Planting futures: School-based food forests and their contribution to holistic education for sustainable development

School-based food forests are innovative tools which provide holistic education for sustainable development learning. They foster sustainability transformations through hands-on learning, critical thinking, and human-nature connections.

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Abstract
This study explores the integration of school-based food forests (FF) into education systems and their potential to foster holistic education for sustainable development (ESD). Using the Whole School Approach (WSA) as a conceptual framework, the research examines the FF project at Chestnut School in Northern Germany, employing interviews and participatory methods to identify its educational, ecological, and social contributions. As edible, perennial, and biodiverse agroforestry systems, FFs address key sustainability challenges. Thereby, they support holistic school transformation, positioning themselves as a model for innovative, solution-oriented ESD. Beyond ecological and recreational benefits, FFs offer interdisciplinary and hands-on learning environments that bridge formal and informal education. They promote systemic thinking, agency, and self-efficacy, enabling students to connect personal actions with broader sustainability goals. The Chestnut School case underscores the FF's potential to foster human-nature connections, critical thinking, and sustainable food practices.

Keywords
case study, edible forest garden, education for sustainable development, food forest, holistic learning, sustainable food systems, Whole School Approach

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Moving towards a sustainable society requires comprehensive transformation and deep changes in perspectives, values, and structures (Meadows 1999, Abson et al. 2017). Education has been considered "the greatest resource" in the sustainability sciences for decades (Schumacher 1973, p. 83). Accordingly, scholars have been calling for a redesign of the education system through transdisciplinary learning processes that cut across disciplines, are solution-oriented, and increase agency (Michelsen and Fischer 2019, Stoltenberg 2016). Education for sustainable development (ESD) aims to design transformative learning settings to nurture those qualities in learners and to empower learners with the competencies, understanding, and values they need to shape a sustainable future (Michelsen and Fischer 2019, Stoltenberg 2016, Wals and Mathie 2022). Beyond that, the Whole School Approach (WSA) extends ESD into schools holistically, encouraging systemic change through critical reflection and restructuring of internal practices (Holst 2023, Wals and Mathie 2022). Holistic here refers to the approach of exploring and addressing sustainability issues "from multiple perspectives in an integrated and relational way", integrating the different cognitive, social, and emotional aspects of learning (Wals and Mathie 2022, p. 2). WSA is increasingly recognized internationally, including UNESCO's *Education for Sustainable Development for 2030* program (2020). Recent studies show that students exposed to WSA models feel more capable of contributing to sustainability and translating school experience into personal actions (Holst et al. 2024).

In addition to the restructuring of institutions and the rethinking of education, human-nature connectedness is a critical realm of leverage for sustainability transformation (Abson et al. 2017). Children and young people are spending less time in nature than previous generations, leading to an "extinction of experience" and disconnect with nature (Miller 2005, Soga and Gaston 2016). Moreover, there is a lack of awareness concerning food, its production processes, and associated environmental and social impacts (Fischer et al. 2019). Global food systems represent another critical field for transformation research, contributing to pressing challenges of our time, including climate change, biodiversity loss, soil degradation, reduced drinking water, food insecurity, and global injustice (Willett et al. 2019, Weber et al. 2020).

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FIGURE 2

FIGURE 2: View of a community square in the food forest of Berlin Britz, Germany.

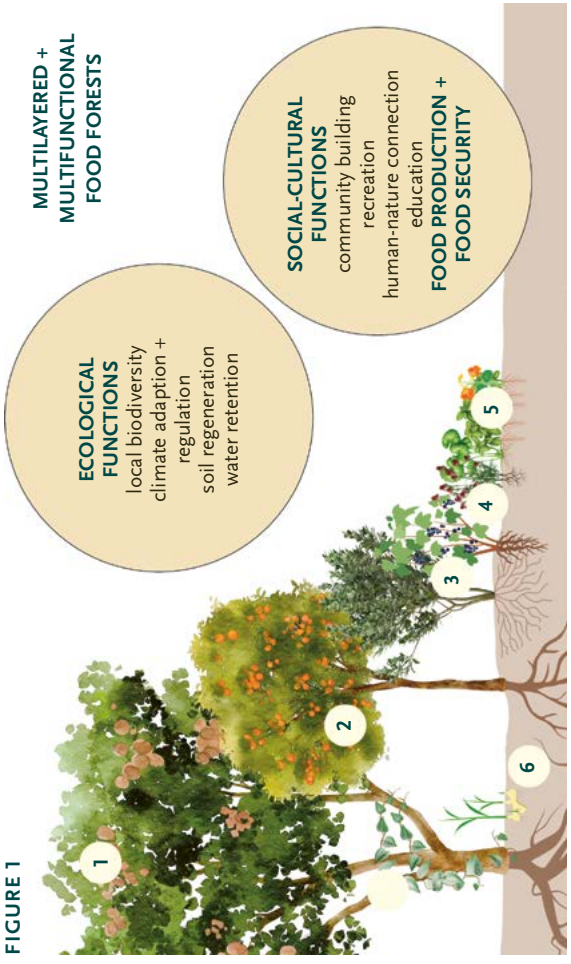

FIGURE 1

FIGURE 1: Schematic representation of the multilayered and multifunctional nature of food forests. Layers: **1** upper tree layer, e. g., sweet chestnut (*Castanea sativa*), **2** lower tree layer, e. g., medlar (*Mespilus germanica*), **3** shrubs, e. g., autumn olive (*Elaeagnus umbellata*), **4** herbaceous plants, e. g., sage (*Salvia officinalis*), **5** ground cover, e. g., wild strawberry (*Fragaria vesca*), **6** root layer, e. g., skirret (*Sium sisarum maritima*) and **7** vertical layer, e. g., kiwiberry (*Actinidia arguta*).

Food forests (FFs) are a novel food solution that has recently gained traction by addressing these challenges and combining a variety of ecological and social-cultural functions. FFs are complex and biodiverse agroforestry systems that cultivate edible, perennial plants in multiple layers (figure 1; Crawford 2012, Jacke and Toensmeier 2005). They can contribute to local food security and increase the availability and accessibility of nutrient-rich foods (Park et al. 2018). As they mature, FFs evolve into more natural, multifunctional, and self-regulating ecosystems, demonstrating enhanced resilience to pests, diseases, and extreme weather events. FFs are an ancient practice of mimicking natural forest structures in food production and are still prevalent in indigenous and traditional practices (Kumar and Nair 2004).

Beyond food production, FF systems are adaptable to a multitude of needs – for example, biodiversity, climate regulation, recreation, and community building. Some 40 % of the social-cultural services that FFs provide are related to education (figures 1 and 2; Albrecht and Wiek 2021). The positive learning outcomes and potential to strengthen children's emotional connection to nature fostered by school gardens are acknowledged in empirical studies (e. g., Blair 2009, Gibbs et al. 2013). However, there is a lack of studies examining the educational potential of FF.

This study explores school-based FFs as an innovative approach to linking ESD learning and sustainable food systems. To identify the contributions of FFs to the transformation of learning settings and the advancement of ESD learning, I employ a transdisciplinary case study at Chestnut School[1] in Northern Germany, where an FF is developed. The study addresses the following question: How can school-based FFs support holistic ESD learning?

Overall research design

In an explorative, qualitative research design, this study combines literature research with a transdisciplinary case study approach consisting of semi-structured interviews and a participatory future workshop. First, I used the WSA framework to conceptually analyse the potential of school-based FFs in general. I structured the contents of relevant literature on FFs and school gardening programmes according to the model. This provided the foundation for the subsequent empirical procedure. In a second step, I employed the transdisciplinary case study approach to empirically analyse a concrete application of FFs; namely, the FF project at Chestnut School, to test and to further develop the conceptual framework.

1 The name of the school is anonymized by a pseudonym.

Conceptual framework and analysis: School-based food forests through a Whole School Approach perspective

To examine how school-based FFs can be embedded in school systems holistically, I use, as a conceptual framework, the WSA flower model by Wals and Mathie (2022). The WSA flower model consists of six interrelating elements (Wals and Mathie 2022, p. 3): 1. vision, ethos, leadership, and coordination, 2. institutional practice, 3. curriculum, 4. pedagogy and learning, 5. capacity building for all staff, and 6. community connections.

Vision, ethos, leadership, and coordination

Establishing a school-based FF requires defining a vision, focal uses, core values, and strategies for its integration and operation, as well as teaching approaches, all aligned with the school's ethos. The entire school collaborates to enable systemic change led by supportive school leadership (Holst 2023, Wals and Mathie 2022).

Institutional practice

Schools acting as sustainability role models require not only teaching about sustainability but embodying it across school activities, thus creating an authentic learning environment (Holst 2023). FFs contribute to ecological sustainability on school grounds by supporting local biodiversity, climate adaption, soil protection, and water retention (Albrecht and Wiek 2021). Moreover, FFs support well-being, reduce stress, and restore human connections with nature (Stoltz and Schaffer 2018). The development of a culture of coexistence that is open to relationships, inclusion, empathy, and emotionality is key to a WSA (Wals and Mathie 2022), and can be fostered in FFs as playing and relaxing together with friends is highly valued by children (Hammarsten et al. 2019).

Curriculum

Although schools retain some flexibility concerning the content and methods for ESD, its integration into the formal educational curricula is crucial (Grundmann 2017, Holst 2023, NP BNE 2017). FFs have the potential to contribute to this integration, as they provide a tangible representation of complex and abstract sustainability concepts (Almers et al. 2018). Students learn significantly more about plant growth and are better able to understand food justice, reduce food waste, and develop a greater appreciation for food itself (Blair 2009, Fischer et al. 2019).

Pedagogy and learning

Transformative and socio-emotional learning engaging "mind, body, heart and soul" is conducive to implementing a WSA (Wals and Mathie 2022, p. 5). As a daily and low-barrier outdoor learning environment, school-based FFs can provide a variety of hands-on learning experiences and access to nature (Shi 2023, Askerlund and Almers 2016). Students also develop a sense of self-efficacy, joy, and pride when actively contributing to the evolution of the FF (Almers et al. 2018). FFs support systemic thinking by functioning as a "small-scale model of the global ecosystem", thus helping to connect local actions to global environmental impacts (Almers et al. 2018, p. 255). In addition, understanding and experiencing the FF system and its living organisms encourages respect and care for the environment (Hammarsten et al. 2019).

Community connections

Schools as societal microcosms must engage internally and externally with stakeholders, including non-governmental organizations, local authorities, and other educational institutions (i. e., peer-to-peer learning; Holst 2023, Wals and Mathie 2022). The FF is a school community project, in which a range of stakeholders play a role, including the school's canteen and clubs. Parents can provide a wide range of resources and contribute to collaboration projects within the wider community (Maliotou and Liarakou 2024). This can foster a sense of emotional attachment and belonging (Askerlund and Almers 2016).

Capacity building

WSA emphasises sustainability as a field of action for all parts of an organisation. Teachers, in particular, can empower students to become agents of change (UNESCO 2020, NP BNE 2017), but all school personnel are expected to be authentic role models, demonstrating the necessary competencies to implement WSA (Wals and Mathie 2022). This underscores the significance of engaging the school community in the process of creating an FF as a sustainability project, as outlined in the ensuing case study.

Empirical part: Case study

Case description and participants

The case study focuses on the FF project at Chestnut School, a municipal secondary school in a medium-sized town in Northern Germany, with an enrolment of over 1,000 students. A planning office has been redesigning the school's outdoor area for several years and is coordinating a participation process. The FF project >

GAIA Masters Student Paper Award

Julia Gobs is the winner of the 2025 *GAIA Masters Student Paper Award (GMSPA)*[a]. Her paper *Planting futures: School-based food forests and their contribution to holistic ESD learning* was selected by an international jury and is now published in *GAIA* after successful editorial board peer review.

The *GMSPA* is open to Masters students who are encouraged to submit their results from research-based courses or Masters theses in the field of transdisciplinary, environmental, and sustainability science. The winner will be granted a prize of 1,500 euros, as well as a free one-year subscription to *GAIA*. The 2025 award was endowed by the Selbach Environmental Foundation and Dialogik gGmbH.

a For more details see *www.oekom.de/publikationen/zeitschriften/gaia/c-131*.

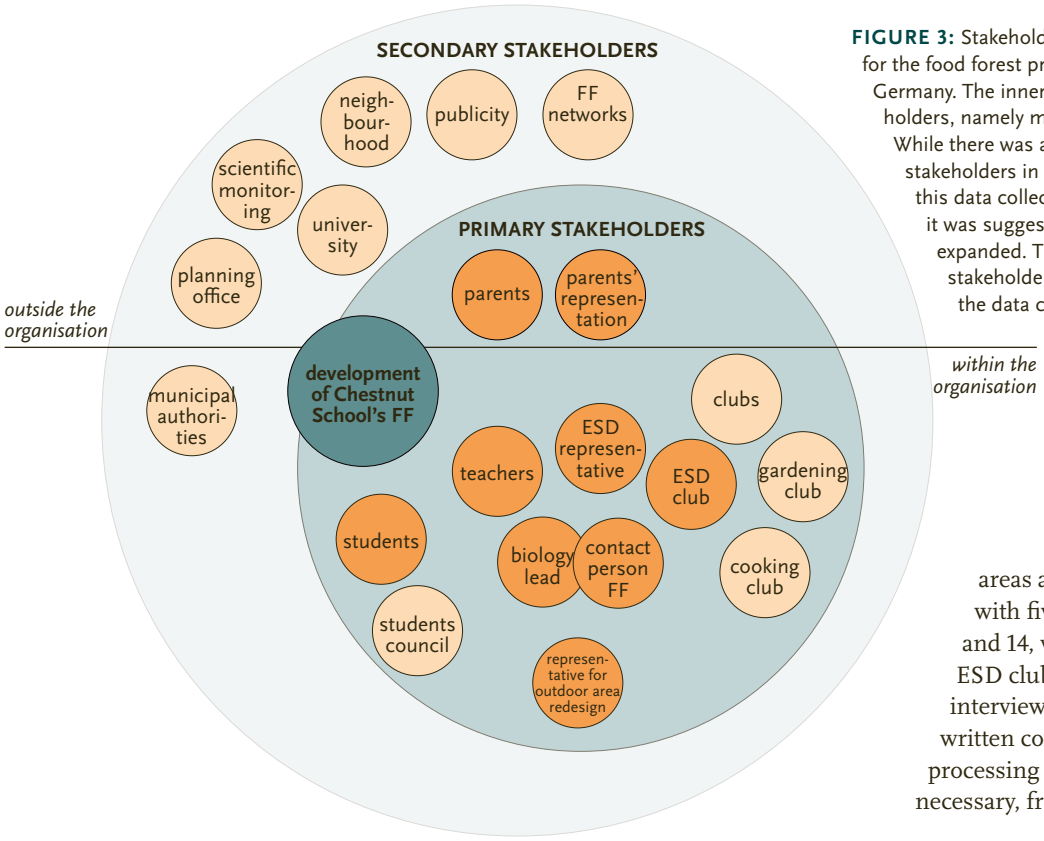

FIGURE 3: Stakeholder mapping of the relevant stakeholders for the food forest project at Chestnut School, Northern Germany. The inner circle represents the primary stakeholders, namely members of the school community. While there was already some contact with the secondary stakeholders in the outer circle, they are not the focus of this data collection process. As the project develops, it was suggested that stakeholder participation be expanded. The orange-coloured groups are the stakeholders/stakeholder groups who took part in the data collection (ESD: education for sustainable development; FF: food forest).

was initiated at a later stage by the head of the biology department following a visit to a nearby FF. Consequently, the FF was initially planned separately. However, collaboration has been maintained between the planning office, the municipality, the school management, and the university. The planned FF will encompass an area of approximately 1,000 m² and will be located on a neighbouring space, made available by the city.

I identified potentially relevant stakeholders and evaluated their importance to the project using the systematic method proposed by Leventon et al. (2016). I selected stakeholders who are directly affected by the development and would be able to exert a decisive influence on the project through their legitimacy, skills, knowledge, and networking abilities (figure 3, appendix 1[2]; Lang et al. 2014, Lelea et al. 2014).

Data collection

Data collection was authorized by the state office for schools and education, and took place between February and April 2024 with a total of 17 participants from the school community (table 1).

Semi-structured interviews

To gain a deeper understanding of the school's expectations and needs for the FF, as well as to identify potential challenges and concerns, I conducted five semi-structured interviews with key school members on-site. Interview guidelines were based on the key elements of WSA to ensure comparability and a pre-test was carried out. I interviewed four teachers from different subject areas and conducted one group interview with five students between the ages of 10 and 14, who were members of the school's ESD club. Furthermore, I transcribed the interviews nonverbatim. I had obtained written consent for participation and data processing from participants and, where necessary, from their parents.

Future workshop

Future workshops are particularly suited for transformative teaching and learning processes, as they offer the opportunity to address societal challenges through a creative, solution-oriented, and democratic negotiation of alternative futures (Appel 2023, Jungk and Müllert 1989). I organised a three-hour future workshop in which participants collectively explored the relevant functions, needs, and desires connected to the FF, and were encouraged to engage with the development and design process on an ongoing basis. The workshop comprised three main phases: criticism, utopia, and realization, and was conducted in a mixed group of 16 stakeholders.[3]

Data analysis

I analysed the empirical data using a structured qualitative content analysis method following Mayring and Fenzl (2022). The dataset consisted of the transcribed interviews, as well as the visual and written outcomes of the future workshop. I derived the main codes[4] deductively from the conceptual framework. During and after the first round of coding, I inductively supplemented and adapted the subcodes to reflect new insights from

2 The detailed description of the stakeholders is presented in the online supplement, appendix 1, accessible at *https://doi.org/10.14512/gaia.34.2.20.suppl*.
3 The detailed procedure of the future workshop is presented in appendix 2 (see online supplement[2]).
4 The category system with main codes, subcodes, and coding rules can be found in appendix 3 (see online supplement[2]).

TABLE 1: Overview of all participants (n = 17) and the form of data collection for a future workshop regarding a food forest project at the Chestnut School in Northern Germany. (ESD: education for sustainable development).

NR.	PARTICIPANT	ROLE	METHOD OF DATA COLLECTION
T01	teacher	contact person for the food forest, head of biology department; teacher in biology, chemistry	interview and future workshop
T02	teacher	representative for outdoor area redesign; teacher in maths, sports	interview and future workshop
T03	teacher	teacher in biology, English	interview and future workshop
T04	teacher	ESD representative; teacher in geography, German, maths	interview, future workshop, and present at group interview
S05	student	year 5, ESD club	group interview and future workshop
S06	student	year 5, ESD club	group interview and future workshop
S07	student	year 5, ESD club	group interview and future workshop
S08	student	year 5, ESD club	group interview and future workshop
S09	student	year 7, ESD club	group interview
10	student	year 5, ESD club	future workshop
11	teacher and parent	teacher in biology, chemistry	future workshop
12	parent	parent representative	future workshop
13	student	year 9	future workshop
14	student	year 9	future workshop
15	student	year 9	future workshop
16	student	year 9	future workshop
17	student	year 9	future workshop

the data. Subsequently, I carried out two further coding cycles, thus ensuring a close alignment between the theoretical basis and the empirical data.

Empirical results

Contributions of the Chestnut School food forest to the Whole School Approach

The results of the interviews and the future workshop are structured according to the WSA model used in the conceptual analysis and in the data coding, and are visualised in figure 4 (p. 102).

Vision, ethos, leadership, and coordination

Participants expressed enthusiasm for the FF project, viewing it as a concrete step toward sustainability. Moreover, it aligns with the school's stated educational mission: "It's critical to instil environmental responsibility as part of general education. And that's why I think that this FF is a great tool" (T02)[5]. Teachers envisioned the FF as a sustainable system that requires minimal intervention and is self-supporting: "We're moving away from doing things without thinking to systems that sustain themselves" (T03).

Institutional practice

The participants at Chestnut School envisioned the FF as a refuge for nature, creating an "ecological sanctuary" (T02) for plants and animals. Practical ideas that emerged from the future workshop included wildflower meadows, bird houses, bat nesting boxes, and a pond for amphibians and insects. The FF is also expected to provide a more pleasant microclimate providing cooling shade during the summer months.

The FF is perceived as a "paradisiacal retreat" (T04) for social interaction, relaxation, and recreation, accessible to all members of the school community. One teacher suggested it could serve as a quiet retreat for students with special needs, such as children with autism.

Curriculum

The participants identified strong interrelations between the FF, sustainability, and the subjects they teach that would facilitate the generation of interdisciplinary ideas. In biology, students could study ecological relationships: "How does this forest function? What interactions are taking place?" (T03). The biology lead presented a curriculum covering all grades from plant studies in fifth grade, photosynthesis and ecology in seventh grade, to nutrition in eighth grade. Additionally, teachers viewed the FF as a model for sustainable agriculture, which would help students understand the changes needed to transform current food systems. Accordingly, geography could investigate agricultural practices and land use, demonstrating that farming does not have to use conventional methods. The ESD representative identified the FF as a practical means of connecting the *Sustainable Development Goals*[6], examining how the concept of "zero hunger" is >

5 Direct quotes from interviews have been translated from German and the interviewed teachers and students have been labeled T01–S09 (see table 1). The results of the future workshop cannot be attributed to individuals as they refer to protocols.

6 The *Sustainability Development Goals (SDGs)* are a set of 17 goals adopted by all United Nations member states in 2015. They apply to the entire global ...

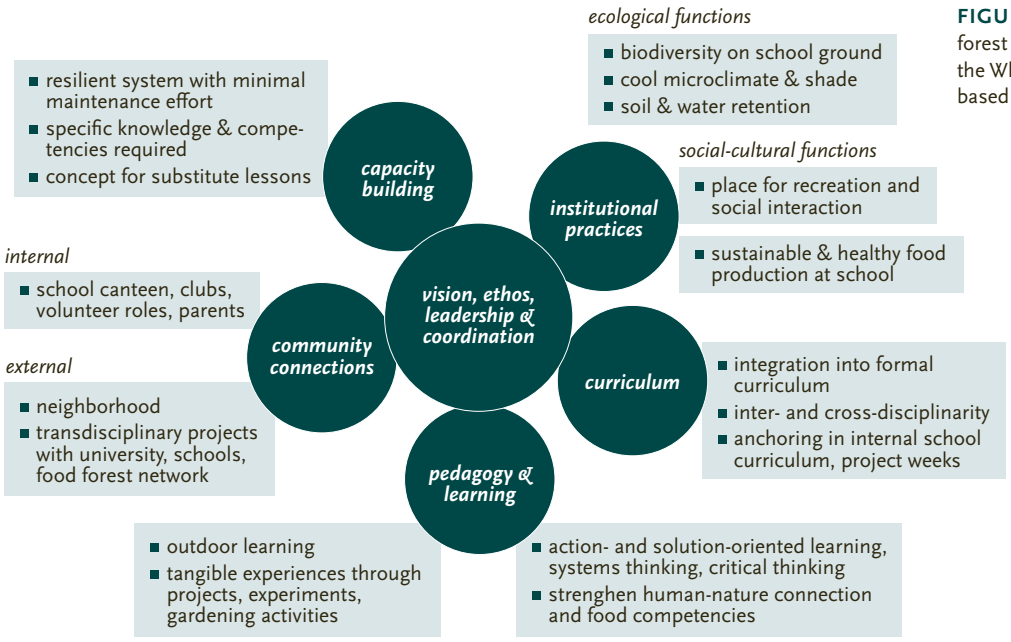

FIGURE 4: The Chestnut School food forest contributes to the key elements of the Whole School Approach flower model, based on Wals and Mathie (2022).

linked to sustainable agriculture. In the future workshop, the participants also debated the possibility of facilitating cross-curricular projects and integrating subjects such as art or sport.

Pedagogy and learning

Teachers and students envisioned the FF as a learning space in which students gain practical knowledge through outdoor experimentation and environmental observation. One teacher underscored the necessity of moving beyond theoretical discourse and emphasized the "role of action competence and individual reflection" (T04) in driving tangible outcomes.

Many expressed interest in a "green classroom" where any subject could be taught: "Even with an English class, it's just a nice place to be" (T03). Students desired more outdoor learning: "It would make classes more exciting" (S06). Teachers said that students are more attentive outside, and even older students ask more questions. Such methods allow for deeper engagement, as one teacher explained: "It's also about paying attention, seeing things, and drawing conclusions" (T03). Teachers viewed the FF as a multi-sensory learning experience that promotes identification with nature and retention of knowledge: "Seeing, feeling, and working together creates identification and deeper learning" (T01).

The FF was regarded as an "ecosystem in miniature" (T03) offering a unique opportunity to observe the intricate dynamics of natural systems directly and to make systems thinking tangible. Participants proposed implementing signage with engaging questions, a quiz trail, or a school planner with seasonal updates and recipes.

One teacher observed a lack of experience with and awareness of plants and animals among some students. The FF was seen as an opportunity to foster closer ties with nature and provide students with new perspectives. In terms of nutrition education, the participants saw possibilities to experience seasonal cycles and the entire process of growing, harvesting, and processing food, fostering an understanding of sustainable consumption habits. Students described home-grown food as "tastier and more satisfying" (S08). Therefore, one of the goals of the FF is to provide fresh produce for the school and encourage students to consume fruits, herbs, and berries directly from the site. Teachers proposed incorporating garden produce in school meals and students suggested making herbal iced tea or jam.

Community connections

Collaboration with other schools, universities, and national FF networks were seen as beneficial for shared learning and as inspiration. The FF was seen as potentially benefiting the neighbourhood and broader community as a public green space. However, concerns about vandalism arose. Teachers proposed introducing new clubs or volunteer roles to foster a sense of shared responsibility, such as watering or maintenance days. Parents were seen as valuable contributors of resources and expertise, especially in the implementation phase.

Capacity building

To develop educators' competencies, one teacher proposed integrating the FF into substitute lessons, allowing all teachers to benefit from using the FF in a low-threshold manner. However, strict curricula were also seen as a constraint, with one teacher noting that "[i]f you didn't have such a tight and narrow curriculum, in other words, if you could break out of this corset a little, you would have many more possibilities" (T02).

6 … community and encompass the environmental, social, and economic dimensions of sustainable development, as well as inter- and intra-generational equity (UN 2015). ESD is formulated as a key factor in achieving all 17 *SDGs* (UNESCO 2020).

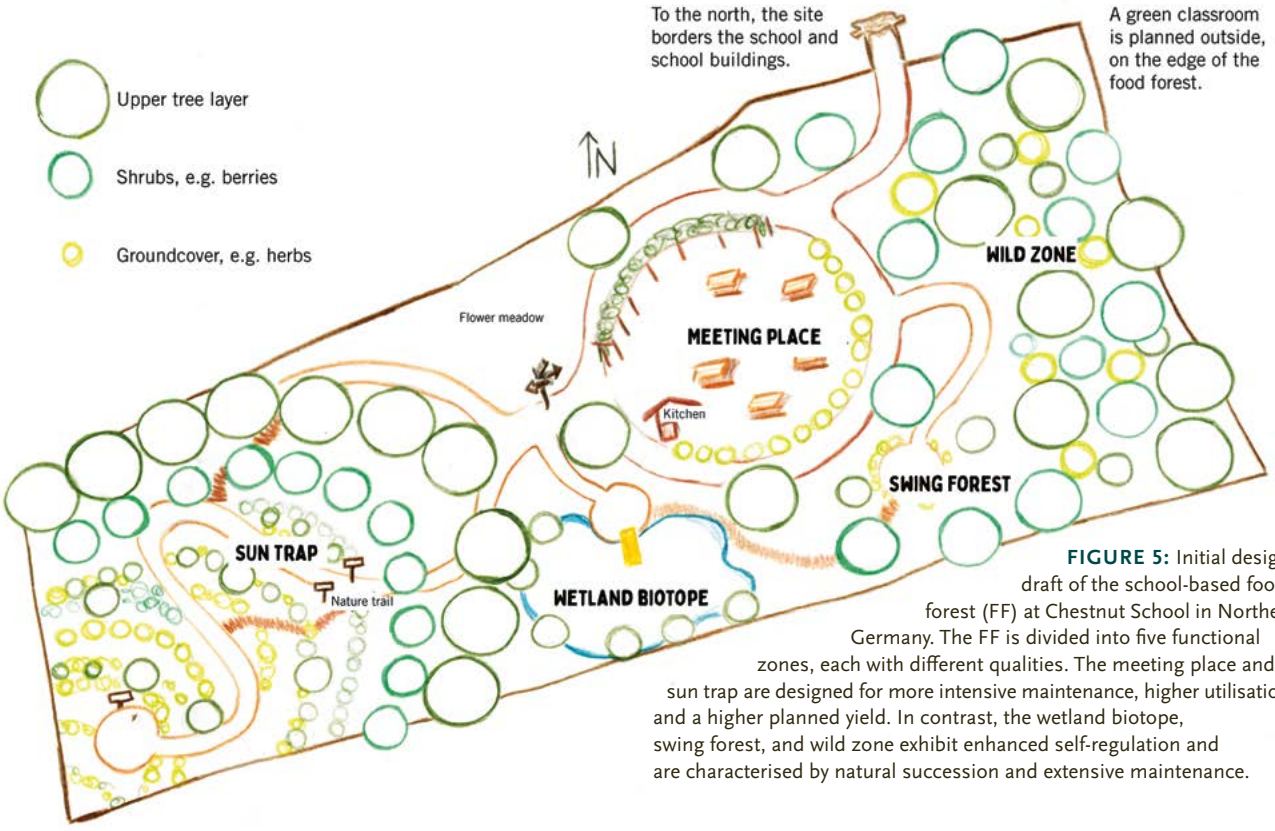

FIGURE 5: Initial design draft of the school-based food forest (FF) at Chestnut School in Northern Germany. The FF is divided into five functional zones, each with different qualities. The meeting place and sun trap are designed for more intensive maintenance, higher utilisation, and a higher planned yield. In contrast, the wetland biotope, swing forest, and wild zone exhibit enhanced self-regulation and are characterised by natural succession and extensive maintenance.

Practical applications: A functional design draft for the food forest at Chestnut School

Going one step further, I implemented the participants' visions, educational goals, and site specificity into an initial design draft by identifying five thematic zones for the FF at Chestnut School (figure 5). For a detailed explanation of the functional zones, see online supplement, appendix 4[2].

The school-based FF at Chestnut School is designed to create an impression of a near-natural environment. This is achieved through an organic and aesthetic design, the inclusion of winding paths and asymmetrical zones. The wetland biotope, swing forest, and wild zone promote self-regulation, while the meeting place and sun trap require more intensive maintenance. The centre of the FF serves as a setting for the exploration of innovative and transformative pedagogical approaches. Group tables and informal seating arrangements are employed for teaching and learning activities. I presented the initial design to the school, planning office, and municipal authorities in August 2024, so that it can be further developed.

Discussion

Food forests as drivers of whole school transformation

This article explores the potential for integrating FFs into a school system and holistic ESD learning. The conceptual framework provides an initial understanding of how FFs can contribute to the WSA. A case study was conducted at Chestnut School, where five semi-structured interviews and a future workshop identified the potential application of their FF. The six key elements of the WSA appear to be a suitable instrument for systematically implementing a school-based FF. Analysis of the results revealed areas for synthesis, new insights, and further reflection.

I argue that school-based FFs represent a promising tool for holistic ESD learning by facilitating a systemic shift grounded in an authentic learning situation. This study advances the view that school-based FFs contribute to socio-ecological transformation in that they combine the three crucial levers of human-nature relationship, education, and institutional change (see Abson et al. 2017).

The case study highlights the FF's potential as a formal and informal educational setting, a restorative space that enhances student well-being, and a place for social interactions that foster a sense of community. In addition, teachers emphasise the importance of wild areas to increase local biodiversity and enhance the perception of ecological functions inside and outside the classroom, thus pointing to the numerous ecological benefits that FFs provide (Albrecht and Wiek 2021, Park et al. 2018).

The teachers at Chestnut School identified clear connections between the FF and the formal curricula (particularly in biology and geography), its alignment with the ESD themes, and its potential for interdisciplinary learning. Initial discussions primarily focused on traditional subject integration and formal teach- >

ing content. However, in light of current shifts in education and holistic ESD approaches (Wals and Mathie 2022), it became clear that school-based FFs can help bridge existing gaps by embedding sustainability principles into everyday practices and informal learning experiences.

Thus, the focus is now on the FF as a holistic and transformative learning environment, promoting an output and competency orientation. Project-based, exploratory, and place-based outdoor learning are pedagogical approaches that can use the FF as a hands-on setting where students engage deeply through observation and direct experience. Participating students have clearly expressed their preference for such active, practice-based learning.

The WSA framework places particular emphasis on self-efficacy, enabling students to gain insight into their own agency. FFs support this by offering opportunities to initiate positive change, thereby fostering feelings of empowerment, pride, and collaboration in meaningful projects (Almers et al. 2018).

Furthermore, both the conceptual framework and the case study demonstrate the value of systems thinking, as exemplified by the WSA's systemic, reflective approach to sustainability (Wals and Mathie 2022). This quality is exhibited by FFs, which act as living models of complex ecological and social systems, allowing students to explore interdependencies and interactions within and outside the FF (Almers et al. 2018).

Another key part of ESD is the critical reflection and discussion of guiding principles, values, and norms (Stoltenberg 2016). School-based FFs offer a space for questioning dominant agricultural practices that exploit natural resources and reinforce inequalities. Engagement with these issues enables students to explore the interconnections between local actions and global systems, and to reflect on equity, power, and human-nature relationships.

FFs also help to foster emotional connection with nature by offering daily interactions with living systems and the experience of gardening. The case study revealed numerous ideas for the implementation of nutrition education, with the potential to encourage sustainable consumption habits focused on healthy, local, and seasonal foods (Fischer et al. 2019).

While the study highlights the considerable potential of FFs, challenges remain. The successful integration of FFs into curricular and school planning requires flexibility, as well as a willingness to adopt innovative pedagogical methods. Consequently, teachers need practical assistance to integrate ESD and FF applications into their teaching. This could be enhanced through educational materials and concepts for substitute lessons. Furthermore, the teachers at Chestnut School demonstrate a strong preference for a resilient, low-maintenance FF system. However, such systems nevertheless require time, resources, and expertise during their initial phases, in addition to a comprehensive understanding of the overall system.

Limitations and further research

In light of the findings, certain limitations become clear. Questions about the detailed project planning and implementation process within the school context remain unanswered and provide starting points for future research. Also, the participation process could be explored in greater depth to identify opportunities for student participation at each stage of the process. Further research could yield valuable insights into the impact of FFs on the holistic integration of sustainability in educational settings, and on environmental and nutritional behaviours (e. g., Holst et al. 2024).

Due to the qualitative and exploratory nature of the study, the results are not intended to be generalized. The findings are based on a selective and voluntary sample and cannot claim to be fully representative of the entire school community, since not all stakeholder groups were equally included. Most participants showed an intrinsic motivation and interest for sustainability and/or the FF itself, which may have affected the overall project development and data collection. As the project continues, it will be important to ensure that any potential conflicts of interest or dissenting perspectives are adequately identified, considered, and further investigated. From both a scientific and practical perspective, this will help to create a more comprehensive understanding of the dynamics and challenges involved.

Despite these limitations and the site specificity of FFs, the case of Chestnut School offers valuable guidance. Its functional design and practical realisation can be an inspiring model for other schools to follow in their own sustainability transformation efforts.

Conclusion

This study introduces a new area of research into the potential of FFs in holistic learning environments, bridging the fields of nutrition, agriculture, and sustainability. I conclude by emphasising the need for a systematic approach to questioning and redesigning established educational structures and practices by integrating holistic ESD learning processes. School-based FFs serve as one element in the implementation of a comprehensive approach to sustainability in education systems, addressing a range of sustainability issues, and offering potential solutions to sustainability challenges. They help reimagine education by connecting formal and informal learning, by promoting innovative pedagogical approaches, and by fostering inter- and cross-disciplinary engagement. School-based FFs have the potential to strengthen human-nature relations, encourage healthy eating, and develop practical and systemic thinking skills among students based on self-efficacy experiences.

The Chestnut School project demonstrates the potential of school-based FFs and offers insights into implementing FFs to achieve whole school transformation, including the establishment of a holistic ESD approach and a sustainable food system.

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