hindered by the lack of knowledge among other actors. This knowledge, as a type of resource, shapes how actors perceive vegetation, reflected in differing discourses (Arts et al. 2006). Interviews revealed different discourses, either focusing on its benefits and or seeing it as a risk or nuisance, with the risk discourse seeming to gain strength in recent decades. High concerns of safety in play environments were also shown in (Jansson, 2008) concerning public playgrounds in Sweden, and as a barrier for outdoor time in elementary schools outside of Sweden (Patchen et al. 2022) and the concern for dirty vegetated play areas has been described similarly outside of the Swedish context (Giezen and Pellerey, 2021). This conflict of discourse hampers collaboration according to the respondents, with the risk-focused discourse often compromising the quality of school grounds. Vegetation is frequently either not planted or removed due to the influence of educators and parents. Respondents mean that implementation largely depends on the specific actors involved, highlighting the significant influence of actors in this context.

Risky play has been shown to be beneficial for children's development (Obee et al. 2020). However, research suggests that rising risk-aversion among parents may be restricting children's chances to experience risk-taking in play (Jelleyman et al. 2019). Opting towards play environments that are as safe as *necessary* instead of as safe as *possible* could result in environments that better support healthy child development according to Brussoni et al. (2012). In this study, this

approach could for example be extended to species with spines and thorns, which several respondents viewed as having potential for use. From children's viewpoint, spines and thorns might not necessarily be seen as a problem but as evoking another type of more careful play (Jingwen et al. 2022). Thus, restricting use of such plants on school grounds could be an unnecessarily reduction of the, already short, list of species available, due to the typically harsh urban growing conditions and intense use of children.

Most respondents highlighted the necessity to design and manage school grounds with a child perspective, for example by referencing the UN Convention on the Rights of the Child when discussing the value of hiding places and risky play. The respondents also noted that a park-like environment, which is preferred by some users, is very hard to ensure and should not be the goal as it may not provide sufficient value for children. Extensive management was put forward as a way to both increase play values by providing loose elements, reduce costs, and aid vegetation establishment. Messy environments with loose elements for play has shown to be beneficial for children's creativity and cognitive development (van Dijk-Wesselius et al. 2018), which strengthen the arguments of the respondents. However, the aversion towards dirty clothes or messy looking school grounds does not align well with such management.

Even when there are no competing discourses, a lack of knowledge concerning vegetation establishment might cause problems. A specific issue is the lack of knowledge from schools regarding the importance of protecting the vegetation during establishment. This can be done by fencing off vegetation or by actively teaching the children how to interact with newly planted vegetation, also noted as important in projects in France (OASIS n.d.). Many respondents advocate for both, but some argue that active instruction on how to interact with vegetation might reduce the need to fence off newly planted areas. As a result, schools would not necessarily have to deal with a temporary loss of play space, which they often see as a concern. However, all respondents agree that vegetation will not survive without neither fencing nor actively teaching children how to interact with it. The engagement of educators is crucial in order for the children to reap the benefits of school ground vegetation (Sekulova and Mallén, 2024, OASIS n.d.), and without it, vegetation risks not contributing to children's environmental learning (Atmodiwirjo, 2013; Akoumianaki-Ioannidou et al. 2016). This study also describes how engagement of educators influences how children interact with and care for the vegetation, which may impact its successful establishment.

The knowledge of the educators is imperative to such engagement (van Dijk-Wesselius et al. 2020; Giezen and Pellerey, 2021). Respondents also highlight the positive impact of increased knowledge, with several pointing out that when they can explain the benefits of school ground vegetation, they encounter less resistance. Thus, when the discourse of the educators and parents change as they get more knowledge, green practitioners can more easily do their job as they deem fit. Increasing the resource knowledge amongst educators could therefore have both positive effects considering the implementation of school ground vegetation and the active and beneficial use by the children. The lack of integration of outdoor pedagogy in curricula has been described as a barrier to teachers' use of school grounds (van Dijk-Wesselius et al. 2020; Giezen and Pellerey, 2021). Therefore, integrating greening and education strategies for school grounds could be a way to increase knowledge and use of outdoor pedagogy by teachers (Zhang et al. 2022).

According to the respondents, discourse in which vegetation is considered more of a nuisance was most prevalent among non-green practitioners, resulting in a low status within municipal planning and building processes. Insufficient financial and human resources for ongoing management and the undervaluing of green practitioners' knowledge often result both in conflict and failing vegetation. The potential advantage of establishing vegetation when children are absent early in the construction process of new schools is rarely taken because school ground vegetation is not prioritized in the building process. Limited funding for management was put forward as a big issue, which is also seen in other countries (Sekulova and Mallén, 2024). Aside from increasing economic resources, one way forward could be to increase knowledge of vegetation aiming for a more unanimous discourse where the importance and needs of vegetation is recognized.

The persons hindering the implementation of school ground vegetation were described to also include green practitioners in some cases. Similarly, a lack of knowledge was also described to be an issue within the green field where people in many different professions may lack knowledge. Throughout the interviews, the respondents discussed the complex knowledge required to design and manage a well-functioning green school ground. Their discussion is in line with previous studies', arguing that such designs are multifaceted and must include both outdoor pedagogy, ecology and vegetation design and management in a special environment (Giezen and Pellerey, 2021; Sekulova and Mallén, 2024). However, this complexity does not seem to be generally acknowledged within the green field, according to the respondents.

Further, all green practitioners described some need for more knowledge concerning vegetation establishment, and the differing views within the direct factors show that there are many knowledge gaps to fill. One example is the effect of play on vegetation establishment. There are studies on play behaviour (Dyment et al. 2009; Raney et al. 2023) but only limited research on how play affects establishment and survival of vegetation structures (Gunnarsson and Gustavsson, 1989; Jansson et al. 2014). Similarly, there is little information on species that tolerate school ground environments, and disagreements on certain species among the respondents in this study. More information on the effect planting size has on establishment is also needed. Increasing research and spreading of knowledge on school ground vegetation design and management could increase the knowledge base among green practitioners and foster a more informed approach to the planning and maintenance of school grounds, thus reducing the risk of failing school grounds. Increased knowledge could also limit the dependence on knowledgeable individuals to ensure long-term success of school grounds (Giezen and Pellerey, 2021).

Many respondents grapple with shifts in users' opinions, as these rapid changes often conflict with the needs of vegetation. A way respondents handle this is by opting towards species mixtures in plantings, trying to create plantings that are resilient towards, for example, removal of specific species. Such shifts may stem from a growing discourse on risk, or frequent teacher turnover (Swedish National Agency for Education, 2019). Outside of Sweden, the project "Thrive in the forest" led by the Mersey Forest Partnership (Mersey Forest Partnership, 2022) has emphasised the importance of a "whole school approach," meaning that the sustainability of outdoor learning in schools is often dependent on one dedicated teacher or teaching assistant, and if they leave, opportunities for students may diminish. Involvement of the whole teacher team is also emphasised by the OASIS project in Paris (OASIS n.d.). Comprehensive policies around school ground vegetation can thus act as an insurance against the loss of influential individuals (Giezen and Pellerey, 2021) and such policies could also cover for rapid changes in desires among the users.

According to Arts et al. (2006), power and influence are distinct concepts within the dimension of resources. In most cases in this study the users and the non-green practitioners seem to have more power and/or influence than the green practitioners. When separate discourses exist between the actor groups in this study the effects appear to trap the green practitioners in between the different actor groups, affecting their ability to work. Knowledge as a resource in general does not seem to provide green practitioners with sufficient power over school ground vegetation. In the interviews many respondents described how they lacked both money and workforce (resources) which could affect their power in relation to the non-green practitioners (Sekulova and Mallén, 2024).

To understand where the users of the school grounds, the school and

parents, get their influence, theories related to New public management (NPM) may be applicable. The principles of NPM, which emphasize tight control and accountability in public professions (Hood, 1991), connected to the "Free school choice" and "Market school" in Sweden, have been described to result in a customer relationship where parents can exert pressure on schools (Lundström, 2015; Henrekson and Wennström, 2022; Sveriges lärare, 2023). As many respondents noted, the opinions around the school grounds often originated from the parents even when they were brought to them by the school. Thus, parental influence also seems to affect the design and management of school grounds, possibly partly derived from this customer relationship as a result of NPM.

It is important, as well as interesting, to note that the amount of control for green practitioners differ between municipalities. In some cases, the respondents seem to have power to dismiss user-requests. It is possible that the influence of the users is connected by the strength of the risk discourse itself, and in places where risk is less of an issue the green practitioners have greater control. But, aside from the connection to discourse, it seems that the power of the green practitioners can increase in cases where there are regulations (or rules, per Arts et al. (2006)) concerning for example green infrastructure or biodiversity. Thus, a different balance within the resource dimension seems to be able to limit the effect of differing discourses between actors.

In order for school ground greening projects and initiatives to be successful and functioning long-term, the importance of regulations and policies have been emphasised also outside of the Swedish context (Stevenson et al., 2020; Giezen and Pellerey, 2021; Sekulova and Mallén, 2024). The result from this study supports the positive effect green (or similar) policies have on school ground vegetation also in Sweden. Nationwide policy changes may, however, not achieve the intended results when schools are managed and governed at the municipal level, where local context plays a significant role in shaping outcomes (Stevenson et al. 2020). As Fridell and Kylin (2024) showed in their report, there is a high variability in which Swedish municipalities implement the guidelines on school ground size provided by Boverket (Boverket, 2015). This is a common result of NPM and coupled decentralisation of the Swedish school system (Lewin, 2014) and thus the sole implementation of guidelines and policies might thus not ensure real changes on the school grounds.

With the growing global interest in school ground greening (Ignell et al. 2024), it is crucial to understand the perspectives of those who work daily with school ground vegetation. While some aspects of this study are specific to Sweden and its school system, many findings are applicable beyond the Swedish context. Urban school grounds often have limited space for vegetation, as described also in e.g. France (OASIS n.d.) which possibly leads to similar challenges of high pressure on school ground vegetation. Yet little research has been conducted on how to ensure the survival of planted vegetation (Ignell et al. 2024). The direct factors examined in this study, such as the impact of children's play on vegetation and strategies to manage it, are applicable in other contexts as well. Several of the indirect factors also seem to appear outside of Sweden, as the importance of teacher engagement (Mersey Forest Partnership, 2022; OASIS n.d.) and supporting regulations and policies (Stevenson et al., 2020; Giezen and Pellerey, 2021; Sekulova and Mallén, 2024). However, exploring the perspectives of practitioners from other countries in future studies could provide a more comprehensive understanding of the factors influencing implementation of school ground vegetation. Additionally, as this research examines the implementation phase, future studies on the long-term impacts and challenges of school ground vegetation and its development would be valuable.

7. Method discussion

Interviewing green practitioners with extensive experiences from working across various stages of implementing school ground vegetation has enabled a deep understanding of what they view as important for ensuring implementation of school ground vegetation. While this selection was valuable to provide insights, the respondents are not reflecting the average green practitioners. This selection was important as we wanted to gather as much information as possible from the interviews both regarding how to practically implement school ground vegetation and the governance aspects surrounding the implementation, and including practitioners with low experience might have given results with less rigor. However, self-assessment of expertise introduces potential bias, making it essential to evaluate responses collectively. As a result, responses with greater consensus carry more weight than individual ones. And the results with conflicting responses are especially interesting to look deeper into. The online interview was a way to enable interviews with practitioners from all of Sweden, removing the geographical bias. While online interviews work quite well if the participants are used to the technology, methods such as walking interviews in actual school ground settings may provide even more in depth understanding.

Assessing the green practitioners in this policy arrangement is important because the voices of them have largely been overlooked in research, despite their crucial role for school ground vegetation. They interact with all other actors while also being responsible for the vegetation, positioning them as a bridge between stakeholders and the school ground vegetation. This does however lead to the lack of perspectives from the other actors. Investigating the perspectives of other actors connected to school ground vegetation, such as parents, school personnel or other practitioners, would be a natural next step and could provide further depth to the results of this study.

The methods used in this study allowed the gathering of qualitative data around important aspects of implementing school ground vegetation. This was particularly important because of the lack of previous studies focusing on these perspectives, and a qualitative study allowed for an inductive approach providing a deep understanding. Future studies could take this further by assessing the opinions of a higher number of respondents in a more quantitative manner through surveys or alike. The PAA has previously been used to understand school ground development (Jansson et al., 2019). Using it to guide the understanding of the results in this study was useful to highlight the interconnectedness and complexity of the aspects around the implementation of school ground vegetation.

8. Conclusions and recommendations

This study examines what impacts implementation of school ground vegetation in Sweden from the perspectives of green practitioners. The results display a complex reality where many different aspects affect the implementation, seen as direct and indirect factors.

Among the direct factors, school ground size, species, planting design, the school ground at large, with for example the presence of usable, established vegetation, were put forward as especially important for successful implementation. The indirect factors included limited knowledge around the importance of school ground vegetation and what is needed to prioritize vegetation among many actors. Viewing the results through in a governance perspective display how the complex interaction of resources, actors, rules, and discourses impact the implementation of school ground vegetation. This shows that green practitioners may need to work in several different ways to cover both the practical, direct factors, and the governance-related, indirect factors and thereby improve the results of green school ground developments. As this may put a lot of pressure on one professional group, it is important to raise the awareness and knowledge also more broadly.

Increasing knowledge about the importance of school ground vegetation and how to ensure its survival among several actors may lead to a shared discourse, thus reducing conflicts and ensuring the successful implementation of vegetation. Establishing clear regulations and standards that emphasize the significance of vegetation by schools would

empower green practitioners by preventing undue influence on the implementation by individual actors or favourable circumstances, ensuring long-term success. This would help maintain school ground vegetation over time, minimizing the need to remove mature plants as well as improving the establishment of new ones.

Further research is needed on school ground vegetation, for example, on how wear and tear, species choice, and planting design affect establishment. Research into the varying influence of green practitioners across municipalities and outside of Sweden and the factors behind these differences, as well as their impact on school ground quality, would also offer valuable insights into the processes shaping the implementation of school ground vegetation.

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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.

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Appendix 1

"Good" species	Number of mentions	Additional comments	"Bad" species	Number of mentions	Additional comments
Acer campestre	1		*Sambucus nigra*	1	Gets torn easily
Acer platanoides	4		*Ribes rubrum*	1	
Acer tataricum	2		*Dasiphora fruticosa*	1	
Alnus sp.	1		*Salix alba*	1	
Amelanchier sp.	1		*Hydrangea anomala*	1	
Bamboo species	3		*Salix rosmarinifolia*	1	Too dense, visability issues
Cornus sp.	2		Bamboo species	2	Can't handle trampling
Cornus Ivory Halo	1		*Cotinus coggygria*	1	
Cornus mas	2		*Thuja sp.*	1	
Corylus avellana	4		*Chamaecyparis*	1	
Cotoneaster dammeri	1	Large size needed to be able to handle wear and tear	Tall grass species	1	Large size needed to be able to handle wear and tear
Crataegus flabellata var. Grayana	2				
Dasiphora fruticosa	1	Long flowering, attracts pollinators			
Larix sp.	3				
Ligustrum sp.	1				
Lonicera caerulea	2				
Malus toringo	1	Good recovering ability			
Physocarpus opulifolius	1				
Prunus cerasifera	3				
Prunus mahaleb	8				
Ribes alpinum	5				
Ribes rubrum	2				
Salix caprea	3				
Salix purpurea 'Nana'	1				
Salix rosmarinifolia	1				
Salix sp.	1				
Salix viminalis	1				
Sambucus nigra	2				
Sorbaria sorbifolia	1				
Sorbus dodong	1				
Spirea betulifolia	1				
Spirea sp.	1				
Stephanandra incisa crispa	1				
Syringa sp.	3				
Viburnum farreri	1				

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