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Hedgerows, Hedgehogs and Campus Biodiversity:

A Prickly Challenge for Universities

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Abstract
Across society, organisations find themselves challenged to address the climate and nature emergencies. Universities have a complex set of responsibilities given that they are preparing students for an uncertain future in which the very survival of life is in the balance. A characteristic of this complex challenge is the need to develop the necessary ecological and vertical literacy required to tackle the many aspects of fragmentation we are subject to. The 30x30 biodiversity challenge provides universities with an opportunity to address one particular form of fragmentation, that affecting habitats. The case-study presented here explores how a Hedgehog Friendly Campus (HFC) initiative allowed awareness of hedgehog habitat needs and in particular the health of hedgerows to feed into campus environmental management. A surprising finding is that addressing the fragmentation of hedgerows highlights organisational fragmentation, with little communication between landscape managers, research and teaching. A collaborative systems approach to the biodiversity challenge is thus needed and

realising this will challenge universities to build their capacity to embrace research and learning for sustainability through living lab projects. This requires a recognition of the responsibility universities have to enable action learning across disciplines in ways that will connect staff and students to, and bring them into relation with, the biodiversity crisis at a local level. The HFC initiative provides a rich opportunity for communities of inquiry and practice to be nurtured and for this process to inform the evolution of our understanding of habitat restoration on university campuses as a corporate responsibility.

Keywords

hedgehog friendly campus, vertical literacy, action learning, habitat fragmentation, 30x30 biodiversity challenge, universities, corporate social responsibility and sustainability

Introduction and Aims

This paper sets out to explore some "prickly and thorny" questions about how universities can evolve their understanding of their responsibilities at a time when we are waking up to the challenges posed by the inter-related planetary crises of biodiversity loss, pollution, and climate change. It does so with the help of two prickly life forms: the hedgehog and the hedgerow.

This paper first introduces the reader to the modern university as a "future fit" (Sterling, 2013) organisation[1] that prepares students for life on a planet in crisis, with all the complex challenges this presents. One of these planetary crises is biodiversity loss arising from a perfect storm of factors including habitat fragmentation and ecological desertification. Global society is challenged to respond to the biodiversity crisis by bringing more land into management for nature, presenting universities with a range of new responsibilities to engage with. However, engaging with such responsibilities cannot be undertaken without a deep understanding of context writ large, for these are not isolated jigsaw pieces but part of a puzzle of our own making. This introduction therefore moves from the global to the local by considering how the wider challenge can be interpreted at the level of university campuses. It presents a critical review of higher education in a time between worlds (Rowson & Pascal, 2021), highlighting the need for universities to radically address the disciplinary fragmentation, reductionism, and specialisation that has characterised education and to teach for ecological literacy. This exploration of the responsibilities of universities where biodiversity loss is concerned is then explored using a case study in which we consider the University of Edinburgh's development of climate and

[1] Universities as organisations are typically afforded charitable status in the UK and therefore seen as part of the public sector. They are, however, vulnerable to being corporatised.

biodiversity strategies and how a specific example of conservation and ecosystem health can help us better understand our responsibilities. The focused example centres on work undertaken, as part of the Hedgehog Friendly Campus (HFC) project, to ensure that campuses provide a healthy, life-sustaining environment that supports this insectivorous small mammal, allowing them and the wider ecosystem to thrive. The authors contributed to this case study as ecological advisors, dissertation supervisors, active members of the workgroup coordinating the HFC initiative on campus, and as developers of the campus mental health and wellbeing strategy.

The case study presented here sets out to demonstrate how initiatives such as the HFC can serve as vehicles and focusing tools for universities as they prepare themselves to take on the nature and climate emergencies. Committed engagement with these initiatives and the underlying emergencies will necessarily challenge Higher Education institutions to reconsider their social responsibilities.

Universities and their Corporate and Social Responsibility

Any carefully considered exploration of universities and their wider responsibilities to society, humanity, and the planet must consider not just what they are in any physical sense but what they are *for* (Boulton & Lucas, 2011; Collini, 2012). Jarvis (2001, p. 4) emphasises the extent to which higher education is caught up by the whirlwind forces of globalisation which exerts irresistible pressures that threaten the ability of the sector to serve the greater good. The purpose of universities and therefore their responsibilities have, arguably, long been allowed to dance to the short-term whims of government, market priorities, and funding. This can be thought of as a social pathology, arising from a myopic misunderstanding that universities exist primarily to prepare people for work and to contribute economically. Any such view, however, reduces the purpose of life to work and denies us the very possibilities that can be realised when our potential to contribute to a life-sustaining society (Macy & Brown, 2014) is nurtured by an educational system that values thriving and flourishing into the future (Wilson-Strydom & Walker, 2015).

The UN Secretary-General, in 2011, during the World Economic Forum Session on Redefining Sustainable Development described our current economic growth model and consumption with the words:"For most of the last century, economic growth was fuelled by what seemed a certain truth: the abundance of natural resources. We mined our way to growth. We burned our way to prosperity. ...Over time that model is a recipe for national disaster. It is a global suicide pact…" (United Nations, 2011, paras 2–3). This model is part of the contemporary civilisation built over the last four centuries through scientific, industrial, and technological revolutions. The modernist project with its illusions and pretensions of progress entails an “irresolute process of secularisation and also the growth of civic and commercial institutions powered by bureaucratic and instrumental rationality and an exploitative relationship to nature” (Rowson &

Pascal, 2021, pp. xxv–xxvi). This is only possible when institutions wear blinkers, ignoring the collateral damage of colonialism, slavery, fossil fuels and modernism's exploitation of nature.

Where does this leave us when we recognise that the socio-economic principles we live by are destroying the planetary life support systems we depend on? This question drives right at the heart of the tensions between accumulative profit and seeking to contribute meaningfully to life, greed and generosity, ego and eco (Scharmer & Kaufer, 2013; Scharmer & Yukelson, 2015). It cuts through to the question we must live into: if education prepares us for life rather than work, how do we nurture life? In many respects, this is about nurturing relational practices, about community (McIntosh, 2022, pp. 197–99) and our praxis as practitioners of life and for life. To understand this better, we need to recognise that, despite the growing body of work on sustainability in the Higher Education sector (Ruiz-Mallén & Heras, 2020), processes of organisational change are still not well understood (Hoover & Harder, 2015) and there is a need to develop an understanding of reflexive and cultural processes (Stephens & Graham, 2010). With this in mind and to better explicate the responsibilities of universities, it is helpful to draw on critiques of the university as an organisational centre of integrative learning and vertical literacy (Scharmer, 2018).

Otto Scharmer's work has repeatedly revisited the need for pedagogical practice to deliver the intellectual, emotional, and spiritual intelligences (Scharmer, 2009, pp. 447–449) required to bridge the ecological, social, and spiritual divides we face today (Scharmer, 2016). He argues that, where the scholastic university was characterised by its teaching (transmission of knowledge) and the classical university by the unity of teaching and research (knowledge acquisition and production), there is a need for us to reinvent educational institutions around the interplay of a more comprehensive ecology of knowledge that leads to civilisational renewal (Scharmer, 2009, 2018; Scharmer & Kaufer, 2000). This third-way recognises the importance of self-reflective and self-transcending epistemologies and the need for universities to integrate not just research and teaching, but transformative change into teaching, so that we no longer reproduce the "same old same old" but can intuit and deliver healthier emergent futures (Peschl & Fundneider, 2014). This recognises the need for a paradigmatic shift from *autopoietic* (self-reproducing) to *sympoietic* (co-evolving with) approaches if we are to rehabilitate and make liveable again the environments with which we are in relationship (Haraway 2016, p. 33).

Universities therefore need to fundamentally revisit their understanding of social responsibility in terms of our practices of connecting and the connections we make possible, nurture, and deny. Interconnections are everywhere and yet human exceptionalism and bounded individualism (Haraway, 2016, p. 30) have come to characterise the culture that emerged from the imperialising 18th Century, blinding us to our interconnections and interdependencies with natural systems and the ecosystem services they provide. Haraway challenges us to ask:

> What happens when the best biologies of the 21st century cannot do the job with bounded individuals plus contexts, when organisms plus environments, or genes plus whatever they need, no longer sustain the overflowing richness of biological knowledges, if ever they did? (Haraway, 2016, p. 30)

Universities need to update their own understanding of who we are as a community of inter-related co-evolving beings and recognise that we are part of rather than apart from nature, that our own wellbeing is deeply entangled with the wellbeing of the wider ecological communities that support us. This involves recognising the planetary ontology of being (Johnson, 2021), that we inter-are with nature (Hanh, 2021), are intra-connected (Siegel, 2022) and need to be afforded opportunities to encounter nature and fall in love with it again, thereby rediscovering biophilia (Cousquer, 2022). Any move towards interbeing and intraconnection involves the nurturing of and teaching for vertical literacy. If universities are to rekindle the flame of learning, they need to take responsibility for reimagining themselves and develop their own vertical literacy:

> The lack of *vertical literacy* is the main problem in our universities and schools today**.** Talk to experienced CEOs and CPOs (chief people officers) of major companies and ask them what they need. They commonly say: people, teams, and leaders that can make our organization thrive in a world of VUCA (volatility, uncertainty, complexity, ambiguity). By that, I believe they mean people and capacities that can take their organization into the 4.0 world in which they respond to disruption by co-sensing and co-shaping the future. Then go to universities and talk to faculty and deans of management and engineering schools. Many, maybe most, are rather illiterate when it comes to vertical development. They think mostly in terms of horizontal development—for example, about adding another skill here or another app or course there. They do not think in terms of upgrading the entire educational Operating System—of our students, our learners, and our societal systems (Scharmer, 2018, para 9).

What might this upgrade for greater vertical literacy consist of? There are no ready-made answers; universities need to explore how teaching and research can partner with and be informed by the life-sustaining future we need. Currently, we are teaching for a society that has become increasingly anthropocentric and egocentric, that is to say disconnected from the living and therefore the real world; and doing so without challenging the status quo. Such challenges are possible when we seek to engage with environmental ethics and ways of being in the world that recognise our interdependencies; but this has to be enabled. We are still learning about the world *out there* rather than learning how to co-sense and co-create new worldings through our self, collective and organisational transformation. Much of this is due to the failure of universities to embrace the inner and outer dimensions of learning through dialogical practice, reflexivity,

action research, and awareness-based systems change (Arnold & Schön, 2021; Vervaeke & Mastropietro, 2021). This requires us to appreciate the illusion of object permanence (McGilchrist, 2021) and recognise how our desire for systems to remain stable leads us to resist emergence. The planet is calling to us to enter into "right-relationship" with natural systems and we are failing to listen and undertake the necessary inner work that is needed to recognise that we are pursuing the wrong story (Yunkaporta, 2023). As part of this, we are looking for technological answers to questions we barely understand. Our lack of literacy about how interconnected everything is leads us to ask reductive questions where unchanging humans are bracketed out. We seek to produce more knowledge and neglect the work of transformation that brings us into right relation. Rooted in deep time and systems thinking, Traditional Ecological Knowledge (TEK) recognises that systems break down, undergoing phase shifts during which new dynamic relational sets and systemic orderings emerge. Vertical literacy is therefore needed to allow us to engage with, participate in, and contribute to this process.

Integrating our multiple intelligences involves embodied practice: the concomitant development of deep listening, somatic awareness, and emotional literacy, equipping us to develop both self-reflexive and self-transforming knowledge. Universities could facilitate this learning at the first person (individual) and second person (group) level; they could also open to and engage with this themselves, encouraging students to study how they themselves can change the institutions and society they are part of. Awareness of this shift in pedagogy is reflected in Learning for Sustainability guidance (QAA and Advance HE, 2021).

The guidance challenges universities to engage with the sustainability challenges in a comprehensive way, involving students, staff (academic and professional services), and the wider community. This can lead to all parties:

> … questioning their own and societies' ways of thinking, ways of practicing and ways of being, which is central to a transformational learning experience. This can be unsettling at first, but is the start of a transformative journey that can lead to a more sustainable future. (QAA and Advance HE, 2021, p. 20)

We now find ourselves challenged to translate this agenda for change into meaningful action that bridges the knowledge-doing gap. In the next section, we consider biodiversity loss as a crisis university students care passionately about and wish to address.

Biodiversity Loss and 30x30

There is indisputable evidence that biodiversity is in dire trouble and the sixth mass extinction is upon us (Ceballos et al., 2015). The recent UN Environment Report (UNEP, 2021) recognises biodiversity loss, together with climate change and pollution, as one of "three planetary crises" that are reinforcing one another

and driving ongoing damage to our environment and health. Leclère et al. (2020) recognise the need to place more land under conservation management and to make our global food system(s) more sustainable if we are to promote the recovery of terrestrial biodiversity. Their analysis of a series of scenarios highlighted the need to be bold:

> Increased conservation efforts … was the only single-action scenario that led, on average across the ensemble, to both a peak in future biodiversity losses before the last quarter of the twenty-first century … and large reductions in future losses. (Leclère et al., 2020, p. 553)

It is analyses such as these that have led to global recognition of the need to protect 30% of land mass by 2030 (the 30x30 biodiversity challenge)[2].

We have known for over six decades that we have been facing a silent spring (Carson, 1962/2000; Oreske, 2022; Werner & Hitzfield, 2012). Unfortunately, that knowledge has not translated into a comprehensive transformation of our relational practices: We may know things conceptually, but we don't behave as if we are interdependent with nature.

Heeding Carson's call for us to learn to live in harmony with nature and the UN's call for humanity to make peace with nature will challenge us to shift our listening to a deeper level and to recognise deeper truths (Rodriguez Carreon & Vozniak, 2021). Will universities take responsibility for breaking the illusion of separation that could be the key to ending and restoring the split between mind and body, self and other, human and nature? Will they take responsibility for ensuring students are sufficiently self-aware and resilient to protect themselves from "being overwhelmed by the nihilism and hopelessness of the current dramatic situation while promoting effective skills acquisition and values of connectedness between humans and nature" (Ruiz-Mallén & Heras, 2020)? This remains to be seen. What is clear is that to know this cognitively is not enough, we must experience and feel it, experientially and somatically, if we are to shift the current paradigm of Western thinking. According to Rodriguez-Carreon and Vozniak (2021) "failing to recognize the illusion creates conflict and disturbs inner peace" (pp. 46–47). The health and inner peace of our students is thus inextricably entangled with opportunities to encounter and care for nature. Opportunities to discover and care for nature can allow universities to balance

[2] The Montreal-Kunming Agreement agreed by more than 190 countries in 2022, as part of the UN Convention on Biological Diversity, establishes a Global Biodiversity Framework, including a global target to conserve at least 30% of lands, inland waters, and oceans worldwide. This work must be carried out in a way that respects the rights and knowledge of Indigenous peoples and local communities, and recognises their leadership.

both the restorative effects of connecting with nature (Ha & Kim, 2021; Scholl & Guwaldi, 2018) with the many benefits of contributing to nature restoration.

University of Edinburgh Climate and Biodiversity Strategies

The University of Edinburgh is a public research university with charitable status and one of Scotland's four ancient universities having been granted a royal charter in 1582. Since then, it has developed a reputation as one of the top universities in the UK and internationally. In 2023, it was ranked 23rd in the world and 5th in the UK by the Aggregate Ranking of Top Universities.[3] This well-deserved reputation hides the ongoing dissatisfaction of students in the quality of teaching and student experience.[4] This is highlighted here to contrast the disparity between the inner experience and development of the student on one hand, with the emphasis placed on their cognitive development on the other, and to raise questions about what students want and the future they face relative to what they are receiving. These questions are relevant because they also pertain to the extent to which the University's strategies on the climate and other crises have developed a firm foundation rooted in reflexivity and transformation.

In 2003, the university developed an Estates Development Sustainability Strategy, together with an Energy Strategy.[5] Twenty years on, in anticipation of the 2016–26 Climate Strategy[6] coming to an end, it engaged in a climate strategy refresh, highlighting the extent to which climate change continues to be prioritised over other planetary crises. It was only in 2012 that the university developed a Biodiversity Policy, which made nine commitments (Table 1), specifying the need to develop an implementation plan[7].

The policy's commitments clearly identified a direction of travel, but how to deliver on these commitments—particularly with regards to bridging practical and academic activities—remained unexplored as reflected by the next steps specified in the policy:

> The next steps will include developing an implementation plan that will embed awareness and learning of biodiversity throughout the University. This will enhance partnerships throughout the

[3] https://research.unsw.edu.au/artu/

[4] The 2023 figures (Complete University Guide) show that while Edinburgh has maintained its overall place as 12th best university in the UK, its student satisfaction ratings dropped to 74 per cent, placing it 121st for student satisfaction out of 128 universities ranked.

[5] https://www.ed.ac.uk/sustainability/governance-publications-reports

[6] https://www.ed.ac.uk/files/atoms/files/web_view_-_climate_strategy_2016-2026_spreads.pdf

[7] https://www.ed.ac.uk/files/atoms/files/biodiversity_policy_2012.pdf

> University, and with the wider community, encouraging a cross-disciplinary and strategic approach moving forward. (University of Edinburgh, 2012)

In 2022, a comprehensive biodiversity policy was published, laying out aims and commitments for promoting biodiversity on the landholdings the university is responsible for: its campuses. This was described as a Biodiversity Plan[8] (University of Edinburgh, 2022).

For the University of Edinburgh, actively managing biodiversity means:
1. Developing and maintaining an up-to-date list of species and habitats through the continued commissioning and periodic review of biodiversity surveys of key land holdings.
2. Conserving and enhancing existing, and creating new, habitats.
3. Maintaining excellent grounds management practices by Landscape staff and contractors.
4. Keeping ecological enhancement opportunities at the forefront of decision making relating to major refurbishments and new capital project investments.
5. Meeting or exceeding the requirements of legislation regarding biodiversity.
6. Enhancing staff, students and the local community involvement in biodiversity issues where appropriate.
7. Continuing to promote healthy living and well-being through use of outdoor amenity areas.
8. Seeking funding and grants to facilitate our biodiversity aims.
9. Developing relations with neighbours and interested parties and sharing knowledge and resources relating to biodiversity.

Table 1. Biodiversity commitments made by the University under the 2012 policy

The Biodiversity Plan aligns with an internal, unpublished biodiversity strategy that prioritises actions within a whole institution approach that includes consideration of research, learning and teaching, operations, investments and partnership working. It focuses these actions around three pillars: geodiversity/ecological communities, species and biophilia, and place-making. The reluctance to publish the strategy, developed in collaboration with university academics and external conservation organisations, arguably reveals a conservatism that is in tension with academic innovation and boundary-pushing. The strategy is much more comprehensive and progressive than the grounds-based Biodiversity Plan, requiring significant institutional change over time. This raises questions about how we build architectures including communities of inquiry and practice where transformative change can safely be prototyped

[8] https://www.ed.ac.uk/c/biodiversity-plan-2022

(Scharmer, 2016). It is to this collaborative approach that we now turn to present how a concern for campus biodiversity can serve as a vehicle for prototyping new relationships and a more integrated ecological approach.

Campuses and Campus Biodiversity

Voltaire, in concluding Candide, reflected on the devastating 1755 Lisbon Earthquake, perhaps the first modern disaster, declaring that the answer to such devastation was not optimism (and perhaps blind faith) in reason, science, and technology but to cultivate one's own garden (Dynes, 2000, pp. 110–111). This could be one of the first and best encouragements to return to the soil and local communities that sustain us in the modern era. For a university, this return to the soil, this move from thinking globally to acting locally, involves refocussing on campuses and campus communities. This involves moving from mission statements, policies, and plans, to examining the values and deeper assumptions that form the deepest level of culture (Holt & Antony, 2000, p.145). It involves nurturing a greater learning ecosystem (Scholl & Guwaldi, 2018), getting out of the office and the classroom and seeing, sensing, and presencing[9] what is and is not thriving. It also involves an exploration of, and investment in, the value of not just green but biodiversity-rich spaces and the wellbeing of staff and students (Ha & Kim, 2021). Liu et al. (2021) highlighted that, whilst university campuses provide unique opportunities for urban biodiversity research, conservation, and education, and can connect the public with nature through citizen science, and whilst at least 300 universities have conducted campus biodiversity surveys since 1940, most of these were concentrated in India and China. This raises important questions about whether UK universities are making the most of their campuses and the latent potential to care both for nature and humanity. One significant development that has allowed UK universities to engage with these questions has been the development of the Hedgehog Friendly Campus (HFC) scheme.

Hedgehog Friendly Campus Initiative

The HFC Campaign, launched in 2019 with funding from the British Hedgehog Preservation Society (BHPS) and support from the National Union for Students (NUS), raises awareness on higher education campuses across the UK of the need to protect this vulnerable species.[10] This initiative engages organisations with significant land holdings who are also able to integrate research, teaching, and learning for change into a participatory action-oriented programme designed

[9] Seeing, sensing and presencing are the three levels of listening described by Otto Scharmer in Theory U (Scharmer, 2016) allowing dialogical connection to be established.

[10] Hedgehogs were added to the UK Biodiversity Action Plan in 2007 and, in 2020, were listed by the IUCN Red List as vulnerable in Great Britain (Matthews & Harrower, 2020).

to address the threats that hedgehogs face. Across the UK, hedgehog numbers have halved since 2000, with urban hedgehogs facing the challenges of road traffic, litter, lack of access to water and food, habitat fragmentation, and poisoning. These issues can all be studied and addressed on campus as universities work their way through the tiered series of bronze, silver, gold, and platinum accreditations that make up the campaign. Each accreditation requires university campus teams to complete a series of actions. The initiative has been taken up by a large number of universities, prompting Moosavi (2021) to comment on how successful the take up of this initiative has been relative to the take up of the Race Equality Charter:

> As of June 2021, 17 UK universities hold an award from the Race Equality Charter, 63 UK universities hold an award from the Hedgehog Friendly Campus initiative and 102 hold an award from Athena Swan. No UK universities hold a gold award for any of the three initiatives which is indicative of the fact that no UK universities have achieved racial equality, gender equality or hedgehog protection to the extent that is desired. (pp. 2–3)

This statement highlights that, sometimes, university communities need an opportunity to engage with an issue and an appealing cause around which to gather a collection of interested and committed people. This has certainly been the experience of the HFC team at the University of Edinburgh, whose campuses provide a home for many plant and animal species, including hedgehogs. The University joined the campaign as an early adopter in 2019. Over a three-year period, staff and students across the University worked together to achieve bronze, silver, and gold accreditation thereby becoming a more hedgehog friendly campus. This provided impetus to actions already being undertaken for wildlife including the provision of logpiles and plantings to encourage insects as food for hedgehogs, holding workshops to make hedgehog "homes" and locating them on the University grounds, using strimmer stickers to remind landscaping staff to look for hedgehogs before strimming, creating litter picking stations, organising regular litter picks, and installing signage to slow traffic for hedgehogs.

A progression from awareness raising at bronze level, to significant actions on the ground at silver level, and then embedding and sustainability of continued actions as well as wider engagement with local and regionally based communities at gold level, became apparent as the team worked through accreditations. By 2022, the HFC team widened their membership and remit to become the University of Edinburgh Biodiversity Working Group (BWG), an expansion that supported more fully the biodiversity strategy with its wider priorities.

The University has now committed to pursuing the HFC Platinum award, following the University of Keele (2023). This requires the University to deliver a project that protects and supports hedgehog populations on campuses. The project must:

- Address your university or local area's most negative impacts and biggest threats to hedgehogs

- Have at least two outcomes that can be measured (or reasonably estimated)
- Leave a lasting legacy beyond the end of the project, so the project can continue to have an impact in the future
- Be replicable by other teams in the future
- Have reached a broader audience than just the HFC team

In considering how to engage with this further action-oriented challenge, the BWG decided to build on research to assess and improve hedgerows at one campus site (Norris, 2022). This project reviewed the literature on hedgerows and hedgehogs, undertook a historical review of the degradation of hedgerows on campus, and carried out survey work to evaluate the current health of hedgerows and the implications for hedgehogs (Figure 1).

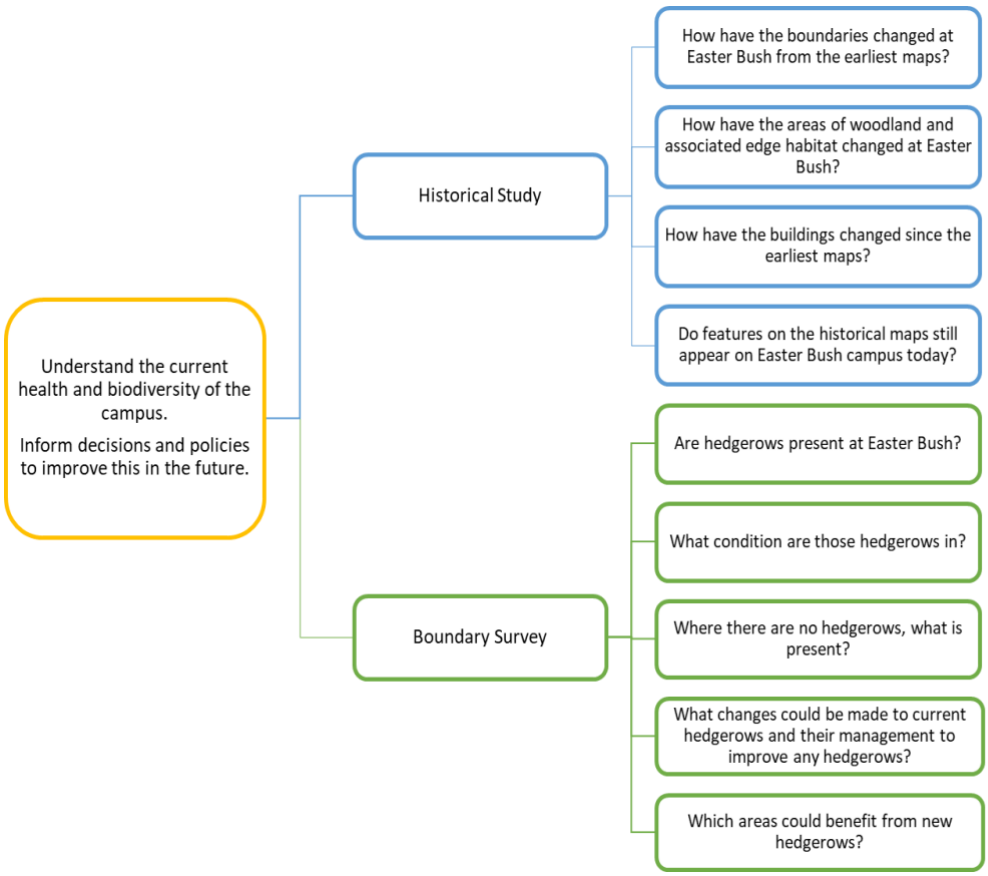


Figure 1. This flow diagram depicts the questions posed by Norris (2022) exploring the history, presence, and quality of hedgerows on the Easter Bush Campus, University of Edinburgh, Scotland.

This project allowed us recommendations on how the University could better care for hedgehog habitats. These recommendations have since informed the development of an approach that could be applied across campuses. Elements

relevant to our exploration of university responsibilities are considered in the next section on hedgehogs and hedgerows.

Life on the Edge: Hedgehogs and Hedgerows

Hedgerows have long been part of the British countryside, both as a cultural landscape and as connecting lifelines supporting biodiversity, including 83 Biodiversity Action Plan species in Scotland (Wolton, 2009). Loss of hedgerows or declines in their quality are likely to significantly impact these species, including the Western European Hedgehog (*Erinaceus europaeus*). Hedgehogs are a highly valuable indicator species widely regarded as a charismatic flagship species, protecting biodiversity in urban areas and fostering public participation in wildlife conservation (Hobbs & White, 2016).

Hedgehogs require resources for food, nesting, shelter and dispersal that are typically and reliably supplied by hedgerows. The literature highlights that increasing the quality and quantity of hedgerows increases habitat and resources for hedgehogs and other endangered species as declining hedgehog numbers have a temporal correlation with a loss of hedgerow quality and quantity. Lawton et al. (2010), in their ground-breaking review of England's ecological network, highlighted the need for a changing approach to conservation—a leap forward that went beyond protecting what was left towards restoration and a system's view with respect to ecological processes and ecosystems services for both wildlife and people. It is this concern for the quality of habitat on campus, coupled with a recognition of the need for a systems approach, that informed the development of the case-study presented next.

Case Study

In mapping out the nested relationships between the global biodiversity crisis and what actually happens on university campuses as we seek to prepare the next generation to care for life in a time of global ecological crisis, we have argued that universities need to take responsibility for how we connect with nature and care for nature's interconnectedness. This paper continues to explore these responsibilities by reviewing the Action Research informed project that sought to develop Hedgehog Friendly Campuses. Our broad question is:

How can universities nurture biodiversity and our relationship with biodiversity through campus-based living lab initiatives and communities of learning for and with nature?

We explore this by considering how the HFC initiative provides a focusing device through which, with the help of ecologists who understand hedgehog ecology, we can develop a deeper understanding of how we foster and care for the biodiversity that our campuses can support. We further consider how this initiative provides an opportunity to engage the wider community in conservation work, thereby nurturing our sense of connection to and our relationship with biodiversity. In moving through the award scheme and in

seeking to engage with the question of what it might mean to be a hedgehog and biodiversity friendly campus, we seek to develop recommendations to increase biodiversity on the Easter Bush campus in line with the UoE Biodiversity Plan and HFC aims. This is achieved by developing a framework for stakeholders to gain an overview of, and better understand, the benefits of providing good quality habitat and wildlife corridors. A key part of that framework involves undertaking fieldwork that can inform decision-making and the development of policies that will enhance biodiversity. Such work can be undertaken, in part, through student-led research projects.

Methodology and Methods

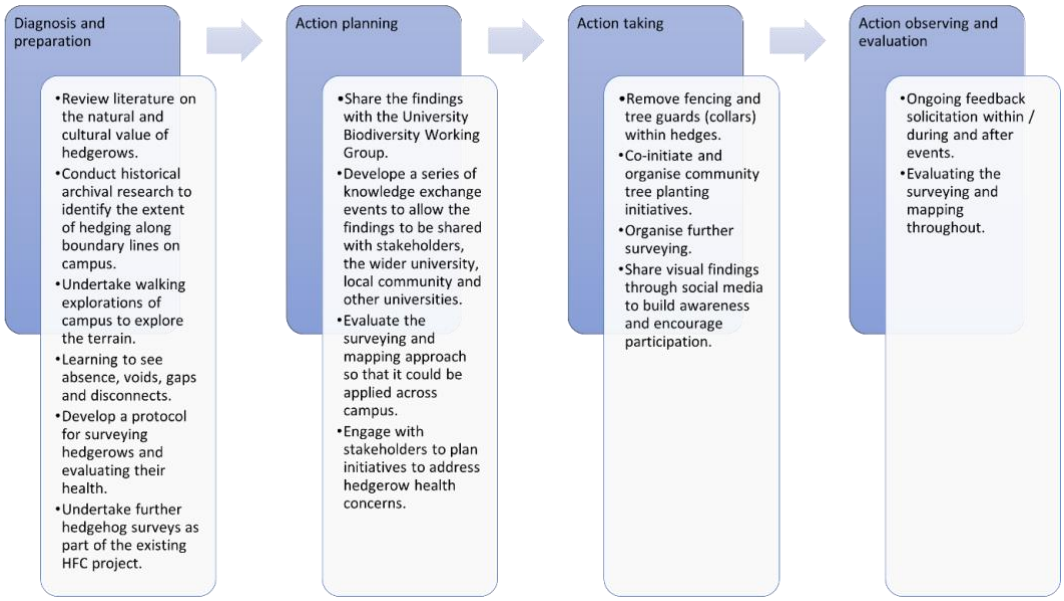
Case-study methodology has become one of the most common qualitative approaches in research on sustainability in Higher Education (HE) as it can be particularly well suited for complex situations with multiple relationships and unclear boundaries (Corcoran et al., 2004). In this case, our HFC project has grown organically as opportunities have arisen for research to be undertaken, knowledge and experience exchanged, lessons reviewed iteratively, and insights drawn on to develop environmental management decisions on campus. The case we present is delimited by the work undertaken for the HFC Bronze, Silver, Gold, and Platinum Awards. This work involved working across departmental boundaries, building relationships with partners[11] drawn to contribute to the project from across the university, including hedgehogs who affect and are affected by changes to the habitat and can be considered stakeholders (Smart, 2022).

The tradition of Action Research (AR) represents a shift in social-science research toward active participation in the process of change (Reason & Bradbury, 2001; Reason & Torbert, 2001). This involves the development of a co-creative methodology with an emphasis on co-constructing the new through ongoing cycles of reflection on action. The important contribution that an AR approach can make within the corporate responsibility sector is emphasised by Becker-Ritterspach et al. (2019), who recommend it as a research approach that aids the real-life development and implementation of corporate environmental responsibility responses. They apply the concept of institutional voids to the environmental context, defining these voids as "the absence or weakness and incoherence of formal and informal institutions geared toward environmental protection" (Becker-Ritterspach et al., 2019, p. 185). Scharmer (2016) has articulated such absencing as the ecological divide and proposed Theory U as an

[11] The partnering stakeholders are creatures, people, groups of people and organisations identified as having an interest at Easter Bush. These include members of the Land and Estates team, undergraduate teaching teams, Centre for Sports and Exercise staff and the wider student body.

Action Research approach that can allow such divides to be bridged dialogically, through deep listening. Cousquer and Haounti (2022) demonstrated the potential for AR to be undertaken not just for but with other-than-human animals. Such approaches to response-ability (Haraway, 2016) require us to invest in building an organisation's capacity to listen and participate (Bradbury, 2006, pp. 236–237) and to bridge, fill, or compensate for these voids (Becker-Ritterspach et al., 2019, p. 191). So how did this inform the architectural development of our AR HFC approach? What spaces and opportunities did we create to bridge the gaps and disconnects? To understand this, we need to consider the nature of AR in more detail.

Action Research can be viewed as a multi-step process involving some or all of the following elements: diagnosing and preparation, action planning, action taking and action observing and evaluating (Battaglia et al., 2015; Dick, 2015). Our starting point was suggested by an observation made by Norris (2022) who, returning to the University's Easter Bush[12] campus several years after graduating, was shocked by the loss of hedgerows. This prompted a series of discussions that led to the formulation of Norris's dissertation research question about the health of campus hedgerows and hedgehog populations. The approach is summarised using four elements (Figure 2).



[12] The Easter Bush campus is a rural campus, situated outside of the City of Edinburgh, comprising of teaching and research facilities, a working sheep farm, and equine paddocks. It is bordered by land owned and managed by the Scottish Rural College; this means there is significant potential for biodiversity to be nurtured collaboratively by these two HE institutions should they decide to prioritise and collaborate on this.

Figure 2. The multi-step process involved with developing Action Research for the hedgehogs and hedgerows on Easter Bush Campus. Hedgerow health evaluation protocols were trialled and evaluated as part of early action planning and taking, reflecting the iterative nature of the process which is not as linear as this representation suggests.

The mapping of hedgerow losses and hedgerow health that followed the extensive literature review (Norris, 2022) presented the case for the crucial importance of hedgerows as habitats and wildlife corridors. The findings from the archival and survey work were then shared with the BWG. Follow up meetings with land managers were undertaken to review and discuss findings and develop suggestions for interventions. The implications of the findings, and how translating knowledge into action, both in terms of practice and policy, are considered next. In this consideration, we highlight the relationship between disconnections within and across organisations and habitat fragmentation.

Findings and Implications for Environmental Management and Vertical Literacy in Higher Education

In this section, we summarise key findings and recommendations from the HFC study and how these are being acted upon through the Action Taking and Evaluating phases that followed the initial study. This allows us to discuss the implications for how universities can evolve their understanding of their responsibilities in the face of the nature emergency.

Perhaps the most striking historical finding was that the university has little data and no studies on campus habitat cover and biodiversity (Norris, 2022). In the absence of such studies Norris relied on official maps to generate a picture of historical changes to boundary lines that could act as wildlife corridors, reporting that:

- Between 1890 and 2021, the building area cover increased by 2604%.
- The biggest change was between 1890 and 1970, when an increase from 13003m2 to 41607m2 was seen.
- Between 1970 and 2021 the length of edge habitat13 decreased by 12.7%.
- The total length of boundaries increased by 24.8% between 1890 and 2021, with the biggest changes noted where fencing has been introduced to create demarcated areas for horse grazing

[13] Edge habitats represent the boundary or connection between two different habitats and may contain features of both. This can result in a more diverse ecological niche and allow for greater biodiversity.

without the benefits a hedged boundary can afford horses and wildlife.

The boundary study reported that:

- Of the 6619m of boundaries surveyed, only 1321m (20%) were deemed permeable to hedgehogs.
- 4145m (62.6%) was possibly permeable to hedgehogs, depending on the size of the holes and gaps in the fence.
- The use of chicken wire fences rendered 1153m (17.4%) of boundaries impermeable to hedgehogs.

Wooden fence lines predominated due to their cheapness, longevity, and convenience, requiring little maintenance and providing instantaneous stock-proof barriers. The resulting lack of vegetation, together with the large amount of impermeable surface and presence of artificial lighting (Figure 3) highlights the extent to which boundaries have been constructed with a view to controlling, protecting, and dividing. Little importance has been given to their potential as a means of connecting and sheltering. This reflects an anthropocentric approach to decision making that spares little thought for biodiversity. There is minimal quality habitat for wildlife, particularly hedge-dwelling species, with no connectivity or cover across these large open areas. Furthermore, the large areas of impermeable surfaces and artificial lighting are known to negatively affect hedgehogs (Berger et al., 2020). Where present, hedgerows were found to be in fair to poor condition with limited tree-species diversity. Increasing the number of quality hedgerows and consideration for placement and timing of artificial lighting could significantly help hedgehogs access these areas, with benefits rippling out.

Figure 3. Sparse vegetative growth across the horse paddocks looking south-east.

The lack of hedgerows and trees across this area can be seen clearly. This contributes to horses becoming easily and regularly spooked by the wind and litter blowing. The path is a solid surface with artificial lighting.

The report concluded that conserving and regenerating existing hedgerows and planting of new hedgerows would benefit hedgehogs, other wildlife, livestock, and the wellbeing of people (Norris, 2022). Over-trimmed hedges would benefit from a change in management to allow for blossoming and fruiting and increase base density. This may involve laying sections (Graham et al., 2018) and filling in gaps with new planting. In some locations lines of trees could be integrated into an enhanced connectivity network by planting new hedgerows. Veteran trees, where present, could thus be incorporated into dense well managed hedgerows, further contributing to the provision of connected habitat.

The recommendations now form the basis of the University's HFC Platinum Award project, which has focused attention on hedgerows as an essential habitat for hedgehogs. This led to a preliminary mapping exercise with student and staff volunteers, facilitated by members of the BWG, using the University's Green Infrastructure (GI) mapping tool, to add detail in terms of hedgerow characteristics to hedgerows identified and visible on the tool. SRS has employed a member of Estates to work one day a week to progress the Platinum Award project and GI mapping over an eight-month period.

Mapping has allowed a more comprehensive survey of campus hedgerows to be undertaken, establishing their health status, capturing valuable data centrally, so that priority hedgerows, and their locations, can be identified for improvement. Mapping shows clearly to Estates where campus and adjacent land managed by farmers would benefit from additional hedgerows or improved hedgerow care. This includes removing wire mesh fencing from hedgerows and tree guards, as well as the laying of dead hedges. Integrating all the elements of sustainable wildlife hedgerows is likely to have a substantial impact on local biodiversity and help hedgehog conversation, creating opportunities for integrating volunteering, research, and teaching. This, however, will challenge the university to consider the underlying fragmentation and how it has arisen through institutional fragmentation and loss of vertical literacy.

With future building works planned, opportunities exist to study how the university mitigates effects on the local wildlife populations and community wellbeing. This requires the fragmented nature of records and thinking to be addressed, and the establishment of baselines to capture the existing condition of hedgerows and other habitats with a view to realising biodiversity net gain. More importantly, it recognises that we have a shared wellbeing. Hedgerows with tree-guards in place, causing an increase in height of the base of the hedge that is likely to be detrimental to hedgehogs, who favour hedges with dense bases, particularly for nesting, represent a learning opportunity for students who can reflect on the lack of integrated care plans more widely. This opportunity to contribute to a shift from management to stewardship, from control to care, thus

extends beyond the removal of collars, viewing the hedgerow as a source of food, shelter, happiness, and wellbeing. The hedge is thus a metaphor for education.

Discussion of the Bigger Picture

This paper set out to consider how universities might evolve their understanding of their responsibilities in light of the biodiversity crisis and the need to restore 30% of land for nature by 2030. This responsibility has been largely overlooked by the literature on corporate responsibility in the Higher Education sector, which fails to recognise the extent to which corporations "are largely responsible for the most serious problems in the world today, in particular, the climate emergency" (Lapadat, 2022, p. 184). Rahman et al. (2019) argued that "universities have a broader responsibility beyond teaching and research, a larger mission in human and social development to be socially responsible to local communities by strengthening relationships with and between constituents" (p. 916). The concept of the public good that they present, however, is very anthropocentric and fails to recognise the disconnection between humans and nature that lies at the heart of the climate and biodiversity crises (Siegel, 2022). This reflects a narrow and therefore limited understanding of the nature of social responsibility (Rahman et al. 2019, p. 926) and a lack of detailed consideration of the role played by universities in ensuring sustainable futures. Any critique of how we frame our understanding of responsibilities is inevitably challenged to become more self-aware and self-critical. This calls for an understanding of responsibilities that are born of reflexivity—turning the camera back on ourselves—and an ability to appreciate how organisational culture, values, and thinking create the crises in which we find ourselves entangled. As Jonathan Rowson (2021), writes of the metacrisis:

> How we understand and react to our crisis is an *endogenous* part of our crisis and our emergency, and at a species-as-a-whole level, at a political level, at a business level, we don't understand it very well at all.
>
> All our rallying cries for action and for transformation arise in cultures and psyches riddled with confusion and immunities to change. We have to better understand *who* and what we are, individually and collectively, in order to be able to fundamentally change how we act. That conundrum is what is now widely called the meta-crisis lying within, between and beyond the emergency and the crisis. That aspect of our predicament is socio-emotional, educational, epistemic and spiritual in nature; it is the most subtle in its effects but is the roots of our problems, and the place where we are most likely to find enduring political hope. (p. 29)

In examining how universities might engage with the biodiversity crisis, in characterising this as a "thorny challenge" that is difficult to embrace and take to heart, we highlight that the sterile and lifeless boundaries we create on the

land are mirrored at an organisational level, reflecting both literally and metaphorically how our linear thinking, boundary making, and siloed disciplinary practices lie at the root of the problem. To better understand this connection, we need to see the whole in the part (Bortoft, 1996) and then consider how parts might be different if universities attended to and operated from the whole.

The HFC initiative provides a focussing device through which we have been able to develop a deeper understanding of how we care for the biodiversity that our campuses can and could support and how we can engage staff and students in conservation work, thereby nurturing their sense of connection to and relationship with biodiversity. This has helped stakeholders gain an overview of, and better understand, the benefits of providing good quality wildlife corridors.

The lack of research into campus biodiversity means that we have no baselines to make comparisons with and little awareness of biodiversity potential. The resulting shifting baseline syndrome (Jones et al., 2020) is therefore part of the system the university needs to develop an overview of. University staff and students have minimal, if any, lived experience of living in a healthy ecosystem and what we have lost. This lack of awareness is further compounded by the lack of academic engagement with the history, sociology, and ecology of university campuses which has left the university community with little knowledge of the health of campus ecosystems. This creates an opportunity for universities to re-examine their responsibilities and specifically how they can nurture both biodiversity and our relationship with biodiversity through campus-based living lab initiatives and communities of learning for and with nature.

This paper's ground-up approach sought to initiate this through a series of action-learning cycles. In doing so, insights have been gained into habitat fragmentation, the challenges associated with habitat restoration and the wider challenges of "getting the system into the room" and bringing the university into right-relation with nature. By highlighting the absence of records and knowledge of campus biodiversity and of how the university hedgerows and campuses have been managed, the historical lack of management for and with biodiversity and the impacts of management practices on campus life, both human and more-than-human come into view. The whole we see in the part that is the HFC project is of a research and teaching organisation that does not study its own relationship to place. Estates are managed for profit, rather than being stewarded for life and for the opportunities to learn how life-sustaining systems can be cared for. There is thus only minimal recognition of place as a living system we inhabit and are all responsible for.

We start to see the effects of hierarchical organisational cultures and disciplined thinking: Each department and discipline may have its partial truths but these do not come into conversation as the quality of listening practice necessary to dissolve silo-thinking is not prioritised. In seeing the whole in the part (Bortoft, 1996), however, we come to appreciate that the ways of attending that characterise thinking in academia, with its obsession with measurement

and utility, are designed and destined to fragment and vivisect (McGilchrist, 2021, pp. 900-903). Without an understanding of and respect for the value of hedgerow ecologies that have established themselves over generations, it is all-too-easy for planners to think it is acceptable and equivalent to tear up old hedgerows, and mitigate this by planting saplings. Such simplistic thinking fails to recognise the relational richness that arises over time through complex co-evolutionary processes.

Looking forward, we argue that universities need to nurture ecological and vertical literacy on their campuses and place emphasis on how we respect, value, learn about, research, study and most importantly, steward and care for our environment. This can be achieved by creating spaces and opportunities for our interdependent relationships with campus/local biodiversity to be engaged with by all disciplines. This, however, is not just about sharing data, it is about sharing stories so that the meta-narrative of how we are deeply related to, dependent on, and responsible for nature re-establishes itself. Yunkaporta (in Vaughan-Lee, 2024) argues for us to embrace deep time diligence as part of this, in order to develop the stories, lore and knowledge that we need for the system to become healthy.

> Everybody's sharing their different ignorances. Your ignorance is only from the fact that you have a valid data set, but it's only from one standpoint. But you get all the multiple standpoints and you start to form a picture. You've got all these different data points coming back in and it's computed, like you've got dark data processing happening at this big collective level with the best computation mechanism ever—'cause the human brain's pretty good, but you get like twenty, thirty, a hundred and fifty of those brains together, sharing stories, sharing data sets, and then all of these things just kind of moving and shaping together, something emerges: principles, lores, story, narrative binding all these together. (transcript, Tyson Yunkaportas answer to the 13th question)

The potential for collaborative transdisciplinary work to contribute to such projects is there to be realised. The next phase of such work will challenge this and other universities to recognise the intersections between social responsibility and vertical literacy, and to evolve and deepen the approach to Action Research to include awareness-based systems change for ecological and planetary health at the organisational level. Substantial bridging work lies ahead, challenging teaching and research and operational services to reflexively and collaboratively work to address the knowledge-doing gaps that have arguably contributed to the ecological crises we face.

It is hoped that such work will be resourced in ways that ensure future generations can enjoy richer, more ethically informed and sustainable relationships with campus biodiversity. Universities can nurture a relational literacy and sense of place that allows the health of the living environment and

the communities their organisations are embedded in to be safeguarded. The thorny challenge they have to embrace involves bringing communities of learning, inquiry, and practice together to listen and collaborate, to make our campuses liveable again and prepare students for these ecological challenges. The HFC initiative can thus serve as a focussing tool that encourages Higher Education institutions to develop the necessary ecological and vertical literacy required to meet the nature emergency more comprehensively.

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