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Co-Creating Change: Seedbed Interventions as Catalysts for Equitable Urban Planning—The Case of Umeå

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Abstract

The ongoing urbanisation and densification at the intersection with increasing environmental and health crises demand a holistic, equitable, and inclusive approach to urban planning, which has also been highlighted in the EU Green Deal's inclusive approach to sustainable urban planning aligned with the UN SDGs' "Leave No One Behind." This article introduces the seedbed intervention as a novel, community-driven, co-creative approach to Nature-based Solutions (NbS) that addresses gaps in equitable and inclusive urban planning frameworks. On the case of Umeå (Sweden), the article introduces the seedbed intervention approach and demonstrates how the approach facilitates the development of locally appropriate and sustainable NbS. The results show that the seedbed intervention approach improved the alignment between local needs and NbS design, connected diverse user groups, and catalysed curiosity, interest, and participation among citizens with the help of applying art-based methods. By demonstrating the practical application of a seedbed intervention, this research contributes to the development of scalable frameworks for more equitable and inclusive urban planning.

Keywords
art-based methods; co-creation; equitable cities; inclusivity; Nature-based Solutions; SDG 11; seedbed intervention; sustainable planning; urban green spaces

1. Introduction

Increased population density in cities, coupled with climate, environmental, health, sociocultural, and socio-political challenges shape discussions about the future of urban areas (Dilk, 2019; Kraas et al., 2016). But urban space is also anticipated to serve as the critical arena for negotiating (Kuge, 2020) and addressing these challenges: "The challenges of global change are particularly evident in urban spaces. However, they also hold special potential, as cities, with their communicative and neighbourhood immediacy, can become engines for sustainable development" (Janko et al., 2019, p. 12). With the establishment of the SDGs in 2016, the UN has specified the need to monitor and ensure sustainable developments on ecological, economic, and social levels by 2030. Goal 11 (SDG 11) aims for an inclusive, safe, and resilient development of cities, ensuring secure and inclusive access to green spaces, as well as more co-creative urban planning (The Global Goals, n.d.). The "Leave No One Behind" principle is the central, transformative promise of the 2030 Agenda for Sustainable Development (UN, 2015) and the EU Green Deal (European Commission, n.d.), which furthermore highlights the need for inclusive planning solutions.

As a way to address these challenges, the article introduces the seedbed intervention as a novel, community-driven, co-creative approach to address gaps in equitable and inclusive urban planning frameworks. These interventions aim to strengthen connections between people and urban spaces, enhancing local belonging, well-being, and resilience—key to building future cities with better quality of life and addressing challenges highlighted by the SDGs (UN, n.d.). Closely tied to SDG 11, the seedbed intervention focuses on inclusive and safe spaces through participation and mediation (Forum Umwelt und Entwicklung, 2016). By promoting adaptable green spaces, they mitigate climate impacts and boost social cohesion, aligning with global sustainability goals. They draw insights from the UN Department of Economic and Social Affairs database on SDG good practices, which ranked SDG 11 as a top-performing goal in successful implementation (UN Department of Economic and Social Affairs, 2020). The seedbed intervention aligns with SDGs 5, 10, and 11, addressing targets like 11.3, 11.6, 11.7, and 11.9 (The Global Goals, n.d.). Rooted in the "Leave No One Behind" principle, inclusive frameworks are used to engage diverse stakeholders. This inclusivity emphasises empowerment, ensuring equal participation and decision-making opportunities through safe, inclusive civic mechanisms (Mensah et al., 2022).

In the case of Umeå in Sweden, this approach is implemented to facilitate the co-creative planning and implementation of Nature-based Solutions (NbS). As a form of ecosystem-based adaptation that is oriented toward enhancing resilience, NbS have received increasing interest in research and practice (EU, n.d.; UN, 2015). In essence, NbS are actions to protect, manage, and restore ecosystems, simultaneously providing human well-being and biodiversity benefits (IUCN French Committee, 2016). The European Commission defines NbS as "solutions that are inspired and supported by nature" (European Commission, n.d.), which are cost-effective, simultaneously provide environmental, social, and economic benefits, and help build resilience. Such solutions bring more diverse nature and natural features and processes into cities, landscapes, and seascapes, through "locally adapted, resource-efficient and systemic interventions"

(European Commission, n.d.). Good examples of NbS in urban spaces are for instance green roofs, green walls, connected parks, or also processes which enhance or regain a better quality of natural habitats.

The seedbed intervention presents a novel approach to inclusive planning for sustainability that addresses key limitations to co-creation processes. Traditional co-creation approaches often struggle with issues such as power imbalances, limited stakeholder engagement, a clear structure of processes to follow (Franz et al., 2015), and a lack of adaptability to local contexts. The seedbed intervention offers a structured yet flexible approach to overcome these limitations, thereby aiming towards equitable urban solutions. By bridging the divide between top-down and bottom-up planning, the approach proposes a "third way" of inclusive urban planning, grounded in participatory flexibility and iterative learning.

Previous studies have highlighted the significance of local knowledge for sustainable city planning, but also recognised the challenges associated with its incorporation into planning practices (Berglund, 2022; Calderon et al., 2022). Next to tapping into local knowledge, it is crucial to foster a sense of personal resonance and engagement so as to ensure the sustainability and suitability of the proposed changes to urban spaces. One way to foster a sense of personal resonance and engagement and tap into existing situational knowledge is the use of art-based methods, as art-based methods "have the capacity to communicate complex and nuanced understandings of neighbourhood" (Carpenter, 2022, p. 359). While the significance of art-based methods is often underestimated in urban planning, we argue that the example of the seedbed intervention, which is introduced in this article, is a promising approach to foster equitable and inclusive planning for urban sustainability. The article thus discusses in what way the integrated seedbed intervention approach, exemplified by the case of Umeå, can foster equitable planning processes for more sustainable cities.

This research and the introduced seedbed intervention approach represent an effort to: (a) address socio-cultural challenges associated with urbanisation by ensuring early, differentiated engagement of stakeholders; (b) systematically connect the potential of artistic methods with co-creation processes; and (c) create places with which stakeholders can better identify. As a result, we aim to contribute to the development of practical, scalable frameworks for creating more liveable and sustainable cities.

2. Background: The Seedbed Intervention as an Alternative Co-Creative Approach for Sustainable City Planning

The seedbed intervention approach discussed in this article was developed as part of the H2020 GoGreenRoutes project, which aimed at promoting health and well-being through the design and implementation of NbS. Within this project, the approach served as a preparatory step for the implementation of a NbS intervention in Umeå (and other cases, not further investigated in the frame of this article). The aim of the approach was to function as a co-creative and experimental intervention strategy to establish foundational conditions for subsequent NbS implementations. The seedbed intervention approach draws on the following key components, which are integrated under a unified concept: art-based methods to tap into local knowledge, method triangulation to foster a holistic approach, and the experimentalism of temporary urbanism for designing actor-focused, adaptable temporary interventions (Franz et al., 2015).

As a co-creation approach, also the seedbed intervention differs from other common forms of participatory communication. While other forms of participatory communication cover a wider spectrum of different

possible levels of engagement (Arnstein, 1969; International Association of Public Participation, 2017), co-creation aims for the higher end of the participation ladder due to its "active involvement of end-users in various stages of the production process" (Voorberg et al., 2015, p. 1335). This means that in co-creation approaches, end-users are significantly more involved, not only in the planning stages but also in the subsequent creation of, for example, a new green space, where they can engage in specific ways (Timpe & Christenn, 2022). It moreover stands out as an iterative process that allows for ongoing learning, reflection, and adjustment (Leask et al., 2019), thus rejecting a "predefined and linear pathway" of knowledge production (Følsgaard Grønvad et al., 2017, p. 6). In line with the circularity of co-creation processes is the attempt to overcome the divide between top-down and bottom-up approaches. Instead, the focus is on achieving a potentially high level of engagement in all stages, mutual learning, and co-ownership of the co-created knowledge and solutions. Mees et al. (2019) suggest distinguishing between public and governmental participation. The former arises when citizens participate in and contribute to policy-making that remains, however, both initiated and structured by the government. Governmental participation occurs when governments contribute to initiatives and projects that are independently originated, organised, and led by citizens and other non-state actors in response to an emergency or policy issue. Both forms can make use of co-creation approaches. Finally, compared to other forms of participatory engagement, co-creation "does not stop at actionable knowledge" but "requires practical outcomes," which is not necessarily foreseen in a typical participatory process (Prager, 2016). Wiek (2016) notes that practical outcomes can be "emotional, behavioural, physical and other changes in the real world." This means that ideally co-creation results in not just the development of a joint action plan, but also its implementation.

Several benefits are associated with the application of co-creation approaches in the field of NbS implementation. The idea of wide inclusion of different stakeholders is seen as beneficial for the joint definition of intervention objectives by taking a "step away from pre-defined issues and solutions towards reframing problems that open up the view on what interventions are needed" (Hölscher & Reil, 2019). It also allows for those stakeholders to be engaged who are often left out by expert-based decision-making or conventional participatory approaches, but whose input is highly needed, for the usability of the joint solutions (Brink et al., 2018) as well as to address the complexity and wickedness of environmental challenges by pooling and co-owning different kinds of knowledge (Schneider et al., 2019; Torfing et al., 2016; Wamsler, 2017). In the field of urban ecology and urban greenery, participatory processes are seen as crucial to overcoming a lack of environmental awareness and estrangement from nature (Dunn et al., 2006; Remme et al., 2021). A main challenge that has been identified, however, is related to the inclusive ideal of co-creation processes which are often challenged by power, knowledge, and trust imbalances, difficulties of including different groups and keeping them engaged throughout the process, the resource-intensive investment in good relationships, the facilitation of group dynamics, as well as the communication flow (Noppenberger et al., 2021). For NbS in particular, this entails also the question of balancing participatory knowledge and expert knowledge and suitable ways of gaining valuable insights into and being able to incorporate local situational knowledge (Brink et al., 2018; Nightingale, 2017; van den Hove, 2006).

The seedbed intervention seeks to overcome these limitations of traditional co-creation processes by offering a structured yet adaptable framework tailored to local contexts, which integrates art-based methods and triangulation to ensure addressing power imbalances and fostering comprehensive stakeholder engagement. Former research has shown that involving art-based methods can help to tap into local knowledge, thereby unfolding hidden knowledge or desires of citizens by the "capacity of art to make

present and not just represent" and reveal "what might be relevant" but difficult to retrieve with more conventional participatory methods such as surveys or focus groups (Berglund, 2022, p. 146). As Berglund (2022) aptly describes in her chapter "Science, Art and Other Ways of Knowing: A Proposal From a Struggle Over a Helsinki Green Space":

> There's no way of producing an adequate understanding of what might happen in a particular human *milieu* without paying attention to an infinity of details about all the other human and nonhuman elements, living and non-living, that populate, animate, and motivate that lifeworld. (Berglund, 2022, p. 149)

The seedbed intervention moreover follows the principle of flexibility and experimentation embedded in the theoretical framework of temporary urbanism, which has garnered attention within the realm of urban planning and design as a method to trial urban spaces, involve communities, and instigate favourable transformations with minimal investment and risk (Madanipour, 2017). This approach facilitates agility and adjustability in addressing dynamic urban issues and potentials. Additionally, pilot projects serve as a prevalent mechanism within temporary urbanism strategies to trial, for instance, novel policy endeavours or designs, and to solicit input prior to implementing permanent alterations. According to current debates on future urban development, it is emphasised that particularly flexible strategies are necessary to ensure resilient cities with a high quality of life (Carr & Dionisio, 2017). Carr and Dionisio combine aspects of flexibility and the involvement of diverse stakeholders and propose a "third way" of planning. Here, they start from a specific category of places which they describe as flexible spaces, such as e.g., "abandoned" or "vacant" spaces (Carr & Dionisio, 2017, p. 73). Carr and Dionisio (2017) interrogate the possibility of using such "flexible spaces" as tools for pursuing a third way of engaging in urban planning for shared space, instead of conventional expert-led and procedural-participatory frameworks. They also highlight that through participatory approaches and a shift in traditional roles, where planners act as mediators rather than decision-makers, there is an opportunity for citizens to openly share their knowledge and desires (Carr & Dionisio, 2017). For the seedbed intervention, this meant that the application of an iterative testing and flexible process was necessary. This process allowed us to refine in detail the sequences of various steps and establish an effective feedback loop to ensure that the interventions were well-calibrated and functional. It included planning workshops, participatory events, and an iterative feedback loop in which the local taskforce—identified with the help of the stakeholder analysis mentioned above—played a central role.

While these principles and methods in themselves are not entirely novel on their own (see Figure 1), the strength of the seedbed intervention approach lies in its integration into a cohesive and comprehensive framework. The goal is to develop locally appropriate and adapted equitable NbS interventions from the very early start together with stakeholders and see them in an even more active role than defined in co-creation approaches (Timpe & Christenn, 2022).

3. Methodology

The seedbed intervention is inspired by the principles and elements of temporary urbanism, such as temporary interventions, art installations, and the experimentation with various, art-based methods, including the photovoice method. Additionally, it is crucial that analytical activities are conducted prior to each seedbed intervention. These include an urban morphological analysis to understand the local context, a

SWOT (strengths, weaknesses, opportunities, and threats) analysis to identify strengths and potentials, and several planning workshops. Ultimately, after a detailed co-creative planning process, the actual event of the temporary seedbed intervention takes place—a time-limited event in which context-specific art-based methods are applied. In the case of the seedbed intervention, all steps are organised and guided by planners/researchers. A local taskforce, consisting of representatives from various user groups, is established at the outset and municipalities are involved from the very beginning. Following the seedbed intervention event, the results are summarised and presented by the planners/researchers and discussed in iterative feedback loops. These feedback loops were crucial as they provided further local knowledge even after the seedbed intervention event through for example questionnaires on a digital whiteboard (www.miro.com), comments on the report, or discussion after one of the often-recorded meetings.

As shown in Figure 1, a seedbed intervention systematically integrates, in addition to the survey method, art-based methods into the planning process, allowing implicit or commonly "unknown" knowledge to inform the design of locally relevant NbS, rather than relying solely on consciously accessible knowledge usually sought with sole reliance on more conventional methods like surveys or interviews (Berglund, 2022, p. 146). This aims to ensure a more user-oriented and inclusive NbS design, thereby ensuring that a wide range of diverse voices are heard (Morello et al., 2018).

The methodology of the seedbed intervention cannot be adequately explained merely by describing the implementation event and the application of its three methods: photovoice, canvas, and survey. Instead, it is

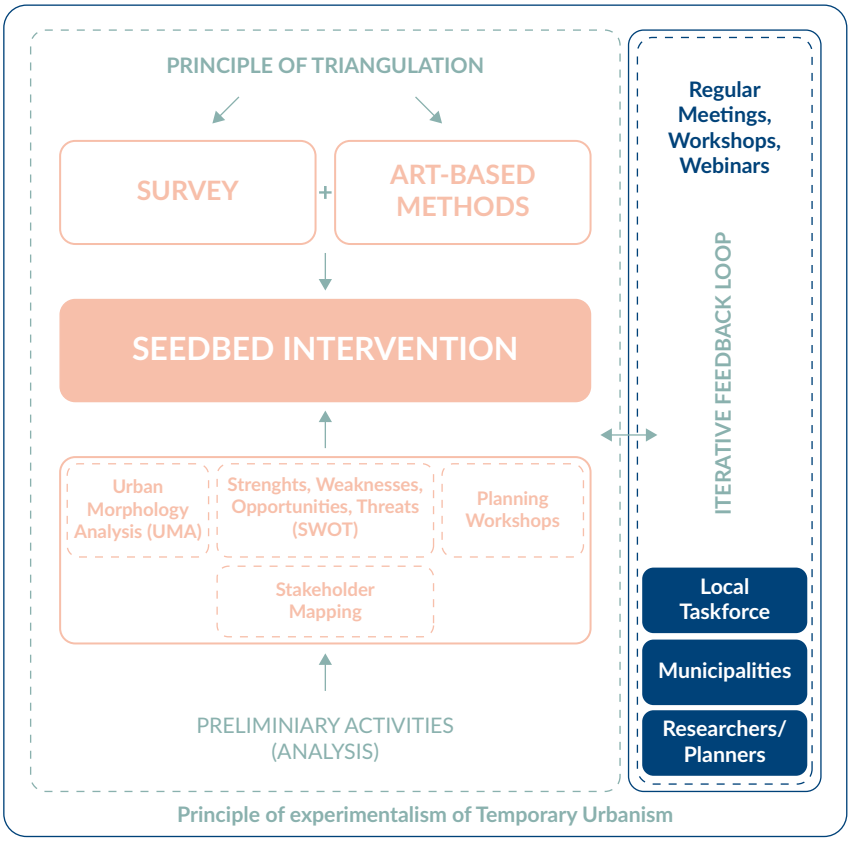

Figure 1. Graphic explaining the concept of a seedbed intervention and its interdependencies.

essential to delineate the process into distinct stages: the pre-stage, the main seedbed intervention event, and a forward-looking perspective on the introduction and implementation of the NbS intervention (see Figure 2). This structure is necessary to clarify the overarching aim of the seedbed intervention, which is intrinsically linked to the subsequent NbS. The intervention is conducted to facilitate a more effective integration of the NbS. While the focus of this article is not on elaborating on the subsequent NbS, this interconnectedness must be acknowledged to fully comprehend the purpose and scope of the seedbed intervention.

3.1. Pre-Stage

After the preliminary research in the form of different analyses (e.g., stakeholder analysis, urban morphology analysis), the local taskforce for Umeå and the final NbS intervention area were selected. The stakeholder mapping was conducted in close collaboration with Umeå's municipality (Bah et al., 2021) and identified diverse actors and led to the formation of a local taskforce. This taskforce, representing various citizen groups, participated in workshops and planning activities to ensure inclusive implementation of the seedbed intervention. Since 2020, preliminary activities leading up to the implementation of the seedbed intervention in 2022 have included initial meetings to prepare city partners for the co-creative approach to developing the interventions. A co-creation workshop was held in early 2021, followed by a stakeholder analysis and an urban morphology analysis. The analyses provided intensive local knowledge of spaces in Umeå, culminating in the selection of suitable sites along the pre-chosen Bölevägen route for interventions. The Bölevägen corridor in Umeå was selected as the focal area for both the seedbed intervention and subsequent NbS initiatives due to its significant potential to encourage active, non-motorised mobility and to foster the development of safe and inclusive urban spaces. This 1.6-kilometre-long street offers considerable opportunities for the integration of small parks and green interventions in its vicinity, making it a prime location for advancing urban sustainability and accessibility. Umeå is recognised for its robust foundation in equitable urban planning and its progressive implementation of planning strategies and legal frameworks. The principles outlined in the Comprehensive Plan for Umeå Municipality highlight that sustainable urban development is achievable only when all stakeholders are granted equal rights and when urban spaces are designed to ensure safety and inclusivity for all groups.

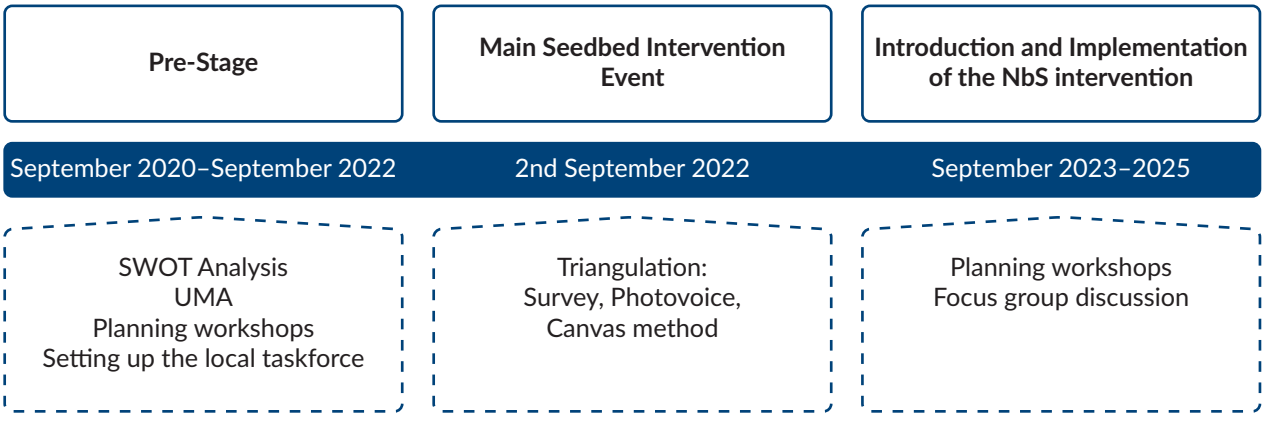

Figure 2. Graphic explaining the process of a seedbed intervention. Note: UMA = urban morphological analysis.

An overview of the seedbed intervention process is presented in Figure 2. Stakeholders were categorised into different user groups and a local taskforce was established to voluntarily represent diverse community opinions. The seedbed intervention was further concretised through a co-creative planning intervention workshop. The planning intervention workshop was promoted through a joint action (Co-Design With Citizens: The DIY Green Area) in the Aspgärdan area, emphasising the importance of clear communication with the public and creating incentives to motivate voluntary participation.

3.2. Main Seedbed Intervention

On September 2, 2022, the main seedbed intervention event was held along Bölevägen, attracting approximately 200 participants (see Figure 3). The event featured activities such as a concert, discussion groups, and interactive chalk drawings, all designed to stimulate public engagement and foster interaction among participants and organisers. These activities served as a catalyst to enhance participants' enthusiasm for three key participatory methods integral to the intervention: photovoice, canvas, and survey. The results were analysed and subjected to iterative feedback loops of discussions between the municipality, the local taskforce, and the researchers. The final outcome was afterwards presented to the public in the form of a short report.

As outlined above, the seedbed intervention approach builds on the principles of triangulation and experimentalism. To accumulate and understand the desired situational and new local knowledge as best as possible, a mixed-methods approach and triangulation were applied. The use of qualitative and quantitative methods can compensate for the weaknesses or biases of any single method, leading to more robust and credible findings. Methodological triangulation was also seen as the best way to understand the different

Figure 3. Collage of the seedbed intervention in Umeå.

perspectives of the participants in-depth and to gain a more comprehensive understanding of the research problem (Alele & Malau-Aduli, 2023; Turner et al., 2015). In particular, next to the preliminary preparatory studies mentioned above, the study employs a combination of the survey method and art-based methods. Among the latter are the canvas and the photovoice methods. Figure 4 explains the methodology of the study and the combination of all three methods.

The integration of art-based methods allowed us to gain a deeper understanding of local knowledge and user desires. Additionally, the objective was to elicit tacit knowledge from users, also referred to as "wordless knowledge" (Hoppe and Holmegaard, 2022, p. 327) and particularly to bring to light the emotions that users associate with the respective locations in the context of the seedbed intervention (Hoppe & Holmegaard, 2022).

As art-based methods, a seedbed intervention integrates the photovoice and canvas methods (see Figure 4). This use of art-based methods aims to tailor NbS interventions to local contexts as effectively as possible, fostering more locally appropriate and adapted solutions, and enhancing the acceptance and sense of connection between public spaces and their users. It also embodies a fundamental revaluation of the roles of users and planners, wherein planners increasingly guide processes and developments, facilitate art-based methods, analyse the resulting data and user narratives, and feed these insights back to users for discussion (Fenge, 2022; Thorpe, 2017). The art-based methods are triangulated with other sources of knowledge, following a mixed-methods framework and the principle of holistic triangulation (Turner et al., 2015). Rooted in the social sciences, the concept of triangulation has become established as a framework for combining multiple methods to gain a better understanding of a problem or situation; in the context of the seedbed intervention, it is used to generate the most comprehensive and holistic understanding of the on-site situation or local knowledge (Turner et al., 2015) and cross-validate if all voices have been heard. For the seedbed intervention, this means that the art-based methods are combined with survey data, predated by a stakeholder mapping, a SWOT analysis, and morphology analyses. Delbaere et al. (2024) highlight that it is crucial for developing more equitable open spaces that planners ask themselves who are key users and "with whom," in this case, NbS are developed. To better understand the local conditions and gain access to new local knowledge, it is essential to involve people and give them a voice (Morello et al., 2018), for which a stakeholder analysis is a crucial pre-step. According to Morello et al. (2018), this also leads to a greater engagement of people with the local activities and the place itself, potentially resulting in the establishment

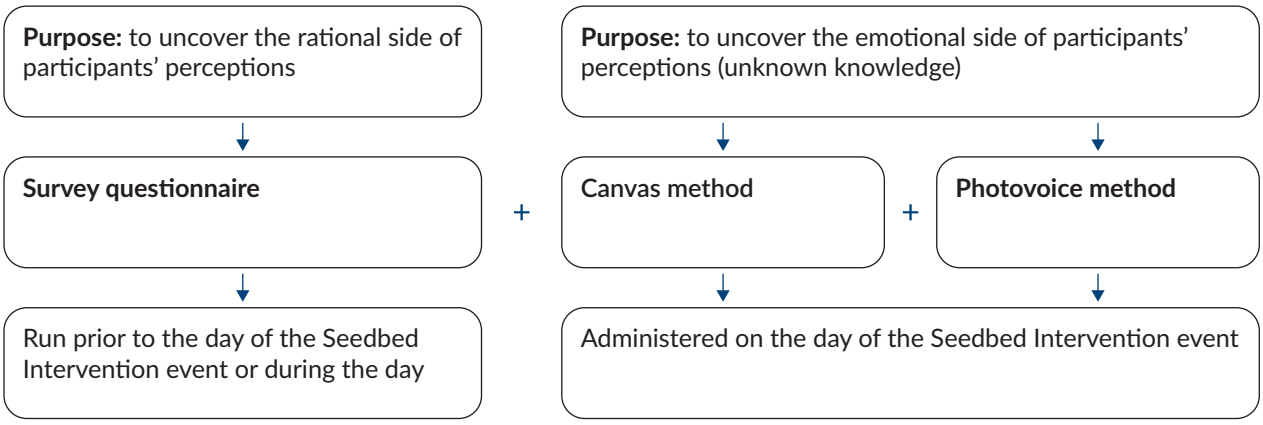

Figure 4. Methodology applied for the seedbed intervention in Umeå.

of new networks and, consequently, fostering innovation (Morello et al., 2018). An extensive urban morphological analysis was conducted to select and understand the location for the interventions as fittingly as possible (Bruen et al., 2021).

3.2.1. Canvas Method

Jointly with the local taskforce and the municipality of Umeå, the canvas method (Miller, 2020) was chosen as one of the art-based methods to be applied in the seedbed intervention. Approximately 200 people were part of the seedbed intervention event and an estimated number of 100 people joined the canvas method. The method is easy to use in a field context. It is economical, inexpensive, and needs no electricity. It allows for creativity and spontaneity. In addition, it is reliable and doesn't require any special skill to use. In Umeå, it consisted of a canvas placed somewhere near the site, usually in a tent, accompanied by project personnel or city partners. Above the canvas hung a banner with the question participants were supposed to answer through drawings and notes. The input question "If you had 3 wishes for the site, what would you wish for?" was used to initiate discussions (see Figure 5).

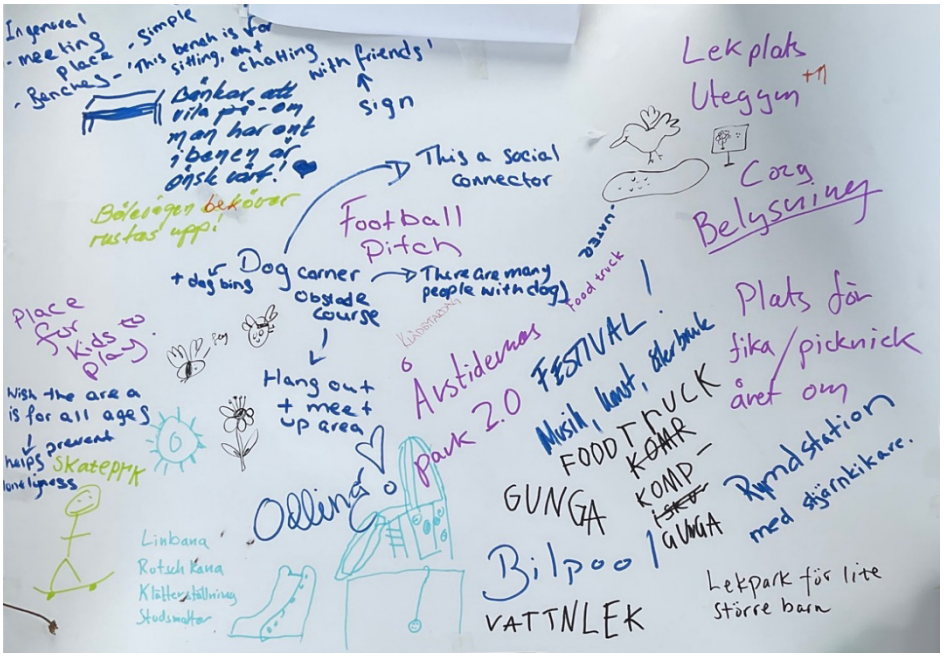

Figure 5. Ideas by participants joining the canvas method.

At the beginning, the canvas was just a white sheet of paper for many people, and no one wanted to start. After a question was added to the canvas and a lot of drawing was done, more and more participants joined and contributed. Especially discussions on people's wishes helped to enrich the process. Passers-by were encouraged to discuss, visualise, and write their opinions and wishes for the green spaces on the canvas. Then the next persons could add to those ideas (see Figure 5). During the process, participants were thus able to discuss intensively with the researchers and among each other and, if needed, walk through the area and further address what changes they would like to see. Often this led to valuable insights into the shared local knowledge. Afterwards, word clouds were used to summarise the results. The word cloud illustrates how frequently certain words have been mentioned by participants on paper as well as verbally (see Figure 6).

Figure 6. Summary of written ideas by participants joining the canvas method. The larger a word is displayed, the stronger the approval of the topic and the more frequently the topic was represented in drawings and texts.

3.2.2. Photovoice Method

Like other art-based methods, photovoice "uses artistic modes of expression (using imagination to create objects, environments, or experiences that can be shared with others)" (Carpenter, 2022, p. 353) to engage participants in creative processes that transcend linguistic and cultural barriers. These methods share a common ethos of democratising knowledge production and privileging diverse voices. What distinguishes photovoice is its unique integration of visual storytelling and participatory action. By combining photography with collective dialogue and advocacy, photovoice bridges the gap between individual expression and collective action. The photovoice method, first termed by Wang and Burris (1994, p. 172) as "photo novella," is a "powerful tool" (Kile, 2021, p. 30) for research and advocacy:

> Photo novella does not entrust cameras to health specialists, policymakers, or professional photographers, but puts them in the hands of children, rural women, grassroots workers, and other constituents with little access to those who make decisions over their lives. (Wang & Burris, 1994, p. 171)

Kile (2021) describes photovoice as "a form of participatory action research and community-based participatory research," but it is also common to approach photovoice in the context of art-based methods (Carpenter, 2022). Emerging from the intersection of art and social science, photovoice empowers individuals to narrate their stories through the lens of photography, amplifying voices often marginalised or unheard. This method extends beyond mere visual representation—it fosters dialogue, understanding, and social change (Wang & Burris, 1994). At its core, photovoice invites participants to capture images that reflect their lived realities, experiences, and aspirations. These images become catalysts for discussion, enabling participants to articulate their views, experiences, challenges, and aspirations. The photovoice method transcends traditional research paradigms by prioritising participant agency and empowerment. By centring on the lived experiences of participants, photovoice fosters a sense of ownership and agency, challenging dominant narratives and fostering empathy and understanding (Carpenter, 2022; Kile, 2021; Ruggeri, 2013; Wang & Burris, 1994).

Of the 200 people who participated in the seedbed intervention, 20 participants joined the photovoice method process. They were provided with instant cameras and were asked to choose from a list elucidating

various emotions to connect their discoveries with a one-word emotion from the list. The following guiding sentence were written on a paper above the table presenting the cameras: "Pick up the camera, take a photo of a spot-on site, and choose an emotion: active; distressed; interested; excited; upset; strong; guilty; scared; hostile; inspired; proud; irritable; enthusiastic; ashamed; alert; nervous; determined; attentive; jittery; afraid." The utilisation of this method within the project aimed to shed light on aspects that might otherwise remain unnoticed by urban planners and participants alike, aspects that were not previously apparent but could be brought to attention through the use of this visual method (see Figure 7). In general, visual methods tend to present the opportunity to uncover hidden insights in one's mind and function in this way as a direct channel to, in our case local, knowledge (Ruggeri, 2013).

Figure 7. Pictures taken by participants during the photovoice method describing the slide with the words "Happy" and "Inspired."

3.2.3. Survey Method

Surveys are used as a central method in studies related to NbS (Anderson et al., 2021), human–nature relationships (Kuldna et al., 2020), green space benefits and accessibility (Boyd et al., 2018; Mak & Jim, 2019), and health and environment (Nieuwenhuijsen et al., 2022). A survey was also used as part of the seedbed intervention's framework and applied in Umeå in order to gather valuable insights into citizens' perspectives on nature connectedness and well-being, as well as to identify the proximity and perceived nearness of natural spaces or levels of perceived safety in local natural spaces.

The survey questionnaire was developed collaboratively with the flexibility for the municipality of Umeå to include additional questions based on their specific contexts and interests. For the majority of questions, the Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013) was applied. Participants were requested to evaluate the following six statements on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*): "My ideal vacation spot would be a remote, wilderness area"; "I always think about how my actions affect the environment"; "I take notice of wildlife wherever I am"; "My relationship to nature is an important part of who I am"; "My connection to nature and the environment is a part of my spirituality"; "I feel very connected to all living things and the earth."

Additionally, supplementary items from the Eurobarometer survey conducted in 2015 were included, specifically focusing on the multifunctionality of green spaces and NbS (Alves et al., 2024; EU, 2015). In total, 47 participants in Umeå responded. The survey aimed to collect descriptive data on residents' experiences with green spaces, their perceptions of safety, and their connectedness to nature. Participants in Umeå were asked to assess their proximity to green spaces within a five-minute walk of their residence. The Umeå survey was conducted online prior to the event and on the day of the event and relied on self-reported data, providing a more personal understanding of residents' experiences and perceived access. Additionally, the survey included questions on safety and inclusivity, recognising the importance of these factors in public space usage. Gender-specific perceptions were explored, with particular attention to how women and other social groups experience safety in green spaces. This focus aligns with Umeå's commitment to gender-sensitive urban planning and highlights the role of safety in fostering inclusive green spaces.

3.2.4. Analysis of Data

Researchers and planners carried out an initial summative content analysis, which involves identifying specific elements in the data to interpret their contextual meaning (Hsieh & Shannon, 2005). All relevant data, including sketches and photographs, were gathered, digitised, and systematically organised. The data were then separately analysed and categorised according to the distinct methodologies employed. Subsequently, the results were presented on a dedicated platform accessible to city partners and local citizens, including the local taskforce.

This approach allowed participants to review the data in advance of a workshop, during which all findings were collaboratively discussed, and another round of summative content analysis was conducted. The workshop outcomes played a pivotal role in enabling municipalities to design tailored NbS interventions.

This process underscores the importance of early and continuous stakeholder engagement, fostering a shared sense of purpose and ownership while ensuring that urban interventions address both practical needs and community aspirations. By combining data preparation with open, participatory dialogue, the methodology effectively bridges the gap between technical planning and local knowledge, thereby promoting more inclusive and sustainable urban development.

3.3. Introduction and Implementation of NbS

The knowledge gained from the seedbed intervention informed the design and implementation of the NbS, which was partially implemented in 2023 and will be finalised in 2025. A report presenting the NbS intervention will be presented to the public by the beginning of 2025 and a draft version was already sent to the municipality of Umeå beforehand. The NbS will be a reconstruction of a street to make it more attractive for pedestrians and cyclists to use. While the street and a large bike lane are being built, four pocket parks are being developed to enhance nature connectedness, welcoming passers-by to take a break. Citizens of different ages are actively included to create the spaces and to emphasise their ideas. The multifaceted social benefits arising from innovative NbS interventions should be communicated more explicitly and with greater nuance. These strategies harbour the potential not only to enhance the climate resilience of our cities but also to fortify their social resilience, fostering more inclusive and sustainable urban ecosystems for the future (Vale, 2014).

4. Findings

The application of the canvas, photovoice, and survey methods in Umeå revealed nuanced insights into the community's aspirations and concerns for the Bölevägen route transformation. The canvas method captured a range of needs across different demographics, with specific suggestions—such as a community garden and traffic calming measures—providing actionable insights for urban planners. The photovoice method facilitated an emotionally resonant engagement with the space, particularly among children, whose photos and associated emotions highlighted the importance of playful, interactive elements in public areas. Furthermore, the photovoice method demonstrated significant potential for helping people perceive their environment anew and communicate their feelings through a different medium. The canvas method (see Figure 5) was highly effective, fostering lively conversations between participants and project partners, with participants writing and occasionally drawing their wishes. The survey added a structured perspective, linking local experiences to broader health and safety standards, though its limited response rate highlights the need for supplementary engagement strategies. Furthermore, it was necessary that consent forms were distributed online and on paper to stakeholders both prior to and on the day of the event for them to provide their consent to answer the survey questions and that the data gathered from the canvas and photovoice methods would be used for example for research and publications.

4.1. Canvas Method Results

In detail, the canvas method revealed distinct needs and desires for the transformation of the Bölevägen route across different demographic groups. Adults with young children showed minimal demands for personal amenities, focusing primarily on facilities for their children, such as a playground. Analysis of the canvas drawings showed that the most frequently expressed wish was for an interactive playground, closely followed by requests for a skatepark and climbing areas. These features indicate a strong preference for active, engaging spaces that can support children's physical activity and social interaction, reflecting parents' desire for safe, stimulating environments for their children. Some participants additionally mentioned that a café near the playground would enhance their experience by offering a place to relax and socialise while their children are playing.

Older participants (50+), on the other hand, demonstrated a broader and more community-oriented vision. Specific examples of suggestions included a community garden where residents could grow vegetables, promoting self-sufficiency and local food production. Another proposal was a dog obstacle course, with the participant noting that this feature could help address loneliness, providing an interactive space for dog owners to connect. These ideas highlight an interest among older adults in creating spaces that foster social interaction, well-being, and community resilience. Teenagers, however, struggled to articulate specific needs or ideas for the space, which may reflect their limited opportunities for input in urban planning contexts.

The canvas findings underscore the necessity of intergenerational design thinking and the value of actively soliciting and incorporating ideas from all age groups, especially those who might feel overlooked. Furthermore, a teacher from a neighbouring school emphasised the safety issues posed by high-speed traffic in the area. He reported that Bölevägen serves as a shortcut for commuters heading to the headquarters of Volvo, leading some drivers to exceed safe speed limits. His suggestion to lower the speed limit to 20–30 km/h underscores a critical safety concern, especially for young students, and provides actionable

feedback for traffic management interventions. This insight from the canvas method highlights the importance of engaging local stakeholders who are directly affected by the infrastructure.

4.2. Photovoice Method Results

The photovoice method provided unique insights by enabling participants to capture elements of the site that evoked emotions. Initially, participants were encouraged to explore independently with Polaroid cameras, documenting their emotional responses to different aspects of the site. However, managing equipment proved difficult, particularly with groups of young people and children. Twenty Polaroid photos were collected, successfully representing perspectives across age groups. Among these photos, eight images were directly associated with specific emotions. Participants linked these emotions to elements such as the temporary climbing structures and play areas, describing these as "inspiring" spaces that invited active interaction. For example, several children expressed enjoyment and excitement when using the temporary play structures, indicating that such installations could enhance the attractiveness of the route for young users. In another case, some participants noted that the act of drawing their ideas (linked to the canvas method) inspired them to think creatively about the space. This overlap between methods indicates that physical activities in a space, combined with creative exercises, can deepen engagement and foster a sense of ownership. The photos were not only expressive but also served as discussion catalysts, e.g., when the same object caused very different emotions, as shown in the pictures in Figure 7. The photovoice method thus facilitated an intuitive, emotionally driven engagement that provided insights beyond what structured questions might reveal.

4.3. Survey Method Results

The results of the survey are limited by the low number of responses (47 participants), which sets clear boundaries for statistically analysing the results. The higher scores indicate a stronger self-reported connection with nature. The results show a need for spaces that are universally perceived as safe and welcoming to all demographics, emphasising the role of environmental design in addressing these perceptions. The survey also used the NR-6 Nature Connectedness Scale to measure participants' relationship with nature. This scale, which assesses affective, cognitive, and experiential connections to the natural environment, revealed cultural differences in how residents connect with nature. Consistent with previous research, it was observed that participants from Nordic regions tend to view nature as more integrated with their lives, whereas other cultural groups may see it as more distinct (Gäckle et al., 2023). This insight is crucial for urban greening initiatives, as understanding cultural attitudes toward nature can inform the design of spaces that resonate with the local population.

4.4. Overall Understanding of the Findings

The findings underscore the importance of employing a multi-method approach in urban planning, as each method contributes unique and complementary insights. The canvas and photovoice methods, by fostering active participation and emotional engagement, addressed some of the limitations of the survey, which struggled with engagement despite yielding valuable data on nature connectedness and safety perceptions. By integrating descriptive data from surveys with the richer, narrative-driven data from the canvas and photovoice methods, Umeå can better tailor its urban interventions to address both the expressed needs

and the underlying emotional and cultural contexts of its residents. This holistic approach to community engagement not only supports the creation of inclusive, health-promoting spaces but also strengthens the community's connection to and stewardship of their environment. The principles of triangulation applied during the seedbed intervention led to a shift in the self-perception of the end-users, as they were surprised to be consulted "so early" in the process and were able to respond very freely. The participants emphasised the critical importance of early dialogues in clarifying the purpose and expectations of the NbS implementation process. Participants highlighted outcomes such as enhanced community engagement, improved safety, enriched educational opportunities, and strengthened community connections, underscoring the necessity of early involvement in effectively addressing these issues (Gäckle et al., 2024).

The results also show that the seedbed intervention approach improved the alignment between local needs and NbS design, connected diverse user groups, and catalysed curiosity, interest, and participation among citizens with the help of applying art-based methods. Despite prior co-creative experiences, Umeå found it novel to involve the public so early in the planning process. The planning and implementation steps for the proposed NbS interventions had to be organised sooner than usual to accommodate public concerns.

5. Discussion and Conclusion

The integrated seedbed intervention approach, as demonstrated in Umeå, fosters equitable planning processes by prioritising inclusivity, adaptability, and early stakeholder involvement, which are essential for more sustainable urban development. The approach addresses key limitations in traditional urban planning, such as power imbalances, limited engagement, and the exclusion of local knowledge, by integrating co-creative planning with art-based and participatory methods.

At its core, the seedbed intervention builds on the principles of experimentalism and triangulation with a specific focus on the inclusion of art-based methods. As the analysis showed, the triangulation of methods in general and the inclusion of art-based methods in particular, benefit the NbS planning process in multiple ways. First, this approach elucidates situational knowledge. As understanding the needs and preferences of citizens interacting with the proposed solutions is paramount to sustainable city planning, this holistic approach is preferable to "usual" participatory methods, as it allows to shed light on tangible but also more tacit knowledge. The initial irritation and novel experience of being asked in "unusual" ways, such as via the canvas and photovoice method, encouraged deeper interactions and reflections on the surroundings—an effect that has also been observed in former studies (Carpenter, 2022; Ruggeri, 2013). The seedbed intervention thus provides an approach to elucidate local knowledge more deeply, including also emotional accounts, which former studies have pinpointed as crucial to place-making and human–nature relations in the city (e.g., Berglund, 2022) and to ensuring diverse voices are heard in the planning of NbS interventions—a central challenge to equitable and more just planning processes. Also, key findings reveal that engaging stakeholders early and continuously fosters a stronger sense of ownership and collaboration, critical for sustainable outcomes. The process helped bridge top-down planning with local insights, ensuring that proposed solutions, such as playgrounds, traffic calming measures, and community gardens, were inclusive and aligned with residents' expectations. Additionally, art-based methods, particularly the photovoice method, allowed participants to express their emotions and ideas creatively, capturing complex social dynamics often overlooked by conventional planning tools.

Following principles of experimentalism common to temporary urbanism, a seedbed intervention involves stakeholders from the outset, which sets it apart from more conventional participatory and co-creation processes, which may engage stakeholders at later stages. By establishing a local taskforce at the outset, a seedbed intervention ensures that varied voices are engaged continuously, thereby enhancing trust and mutual understanding among stakeholders. This early and sustained engagement fosters a stronger sense of ownership over proposed solutions, bridging the gap between top-down governance and local needs. The iterative nature of the approach allows for real-time feedback, learning, and adaptation, ensuring that evolving conditions and community insights are continuously integrated into the planning process. This contrasts with more conventional, linear urban planning models, which are less responsive to stakeholder feedback and contextual changes.

Additionally, the facilitation of low-risk experimentation enables municipalities to test potential solutions—such as playgrounds or green spaces—before making permanent commitments, further ensuring that implemented solutions are both equitable and effective. The inclusion of art-based methods enriches the process by promoting creativity and deeper engagement, fostering innovative outcomes aligned with the lived experiences of residents. These elements collectively contribute to more just and inclusive planning processes that can accommodate diverse urban challenges.

Moreover, by offering a clear yet adaptable framework, the seedbed intervention approach is applicable across different urban contexts. Its flexibility in accommodating various stakeholder group sizes and types of interventions makes it a replicable model for other cities seeking to promote sustainable development. Ultimately, the approach not only strengthens urban resilience but also aligns closely with international sustainability goals, particularly SDG 11, by advancing inclusive and equitable urban transformation processes.

Overall, the seedbed intervention approach catalysed a shift in Umeå's municipality and citizens' collaboration, promoting inclusivity and equity in urban transformation. By systematically integrating community engagement, iterative co-creation, and diverse knowledge sources, the approach supports the development of liveable, resilient urban spaces, directly contributing to the realisation of SDG 11 and the "Leave No One Behind" principle. Now adapted to the era of sustainability planning, studies of NbS and green infrastructure alike have aimed for deeper participation from below (Wilker et al., 2016), based on the principle that the knowledge and agency of citizens could actively contribute to more sustainable outcomes. A seedbed intervention aims to deeply understand participants' perspectives and actively use strategies to effectively organise co-creation processes, which is indicated as central to creating more targeted, acceptable, valuable, and enduring outcomes, improving the credibility of the results and the chance that new innovations will be adopted in practice (Stevens et al., 2020; van Dijk-de Vries et al., 2020). As such, the approach also aligns with the pursuit of UN's SDG 11, which aims to establish "inclusive, safe, resilient, and sustainable cities and human settlements" (UN, 2024), and offers a promising pathway toward greener, fairer, and more resilient urban environments.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Data used in this article is available in Gäckle et al. (2023) and Gäckle et al. (2024).

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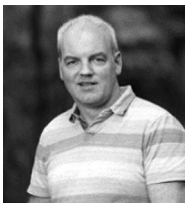

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