



Edinburgh Future Institute  
*Students as Change Agents Course*



# ADDRESSING BIODIVERSITY IN EARLY EDUCATION

## 2025 Report



SACHA

*For the Department for Social  
Responsibility and Sustainability*

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# INTRODUCTION



Photo by Khan. (2017). Children watering plants. CC0.

This advisory report aims to respond to the challenge question proposed by Edinburgh University's Department of Social Responsibility and Sustainability:

***“How might we ensure that biodiversity interventions are effective and equitable for all, both now and in the future?”***

We aim to uncover gaps in current biodiversity interventions in order to develop a more effective, equitable, and sustainable approach. Our proposal is informed by research into the political, economic, socio-cultural, technological, legal, and environmental dimensions of the issue, and is supported by established frameworks and methodologies such as the Value Proposition Framework, Human-Centred Design and Systems Thinking.

We identified that raising biodiversity awareness in the early stages of education is one of the most efficient and accessible strategies for the university, as indicated by Ardoin and Bowers (2020) systematic review of 66 early-childhood environmental education research literature. Yet this area remains underdeveloped. Inspired by successful projects such as the private school Arcadia, we explored more affordable and inclusive interventions.

Our approach addresses this gap by bringing biodiversity education directly to children with the least access to it, raising their awareness at a younger age to help them build an understanding of biodiversity's importance in their lives. The adaptive nature of our intervention ensures resilience to environmental constraints and can easily be scaled up or down according to the shifting economic and political conditions.



# CONTEXT

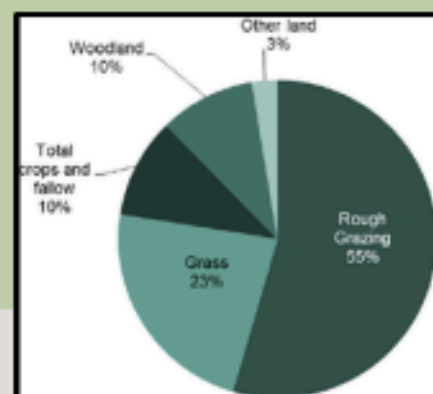
The biodiversity crisis is a rapidly escalating global emergency, driven by human activities. Its impacts are profound, threatening the natural systems that support life on Earth and the well-being of current and future generations (The London School of Economics and Political Science, 2022).

That is why immediate, transformative action is required to protect the planet's biological richness and guarantee a sustainable future



Photo by CIEEM (2023)

Land-Use Data  
from Scottish  
Government  
(2017)



## Data from Scotland

About 70% of Scotland's land is managed for agriculture, which has contributed to habitat loss, fragmentation, and declines in biodiversity (Scottish Wildlife Trust 2025). [See above right graph]

Around 1 in 9 Scottish species is at risk of extinction (NatureScot, 2023).

Funding cuts such as a roughly 12% reduction in NatureScot's budget are threatening the future of projects that aim to halt biodiversity loss (Buchan 2024).

## Why early education?

Our project is centered around raising biodiversity awareness in early education since it's crucial for nurturing environmentally responsible, knowledgeable, and empowered individuals. Benefits of biodiversity in early education include:

- Regular interaction with nature through biodiversity-focused activities supports not only environmental learning but also physical and mental health (Poppell and Monroe, 2020).
- Environmental education helps children understand the impact of their actions on the environment, fostering a sense of responsibility for its protection (Lloyd Center for the Environment, 2023)
- By learning how biodiversity supports the health of the planet and human well-being, children are better equipped to make informed choices and adopt sustainable habits as they grow older (UNESCO, 2023)

**CURRENT BIODIVERSITY INTERVENTIONS  
FREQUENTLY FACE CHALLENGES THAT LIMIT  
THEIR EFFECTIVENESS AND EQUITY**

Accessibility barriers	Many programs require physical access to natural areas or digital technologies that disadvantaged communities often lack
Socioeconomic disparities	Initiatives frequently benefit wealthier communities while imposing costs on less affluent ones
Short-term focus	Many interventions lack sustainability planning for continued impact beyond initial implementation
Limited scalability	Successful programs often struggle to scale due to resource constraints or contextual dependencies



Photo by Project Learning Tree

**Our solution**

address the significant inequity in biodiversity education among primary school children particularly those in under-resourced communities, by developing a sustainable, engaging intervention that integrates meaningful nature experiences into their educational journey without disrupting existing curricula or placing additional burdens on already-stretched school resources.



# OUR SOLUTION

## ► University-Led Biodiveristy Education Program

Our proposed solution centres around a weekly outreach program whereby University of Edinburgh students deliver interactive sessions on biodiversity at primary schools. Using a refurbished 'eco-van' as a mobile nature lab, we could provide hand-on learning experience (e.g. examining local plants, ecological games etc..) that complement classroom teaching, whilst not disrupting the syllabus. Regular contact with nature through outdoor lessons has proven benefits for children's engagement and confidence – studies show that nature-based learning is able to 'measurably boost students' motivation, participation and self-esteem in the curriculum' (Edwards, 2023).

The near peer teaching model whereby university students volunteer to mentor pupils also offers role modelling, which can raise aspirations towards science and conservation careers. Crucially to our research, this aligns with Scotland's Curriculum for Excellence, which gives weight to interdisciplinary learning and developing 'responsible citizens' through real-world contexts (Hamilton, 2018). By integrating biodiversity education into the weekly curriculum, the programme can reinforce knowledge over time, during such as crucial age of development in children, which normalises nature as an exciting part of learning, rather than an occasional field trip.



**Picture: Re-modelled bus for classroom purposes. Source: BBC**

# OUR SOLUTION

## Student-Led Biodiversity Projects in Schools

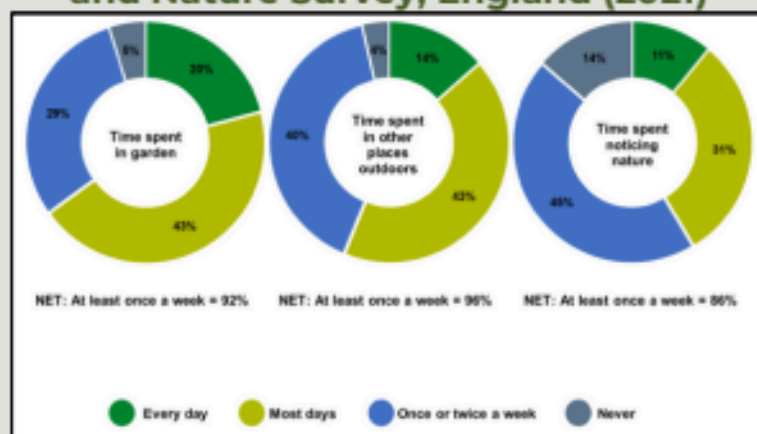
In addition to lessons, this initiative will allow student-led projects such as creating pollinator gardens, wildflower patches or insect 'hotels' on school grounds. These projects allow children to display active stewardship, which reinforces classroom learning with tangible action: planting and habitat-building. A study from Cornell University (2019) indicates that school gardening and outdoor projects are able to improve academic performance and personal development by creating a 'safe and novel environment' for autonomous exploration. As an example, recently, Scotland's 'Polli:Nation' program saw over 250 schools transform their grounds for pollinators; with the greatest impact being 'the impact on pupils' ecological awareness'. (ScottishPollinators, 2019). In the same study, students displayed a newfound understanding of biodiversity – one P6 pupil exclaimed "I've learned what an important job bees do... if bees didn't do their job... we wouldn't have any honey... or vegetables" (SP, 2019). Data below from the Children's People and Nature Survey in England shows that almost 15% of children have 'never' spent time noticing nature. This is a goal of our project, even if we are able to draw attention to nature and biodiversity interventions once a week, this would make a sizeable difference within children's education in schools

This hands-on work deepens scientific learning but also creates a pro-environment attitude at a young age, and is also able to develop teamworking skills. Older students too can contribute, with work being able to be recognised through award frameworks such as the Duke of Edinburgh or the John Muir Award, which provides motivation and accreditations for their environmental service. Hence, we can see how schools can enrich the Curriculum for Excellence in a practical, cross-curricular manor with our intervention.



**Picture: Photo from  
Polli:Nation Final Report**

### Data from the Children's People and Nature Survey, England (2021)





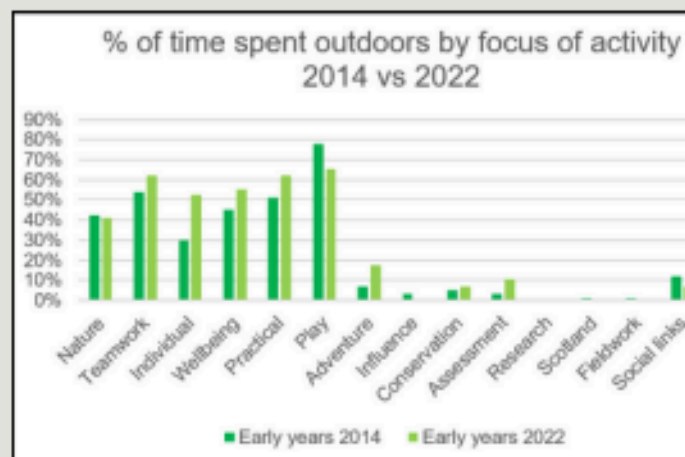
# OUR SOLUTION

## Experiential Learning at the Pentland Hills Field Site

A highlight of this proposal is the seasonal capstone experience visit to the University's field site in the Pentland Hills. Each term, pupils who are keen will travel to this living 'outdoor classroom' to witness biodiversity and conservation efforts first-hand. These trips provide immersive learning which connects textbook concepts to real ecosystems, creating memorable experiences for these children. Educational studies affirm that well-designed field trips offer great benefits: 'providing first-hand experience, stimulating interests, and promoting social development in ways classroom sessions are unable to' (Behrendt & Franklin, 2014). At the Pentlands, children may apply knowledge from their weekly sessions (e.g. identifying native species or surveying pollinators) in a real-world setting, under guidance from experts. Shown below, data from a recent NatureScot report suggests that time spent actually in nature has declined, and it a mere 40% of time spent outdoors focussing on nature. Our project would look to boost these rates of time spent outdoors, enhancing the wellbeing of students and helping to promote outdoor learning within nature with a sustainable conscious.



**Picture: Pentland Hills Field Site - Source: TripAdvisor User (2019)**



**Graph: NatureScot 2022 Report Data on Time Outdoors**





## ► Ensuring Equity and Inclusive Participation

This solution is designed with a lens towards equity, actively targeting schools and children who have the least access to nature. A data-informed approach allowed us to identify under-resourced primary schools in Edinburgh, by using the Scottish Index of Multiple Deprivation and GIS mapping of greenspace. These schools will be prioritised, with additional support (e.g. funding for transport, outdoor clothing, extra volunteers) to remove barriers to participation. We found that improving nature access can disproportionately benefit disadvantaged children – a study from Glasgow University (2024) found that children who spent even 60 minutes per day in natural environments had a 50% lower risk of mental health issues, with the greatest gains coming from low-income families. Natural environments have an ‘equigenic’ factor, meaning they reduce inequalities by boosting outcomes for those who start disadvantaged. By intentionally directing resources to schools that have historically been underserved in terms of environmental education, the program ensures no child is left behind in reaping the benefits of nature. This equitable approach not only promotes social justice, but also maximises the overall impacts, as these will be greatest in high-need groups, which amplifies the value of intervention.

## ► Funding, Partnerships, and Policy Alignment

To implement and sustain this program, a mix of funding source and strategic partnerships will need to be used. The initiative, as previously mentioned, aligns with the Scotland Curriculum for Excellence and Learning for Sustainability, which promotes outdoor learning and equity in education. Support from the University – including student volunteers, expertise, and access to the Pentlands – underscores its civic commitment. External funding may be required from Education Scotland, the Scottish Attainment Challenge, and NatureScot’s community learning grants. Successful models such as ‘Learning in Local Greenspace’ (2023), funded by NatureScot, which supported 115 schools and over 6000 children, shows strong precedent for this public investment in equitable and nature-based education within Scotland. We would also look to partner with NGOs such as the Scottish Wildlife trust and Keep Scotland Beautiful to enhance content and help schools gain recognition for their work with awards. By combining strength across sectors, this program will allow us to build a collaborative and sustainable framework which improves biodiversity awareness, supports inclusive learning, and contributes to national goals for wellbeing, environmental responsibility, and educational attainment.



# BENEFITS & INCENTIVES



*Photo by National Education  
Nature Park*

Our report response to the challenge question "How might we ensure that biodiversity interventions are effective and equitable for all, both now and in the future?" Our solution has both short and long-term benefits to it by including biodiversity education among children. This will hopefully then create a equitable learning environment for all.

When looking into the challenge question we saw there was a gap in accessible biodiversity education for young children, especially those in state-funded schools. Even though primary education does offer some awareness for the environment, the amount of learning outside has decreased. According to Nature Scot, primary school outdoor learning fell "from 24 minutes per pupil per week in 2014 to just 7 minutes in 2022". (NatureScot, 2023b) The significant decline shows us how concerning this decline is amidst the biodiversity and climate crisis.

In order to try and address this problem we came up with the idea to create an equitable site. We think that this idea is inclusive and meets both our environmental and social goals. We believe that our project will support Scotland's Curriculum and will make sure that outdoor learning and sustainability are key topics that are delivered. By delivering this content in an engaging way it means that the students are more likely to take the information in and retain it. If University students were involved it would help benefit both enriching their learning and the university's ties with local communities.

We know that time and budget for schools to try and organise outdoor trips are significantly difficult. In this case our idea hopes to help this by providing transport options, volunteers to help with school visits and also a partnership with the Scottish Government to try and get this into the curriculum for the children to learn about. This would mean that there would be less stress of planning for schools especially with limited resources it will help provide great access.

Our idea also helps the local community take care of their local natural environment. By collaborating as a whole and this including school children, residents and university students it will help show what biodiversity means to them. Our idea can act as an outlet. Also, by raising awareness of this crisis through schools, it will ensure that families and the children will hopefully develop a real need to help and improve the environment.

By incorporating outdoor learning into children's early experiences and involving the University the project is something which could be done nationally. This is because the idea also helps reduce many challenges that schools may face. In this case if this is done then this idea will help bring nature, community and learning all together, which will create actual benefits that will still be there for future generations to come.

Furthermore, by taking into consideration the stakeholders reached by this project, the bus will be prepared and equipped to address their specific needs. For example, if a school has access to its community to help care for plants, the biodiversity bus could bring the necessary tools, bulbs, experience, and knowledge to support pupils in enhancing their school's biodiversity. Biodiversity that will then be maintained by the local community. If the school cannot be sustainably improved on-site, the bus would instead visit a nearby park for a local school outing, giving children the opportunity to learn in nature and contribute to improving the biodiversity of their local environment, guided by volunteers, students, and staff.



# STAKEHOLDERS



## Edinburgh University (students, academics, SRS)

**Design:** Students can co-create the bus' learning modules, physical layout, or biodiversity content—blending science, design, and education. Experiential Learning.

**Visibility:** A branded bus offers a visible symbol of the university's sustainability commitment, potentially attracting new interests.

**Research:** The projects offers real-world data collection opportunities on learning outcomes and ecological engagement.

## Primary Schools & Pupils

**Tailored:** The bus adapt to each school's context—offering tools and expertise for on-site or local green spaces biodiversity projects.

**Responsibility:** By directly helping the local biodiversity, children are more likely to develop a feeling of ownership and pride, developing their environmental values.

**Accessibility:** Even schools with limited greenspace can benefit through local park visits.



Image by Soepratman<sup>1</sup>

## Local Communities



Image Designed by Freepik<sup>2</sup>

**Collaborative Care:** Community members could partner in plant care or biodiversity projects initiated by the bus, strengthening the social bonds in the community.

**Development:** The project could focus in improving the most neglected and underused spaces, transforming them in new assets for the community.

# STAKEHOLDERS



## Government & Funders

(e.g: Local Authority, Education Scotland)

**SDG:** The projects aligns with the UN Sustainable Development Goals: SDG 10, SDG 11 & SDG 15.

**Pilot:** It could demonstrate a replicable and scalable model for sustainable education across Scotland.

**Cost-adaptive:** Initial investments can be kept low, especially if the start-up costs are absorbed by corporate donations and volunteer works. The project can then grow or shrink according to needs and budget.

## Private Sector

(e.g: Lothian Buses, Local or outdoor Businesses)

**Visibility:** Donating a bus or supplies would give businesses the opportunity to advert themselves while supporting a sustainable cause.

**Branding:** It would portrait them as champions of environmental sustainability and education, increasing their standing locally.

**Finance:** Increased standing and positive advertisement would likely boost local economy and incentivise for further funding.



Image Designed by Freepik<sup>1</sup>



# NEXT STEPS

## **Recruitment and organisation of student volunteers**

Student volunteers are the backbone of the initiative, and will be responsible for planning and hosting interactive biodiversity education sessions. Reaching out to university students on related courses, such as conservation, biosciences, and education, will enrich the experience for students in early education, and create opportunities for university volunteers to hone their skills in explaining complex concepts to non-experts.

A logistics role will be established for coordinating with local schools, organising trips and materials needed for interactive education. Roles suitable for students would include educational activity leaders, creative workshop tutors, and outdoor learning officers. These roles can draw on insights from a wide range of disciplines, and spark a curiosity in biodiversity for young students with different backgrounds and interests.

## **Capstone considerations**

The capstone experience can be organised with considerations made to the difficulties of managing a school trip. Easy-to-use checklist paperwork to be created and provided, including site information, risk assessments, and useful contact details to help teachers plan for the trip. Transport arrangements can be made ahead of time.

## **Marketing and Community Outreach**

Local schools and parents are key points of contact for our proposal to be successful. Establishing effective communication channels with local schools will ensure that scheduled biodiversity education programs are well-supported.

Awareness of this initiative can be improved by promoting within existing communication channels such as school newsletters, and advertising at local community centres.

A long-term goal for this project will be to refine its approach for creating equitable access to biodiversity education. This will be improved and iterated upon with feedback from parents, students, and teachers over time.



# CONCLUSION



*Image generated by DeepAI*

In conclusion, our solution addresses all four of the key targets in the challenge question by focusing our project towards children in primary education.

The weekly outreach programme and the Pentland site visits are effective as they utilise immersive learning to achieve a memorable biodiversity experience that will inspire students to be passionate about biodiversity in the future.

We have specifically targeted under-resourced primary schools in our report, offering extra resources such as funding for transport. This makes sure that children that often don't get to experience biodiversity education policies will not be left behind.

We hope this solution will be acted upon in the present and future. We believe this is very likely as outdoor learning is decreasing, making our project vital for the future of children's education as outdoor learning is the backbone of this report.

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