EXPERT ASSESSMENT OF INNOVATIONS

Deliverable number: D2.2

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DAISY

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List of abbreviations and acronyms used in this document

Acronym	Definition
3D	3 Dimensional (printing)
AI	Artificial Intelligence
BiSciCol	Biological Science Collections Ontology
CRISPR/CAS9	Clustered Regularly Interspaced Short Palindromic Repeats/ CRISPR-associated protein 9
CU	Coventry University
eDNA	Environmental DNA
ESSRG	Environmental Social Science Research Group
GF	GreenFormation
GM	Genetically Modified
GBIF	Global Biodiversity Information Facility
GIAHS	Globally Important Agricultural Heritage Systems
ICCAS	Indigenous Community Conservation Areas
ICT	Information and Communication Technology
KTU	Kaunas University of Technology
LLM	Large Language Model
MLU	Martin Luther University Halle-Wittenberg
TIESS	Scientific Institute for Environmental and Social Research
TIMS	Transformative Intervention Mixes
TRD2	Transformative Diagnostic Tool
UAV	Unmanned Aerial Vehicle
UFZ	Helmholtz Centre for Environment Research
VR	Virtual Reality
WP	Work Package
WR	Wageningen Research Foundation

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Background: About DAISY

DAISY - DigitAl, technologIcal and Social innovation mixes enabling transformation for biodiversity and equitY - will advance understanding of how specific mixes of interventions including social-technological innovations can be used to induce transformation for biodiversity and equity.

DAISY's main objectives

- To understand which socio-economic, political and behavioural processes, and their interrelationships shape and enable our personal, political and practical ability to respond to the biodiversity crisis and how they impact on transformative change.
- To collect existing tools, processes, interventions and innovations that are conducive to triggering transformative change with the understanding of what enables them to address biodiversity loss and social inequity.
- To create intervention mixes based on existing tools and innovations and apply them in practice to induce transformation in all three spheres (personal, political, practical) to support biodiversity and equity prioritisation in decision- and policymaking.

Our case studies to test innovations

Innovation mixes will be tested and assessed for effectiveness in five seed innovation intensive case studies, within the domains of agri-food, education, energy and urban and regional development.

Turning on transformation

DAISY will have a special emphasis on amplifying innovation through bridging activities, networking events, wide stakeholder engagement and collection, connection and distribution of innovation seeds to switch on transformation.

Executive summary

This report presents the outcomes of Task 2.2, which focused on the expert assessment and validation of a shortlist of 49 innovations identified as having potential to support transformative change for biodiversity and equity. These innovations were selected from a broader landscape of 987 entries mapped in Task 2.1 and span the domains of agri-food, energy, education, and urban and regional development.

The assessment process combined structured mapping, expert workshops, and application of DAISY's Transformative Diagnostic Tool (TRD2) (Deliverable 1.4). Experts evaluated innovations using scenario prompts, qualitative reflection, and TRD2 radar chart visualisations, enabling comparative analysis across transformation, equity, and biodiversity dimensions.

Findings show that transformation is not a property of innovations alone, but emerges through their interaction with enabling conditions, governance structures and societal values. Equity was consistently emphasised as both a goal and a prerequisite for transformation, with experts highlighting the importance of inclusive governance, recognition of diverse knowledge systems and capacity-building.

Context was also found to be critical. Innovations varied widely in type and maturity, and their transformative potential was seen as highly dependent on ecological, cultural and institutional settings. Digital and technological innovations offered new possibilities for monitoring and engagement, but also raised concerns around access, governance and unintended consequences. Their impact was viewed as contingent on how they are implemented and by whom.

DAISY's TRD2 proved valuable in guiding structured reflection and visualising ambition–practice gaps. It supported relatively consistent assessment across diverse innovation types and helped identify underrepresented linkages – such as distributive equity and biodiversity–justice integration – that are central to systemic change.

Overall, the results of Task 2.2 provide a validated portfolio of innovations and a set of insights that will inform the development of transformative intervention mixes in

the next phase of the DAISY project. They will also contribute to the further refinement of the TRD2 and deepen understanding of the conditions under which innovations can support just and sustainable transitions and transformation.

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1. Introduction

1.1 Purpose of the Deliverable

This deliverable presents the outcomes of DAISY's Task 2.2, the aim of which was to critically assess and validate a subset of biodiversity-related innovations identified in the preceding Task 2.1 (Deliverable 2.1). The purpose of this report is to provide a consolidated expert evaluation of the transformative potential of the subset of innovations, with particular attention to their capacity to address biodiversity loss and social equity. The report contributes to the DAISY project's broader goal of identifying and amplifying innovation mixes that can trigger systemic change across personal, political, and practical spheres. Based on the assessment of the innovations the deliverable also offers insights into key trends and enabling factors for transformation, including a focused analysis of the risks and opportunities associated with the assessed subset of innovations.

1.2 Context and Relevance

This deliverable is situated within Work Package (WP) 2, which focuses on identifying and assessing innovations with the potential to drive transformative change for biodiversity and equity. By providing a validated and expert-reviewed shortlist of 49 innovations, it creates a foundation for subsequent tasks and work packages. These findings will inform further analysis in Task 2.3, where deployment pathways, barriers, and enabling policy contexts will be explored. They will also support the development of transformative intervention mixes (TIMs) in WP3. Beyond WP3, the insights generated here will contribute to participatory processes and scenario-building activities in WP4 and WP5, ensuring that DAISY's approach remains empirically grounded and responsive to systemic challenges.

1.3 Scope and Objectives

While Deliverable 2.1 focused on identifying a broad landscape of potentially relevant innovations, this report narrows the scope to those with the strongest alignment to DAISY's transformative aims. The innovations assessed span the four DAISY domains – agri-food, energy, education, and urban and regional development – and beyond. The core objective was to evaluate the transformative potential of

these innovations using DAISY's TRD2 framework, with attention to their capacity to support biodiversity and equity. This included identifying enabling conditions, surfacing key trends, and analysing risks and opportunities. Accordingly, the specific objectives of this deliverable are to report on the:

- Critical evaluation of the transformative potential of shortlisted innovations using the TRD2 framework.
- Identification of key trends and enabling conditions that support systemic change.
- Analysis of the risks and opportunities associated with the subset of assessed innovations in the context of biodiversity and equity.
- Provision of a validated list of 30-50 transformative innovations to form the basis for Task 2.3 and to inform the development of intervention mixes in WP3.

In addition to assessing innovations, this task also provided a valuable opportunity to test and refine the TRD2 framework in practice. Insights from expert workshops contributed to improving the tool's usability and conceptual robustness, supporting its future application across other DAISY work packages.

1.4 Structure of the Document

This document is structured to guide the reader through the rationale, process, and outcomes of the expert assessment of innovations. Section 2 outlines the methodology used to critically evaluate the innovations, including the frameworks applied, data sources and validation processes. Section 3 presents the results and discussion, together with a list of the expert-assessed innovations. Section 4 offers concluding insights, implications for policy and practice, and recommendations for future work within the DAISY project. The Annex contains a more detailed listing of the assessed innovations, inclusive of their domain, key points from their individual evaluations and an accompanying TRD2 radar assessment chart.

1.5 Target Audience

This deliverable is intended for multiple audiences within and beyond the DAISY consortium. Internally, this deliverable serves project partners involved in Task 2.3,

where the validated innovations will be further analysed in terms of deployment pathways, barriers, and policy frameworks. It also supports those working on the development of transformative intervention mixes (TIMs) in Work Package 3, as well as contributors to cross-cutting analyses in Work Packages 4 and 5. Externally, the report is relevant to policymakers, civil society organisations, innovation practitioners, and researchers working at the intersection of biodiversity, equity and systemic transformation. By providing a validated and expert-assessed list of transformative innovations, the deliverable offers a resource for those seeking to design, support or evaluate interventions that aim to address complex social-ecological challenges.

2. Methodology

2.1 Overview: Approach and Research Design

The methodological approach for Task 2.2 combined systematic mapping, expert validation and participatory assessment to critically evaluate the transformative potential of the innovations identified in Task 2.1. By way overview, the research design was structured into five predominantly sequential stages:

- **Initial shortlisting**: The longlist of 987 innovation entries (derived from Task 2.1) was double-coded by the research team (CU, KTU, MLU, TIESS) using a structured coding sheet. This stage aimed to identify innovations with potential relevance to biodiversity and equity, as well as alignment with the overall scope and focus of the DAISY project. It resulted in a long-shortlist of 71 innovations which, where applicable (in the case of overlapping entries), included entries grouped into a single focal innovation.
- **Long-shortlist refinement**: The 71 innovations were loosely ranked by CU - to the extent of being provisionally identified as with sufficient potential to be within or without the top 50 – and then further reviewed by the full research team. As part of this review stage the research team also analysed for gaps (informed in doing so by Deliverable 1.3 and their own expertise). This resulted an expanded list of 82 innovations, of which a final shortlist of 49 were selected (– via collective research team discussion and consensus – as having sufficient transformative potential to be taken forward).

- **Expert validation**: Selected innovations were assessed, primarily via in-house workshops, at CU, KTU, MLU, and TIESS. Experts engaged with innovations, applying their own knowledge and experience. Alongside, group discussion was further supported via scenario-based prompts and via completion and review of TRD2 assessments, which served as structured conversation starters to explore each innovation's transformative potential.
- **TRD2 assessment**: DAISY's Transformative Diagnostic Tool (TRD2) (Deliverable 1.4) was used in accompaniment to the round of independent expert assessment, to evaluate and synthesise the current and future potential of individual innovations.
- **Synthesis and reporting**: Expert feedback and TRD2 results were analysed to identify key trends, enabling factors, risks and opportunities associated with the innovations. These findings form the basis of the results documented in this deliverable.

This mixed-methods design ensured that the assessment process was both systematic and inclusive, combining structured analysis with expert judgement and contextual sensitivity.

2.2 Data sources and selection criteria

2.2.1 Innovation long-shortlisting

Task 2.1 began with a scoping analysis of the longlist of 987 innovation entries, (compiled during Task 2.1). Each entry – comprised of bibliographic information, publication/ patent title, abstract/ summary and AI-generated title of the focal innovation – was systematically reviewed and double-coded by two research team members, using a structured Excel-based coding sheet (created by CU and MLU).

Entries were assessed for relevance to DAISY's focus on biodiversity, equity and transformation, and alignment with DAISY's overall scope – including its core domains (agri-food, energy, education, urban/regional development). Innovations with reduced applicability in an EU context or beyond DAISY's remit (e.g. marine or space technologies) were excluded unless deemed highly relevant. Decisions for inclusion were recorded as 'Yes,' 'No,' or 'Maybe,' alongside brief comments to

capture rationale and uncertainty. Discrepancies between coders were resolved through re-review (with re-review undertaken by CU), and pattern matching techniques were used to consolidate duplicate entries and group closely related innovations.

Based on this screening, an initial 'long-shortlist' was produced (by CU) containing 71 entries and shared amongst all task partners, for further review in preparation for a task-level review meeting. It was constructed with an approximate ordering of entries, such that those with strongest alignment to the (above outlined) selection criteria appeared higher in the list, and those with less comprehensive alignment appeared lower in the list, with the approximate cut-off point of 50 innovations (in accordance with the Task 2.2 description) clearly indicated. All Task partners - both individually and via collective discussion during the task-level review meeting - were then asked to (1) further assess this list; (2) review the draft ordering of entries – in accordance with the task description requirement that approximately 30-50 innovations be shortlisted for further review (the main significance of the approximate ordering being the likelihood that entries located towards the bottom of this long-shortlist would not be taken forwards to the next stage of the task); and (3), identify whether there were potential gaps in the long-shortlist.

The above process resulted in an additional 11 innovations being nominated for inclusion by individual members of the research team (inflating the long-shortlist to 82). The nomination of these additional entries was driven by the combined view of the research team that the innovations deriving from the original Task 2.1 longlist both contained some gaps and also appeared to contain only a limited number of innovations with potential to enable transformative change for *both* biodiversity and equity. This view and the resulting nominations were informed by the findings arising from preceding Deliverable 1.3 and also by the pre-existing expertise of the research team. During the task-level (online) review meeting, the additional entries were each discussed and ranked for inclusion or exclusion within the top 50. In follow-on, the research team re-reviewed the full list resulting in final consensus that 49 innovations would be taken forward to the next stage of (expert validation) assessment.

This final pre-validation list was then divided between the research team in preparation for expert assessment in the subsequent workshop phase. Allocation of

innovations to individual partners was co-ordinated by CU, taking into account expertise alignment of individual task partners (and/ or within their host departments and wider institutions).

Table 1: Distribution of shortlisted innovations for expert assessment

Partner	Allocated Innovations
CU	17
KTU	11
MLU	11
TIESS	10

2.2.2 Expert assessment and validation

The data collection stage of Task 2.2 involved independent expert assessment and validation. For most shortlisted innovations, this stage was completed via in-house workshops conducted with experts employed within the partner institutions. However, in the case of all innovations assessed by TIESS the workshop was comprised of a mixture of external experts (in accordance with the small institutional size of TIESS). Similarly, three of the innovations allocated to CU were also assessed via specialist external experts. Meanwhile, in the case of KTU the expert assessments and validation were conducted via online asynchronous communication (primarily via email).

Experts were selected and approached for participation, based on their known familiarity with the specific innovations under review, but also with deliberate attention to ensuring – wherever possible – disciplinary diversity across the natural and social sciences. This helped to capture a broad range of perspectives on transformative potential, equity and biodiversity relevance.

Table 2: Overview of expert assessment and validation workshop metrics

Partner	No. of work-shops held	No. of participants (inc. facilitators)	No. of innovations assessed	Disciplinary background of experts	Gender distribution
CU	6	28	17	Ecology, Conservation Biology, Human & Physical Geography, Sociology, Economics, Behavioural Psychology Agronomy, Software development/ database management.	18 female/ 10 male/ 0 non-binary
KTU	(asynchronous online communication)	3	11	Political science, sociology, geography	1 female/ 2 male/ 0 non-binary
MLU	2	7	11	Agricultural economics, Sociology, Geography, Economics	3 female/ 4 male/ 0 non-binary
TIESS	1	4	10	Law, Agronomy, Information Technologies, Machine Learning	1 female/ 3 male/ 0 non-binary

In the case of all assessments undertaken via workshops, the workshops were designed to assess the transformative potential of the shortlisted innovations through structured, participatory engagement with domain experts. Each innovation was introduced using a concise summary and an accompanying scenario narrative. The scenario was designed to contextualise its potential application in a European setting and to prompt further discussion specifically regarding the relational dimensions of biodiversity, equity and transformation. Drawing on their own knowledge and experience, and stimulated also by the prompting material, experts were asked to first spend time recording their individual assessments and then participate in facilitated group discussions.

In recording their own assessments experts were asked to complete a standard proforma that included four guiding questions addressing:

- Short- and long-term transformative potential
- Enabling conditions
- Risks (particularly for biodiversity and equity)
- Opportunities for future development
- Additional comments/ observations

The assessment process was further guided by the TRD2. A preliminary TRD2 assessment of each innovation was presented to the experts (prepared in advance by the facilitating DAISY partner), visualising its current and projected potential (for 2050) across three transformation spheres (personal, political, practical), four equity dimensions (procedural, distributive, recognition, capabilities), and four biodiversity dimensions (genetic, species, habitat, ecosystem). These visual tools supported comparative analysis and helped surface areas of consensus and divergence among participants. Having considered the visual result, together with the accompanying oral explanation, and drawing also on wider discussion and their own expert view, participants were asked to complete their assessment of each individual innovation by providing their own scores feeding into the radar-chart visualisation, which was automatically generated from aggregated scores across 11 sub-dimensions (3 transformation, 4 equity, 4 biodiversity) for both the current and future evaluation. .

Whilst the workshops were managed such that fixed amounts time were allocated to the assessment of each featured innovation (ranging on average from 20-40 minutes), experts were also given the opportunity to revisit their individual assessments in follow on from the group discussion, in case they preferred to make any additions or amendments (including to their visualisation of the relative current and future TRD2 potential of the innovation).

At the end of each workshop all notes, digital oral recording, completed assessment forms, and TRD2 charts were collected and digitised for synthesis. This dataset forms a core component of the deliverable and will be made available within the Zenodo DAISY project community.

In addition to validating the innovations themselves, the expert assessments also provided critical feedback on the TRD2 framework, contributing to its refinement and future applicability within the DAISY project.

2.4 Analytical Methods: analysis of expert assessment

Qualitative data from expert validation – including written assessments, group discussions, TRD2 radar diagrams, and TRD2 user-feedback – were synthesised to identify patterns, trends and divergences. Particular attention was paid to areas of consensus or disagreement regarding transformative potential, enabling factors, and risks. These insights were used to refine the preliminary TRD2 assessments and inform the final evaluation of each innovation.

The combination of structured and interpretive methods enabled a robust analysis of innovations, ensuring that both technical and experiential knowledge were incorporated into the final assessments.

2.5 Reflexivity and Research Ethics

The research team approached Task 2.2 with a reflexive awareness of the positionality of both researchers and expert participants. Given the qualitative and participatory nature of the expert validation, we recognised that assessments of transformative potential are shaped by disciplinary backgrounds, institutional affiliations and lived experiences. To mitigate potential bias and ensure diversity of perspectives, experts were selected from across DAISY consortium institutions and represented a range of domains, disciplines and professional backgrounds; they also included a mixture of nationalities, ages, ethnicity (although predominantly white European) and gender.

The TRD2 tool was explicitly framed as a 'conversation starter' rather than a prescriptive framework, allowing space for critical reflection and disagreement. Research team members encouraged participants to challenge assumptions embedded in the prompting scenarios and to reflect on the contextual factors that shape innovation outcomes. This reflexive approach was particularly important in discussions of equity, where recognition of marginalised perspectives and local knowledge was actively sought.

Ethical standards were upheld throughout the data collection process. All participants were provided with institutional ethics information sheets and asked to provide written informed consent at the outset. Workshops included a sign-in process and clear communication about the purpose of the research, data handling procedures and participants' rights. Data collected during workshops – including written assessments and TRD2 radar charts – were anonymised and stored securely in accordance with DAISY's Data Management Protocol (Deliverable 6.1).

2.6 Limitations

While the methodology for Task 2.2 was designed to be rigorous and inclusive, the following limitations should be acknowledged:

- **Scope of source material**: The initial (Task 2.1) longlist of innovations was derived from academic literature and patent databases, which may underrepresent grassroots, indigenous, or practice-based innovations not captured in formal publications.
- **Subjectivity in coding and assessment**: Despite the use of double-coding and structured templates, decisions regarding inclusion and transformative potential involved subjective judgement. While expert validation helped mitigate bias, some variability in interpretation remains.
- **Workshop constraints**: Expert validation workshops were time-limited, typically allowing 20-30 minutes per innovation (and in a limited number of cases 40 minutes). This was largely unavoidable due to the volunteer nature of the experts and their time availability. This may have constrained the depth of discussion, particularly for complex or unfamiliar innovations. Additionally, not all innovations were assessed by the same number or diversity of experts.
- **Contextual dependency of innovation assessment**: A key limitation of the expert assessment process was the difficulty in evaluating innovations in abstract or decontextualised terms. The transformative potential of any innovation is inherently dependent on its application context – who uses it, for what purpose, under what conditions, and with what degree of inclusivity (for further discussion of this point, see Section 3.2, below). This complexity meant

that generalised assessments risked overlooking critical relational and situational factors. To mitigate this, scenario narratives were developed and presented alongside each innovation to facilitate the grounding of discussions in plausible, context-rich examples. While this approach helped anchor expert reflections, it also introduced potential bias by framing the innovation in a specific way. Moreover, due to the time-bound nature of the assessment workshops, only one scenario was provided per innovation, which may have limited the scope of consideration.

- **TRD2 maturity**: The **expert assessment phase** presented the first opportunity for a wider pool of experts to test and validate the TRD2. While the TRD2 proved to serve as an excellent conversation starter (in accordance with the original aim behind the tool), its indicators and scoring system may require further refinement before broader application (for further discussion of this point, see Section 3.3, below).
- **Geographic and cultural bias**: Most experts (and the task research team) are affiliated with European institutions, of European descent and/ or with professional experience primarily drawn from European study contexts; this may have influenced the assessment of some innovations. Furthermore, whilst the gender mix of participating experts was relatively balanced, there was under-representation of Black, Asian and/ or ethnic minority groups — a pattern that also reflects broader demographic imbalances within many European academic institutions.

3. Results and discussion

3.1 List of transformative innovations

Table 3, below, presents the set of 49 innovations selected for expert assessment and validation under Task 2.2, following the refinement and shortlisting process described in Section 2.

Table 3: Shortlist of Innovations for expert assessment

• AI – Large Language Models (LLMs) (for application in biodiversity-relevant context) • Citizen science/ community science/ participatory science

- eDNA for species monitoring (includes DNA barcoding)
- Community engagement /participatory planning for ecosystem restoration/conservation
- Nature Based Solutions
- Integrating Traditional Knowledge and Science in Agriculture
- Transforming Urban Green Space Governance for Biodiversity; Urban features to promote urban biodiversity and nature-society relations
- Globally Important Agricultural Heritage Systems (GIAHS)
- Rewilding
- Agroforestry
- Wildlife vaccinations
- Camera trap
- AI for energy optimisation, waste management, climate modelling and disaster response (decision-making)
- AI in autonomous agriculture/ smart agriculture
- Geographic Information System (GIS) for environmental monitoring and planning
- Remote sensing (e.g. Satellite imagery), including Unmanned aerial vehicle (UAV)/ drones
- AI (machine learning) image classification/data processing
- Vertical farming
- Organic farming
- Green-Space Record - tool for inventorying urban green space (inc. Web-based Geoportal for Urban Green Space)
- Macroscope - a combination of tools for Global Biodiversity Monitoring
- BiSciCol Triplifieer (software for converting biodiversity data into standardised formats for easier web sharing)
- Biodiversity data storage, e-infrastructure and sharing platforms e.g. The Global Biodiversity Information Facility (GBIF)
- Agro-environmental subsidies
- AI + sensor systems/ IoT for environmental/ biodiversity monitoring
- In vitro methods for plant conservation (e.g. Cryopreservation)
- Community seedbank
- Ecosystem service valuation, inc. cultural ecosystem services
- Regenerative Agriculture/ Ecological intensification of mainstream farming practices
- Circular design in the building industry
- Intelligent ecosystem management platform
- Biodiversity and Ecological education in engineering training

- Transdisciplinary collaboration around Science-fiction portrayable of greenery in cities
- Dietary change (mini livestock farming/ edible insects/ alternative proteins)
- Biofuels including biomass fuels
- Genetically Modified (GM) Food Crops
- Sustainable Tourism
- Virtual Reality (VR) technology for learning and engagement
- Digital communities or platforms for education and knowledge sharing
- Smart wildlife collars
- CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)/ CAS9
- Mainstreaming indigenous & community conserved areas
- Mobile games or apps for environmental learning & engagement
- Blockchain for transparent & equitable business/ decision-making/budgeting
- 3-D printing for habitat reconstruction
- Forest Schools
- Rights of Nature
- Nudges, Choice Architecture (for biodiversity-relevant contexts)
- Commons, Commoning

Further (summative) detail on each innovation assessment is provided in the Annex with the overview of results organised around: key strengths, potential risks, enabling conditions or requirements for implementation, and anticipated future potential. For each innovation the written assessments are accompanied by TRD2 radar charts visualising current and projected transformative potential across the three main TRD2 dimensions. Classified also by domain type, the annexed assessment overviews provide a summative record of the expert validation process and will serve as a reference point for further analysis in Task 2.3. While not presented as a ranked list, the collection offers a curated portfolio of innovations with diverse characteristics and relevance to DAISY's transformative aims.

3.2 Key trends and factors enabling transformation

3.2.1 Key Trends

The findings from the expert assessments and TRD2 informed validation process reveal several overarching trends shaping the transformative potential of

interventions for biodiversity and equity. These trends cut across domains and innovation types, highlighting systemic challenges and opportunities for change. In this section we begin by outlining these overarching trends. We then proceed to examine specific risk factors, enabling conditions, and opportunities that shape the transformative potential of innovation in more detail.

Transformation requires more than innovation

Across all domains, experts consistently emphasised that innovation alone is rarely sufficient to drive transformative change. Whether digital, technological or social, innovations must be supported by enabling conditions that address deeper structural, behavioural and cultural barriers. Without attention to context and governance, including barriers to transformation such as vested interests and power structures, even promising innovations risk being ineffective, unsustainable or having a series of unintended consequences. Similarly, expert assessments consistently emphasised that the transformative potential of innovations is highly dependent on contextual factors – including ecological conditions, cultural norms, and existing land-use practices. Innovations that are not tailored to local realities risk being counterproductive. Several experts noted that definitions and expectations around some social innovations (e.g. agroforestry, rewilding) vary widely, and that clarity, adaptability and locally grounded design are essential for meaningful impact. *Social equity is both a critical enabler and outcome*

A recurring theme was the centrality of equity – not only as a goal, but as a condition for transformation. Innovations that fail to engage diverse communities, address exclusion, or consider local knowledge risk reinforcing existing inequalities. Conversely, interventions that foster inclusive governance, co-design and capacity-building are more likely to be socially accepted and sustained. This is particularly evident in domains such as agroforestry, citizen science and rewilding, where community involvement and ownership are pivotal.

Digital and technological innovations can be double-edged

Digital tools (e.g. apps, sensors, AI) offer new possibilities for monitoring, engagement and efficiency, but also raise concerns about access, data governance, and ecological detachment. Experts cautioned against over-reliance on technology, noting risks of deskilling, exclusion and loss of connection to nature. The

transformative potential of digital innovations depends on their ethical design, integration with human expertise and alignment with ecological values. Experts stressed that transformation depends not just on the novelty or technical sophistication of an innovation, but on how it is implemented, by whom, and under what conditions.

Significance of governance and policy frameworks

Policy environments can significantly enable or constrain innovation uptake and impact. Experts highlighted the need for policy coherence, integration of biodiversity across sectors and supportive regulatory frameworks. Transformative change requires not only new policies but also reform of existing ones, particularly in agriculture, energy, and urban planning. The role of EU-level policy processes was found to be especially significant in shaping enabling conditions for many of the assessed innovations.

Innovation scope and systemic relevance vary widely

Expert assessments revealed that not all innovations contribute equally to transformative change. While some offer broad systemic potential, others – though technically sound – were seen as limited in scope or impact. For example, tools such as wildlife collars may support monitoring and data collection but offer minimal structural change unless embedded within wider governance frameworks. Without alignment to broader biodiversity and equity objectives, such innovations are likely to remain peripheral to transformation efforts. This variation underscores the importance of assessing not only technical functionality but also the systemic relevance and integration of innovations.

3.2.2 Risk factors

While many of the innovations assessed show promise for transformative change, the expert validated assessments also surfaced a range of risks that could undermine their effectiveness or exacerbate existing inequalities.

Inequitable access to technology due to high cost of equipment

Many of the technological and digital innovations assessed require the use of expensive equipment (e.g. lab equipment for processing eDNA samples, virtual reality headsets or smart agriculture machinery). This cost can be prohibitive for some parts of society meaning the innovations are only available to communities, or certain members within a community that already have access to financial capital. This can lead to further exacerbation of inequity and a wealth gap, whereby those with means to afford the innovations will further benefit, while those who cannot afford them risk being left further behind.

Digital divide

Across the globe, including across Europe, there are differences in the level of access that individuals, communities or countries have to information and communication technologies (ICT) such as broadband, computers and smartphones. This digital divide may be caused by cost of technology and lack of infrastructure, or lack of education and digital literacy, as well as cultural factors. It creates a risk that digital innovations such as digital communities and educational platforms, or mobile apps and games, are not accessible to many members of society. In turn, it also creates a risk that people may be excluded from a range of different social processes and systems, including environmental decision-making, participatory governance, education and training opportunities, access to conservation funding, and the co-design of biodiversity interventions.

Over-reliance on technical solutions

Using high-tech solutions such as environmental sensors, drones and other remote sensing technologies can provide valuable environmental data but they can mean that less time is spent in the field. This can contribute to a loss of first-hand ecological knowledge and a loss of connection to nature. Furthermore, loss of expertise and experience can risk misinterpretation of the data or unsuitable use of data collection techniques.

An over-reliance on technological solutions was also flagged by some experts as risking increasing societal complacence and lack of immediate action to address the current biodiversity crisis. For example, if it is believed that use of cryopreservation or gene editing can aid in returning extinct species to the wild there may be less urgency to prevent extinction. Similarly, habitat destruction may not raise as much

concern if it is believed that 3D printing can help recreate the habitat later without full awareness of the impact of the original loss of species or habitat or evidence that they can be accurately recreated.

Data security, and privacy concerns

Large amounts of data are collected and stored using digital databases and platforms. This includes data on both wildlife species and personal data from humans (e.g. from submitting wildlife records or participating in citizen science or other community or participatory processes). Expert assessors expressed concern that data could be leaked, stolen or used in some other way than that which was the original and agreed upon use when data was first submitted. For citizens this may mean personal data is shared without consent. For wildlife – especially sensitive species – it may increase risk of disturbance, persecution or poaching.

Expert assessors also noted that privacy concerns are not limited to digital issues. Many forms of remote sensing such as camera traps, drones or satellite imagery can capture information on human behaviour and even record individuals. It was noted that safeguards and protocols need to be in place with clear guidelines on how privacy issues and inadvertent records of humans should be handled. Placing recording devices without raising awareness and consulting with a community can increase issues of conflict and mistrust.

Ownership, commercialisation and patents reducing access

Experts raised concern about the increasing commercialisation of biodiversity-related innovations, particularly those involving molecular tools, digital platforms, and AI systems. In the case of eDNA sampling, for example, risks were noted around biopiracy and data exploitation, especially where genetic data from local ecosystems could be extracted and used without appropriate consent or benefit-sharing. More broadly, proprietary technologies and patent restrictions were seen as limiting access for communities and small-scale actors, thereby reinforcing existing inequalities. It was also noted that centralised control of data and dependence on commercial providers may undermine transparency, inclusivity and long-term sustainability, unless open-source alternatives and equitable governance mechanisms are prioritised.

Data quality

Experts discussed how data collected both by humans and via technological devices can contain errors. Data collected by members of the public – e.g. via citizen science – may have misidentified species, or data may be entered incorrectly into databases. Technologies such as camera traps or other types of environmental or remote sensors can malfunction or be set up incorrectly. If the data collection process is not carefully monitored and data checked and verified, then there is a risk of poor data quality. If this data is then used to train AI models, then it can result in poor model performance which can in turn decrease data quality still further if, for example, models are being trained to identify species from images. If poor quality data is produced, this can then cause poor decisions to be made based on the data with risk of further loss of biodiversity or equity.

Epistemic bias and extractive data practices

In addition to concerns about data quality, experts also highlighted risks relating to the design and governance of AI systems and large language models (LLMs). These technologies are often developed by corporate or Western institutions, which can embed epistemic biases and reinforce extractive data practices. When local communities are excluded from the development process for such innovations, but their data are used, there is a risk of reproducing patterns of data colonialism and technocratic control. Without transparent governance, inclusive participation, and culturally sensitive design, such systems may undermine equity and erode trust in digital innovation.

Symbolic innovations and risk of co-option

Experts cautioned that some innovations, while conceptually transformative, may remain symbolic or be co-opted for purposes that do not align with biodiversity or equity goals. For example, Rights of Nature frameworks may be adopted without meaningful enforcement or may be implemented in violation of Indigenous Peoples' rights, and ecosystem service valuation may be used to justify inaction or commodify nature. Without robust governance and accountability, such innovations risk reinforcing existing power structures or being used selectively to serve narrow interests.

Increased energy consumption

Some technologies, such as intensive agriculture methods used in vertical farming techniques, or where AI is integrated (e.g., LLMs), can have very high energy demands. If energy is not sourced sustainably, use of such innovations results in increased emissions with further negative climate and biodiversity impacts.

Cultural resistance and polarisation

Innovations promoting dietary change – such as edible insects or alternative proteins – face significant cultural resistance and risk triggering public backlash or polarisation. Experts advised that without careful framing and inclusive engagement, such interventions may be perceived as imposed or paternalistic, undermining their transformative potential and reinforcing societal divides.

Gentrification and displacement linked to urban biodiversity interventions

Urban biodiversity interventions, such as green infrastructure and revitalisation projects, may inadvertently contribute to gentrification. Rising property values and aesthetic improvements can lead to displacement of low-income communities, undermining equity goals.

Volunteer fatigue and short-term engagement risks

Participatory innovations often rely on volunteer engagement. Experts discussed how this can wane over time due to fatigue, lack of feedback, or funding uncertainty. Furthermore, without sustained support and meaningful involvement, projects risk becoming tokenistic or collapsing prematurely.

Ecological oversimplification and species bias

Experts discussed how some innovations may prioritise charismatic or easily detectable species, neglecting ecological complexity. This can result in skewed conservation priorities and unintended ecological consequences, especially if field validation is lacking. For example, the expert assessment of urban biodiversity infrastructure highlighted that design choices may favour visually appealing or culturally valued species – such as ornamental plants or iconic animals – over ecologically critical but less visible species like pollinators or soil organisms. This aesthetic bias can undermine biodiversity goals and reduce ecological resilience.

Deployment ethics and public acceptance

Some innovations, particularly those involving genetic interventions or legal paradigms such as Rights of Nature, raise particular concerns around deployment ethics and public legitimacy. Experts noted that without transparent governance and meaningful public engagement, such innovations may face resistance or be implemented in ways that undermine trust and equity. Ethical concerns were especially prominent, for example, in discussions of wildlife vaccinations and AI-based decision systems, where unilateral action or lack of oversight could lead to unintended consequences.

3.2.3 Enabling factors

Experts identified a set of enabling factors that can significantly enhance the transformative potential of innovations when thoughtfully integrated into design and implementation.

Thorough, inclusive and well-thought-out public engagement and consultation

Societal engagement and inclusion are key enabling factors for innovations to truly become transformative. Nevertheless, there is still a danger that even when engagement efforts take place that some community members are still excluded. This could be due to time or location of meetings or events making them inaccessible, lack of awareness of events taking place or lack of interest if the project does not engage with their values or priorities. Accordingly, experts emphasised that for the potential to be truly transformative engagement efforts must seek to remove all barriers from participation and enable all voices within society to be heard.

Open access data and technology

Making data on biodiversity and the environment open access increases fairness, as well as supporting data sharing. Furthermore, data collected from different sources, geographic areas or focused on particular taxa or environmental components can be combined to give a more well-rounded overview of the state of nature. Experts similarly flagged the need for technology and its coding and development to be open access; doing so reduces knowledge barriers, encourages collaboration and

enables distributed innovation while guarding against commercialisation. It was also noted that open access encourages decentralisation – helping to ensure that progress and development is not only occurring in wealthy lab environments.

Increased affordability of technology

Some technology naturally becomes more affordable over time as it becomes more established - for example camera traps used to be considered much more specialist equipment but are now much more commercially available and lower in price. More novel technologies such as VR, 3D habitat printing and eDNA processing are still prohibitively expensive, but over time (and with the aid of open-source development) they may become more affordable. Experts advised that access to expensive technologies can be increased through provision of funding and grants to communities who need them, and investment in the technologies themselves to help develop more affordable versions in the long-term.

Values, Emotions and Norms

Experts pointed to the importance of values, emotional engagement, cultural identities and social norms in shaping responses to biodiversity loss. It was asserted that innovations that tap into care ethics and relational values, and also collective identity, may be more effective in shifting mindsets and behaviours. These dimensions were noted to be all too often overlooked in technical assessments, despite being crucial for achieving long-term transformation.

Long-term planning and funding

Interventions such as rewilding, nature-based solutions, community conservation areas, and community or participatory conservation planning were assessed as requiring long-term support and funding from the outset if long-term benefits are to be achieved. If funding runs out or a project ends, engagement can drop as people lose interest. Also, given that ecosystem restoration can take time, if projects are ended too early, experts noted that they may be ineffective and end up being an inefficient use of funds. Environments that need maintaining may be left abandoned and lose functionality for their original purpose. Maintaining engagement for long-term projects was also acknowledged to be challenging; ensuring that available

funding reflects longer-project timelines allows for projects to continue to grow and develop over time.

Supportive legislation and policy

Experts emphasised that policy frameworks play a critical role in enabling or constraining innovation uptake. Long-term success often depends on regulatory clarity, consistent funding mechanisms, and integration of biodiversity and equity goals into existing schemes. Examples included the need for clearer definitions and support structures in agroforestry, embedding participatory planning into protected area governance, and ensuring urban biodiversity interventions are backed by anti-displacement measures. Adaptive governance and cross-sectoral coordination were seen as essential to sustain transformative potential over time. This includes adaptive governance structures that allow for inclusive decision-making, conflict resolution, and responsiveness to changing conditions. Overall, innovations were perceived to be more likely to succeed when governance frameworks are transparent, participatory and capable of evolving with community needs.

Legal protection and recognition of traditional knowledge

Building on the broader importance of governance frameworks, experts also emphasised the need for legal mechanisms that specifically protect traditional knowledge and support its equitable integration into innovation processes. This includes formal recognition of collective rights, safeguards against misappropriation, and benefit-sharing arrangements that respect diverse epistemologies. Such measures were seen by experts as essential for enabling meaningful collaboration between scientific institutions and local communities, and for ensuring that innovations grounded in traditional practices are not marginalised or co-opted. Long-term institutional partnerships and intercultural education were also identified as key enablers for sustaining inclusive and context-sensitive approaches.

Expertise for correct innovation application

Some innovations and technologies were found to be better suited to address certain types of problems compared to others. The best choice and application of an innovation was said to depend on the problem (or problems) to be solved, the current state of an environment, requirements of the community, resources

available, timescale of the project and other environmental conditions. Examples were cited of cases where misuse or poor execution of an innovation or intervention had resulted in detrimental effects to biodiversity and society. By way of illustration: if agroforestry is being implemented at a new site, correct choice of tree species and suitable planting sites are key to enabling long-term success. If the wrong species and sites are chosen, invasive species can be introduced, risking harm to pre-existing biodiversity. In addition, valuable existing habitat may be lost to make way for tree planting. If tree species are not suited to the environment, they may have limited productivity and therefore provide little societal benefit.

Effective implementation requires not only technical expertise but also integration of local and traditional ecological knowledge. Experts emphasised that co-design and context-sensitive planning are essential to avoid unintended consequences and ensure long-term success. Similarly, they also noted that the transformative potential of monitoring technologies (e.g., remote sensing, drones, wildlife collars) depends on how data is interpreted and applied. When integrated with participatory governance and community-led conservation strategies, these tools can support more inclusive and adaptive decision-making.

Accessible sharing of knowledge

Improved access to knowledge can help empower communities to make their own decisions and better understand their local landscape. It was noted, for example, that whilst some forms of biodiversity or environmental recording – such as eDNA or remote sensing and GIS – gather valuable information, the data can be difficult to interpret and understand by non-experts. Presenting and sharing the data collected with local communities in an accessible and digestible way can make the innovation more equitable and remove gatekeeping of the knowledge. Experts noted that data sharing platforms can also aid in this, especially when data and information is being shared between communities and across geopolitical boundaries. An enabling feature of such platforms is their language accessibility and translation tools. Such features mean that language barriers do not inhibit knowledge transfer and thus exclude certain peoples; rather, subject to access, they enable cross-cultural knowledge exchange and broader participation.

Support for both greater mainstreaming and decentralised implementation

It was noted that some innovations are currently only implemented at localised or small scales (e.g. community seedbanks, Indigenous community conservation areas (ICCAS), Globally important agricultural heritage systems (GIAHS)), with this limiting their overall transformative potential. Experts advised that mainstreaming these practices so they become more commonplace will increase the scale of their transformative potential in the future, as more communities and landscapes can be included. Experts also emphasised the importance of supporting small-scale actors and decentralised innovation efforts. This includes ensuring equitable access to funding, training, and market opportunities for community-led initiatives and smallholders. Without such support, mainstreaming risks favouring large-scale or well-resourced actors, potentially undermining equity and limiting the diversity of innovation pathways.

Ongoing research and monitoring

All innovations can benefit from ongoing research and monitoring. Experts discussed how, by making this a continuous process, problems can be identified early and actions taken to modify the innovation to reduce negative outcomes and improve positive ones.

Institutional openness to experimental and transdisciplinary approaches

In the case of several innovations, experts highlighted the role that academic and third sector institutions can play in supporting the integration of experimental, creative, and transdisciplinary methods – for example, in relation to advancing urban biodiversity and ecological literacy. They discussed how openness to non-traditional planning and inclusive facilitation across disciplines can foster new imaginaries and more adaptive governance models.

Combining of different tools, techniques and innovations

Experts highlighted that no single innovation is likely to be transformative in isolation. Combining different approaches – such as integrating digital monitoring tools with participatory governance, or pairing ecological restoration with education and awareness raising – can help address multiple dimensions of biodiversity and equity simultaneously. Such combinations allow innovations to complement one

another, mitigate individual limitations, and adapt more effectively to diverse contexts and challenges.

3.2.4 Potential opportunities

Many of the enabling factors identified via the expert assessments – such as inclusive governance, open access data, and long-term funding – are not only necessary conditions for transformation but also represent strategic openings for action. Provided they are approached with contextual sensitivity and an awareness of existing structural constraints, they offer scope for targeted interventions that could advance biodiversity and equity outcomes. Experts cautioned, though, that opportunities are not uniformly distributed, and their realisation depends on deliberate, inclusive, context-sensitive and well-supported implementation.

One expert-validated area of opportunity lies in strengthening ecological literacy and public engagement. Embedding biodiversity and equity themes into education systems, digital platforms, and participatory science initiatives was seen as a means to foster more informed and inclusive societal responses. When designed with attention to accessibility and supported by feedback mechanisms, such approaches may contribute to shifts in values and behaviours that underpin long-term transformation.

Technological developments also present opportunities, particularly in the realm of biodiversity monitoring and decision support. Tools such as AI-driven sensors, open data platforms and geospatial mapping systems, for example, were cited by experts as having the potential to extend the reach and precision of conservation efforts, especially in under-resourced or remote areas. However, experts also consistently cautioned that these technologies must be governed ethically, used in conjunction with human expertise, and embedded within broader systems of accountability to avoid unintended consequences.

Another expert-validated area of opportunity identified during the workshops is scope to support and scale localised practices that have demonstrated transformative potential in specific contexts. For example, innovations such as agroforestry, organic farming, and commons-based governance – when carefully designed, inclusively implemented, and sustained over time – were viewed as

effective approaches for restoring ecosystems and supporting livelihoods. Experts emphasised that clearer definitions, robust impact assessments, and equitable support mechanisms are needed to enable wider uptake without compromising ecological integrity or social equity.

A further set of opportunities identified by experts involved the strategic integration of innovations across domains and scales. Rather than relying on innovations as a basis for isolated interventions, experts pointed to the value of combining approaches that address multiple dimensions of transformation. Examples given included linking digital tools with participatory processes, aligning local initiatives with policy frameworks, and fostering cross-sectoral collaboration. Such integration may enhance resilience, adaptability, and cumulative impact, but (as noted above) require care-full coordination and ongoing evaluation. Realising these opportunities will depend on sustained commitment, inclusive design, and a well-informed understanding of the political, ecological, and social dynamics that influence innovation outcomes (Deliverable 1.3).

3.3 Reflections on the application DAISY's TRD2

DAISY's TRD2, developed in WP1, was designed as a forward-looking, diagnostic and conversation-starting instrument, intended to facilitate and support structured reflection on the transformative potential of innovations, rather than produce evaluative measurement. Its application in Task 2.2 provided a valuable first opportunity to test the tool in practice, across a diverse set of innovations and expert perspectives. While the TRD2 proved effective in facilitating dialogue and surfacing key dimensions of transformation, equity and biodiversity, its use also revealed areas for refinement and contextual sensitivity.

Experts consistently emphasised that the transformative potential of innovations is highly context dependent. The TRD2 framework helped to foreground this by encouraging assessors to consider both current and future scenarios. However, the speculative nature of future scoring (for 2050) often proved challenging. This challenge reflects the dual-horizon logic (as described in Deliverable 1.4), where the current (C) and future (F) scores were intended to expose ambition–practice gaps and stimulate reflection, not to predict outcomes. Assessors varied in their

assumptions about enabling conditions, policy shifts and societal change, which in turn influenced how future potential was plotted. This variation suggests that clearer guidance may be needed on how to approach long-term assessments, especially when innovations are still in early stages or highly contingent on external factors.

The diversity of innovation types assessed – ranging from specific tools like wildlife collars to broad governance models such as ICCAs or GIAHS – also posed challenges for comparative scoring. While the TRD2's structure allows for consistent assessment across transformation, equity and biodiversity dimensions, the heterogeneity of innovations meant that some were more easily aligned with the tool's indicators than others. Innovations with indirect or symbolic impacts, for example, were sometimes difficult to score using the same criteria as those with direct ecological or social interventions. This highlights the importance of maintaining flexibility in interpretation and ensuring that qualitative reasoning accompanies quantitative scores. The design of TRD2 further makes its use a starting point for, rather than an accurate tool of, assessment.

Several expert groups raised questions about what constitutes an 'innovation' and what counts as 'transformative.' In some cases, traditional practices were assessed not for their novelty, but for their potential to challenge dominant paradigms and be mainstreamed in new contexts. The TRD2 accommodated this to some extent, but further clarification of how contextual novelty and systemic relevance are captured would strengthen its utility.

Importantly, as noted above, TRD2 was never intended to produce definitive rankings or prescriptive judgments. Its role as a diagnostic and facilitative tool was affirmed in the Task 2.2 expert workshops, where it served to structure discussion, prompt reflection and visualise ambition–practice gaps. Meanwhile, the radar chart outputs - automatically generated from aggregated scores across the 11 sub-dimensions (comprising three for transformation, four for equity and four for biodiversity) - were particularly useful in highlighting areas of strength and weakness across the transformation–equity–biodiversity nexus, and in supporting comparative analysis across innovations. However, while TRD2 proved effective in guiding structured assessment, its application also revealed areas where further refinement could enhance usability and relevance.

Some expert assessors noted that the tool's scoring framework did not always capture relational or normative aspects – such as emotional engagement, cultural resonance, or political feasibility – that were central to their evaluation of transformative potential. These aspects were implicitly included in the TRD2's personal and political spheres of transformation (Deliverable 1.4; see also O'Brien 2018, IPBES 2024), but were not fully operationalised as scoring prompts, which highlights a key area for refinement. For instance, the personal sphere, which encompasses emotional, cognitive and identity-related aspects, was considered by some expert assessors to be underrepresented, or difficult to assess using the existing framework. Similarly, elements of the political sphere, such as governance dynamics, power relations and political feasibility, were observed to sometimes be ambiguously framed or insufficiently captured.

As a related point, it was highlighted that transformation does not happen in a vacuum, it happens in a specific social-economic and legal context. The potential of each innovation, therefore, depends not only on the innovation itself but also (and predominantly) on the barriers related to vested interests and power structures. These gaps suggest that while the tool accommodates these dimensions in principle, users may benefit from more explicit guidance, expanded indicators and illustrative examples to help surface the relational and normative layers of transformation. This suggests that while TRD2 may implicitly accommodate these dimensions, users would benefit from more explicit guidance and illustrative examples that help surface the emotional, cultural and political layers of transformation. Modest adaptations – such as expanded indicators, clearer framing of the transformation spheres, and stronger integration of qualitative prompts – could help ensure that the TRD2 remains responsive to the diverse contexts and innovation types it is applied to and accordingly will be further considered. These refinements would build on the tool's original design principles and support its continued use as a flexible, stakeholder-oriented instrument for transformation assessment.

These observations also reaffirm that TRD2 is most effective when used in conjunction with qualitative dialogue and contextual interpretation, rather than as a standalone evaluative tool. Its strength lies in structuring reflection, enabling

comparison, and visualising ambition–practice gaps, while leaving space for deeper deliberation on the relational and systemic dimensions of change.

4. Conclusion

4.1 Key Insights

The expert assessment process undertaken in Task 2.2 revealed several foundational insights into the nature of transformative innovation for biodiversity and equity. First and foremost, it became clear that transformation is not a property of innovations in isolation, but rather emerges through their interaction with enabling conditions, governance structures, and societal values. Innovations that were technically sound or ecologically promising were not necessarily considered transformative unless they also demonstrated relevance to systemic change and inclusivity.

Across the assessments, experts consistently emphasised that equity is not only a desired outcome but a prerequisite for transformation. Innovations that addressed procedural fairness, recognised diverse knowledge systems, and supported capacity-building were viewed as more likely to be sustained and scaled. Conversely, those that failed to engage with social justice dimensions risked reinforcing existing inequalities or triggering unintended consequences.

The assessments also highlighted the importance of context. Innovations varied widely in type, scope, and maturity – from digital tools and molecular techniques to governance models and traditional practices – and their transformative potential was seen as highly dependent on ecological, cultural, and institutional settings. This reinforces the need for flexible assessment approaches that can accommodate both direct ecological interventions and innovations that operate through education, governance, or symbolic change.

Another key insight was the value of integration. Experts noted that no single innovation is likely to be transformative in isolation. Instead, combining approaches – such as linking digital monitoring tools with participatory governance, or

embedding ecological restoration within educational programmes – was seen as essential to achieving cumulative impact and long-term resilience.

Taken together, these insights provide a nuanced understanding of what makes an innovation transformative. They point to the importance of systemic relevance, equity, contextual sensitivity, and strategic integration – principles that will guide the development of transformative intervention mixes in the next phase of the DAISY project.

Notably, however, despite the diversity and promise of the innovations assessed, none of the 49 shortlisted entries scored highly across all three TRD2 dimensions – transformation, equity, and biodiversity – simultaneously. This pattern suggests that while many innovations demonstrate strong potential in one or two areas, achieving high scores across all three remains rare. In several cases, high equity and biodiversity scores were not matched by transformation scores, reflecting barriers to uptake, limited systemic relevance, or contextual constraints. This reinforces the view that transformative potential is not an inherent property of an innovation, but rather emerges from its interaction with enabling conditions, governance structures, and societal values. Recognising this complexity is essential for guiding future innovation selection and for designing intervention mixes that are both context-sensitive and systemically impactful.

4.2 Wider Implications

The findings from Task 2.2 reaffirm and extend several core insights developed in Work Package 1, particularly those presented in Deliverables 1.1 and 1.3. The diversity of innovation types assessed – ranging from technological tools to governance models and traditional practices – reflects the complexity of transformation for biodiversity and equity. This diversity required flexible interpretation of transformative potential and highlighted the importance of context-specific analysis. It also underscores the need for future work to refine assessment frameworks that can accommodate both direct ecological interventions and innovations that operate through governance, education, or cultural change.

Deliverable 1.1 emphasised that transformation requires a shift away from dominant economic paradigms, with alternatives such as degrowth, doughnut economics, and well-being economies offering more promising pathways for biodiversity and equity (Kallis et al., 2018; Raworth, 2012; Fioramonti, 2024). The expert assessments in Task 2.2 validate this by showing that innovations aligned with these paradigms – particularly those that prioritise justice, participation, and ecological integrity – were consistently rated as having higher transformative potential.

Similarly, Deliverable 1.3 highlighted that justice is not merely a desirable outcome but a structuring condition for transformation. Task 2.2 outcomes echo this finding, with experts repeatedly emphasising the importance of procedural fairness, recognition of diverse knowledge systems, and inclusive governance. Innovations that failed to engage with these dimensions were often seen as limited in scope or vulnerable to co-option.

Both WP1 reports also cautioned against overreliance on technological solutions and stressed the need for integrated approaches that combine social, digital, and policy innovations. Task 2.2 assessments support this view, showing that innovations were most effective when embedded within broader systems of care, governance, and cultural legitimacy.

These implications reinforce the conceptual foundations of the DAISY project and highlight the importance of maintaining a pluralistic, justice-oriented lens in the design and evaluation of innovation mixes.

4.3 Contribution to the DAISY Project

4.3.1 Application and validation of TRD2

Task 2.2 has contributed to the DAISY project by practically applying and validating the TRD2 to guide expert assessment and reflection of innovations. In so doing, the structure and framing of the TRD2 has operationalised key conceptual insights from WP1, particularly the emphasis on transformation as a multidimensional process and the integration of equity and biodiversity considerations. Task 2.2 thus serves as the first empirical test of the TRD2, generating insights into its usability across

diverse innovation types and contexts, and offering feedback that will support its continued refinement.

The expert assessments conducted in Task 2.2 helped to validate TRD2's conceptual structure, particularly its emphasis on transformation as a multidimensional process and its inclusion of all four equity subdimensions. The findings reaffirmed empirical patterns identified in D1.4 - such as the dominance of capabilities-oriented equity and the marginalisation of distributive and recognition-based justice – and extended them by showing how these patterns manifest in expert evaluations of specific innovations. The assessments also highlighted the importance of context, with innovations perceived as more transformative when embedded in broader systems of governance, care, and cultural legitimacy.

4.3.2 Innovation selection and transformative potential

Task 2.2 has resulted in an expert-validated portfolio of shortlisted innovations that reflect the project's commitment to biodiversity and equity. The diversity of innovation types – spanning digital tools, governance models, and traditional practices – illustrates the need for flexible and pluralistic approaches to transformation. The findings also offer insight into enabling conditions, barriers, and perceived gaps between ambition and practice, which will inform subsequent work on intervention design and stakeholder engagement. In this way, Task 2.2 has strengthened the bridge between conceptual framing and applied analysis, ensuring that DAISY's innovation mapping remains empirically grounded and responsive to the complexity of transformative change.

Notably, however, while many of the expert assessed innovations demonstrated strong potential in one or two TRD2 dimensions, few achieved high scores across transformation, equity and biodiversity simultaneously. Consequently, the identification of a final set of 30-50 leading examples that fully align with DAISY's transformative aims may require further refinement. Task 2.3 will be critical in this regard, enabling a more context-sensitive analysis of deployment pathways and helping to surface innovations that – while not universally transformative – may hold exceptional relevance within specific case study settings. This approach aligns with the DAISY project's emphasis on systemic change through tailored intervention

mixes, and supports the project's commitment to equity, biodiversity and transformation as interlinked but context-dependent goals.

4.4 Recommendations and Next Steps

The findings from Task 2.2 offer several important insights to guide the next phases of the DAISY project. First, they highlight the need for continued attention to underrepresented dimensions of transformation – particularly distributive equity and the integration of biodiversity and justice. These linkages were consistently identified by experts as critical to systemic change yet remain weakly embedded in many innovations. Future work should prioritise these dimensions in the design and evaluation of transformative intervention mixes (TIMs), ensuring that justice is not only a desired outcome but a structuring condition for innovation.

Second, the diversity of innovation types assessed underscores the importance of maintaining a pluralistic and context-sensitive approach, consistent with TRD2's flexible structure that combines quantitative scoring with qualitative interpretation. Innovations were more favourably assessed when they showed potential to engage with broader systems of care, governance, or cultural legitimacy – though these aspects were often identified as areas requiring further development. This suggests that TIMs will need to be tailored not only to thematic domains but also to the specific social–ecological contexts in which they are applied.

Third, the variation in expert assumptions about future enabling conditions points to the need for clearer guidance on assessing long-term transformative potential. While TRD2 provided a structured basis for reflection, the assessments revealed areas where further refinement could improve responsiveness to diverse innovation types and stakeholder perspectives – including more explicit framing of transformation spheres within TRD2's indicators and guidance materials, and greater sensitivity to the political dimensions of change.

Overall, the application of TRD2 in Task 2.2 confirmed its value as a structured, transparent and adaptable diagnostic and facilitative tool for assessing transformative potential. It supported consistent reflection across diverse innovations and helped identify underrepresented linkages that are critical to systemic change. As the project progresses, TRD2 will continue to serve as a

guiding framework, with further refinements informed by ongoing use, stakeholder feedback and the evolving needs of DAISY's work packages.

The immediate next step – Task 2.3 – will build on the validated innovations from Task 2.2 by exploring their potential deployment pathways, identifying barriers, and examining relevant enabling conditions and policy contexts. The resulting insights will inform the development of transformative intervention mixes and support scenario-building and stakeholder engagement in subsequent work packages. Together, these elements will support DAISY's broader aim of designing and amplifying interventions that are ecologically meaningful, socially just and capable of delivering transformation across personal, practical and political spheres in contextually grounded ways.

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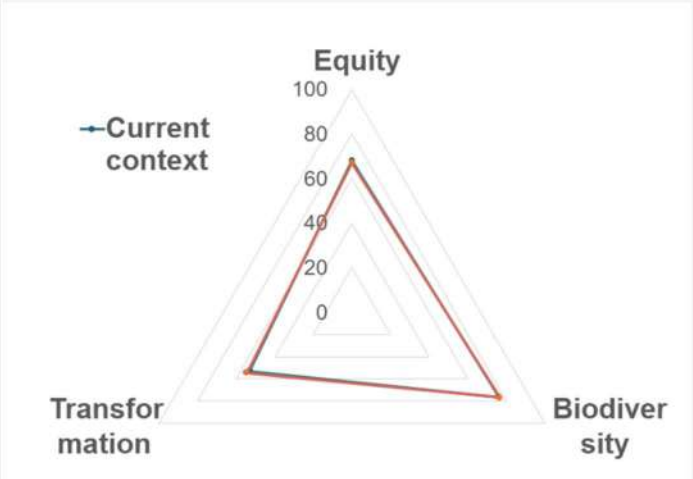
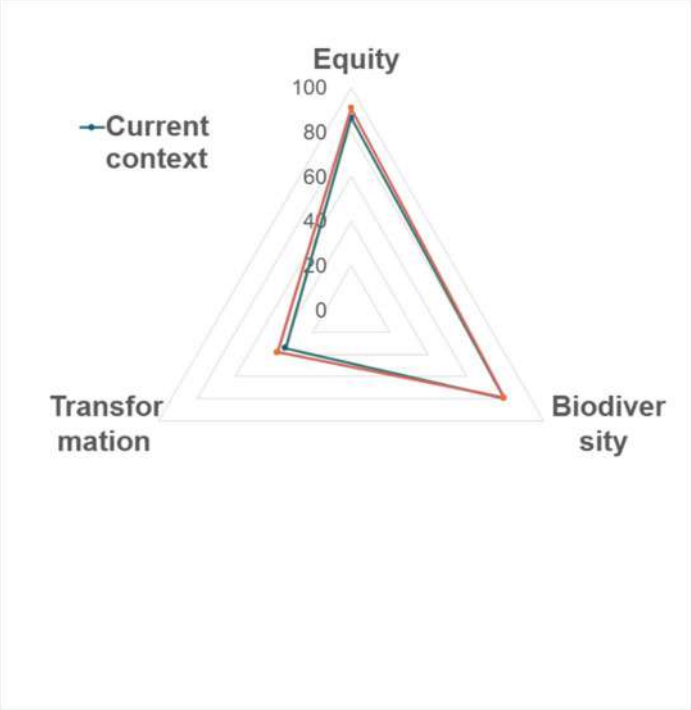
Annex

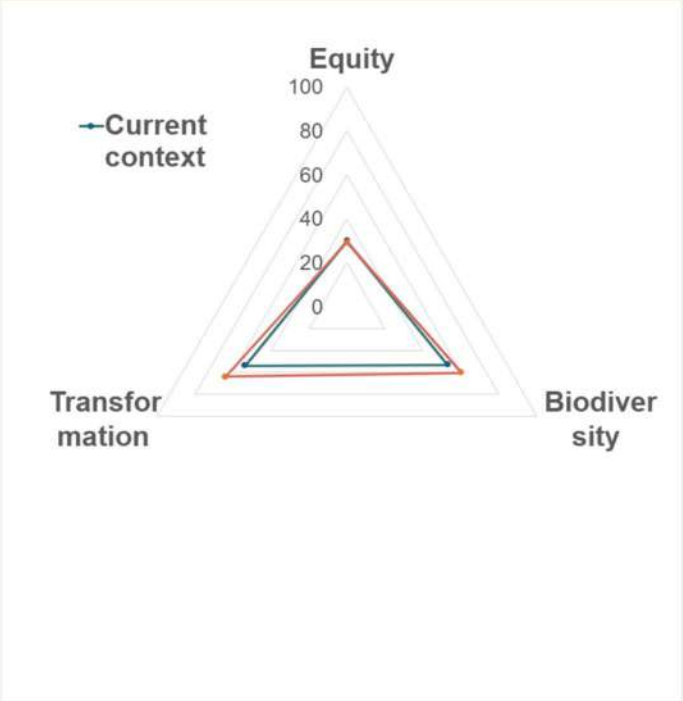
List of Transformative Innovations

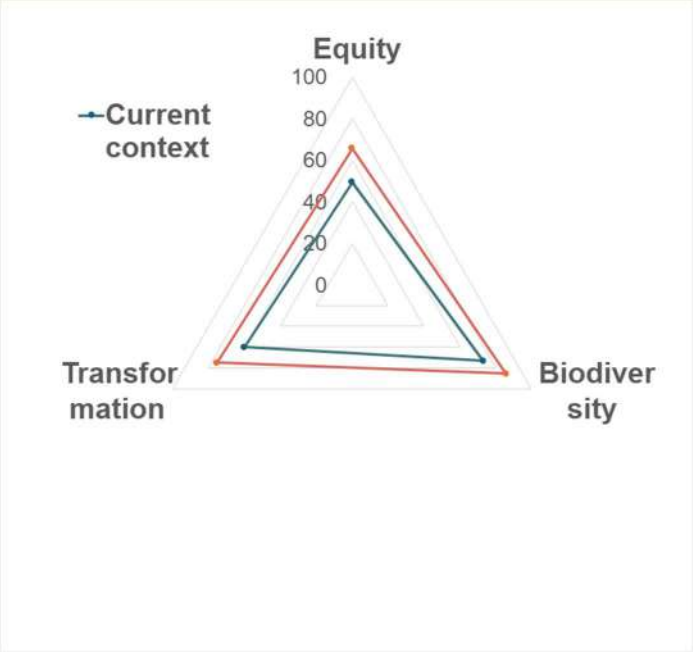
The table on the next page lists the 49 innovations that were included for expert assessment. For each innovation the following has been provided:

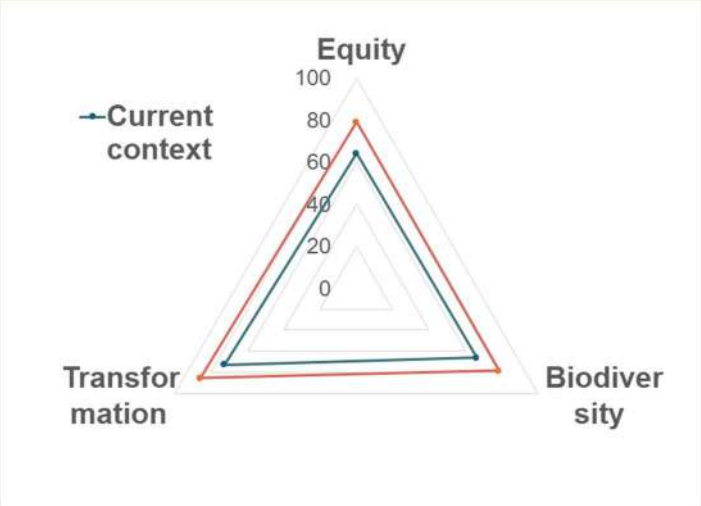
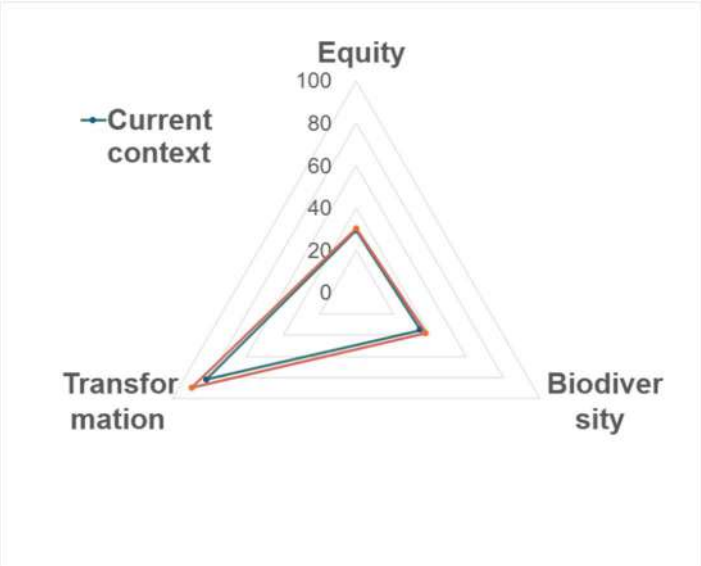
a. a short description
b. DAISY relevant domain
c. key points on strengths, risks, enablers and future potential that arose during expert evaluation
d. mean response of experts to questions on whether the transformative potential of an innovation for biodiversity and equity is 'low', 'medium' or 'high' in both the short and long term
e. The TRD2 assessment that was used as part of expert discussion.

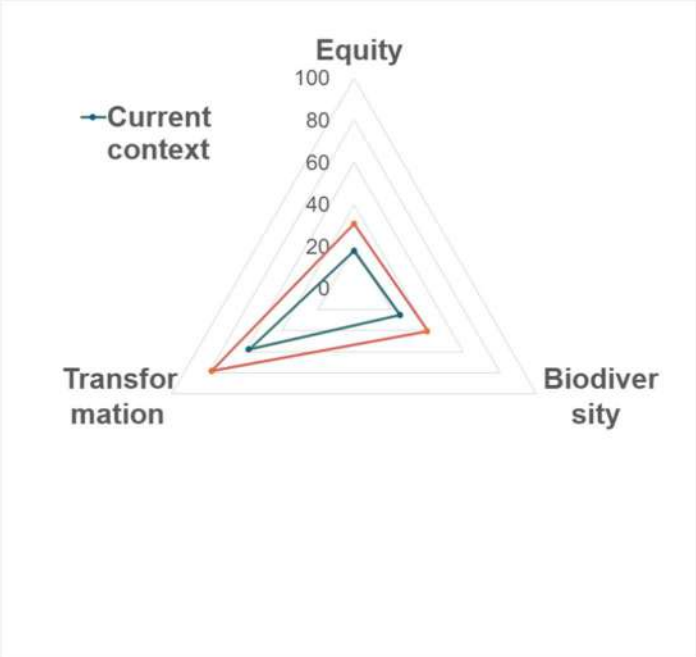
Community seedbanks	*Locally managed repositories where seeds of diverse plant varieties are conserved, exchanged, and regenerated by community members*
Domain: Agri-food ✅ **Strengths: Community building, can increase access to and sharing of resources** ⚠️ **Risks: Poor equipment can risk seed quality** 🔑 **Enablers / requirements: Policy support and greater mainstreaming of the practice** 🌱 **Future potential: This can be a valuable tool for awareness and community-building through access to seeds and related knowledge**	Transformative potential in the short/ medium term for biodiversity: *High* Transformative potential in the short/ medium term for equity: High Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: *High* **TRD2 assessment**: 
Mainstreaming indigenous and community conserved areas (ICCAs)	*The integration of Indigenous and community-led conservation areas into national and global biodiversity strategies, policies, and monitoring frameworks.*
Domain: Urban and regional development ✅ **Strengths: Inclusive community-led initiatives for biodiversity conservation that include indigenous knowledge and can promote stewardship.**	Transformative potential in the short/ medium term for biodiversity: *High* Transformative potential in the short/ medium term for equity: High Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: *High*

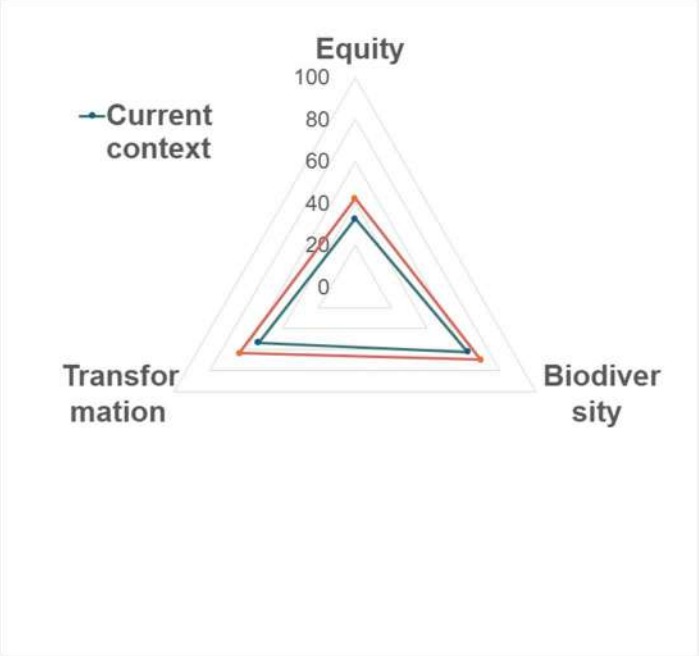
⚠️ **Risks: Inequitable cost and benefit distribution in a community. Conflicts within and between communities** 🔑 **Enablers / requirements: Mainstreaming of the practice. Inclusive community consultations. Intra-community benefit-sharing arrangements** 🌱 **Future potential: Their high transformative potential depends on inclusive governance processes (both central and community-based) and mainstreaming these and related conservation/sustainable use practices against both intensification in land use and mainstream conservation practices**	**TRD2 assessment**: 
Globally Important Agricultural Heritage Systems (GIAHS)	*Landscapes recognised by the Food and Agriculture Organization (FAO) for their unique agricultural practices that have evolved over centuries, maintaining biodiversity, cultural heritage, and resilient ecosystems.*
Domain: Agri-food ✅ **Strengths: Supports the balance of conservation, agriculture, cultural heritage values and community livelihoods in a landscape** ⚠️ **Risks: Friction between communities and inequitable distribution of benefits and costs. Loss of system and**	Transformative potential in the short/ medium term for biodiversity: *High* Transformative potential in the short/ medium term for equity: High Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: *High* **TRD2 assessment**:

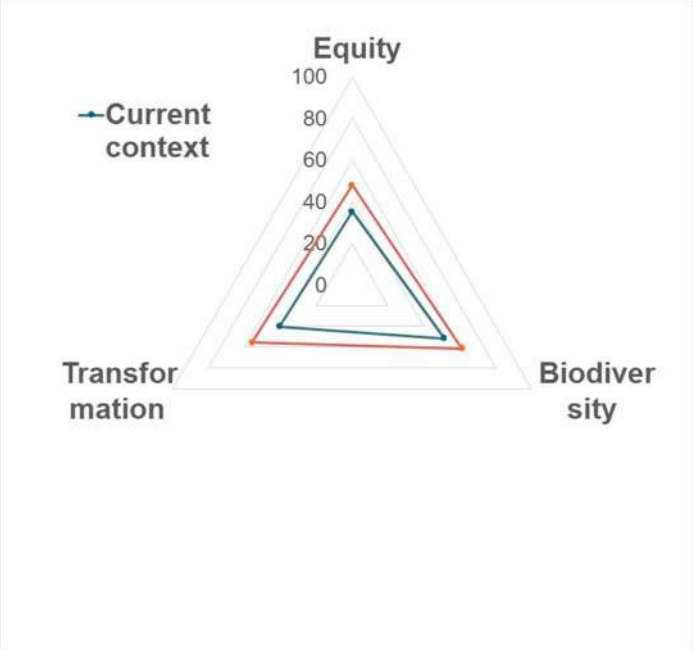
commercialisation due to tourism 🔑 **Enablers / requirements: Greater mainstreaming of the practice. inclusive consultations and intra-community governance mechanisms. Intra-community benefit-sharing arrangements** 🌱 **Future potential: These systems have high transformative potential, but this depends on mainstreaming and internal governance processes**	
Rewilding	*A conservation approach that seeks to restore ecosystems to their natural state by reintroducing native species, removing human interventions, and allowing ecological processes to unfold with minimal management.*
Domain: Other (Environmental restoration and conservation) ✅ **Strengths: Can result in improved habitat quality and biodiversity, reintroduction and recovery of rare or locally extinct species. Promote healthy ecosystems and improve ecosystem services** ⚠️ **Risks: Displacement of local populations. Division among stakeholders and landowners. Species focused projects can lose sight of the bigger picture and cause imbalance in an ecosystem.**	Transformative potential in the short/ medium term for biodiversity: *High* Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**:

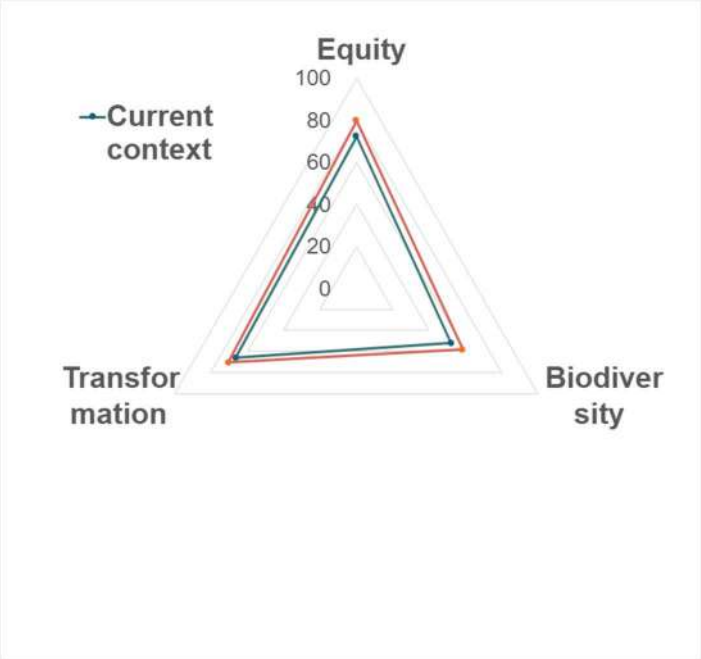
🔑 **Enablers / requirements: Community engagement and consultation and open dialogue to address concerns. Suitable choice of land and species with ecological expertise and ongoing monitoring. Clear objectives and agreed upon terminology** 🌱 **Future potential: Cross border rewilding projects can help connect wildlife populations on a large scale. Opportunities for local communities can include eco-tourism and sustainable product sale**	
Organic farming	*A food production system for high quality produce using methods that benefit the whole food system including people, biodiversity and animal welfare*
Domain: Agri-food ✅ **Strengths: Biodiversity benefits from reduced pesticide use and other biodiversity-friendly farming practices. Nutritional benefits for consumers from high-quality foods** ⚠️ **Risks: Market pressure leading to organic farming reaching certification without fully adhering to wider organic principles, leading to reduction in benefits** 🔑 **Enablers / requirements: Accessible knowledge both for**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**:

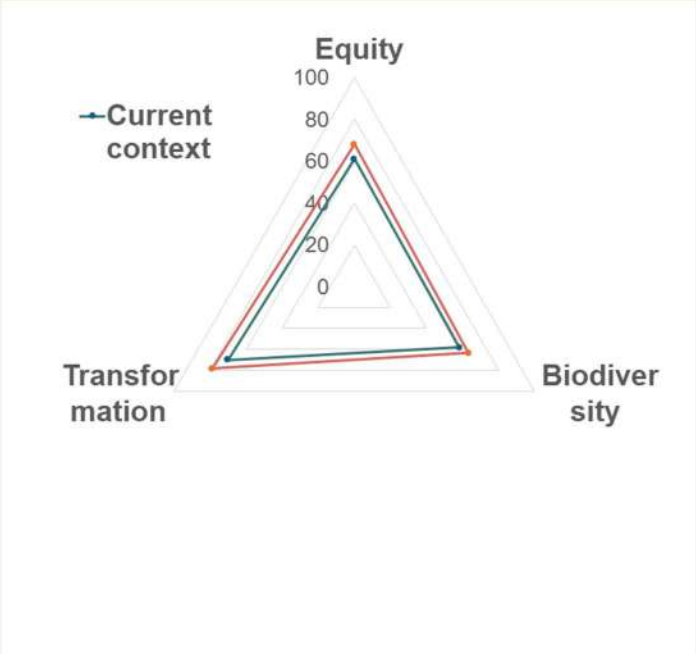
farmers producing the food and for consumers on the benefits or organic 🌱 **Future potential: Moving away from the idea of 'low yields' being an issue in food production and addressing the idea of food waste could help relieve pressure on production and aid in promoting organic farming**	
Camera Traps	*Remote cameras used for recording wildlife and public engagement*
Domain: Other (Biodiversity monitoring and research) & Education ✅ **Strengths: A versatile and effective tool for studying seldom seen wildlife with the potential to engage and highlight issues through imagery** ⚠️ **Risks: Over-reliance on technology, especially if combined with AI may exclude people from the process. Bias in species detected. Cost of equipment can be exclusionary. Privacy risks of remote monitoring** 🔑 **Enablers / requirements: Accelerated data processing and analysis through integration of AI, but also human engagement to support connection with nature**	Transformative potential in the short/ medium term for biodiversity: Medium-high Transformative potential in the short/ medium term for equity: Low Transformative potential in the long term for biodiversity: Medium-high Transformative potential in the long term for equity: Medium - low **TRD2 assessment**: 

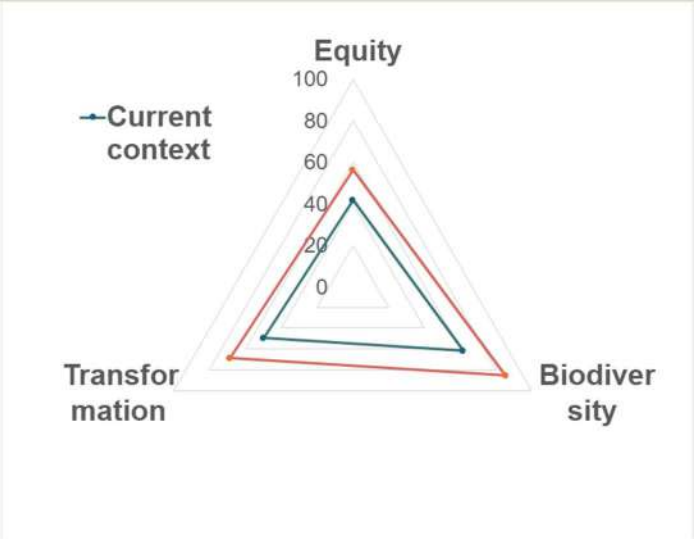
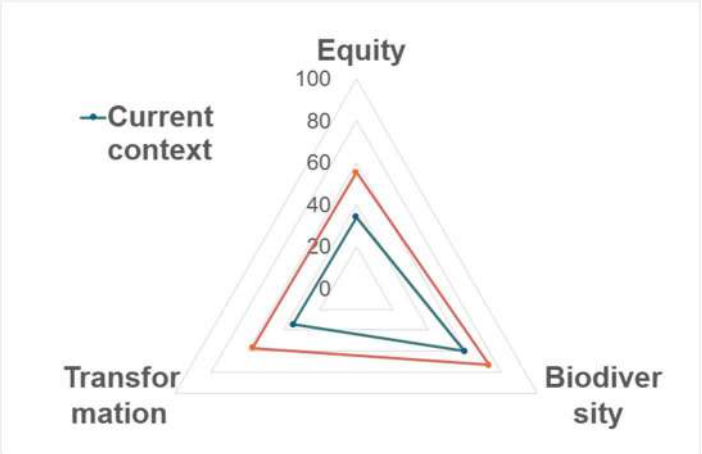
🌱 **Future potential: They have the potential to be a powerful tool as technology advances and becomes cheaper and more affordable and can improve connection to nature and care if combined with engagement initiatives**	
AI for image recognition	*Machine learning application for recognition and identification of wildlife in images*
Domain: Other (Biodiversity monitoring and research) & Education ✅ **Strengths: Potential to speed up image classification to aid in biodiversity data processing and analysis and use in educational contexts** ⚠️ **Risks: Energy consumption and consequent climate impact. Reliance on technology excluding people from the process** 🔑 **Enablers / requirements: Improved species recognition models, funding for development, but with focus on ethical use** 🌱 **Future potential: There is high potential to aid in species monitoring and for integration with engagement for learning and connection to nature, but only in combination with other tools and responsible application**	Transformative potential in the short/ medium term for biodiversity: Medium-high Transformative potential in the short/ medium term for equity: Medium-low Transformative potential in the long term for biodiversity: Medium-high Transformative potential in the long term for equity: Medium-low **TRD2 assessment**: 

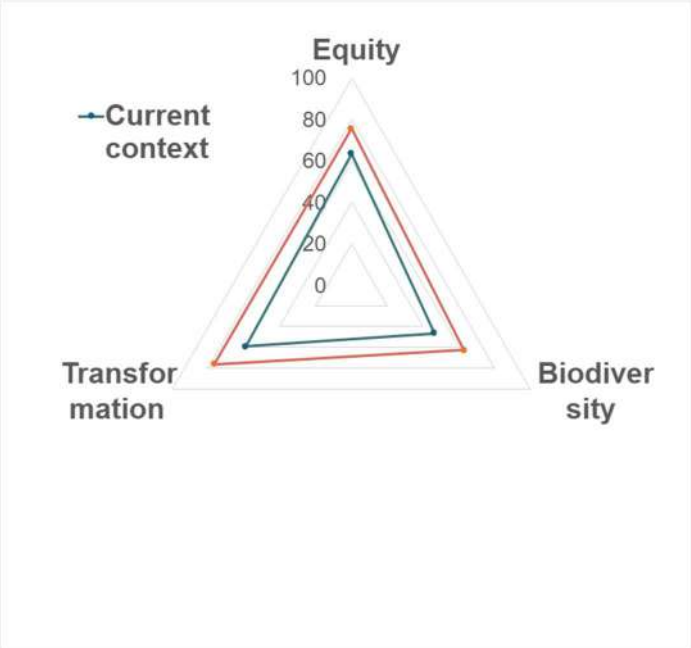
eDNA for environmental/species monitoring	*Collection of environmental DNA samples for identification of species present*
Domain: Other (Biodiversity monitoring and research) & Education ✅ **Strengths: A non-invasive and powerful tool for species monitoring. Can aid in early identification of invasive species** ⚠️ **Risks: Need for lab processing is costly and requires specialist knowledge which could reduce accessibility. Loss of field experience and over-reliance on technological solutions. Irresponsible or unethical use of data** 🔑 **Enablers / requirements: Engagement with local communities to add context and relevance to the data. Sharing of data in an accessible format. Improved reference libraries to expand range of species/ sub-species it can be applied to.** 🌱 **Future potential: It has the potential to be a powerful tool monitoring species presence, but impact relies on appropriate action being taken based on the data and can be further improved by making information more accessible and engaging local communities**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**: 
Intelligent ecosystem management platform	*Use of AI for processing data and aiding in decision-making to inform environmental management action*

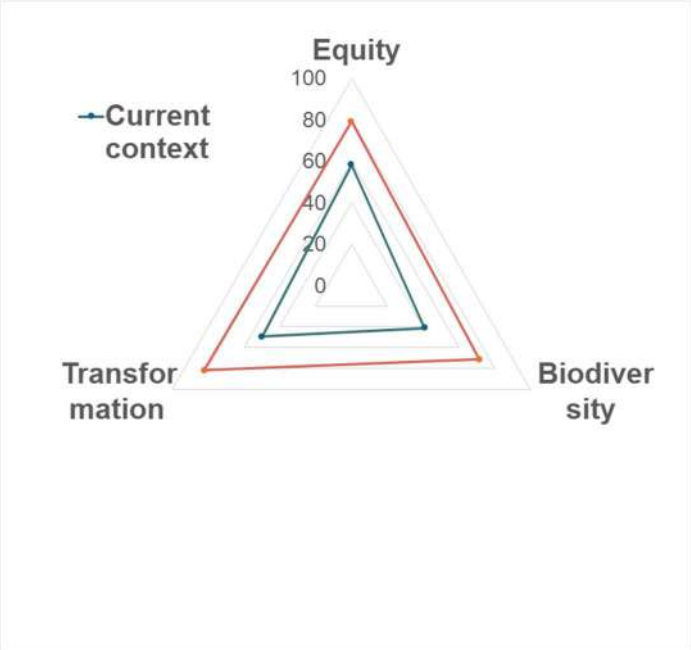
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Enable rapid decision making and actions to address biodiversity crisis** ⚠️ **Risks: Lack of ground truthing of data and feasibility of management actions in different settings and scenarios. Poor input data leading to poor decision making with long-term consequences** 🔑 **Enablers / requirements: Sharing of information and inclusion of input from local communities into the decision-making algorithms. Human oversight and interpretation of data to ensure accuracy and appropriateness** 🌱 **Future potential: Platforms could aid in decision making and knowledge sharing, but need to be constantly updated with relevant data and inclusion of local communities will be key to any ongoing positive impact**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Community/ Participatory planning for ecosystem restoration & conservation	Actively engaging local stakeholders—such as residents, indigenous groups, farmers, and civil society—in decision-making processes related to environmental management.
Domain: Urban and regional development & Education ✅ **Strengths: Potential for protecting biodiversity at a local**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-high*

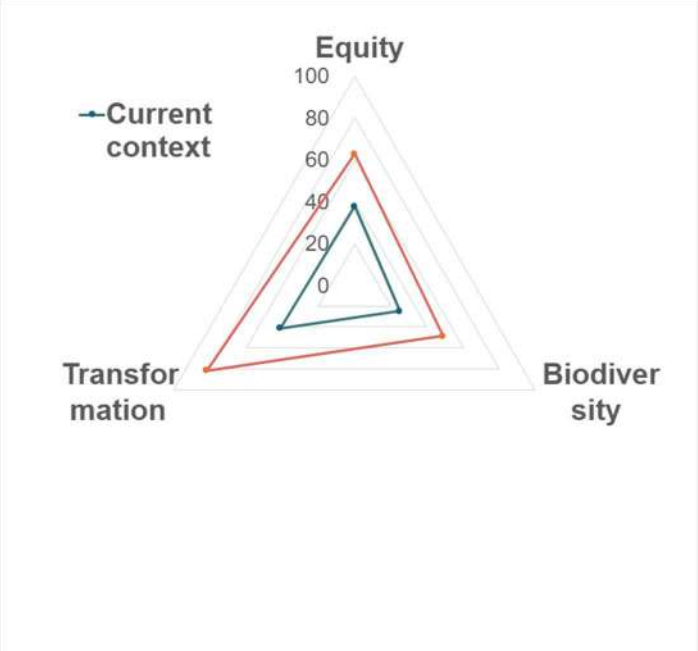
scale and increasing local engagement with nature and a sense of ownership and care for local area ⚠️ **Risks: Lack of engagement from community/ loss of community engagement over time with some parts of community feeling excluded. Community decisions may not always benefit biodiversity** 🔑 **Enablers / requirements: Ensuring local interests are fairly represented and prioritised and that this engagement is maintained. Adequate long-term funding with clear guidelines and protocols** 🌱 **Future potential: In order for impact to be maintained in the future long-term investment and ongoing engagement is needed**	Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**: 
Transforming Urban Green Space Governance for Biodiversity and Urban Features to Promote Urban Biodiversity and Nature-Society Relations	*Rethinking how urban green spaces are planned, managed, and accessed, with the goal of enhancing biodiversity and promoting social equity. Urban features may include green roofs, pollinator corridors, community gardens, and parks*
Domain: Urban and regional development ✅ **Strengths: High potential to improve urban environments for species and for providing access to nature and green space for urban communities**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-high* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**:

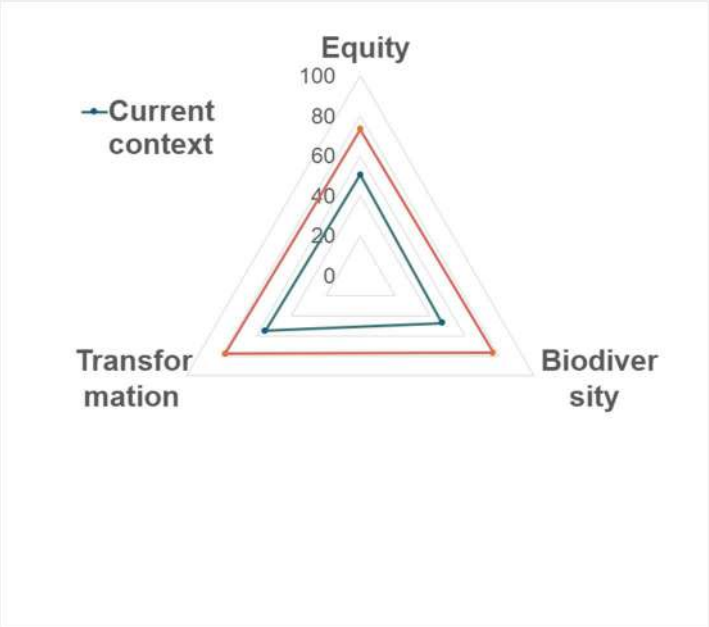
⚠️ **Risks: Exclusion of some parts of society, gentrification and rising house prices. Community needs may not be met if their input is not considered** 🔑 **Enablers / requirements: Education and awareness initiatives as well as dialogue and input from local communities. There also needs to be plans for ongoing maintenance of greenspaces** 🌱 **Future potential: There is great potential for transformative change if done well, through increase in biodiversity in cities, increased access to nature leading to increased connection to nature and health and wellbeing benefits**	
Agroforestry	*A land-use management system that integrates trees and shrubs into agricultural landscapes, combining forestry and farming practices*
Domain: Agri-food ✅ **Strengths: Potential for landscapes that are productive for people and beneficial to wildlife** ⚠️ **Risks: Introduction of invasive species, planting of unsuitable species, destruction of pre-existing landscape and loss of native flora**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**:

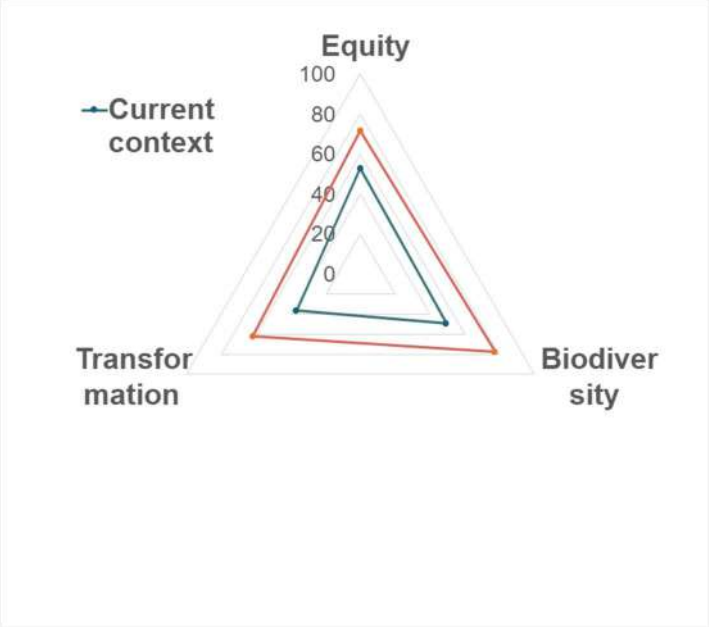
🔑 **Enablers / requirements: Good communication and knowledge sharing between experts, farmers and local communities. Choice of suitable species for planting and of location for planting** 🌱 **Future potential: Trees, if species chosen correctly can develop and mature, increasing future yields and biodiversity benefits**	
AI sensor systems/IoT for biodiversity monitoring	*Integration of artificial intelligence with Internet of Things (IoT) devices—such as remote sensors, drones, camera traps, and acoustic monitors—to collect, process, and analyse environmental data in real time.*
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Real time collection of biodiversity data allows fast decision making. Increased ability to collect data on a range of species** ⚠️ **Risks: Increased disconnect between people and the natural world and an over-reliance on technology. Unequal access to data, lack of funding, lack of expertise.** 🔑 **Enablers / requirements: Ground truthing of data, existing expertise and ecological understanding of area for correct data interpretation**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 

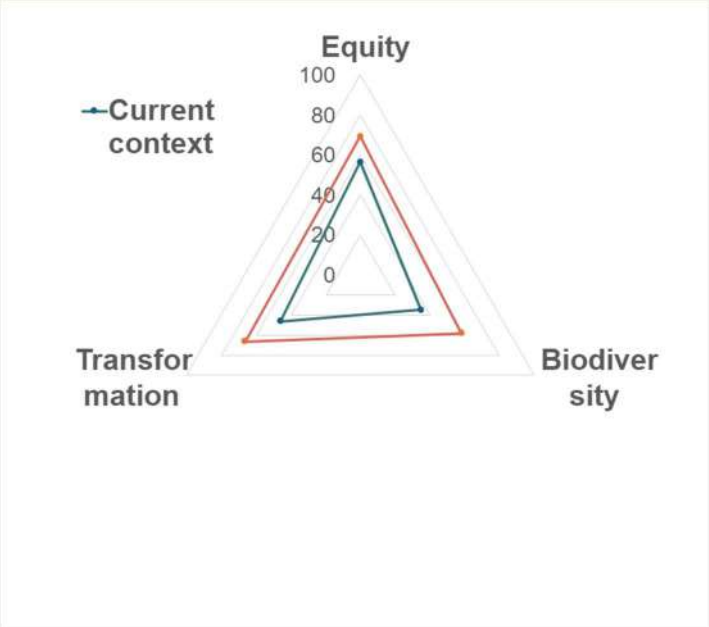
🌱 **Future potential: This can be a useful tool and advancements in technology can help increase the range of species and accuracy at which they can be identified but will need continual management and updating**	
Citizen/community/participatory science	*Involvement in of the public in the scientific process e.g. study design input, data collection, data processing*
Domain: Education & Other (Biodiversity monitoring and research) ✅ **Strengths: Can engage and include the public, increasing scientific literacy and ecological awareness. Can lead to enhanced connection to nature and health and wellbeing benefits for participants.** ⚠️ **Risks: Lack of participant diversity, exclusion of some parts of society** 🔑 **Enablers / requirements: Careful study design so that useful data can be collected while benefiting and meeting the needs of the community/ participants** 🌱 **Future potential: Impact of citizen science can be improved in the future through engaging wider parts of society. Options for engaging different demographics include apps and**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**: 

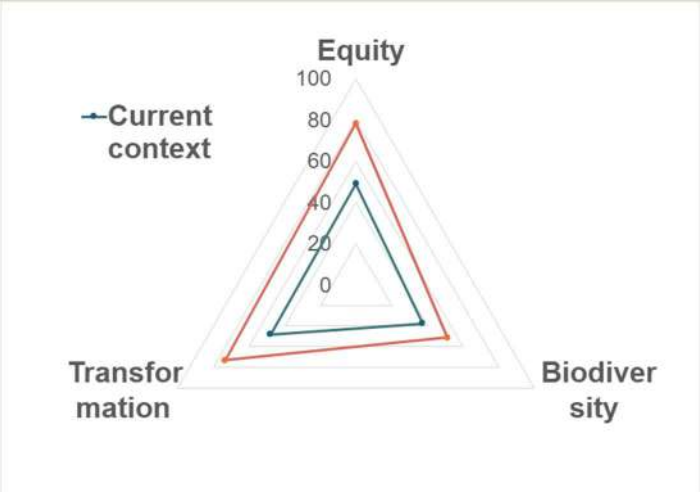
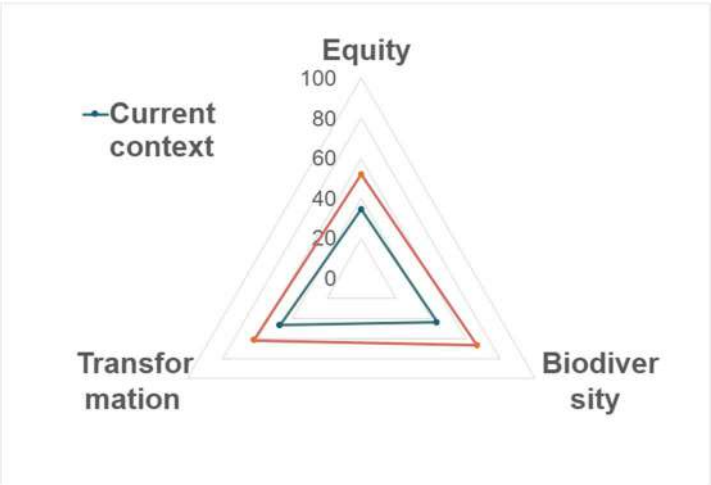
other technology as well as outreach e.g. in schools	
Digital communities or platforms for education and knowledge sharing	*Online spaces—such as forums, apps, websites, or social media groups—where individuals and organisations collaborate, exchange information, and learn from one another.*
Domain: Education ✅ **Strengths: Opportunities for learning and knowledge sharing across and between communities** ⚠️ **Risks: Exclusion of non-digital communities. Reduced knowledge retention comparative to in-person tuition.** 🔑 **Enablers / requirements: Accessible and user-friendly websites/ platforms with multilingual services. Regular management and updating and curation of content** 🌱 **Future potential: As platforms and communities grow there is great potential for positive future impact through creation of large biodiversity positive communities sharing knowledge and ideas and creating support networks**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-high* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**: 
Green-Space Record and a web-based Geoportal for Urban Green Space	*Tools for inventorying and sharing data on urban green space*
Domain: Urban and regional development	Transformative potential in the short/ medium term for biodiversity: *Low*

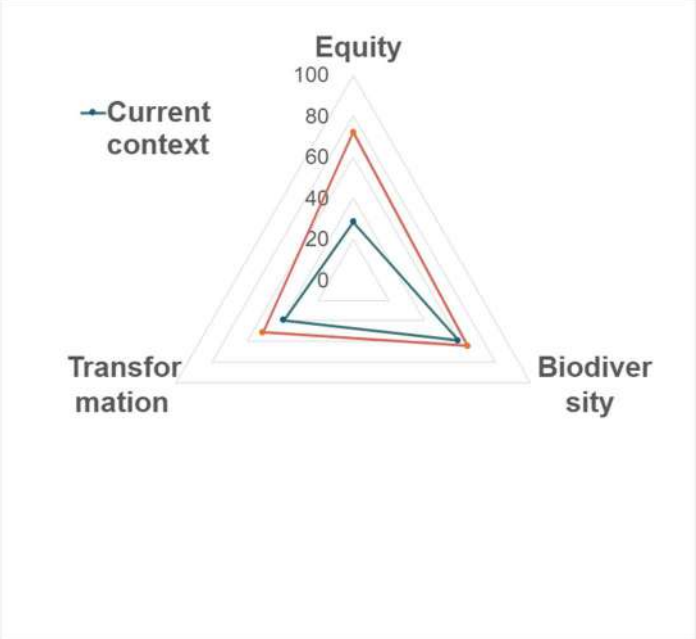
✅ **Strengths: Can provide information on green space availability which can be used to improve equitable access to green space. Can also increase awareness of available green spaces** ⚠️ **Risks: Overlooking of value of cultural important green spaces. Gentrification of areas shown to have high levels of green space. Privacy concerns with how data is collected and stored. Digital divide means not everyone can access the information.** 🔑 **Enablers / requirements: Long-term funding and project planning to ensure records are kept up-to date. GIS expertise to understand data and present it in an accessible format to others. Use of the data provided to inform decisions on increasing green space** 🌱 **Future potential: Measuring and monitoring urban green space can be a key tool for informing future development of green spaces to improve equitable access for all**	Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**: 
Commons or Commoning	*Resources that are collectively owned, managed, or used by a community. In biodiversity, this can include shared ecosystems, traditional ecological knowledge, and open-access data*
Domain: Urban and regional development	Transformative potential in the short/ medium term for biodiversity: *Medium*

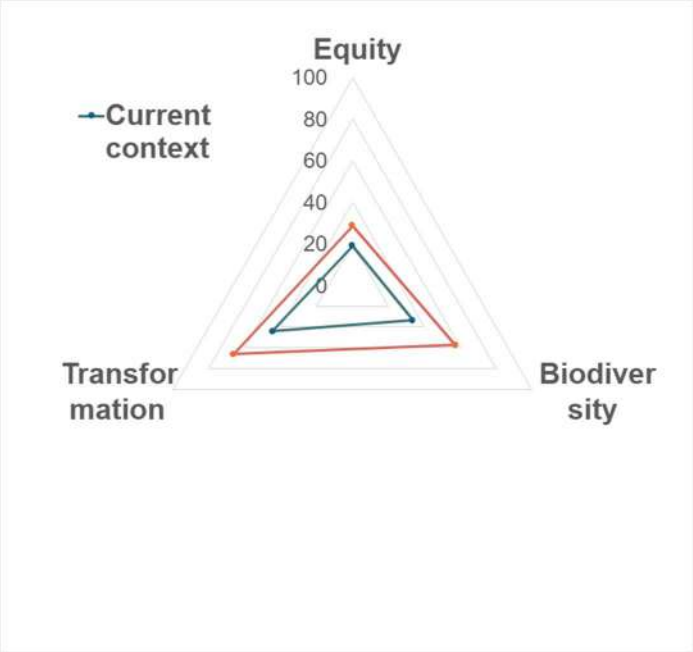
✅ **Strengths: Strengthens community-based stewardship and biodiversity monitoring. A democratic and inclusive process with higher likelihood of positive outcomes for a natural area** ⚠️ **Risks: Exclusion of marginalised groups, conflict between different stakeholders, lack of interest, decreasing interest overtime, poor governance.** 🔑 **Enablers / requirements: Sustained funding and support, transparent data management and knowledge sharing. Clear governance structures and inclusive participation** 🌱 **Future potential: Can play a role in transforming environmental governance. Greater impact can be supported through creation of regional networks to facilitate knowledge transfer and integration into policy frameworks.**	Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**: 
Integrating Traditional Knowledge and Science in Agriculture	*The collaborative use of Indigenous and local knowledge systems alongside modern scientific methods to enhance agricultural practices.*
Domain: Agri-food ✅ **Strengths: Can empower local communities and utilise valuable knowledge to the benefit of society and biodiversity**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium-high* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high*

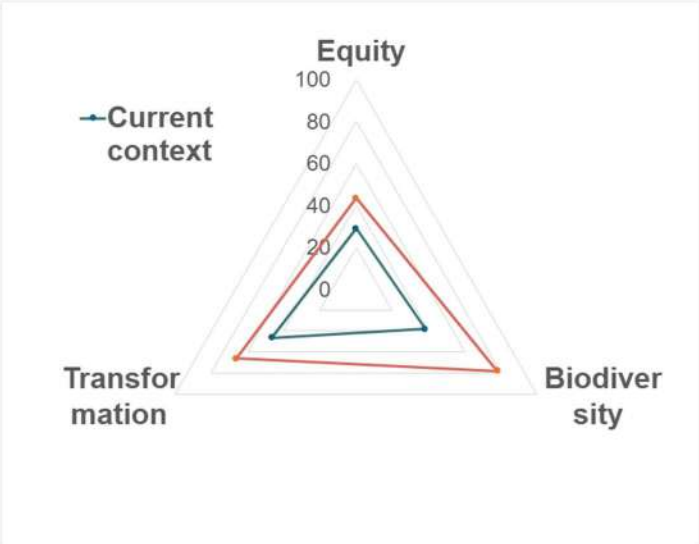
⚠️ **Risks: Misappropriation of traditional knowledge, exclusion of young or non-local voices. Tensions between participants, dominance from scientific institutions** 🔑 **Enablers / requirements: Participatory governance and equitable benefit-sharing. Long-term partnerships. Scientific monitoring and evaluation of outcomes. Legal protection for traditional knowledge** 🌱 **Future potential: Embedding practices in agricultural methods and traditional knowledge in agricultural education can help reshape agricultural systems for beneficial ecological and social transformations**	**TRD2 assessment**: 
Sustainable Tourism	*Travel practices that minimise negative impacts on the environment, culture, and society while maximising benefits for local communities and ecosystems.*
Domain: Urban and regional development ✅ **Strengths: Can generate income for conservation and support local livelihoods. Provides financial benefits to local commutates for supporting and living alongside healthy wildlife populations** ⚠️ **Risks: Potential for greenwashing, competition over housing between local people**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**:

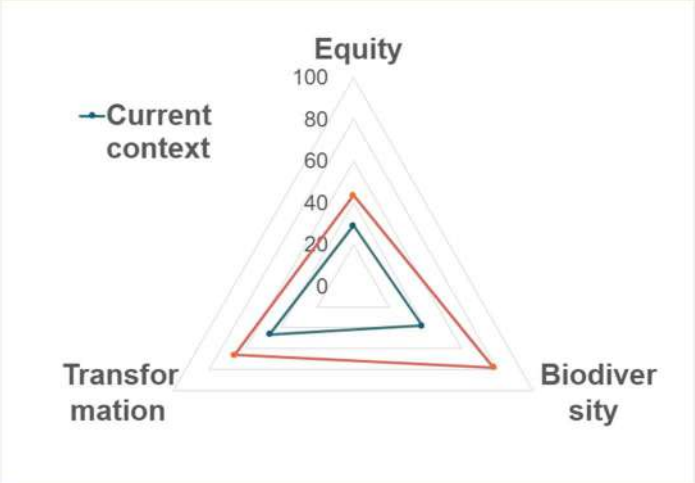
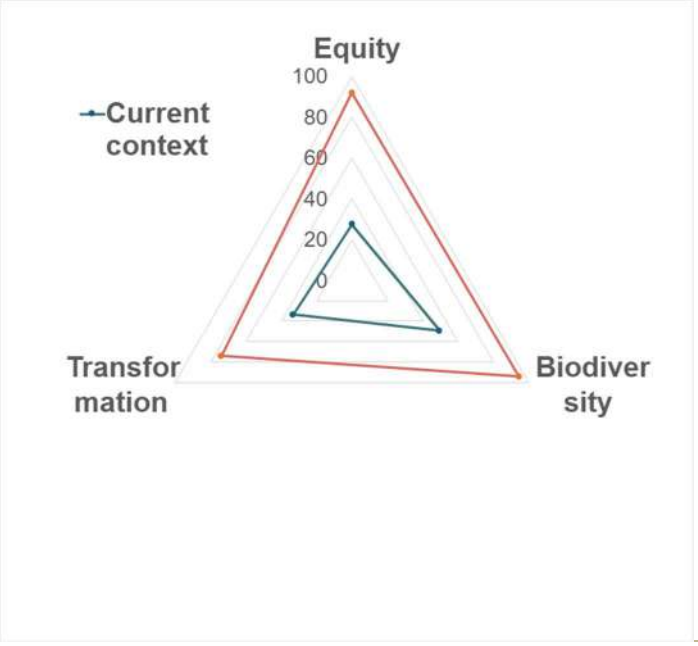
and tourists, habitat disturbance, unequal profit distribution 🔑 **Enablers / requirements: Limits on visitor numbers and biodiversity monitoring, reinvestment of income into conservation, community participation and transparent governance** 🌱 **Future potential: Can support and empower communities providing income and supporting biodiversity if done well. Can also help educate tourists and encourage further environmentally friendly behaviours into the future**	
AI for energy optimisation, waste management, climate modelling and disaster response (decision making)	*The use of artificial intelligence technologies—such as machine learning, predictive analytics, and autonomous systems—to improve environmental decision-making and operational efficiency.*
Domain: Urban and regional development & Energy ✅ **Strengths: Can aid in fast, transparent and efficient decision making** ⚠️ **Risks: Poor data leading to poor models and inaccurate predictions. Bias in data, data analysis and interpretation e.g. cherry picking. Unequal power balance and access to data and technology. Overreliance on AI** 🔑 **Enablers / requirements: Open access AI models. Bridging**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**:

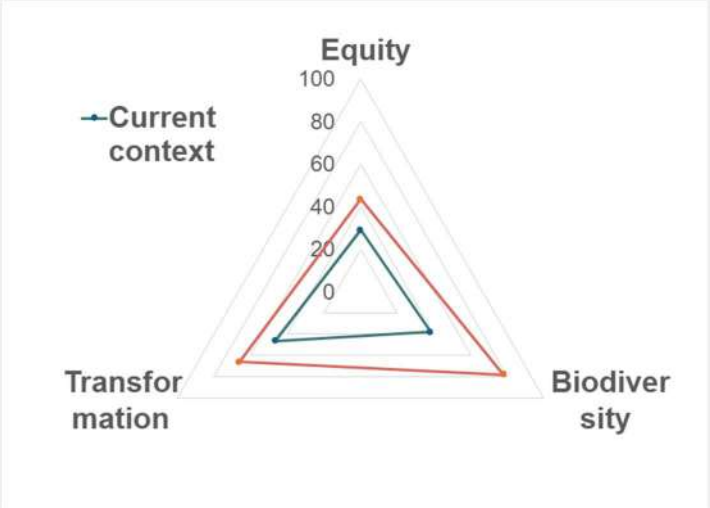
of the global North – South divide. Responsible and inclusive legislation regarding use of AI. Continual supervision and improvement of models. 🌱 **Future potential: Could be used to aid in disaster preparedness and response. Greater use in modelling, research and investigation purposes as models improve**	
Dietary change, mini livestock farming edible insects and alternative proteins	*Approaches to sustainable food production aimed at reducing the environmental impact of conventional livestock.*
Domain: Agri-food ✅ **Strengths: Reduced environmental impact through land use and emissions while enhancing food system resilience and nutritional availability globally** ⚠️ **Risks: Lack of societal acceptance and cultural resistance. Introduction of invasive species and ecosystem disruption. Economic barriers for some communities** 🔑 **Enablers / requirements: Clear regulatory and monitoring practices and appropriate legislation. Awareness, education and increased trust. Economic support and inclusive access.** 🌱 **Future potential: There is transformative potential if**	Transformative potential in the short/ medium term for biodiversity: *Medium-high* Transformative potential in the short/ medium term for equity: *Medium* Transformative potential in the long term for biodiversity: *High* Transformative potential in the long term for equity: Medium-*high* **TRD2 assessment**: 

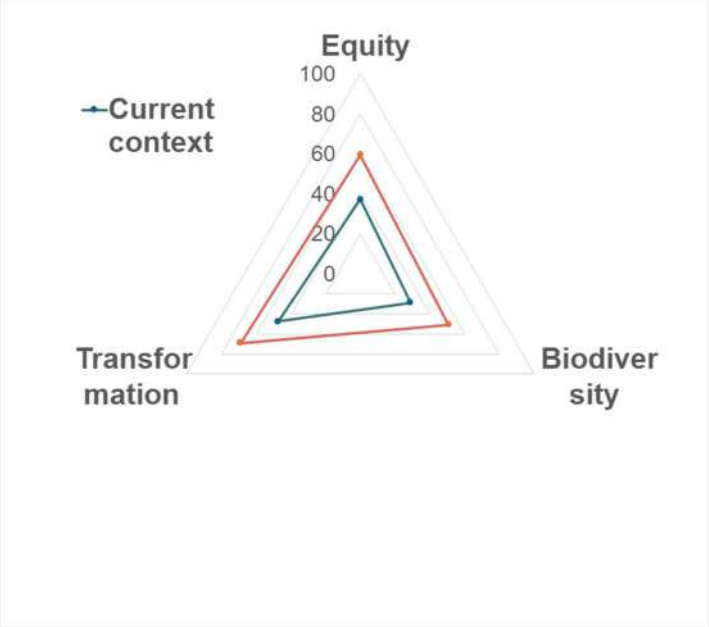
social, ecological and cultural factors are addressed	
Biodiversity data storage, e-infrastructure and sharing platforms e.g. GBIF	*Online data storage and sharing for biodiversity science and monitoring*
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Important in biodiversity science and conservation planning. Can aid in monitoring policy outcomes** ⚠️ **Risks: Private appropriation of data. Risks to vulnerable species with completely open access data. Bias in data distribution across species** 🔑 **Enablers / requirements: Data and benefit sharing mechanisms and open access data. Better integration of data into decision making process. Technical expertise and ecological knowledge.** 🌱 **Future potential: AI integration and benefit-sharing schemes could improve future impact. Room for greater integration with citizen science schemes. Overall impact relies on better decision making based on the data.**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Ecosystem service valuation, including cultural ecosystem services	*Methods of assigning monetary value for ecosystem services*

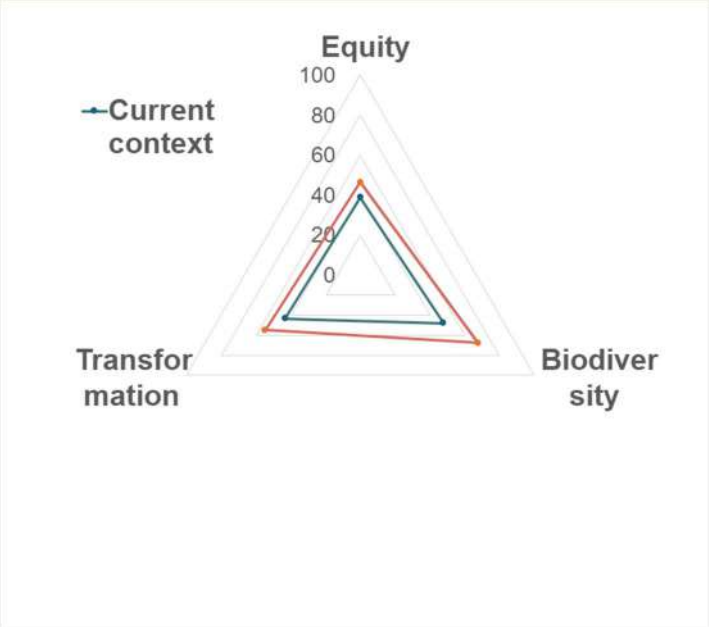
Domain: Urban and regional development ✅ **Strengths: A valuable decision-making tool which can help justify and enable biodiversity measures while taking into account interests of local communities** ⚠️ **Risks: Commodification of nature and prioritisation of economic over non-economic value. Misuse and harm to nature and misrepresentation of local communities** 🔑 **Enablers / requirements: Research and improved general understanding of concept as well as legislative support** 🌱 **Future potential: If it can be demonstrated to work and be effective and practical it will encourage wider uptake and increase potential impact**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-Low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Macroscope - a combination of tools for Global Biodiversity Monitoring	*A way of combining data inputs from different sources of biodiversity monitoring*
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Provide a more complete picture of biodiversity with better data to help inform decision making** ⚠️ **Risks: Potential to miss species or focus only on certain**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low*

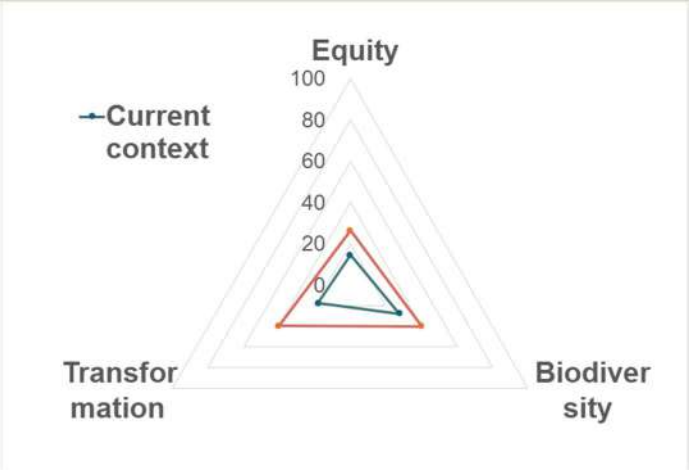
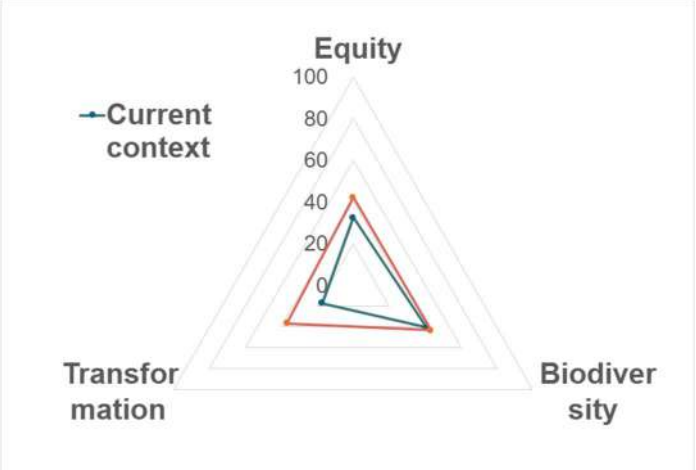
taxa or ecosystems. Potential for human and computer error. **🔑 Enablers / requirements: Technical developments to enable multi-source data integration, with particular support for developing countries. Long term funding and data storage capacity** **🌱 Future potential: Integration with other environmental sensors (IoT) and AI can lead to fast and large scale collection of biodiversity data**	**TRD2 assessment**: 
Nature Based Solutions	*Protection, restoration, and sustainable management of ecosystems in ways that address societal challenges*
Domain: Urban and regional development **✅ Strengths: Has the ability to improve biodiversity and ecosystem function in the long-term which can also improve the environment for human health. Can be an affordable natural solution without the need for technological fixes** **⚠️ Risks: Choice of unsuitable locations and harm to local communities. Division and lack of trust from communities and different stakeholders** **🔑 Enablers / requirements: Appropriate governance mechanisms and legislation. Increased awareness, site**	Transformative potential in the <u>short/ medium</u> term for biodiversity: *Medium-low* Transformative potential in the <u>short/ medium</u> term for equity: *Medium-low* Transformative potential in the <u>long</u> term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**:

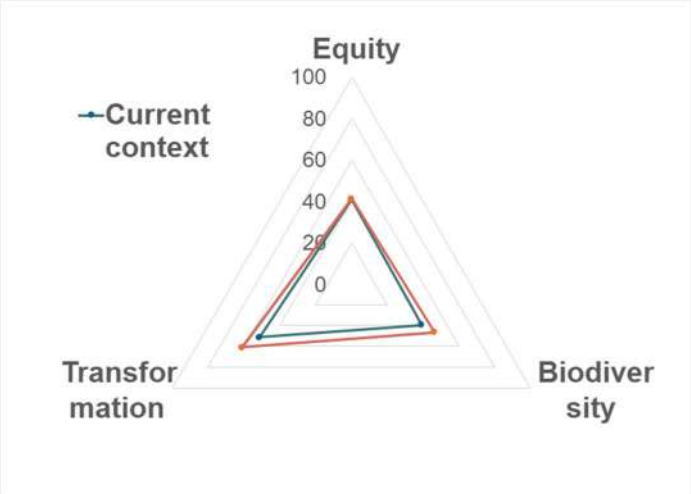
specific knowledge and inclusion of community consultation 🌱 **Future potential: Greater uptake will increase the impact, but research is needed to make sure it is done well as it will need tailoring to each specific site**	
Rights of Nature	*Upgrading the legal status of nature, ecosystems, or species*
Domain: Other (Environmental governance and legal) ✅ **Strengths: Gives nature priority and protection without the need for it to have economic value. Gives communities and nature advocates a tool to support their arguments** ⚠️ **Risks: Misrepresentation, different and conflicting rights, misuse of power and difficulty enforcing.** 🔑 **Enablers / requirements: National and international legal change with clear terms and conditions and fair representation and decision making** 🌱 **Future potential: High future potential as it can allow nature and some neglected communities to have a voice but**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**: 

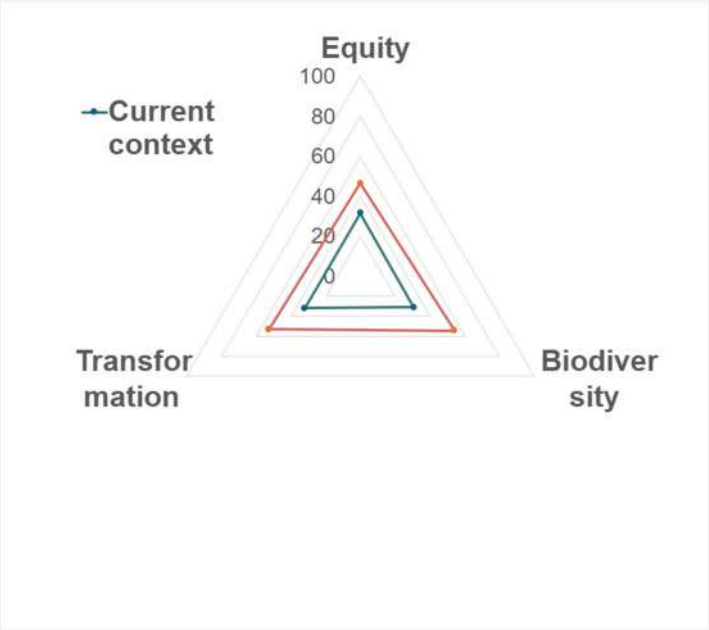
needs further testing to ensure it works in practice	
Wildlife vaccinations	*Immunisation of wild animal populations—often through oral baits or darting—to prevent the spread of infectious diseases that threaten biodiversity, livestock, or human health.*
Domain: Other (Wildlife health and conservation) ✅ **Strengths: Can protect endangered species, and reduce risk of disease transfer between wildlife and livestock or humans** ⚠️ **Risks: Biosafety, particularly if considering genetic approaches. Unexpected outcomes causing harm to species. Incomplete or insufficient numbers reached** 🔑 **Enablers / requirements: Societal support, further research, education and awareness raising** 🌱 **Future potential: A considerable amount of potential exists but more research is needed for this innovation to have greater future impact**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Forest schools	*Outdoor, nature-based educational programs that emphasise child-led learning through regular sessions in woodland or natural environments.*
Domain: Education ✅ **Strengths: Facilitates long-lasting knowledge, awareness**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium*

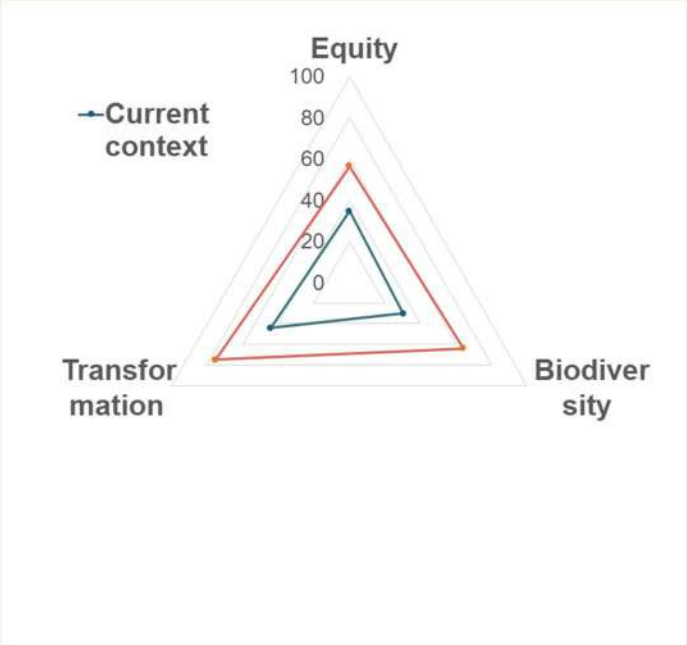
and stewardship of the environment in young people while strengthening community connection to nature ⚠️ **Risks: Social exclusion, financial barriers. Accessibility barriers leading to inequity. Biodiversity disturbance or harm. Cultural bias in teaching and learning** 🔑 **Enablers / requirements: Inclusive and accessible programmes with access to funding. Careful choice and management of sites. Suitable programme design and integration with formal education** 🌱 **Future potential: Could be integrated into more formal and mainstream education to increase reach and impact**	Transformative potential in the <u>long</u> term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**: 
Agri-environmental subsidies	*Financial incentives provided to farmers and landowners to encourage environmentally friendly agricultural practices.*
Domain: Agri-food ✅ **Strengths: High direct impact on biodiversity through encouraging beneficial action and behaviour in farming practice** ⚠️ **Risks: Inequitable benefits with greater advantages for larger, wealthier landowners. Subject to political changes and corruption. Low long-term**	Transformative potential in the <u>short/ medium</u> term for biodiversity: *Medium-high* Transformative potential in the <u>short/ medium</u> term for equity: *Medium-low* Transformative potential in the <u>long</u> term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-high* **TRD2 assessment**:

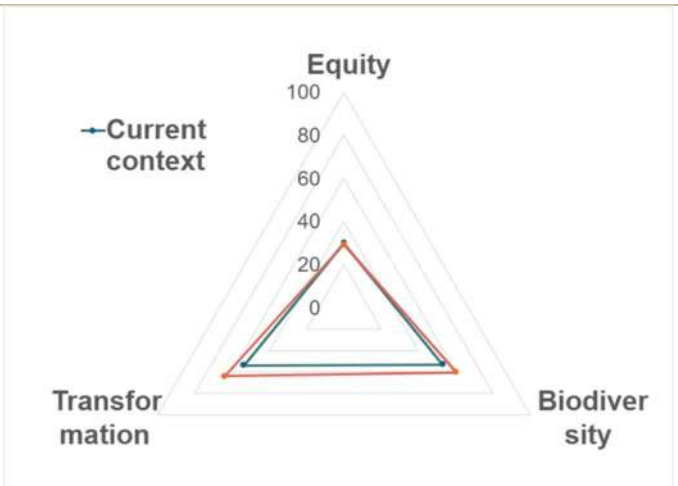
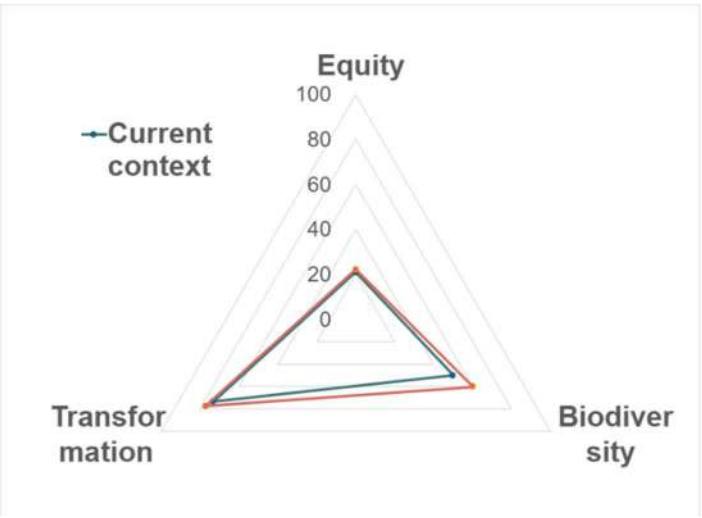
impact from lack of change in values. 🔑 **Enablers / requirements: Good design and governance with long term funding and suitable financial compensation. Focus on social criteria to increase equity and social inclusion** 🌱 **Future potential: There is transformative power if schemes are restructured towards inclusiveness and adaptive landscape governance with long-term focus and verifiable outcomes.**	
Regenerative agriculture or ecological intensification of mainstream farming practices	*Farming approaches that aim to enhance ecosystem services and increase productivity by working with natural processes rather than against them*
Domain: Agri-food ✅ **Strengths: Can help to realign agriculture and ecological systems to benefit biodiversity and improve ecosystem services in the long-term** ⚠️ **Risks: Access barriers, and exclusion from subsidies and lack knowledge or awareness, can reduce uptake and increase inequity. Lack of clear definition leading to co-option of term and use for justification for unsustainable practices** 🔑 **Enablers / requirements: Long-term funding,**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**:

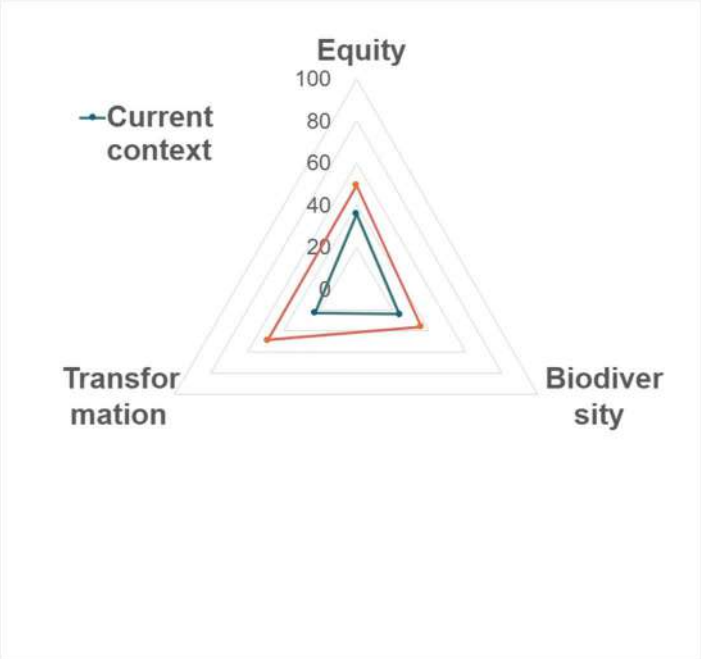
inclusiveness training and knowledge sharing. Supportive legislation and policies. Clear definitions ad standards 🌱 **Future potential: If sustainable practices can be mainstreamed it can transform the impact of agriculture on biodiversity**	
Biodiversity and Ecological education in engineering training	*The inclusion of ecological principles and biodiversity awareness in engineering curricula to help future engineers understand, monitor, and mitigate the environmental impacts of their designs and projects.*
Domain: Education ✅ **Strengths: Supports biodiversity friendly and sustainable technical solutions** ⚠️ **Risks: Lack of holistic learning leading to decision making without adequate knowledge of the complete picture. Difficulty enforcing this type of programme.** 🔑 **Enablers / requirements: Suitable educational programmes/ courses and subsidies to enable access. Job openings and contracts relevant to skills** 🌱 **Future potential: If there is greater uptake and support for education it may start to have a bigger impact in the future**	Transformative potential in the <u>short/ medium</u> term for biodiversity: *Medium-low* Transformative potential in the <u>short/ medium</u> term for equity: *Medium-low* Transformative potential in the <u>long</u> term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 

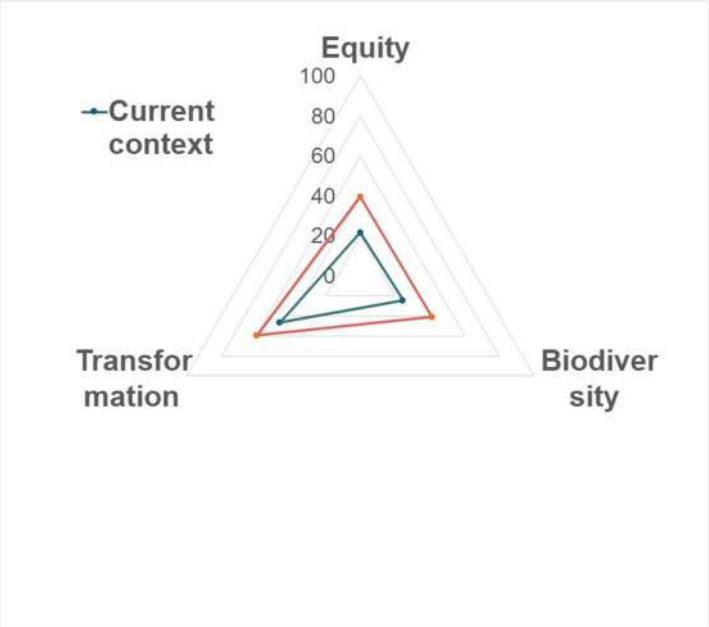
AI in autonomous agriculture / smart farming	*The use of artificial intelligence technologies—such as machine learning, computer vision, and robotics—to optimise farming practices.*
Domain: Agri-food ✅ **Strengths: Can be a useful tool to support farmers and provide them with data. Precision agriculture can help reduce inputs such as pesticides and fertilisers** ⚠️ **Risks: Over-reliance on technology resulting in loss of connection to nature, loss of knowledge and skills. Unequal access to technology** 🔑 **Enablers / requirements: Accessible, reliable and user-friendly technology** 🌱 **Future potential: Could provide data from over a large area but needs to be combined with knowledge of land and ecosystem to be most useful**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Transdisciplinary collaboration around SciFi portrayable of greenery in cities	*The integration of diverse disciplines—such as ecology, urban planning, social sciences, and speculative fiction—to imagine and co-create futuristic, green urban environments.*
Domain: Urban and regional development & Education ✅ **Strengths: New forms of collaboration that are inclusive and can engage with society in a fun and imaginative way and**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium*

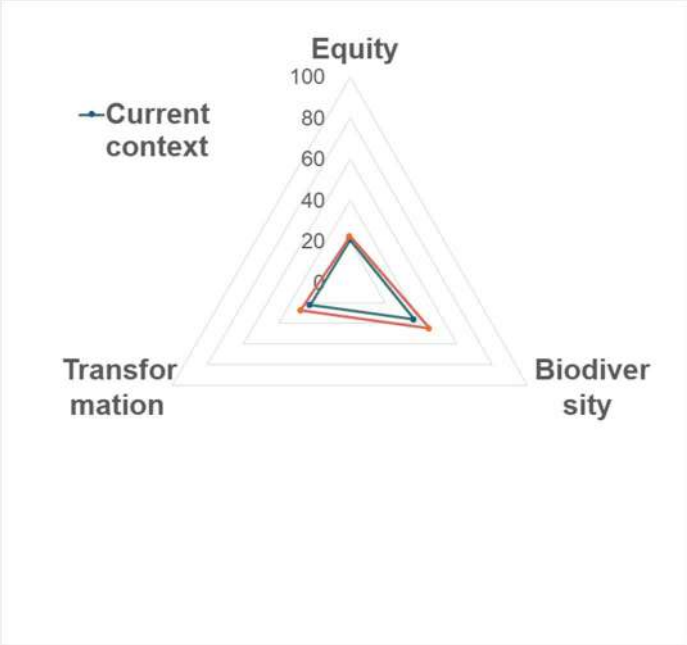
change perspectives of nature and green space ⚠️ **Risks: Unrealistic visions and disconnect from real world nature and biodiversity. Alienation or under-representation of some parts of community** 🔑 **Enablers / requirements: Open dialogue, inclusiveness, easy access to participation, shared language and long-term financing** 🌱 **Future potential: Can increase awareness and engagement with biodiversity and aid in urban planning by bridging science, art and policy**	Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Large language models (LLMs) (in biodiversity-relevant contexts)	*A type of artificial intelligence that processes and generates text*
Domain: Education ✅ **Strengths: Can aid in processing of data and help translate complex topics into more accessible language** ⚠️ **Risks: Bias (especially towards a more Western perspective) in the data leading to bias in responses. High energy consumption and large environmental footprint. Loss of human expertise and input. Concentration of power in private sector technologies**	Transformative potential in the short/ medium term for biodiversity: *Medium-low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**:

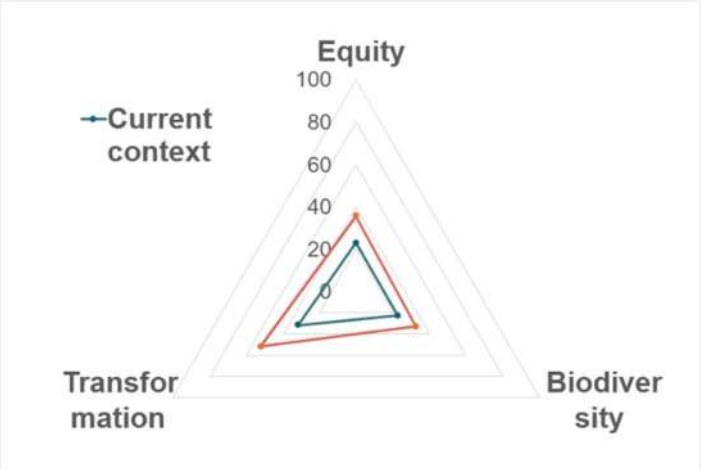
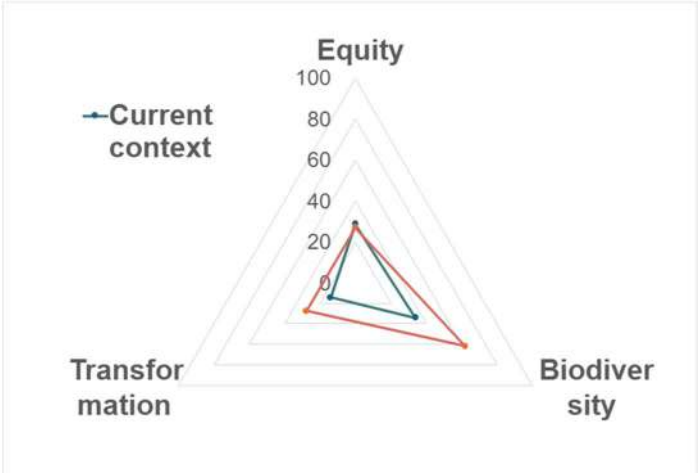
🔑 **Enablers / requirements: Training with suitable relevant and unbiased data sets, with ongoing training and human supervision. Development of open community-owned AI systems. Creation of frameworks for ethical and fair governance** 🌱 **Future potential: There is transformative potential, particularly when combined with other initiatives such as citizen science or educational programmes where it can help increase access to knowledge**	
Remote sensing, including UAV/drones	*The collection of data about the Earth's surface without direct contact, typically through satellite imagery, aerial photography, or drone-based sensors*
Domain: Other (Biodiversity or environmental monitoring and research) ✅ **Strengths: Aid in land-use and landscape scale monitoring** ⚠️ **Risks: Risk of debris and disturbance of wildlife. High cost creates inequitable access. Lack of trust, privacy issues.** 🔑 **Enablers / requirements: Reduction of cost and development of open-source software** 🌱 **Future potential: Engagement of drone owners to engage them to aid in citizen**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Low* **TRD2 assessment**:

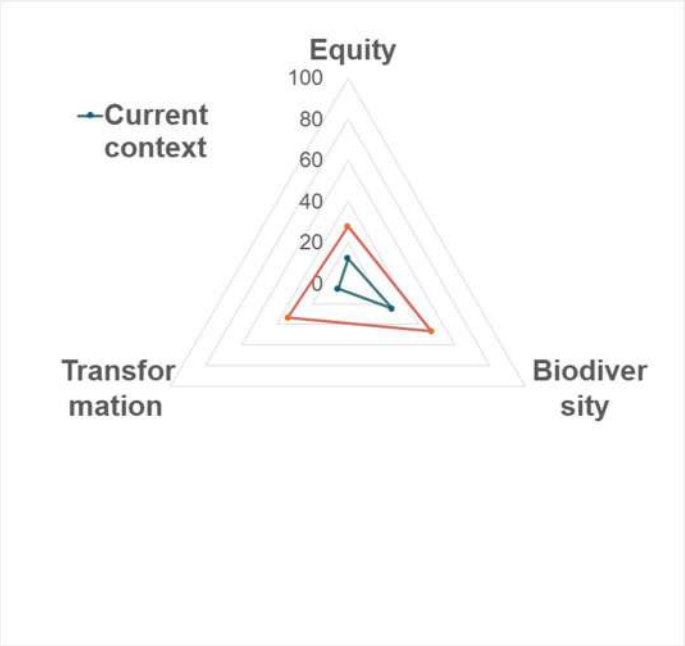
science/ community wildlife monitoring	
GIS for environmental monitoring and planning	*The use of spatial data and mapping technologies to collect, analyse, and visualise geographic information related to ecosystems, land use, and environmental change*
Domain: Other (Biodiversity and environmental monitoring and research) ✅ **Strengths: Provides knowledge and overview required for decision-making and effective governance** ⚠️ **Risks: Overreliance on GIS technologies can lead to further marginalisation of local community knowledge. Broadening global justice and equity gaps through inequitable access to technology** 🔑 **Enablers / requirements: Combining with ground-truthed data and local/ community knowledge** 🌱 **Future potential: Can be integrated with many different technologies, or initiatives**	Transformative potential in the <u>short/ medium</u> term for biodiversity: *High* Transformative potential in the <u>short/ medium</u> term for equity: *Low* Transformative potential in the <u>long</u> term for biodiversity: *High* Transformative potential in the <u>long</u> term for equity: *Low* **TRD2 assessment**: 

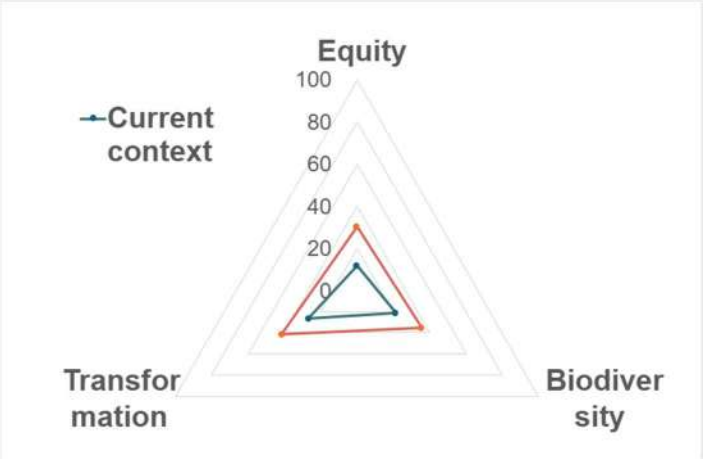
Virtual reality technology for learning and engagement	*The use of immersive, computer-generated environments that simulate real or imagined settings*
Domain: Education ✅ **Strengths: Can be used to explore and experience remote or inaccessible landscapes with educational and planning uses** ⚠️ **Risks: High cost leading to unequal access across society. Can increase detachment from the real world. Risk of commercialisation and use in advertising** 🔑 **Enablers / requirements: Consideration of the real problem that needs addressing and tailoring of the technology to this. Regulation of use to maintain ethic. Lower cost to increase accessibility** 🌱 **Future potential: The technology can have a wide range of applications but development needs to focused on where it can make the most difference i.e. environmental planning or experiences for people with mobility challenges.**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Mobile games or apps for environmental learning and engagement	*Digital tools designed to educate users about ecological issues, promote active participation in biodiversity monitoring, and foster environmental stewardship.*
Domain: Education	Transformative potential in the short/ medium term for biodiversity: *Medium*

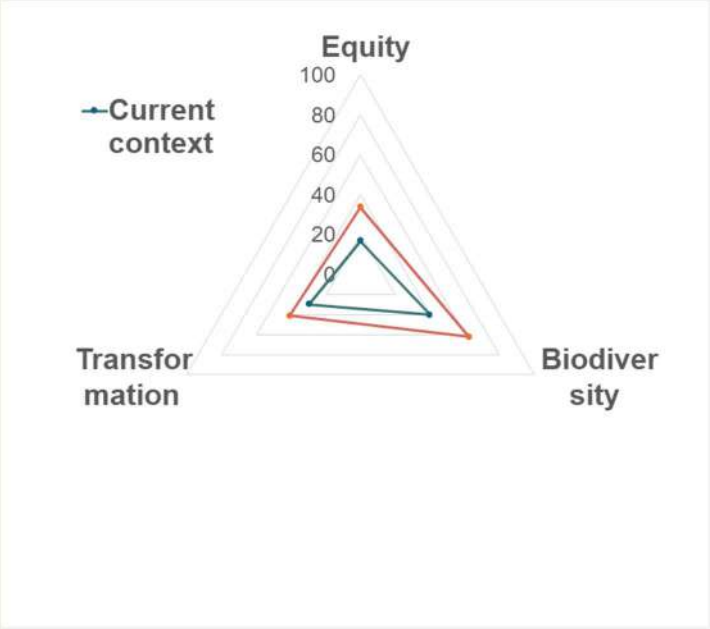
✅ **Strengths: Can engage a wide audience and provide education and awareness on biodiversity issues as well as facilitate data collection and increase knowledge and connection to local nature** ⚠️ **Risks: Disturbance of sensitive ecological sites, inequitable access and digital divide, concerns over data quality, ownership and usage** 🔑 **Enablers / requirements: Outreach activities, inclusive design with strong marketing. Maintaining high scientific and data standards** 🌱 **Future potential: Integration with educational programmes and connection to larger data networks can increase future impact**	Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
3D printing for habitat reconstruction	*Creation of artificial habitat/habitat features to support habitat regeneration and species suitability*
Domain: Other (Biodiversity conservation) & Urban and regional development ✅ **Strengths: Can provide an immediate solution to help support species at risk** ⚠️ **Risks: Increased reliance on technological solutions that do not address the root cause of habitat loss or degradation.**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Medium-low*

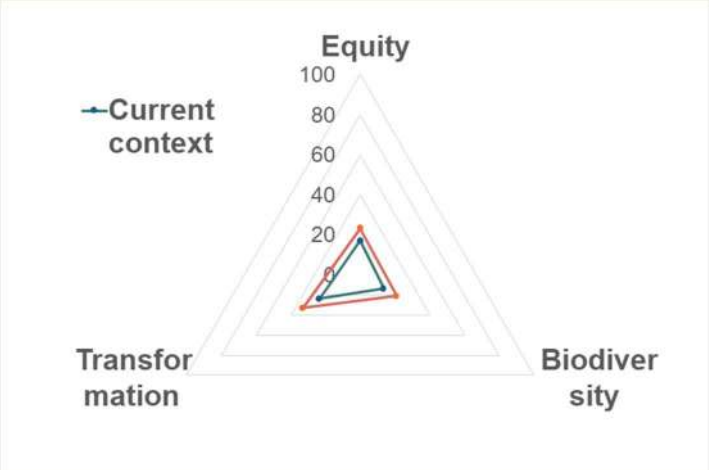
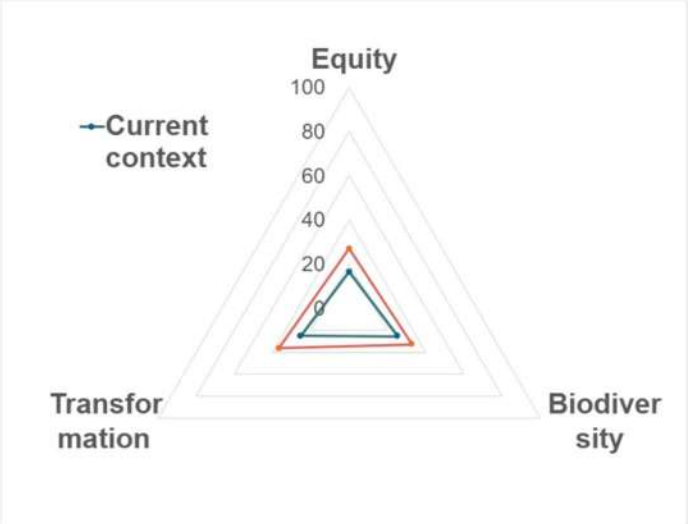
Unintended consequences/ impact on other species 🔑 **Enablers / requirements: Detailed knowledge of species requirements, ongoing species monitoring, community engagement and support. Cheap and accessible materials** 🌱 **Future potential: There is potential for use in helping restore habitats for the future, especially if biodegradable, and environmentally friendly materials or used, but needs to be alongside other measures to encourage natural habitat regeneration**	**TRD2 assessment**: 
BiSciCol Triplifier	*Description: A tool for converting data to RDF format for easier sharing and collation across data sets*
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Supports collaboration and collation of biodiversity data from different sources to help look at the bigger picture** ⚠️ **Risks: If it is not kept up to date, which requires funding, it could quickly become obsolete. User errors could result in poor quality data** 🔑 **Enablers / requirements: Mass uptake is required for impact to be achieved**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Low*

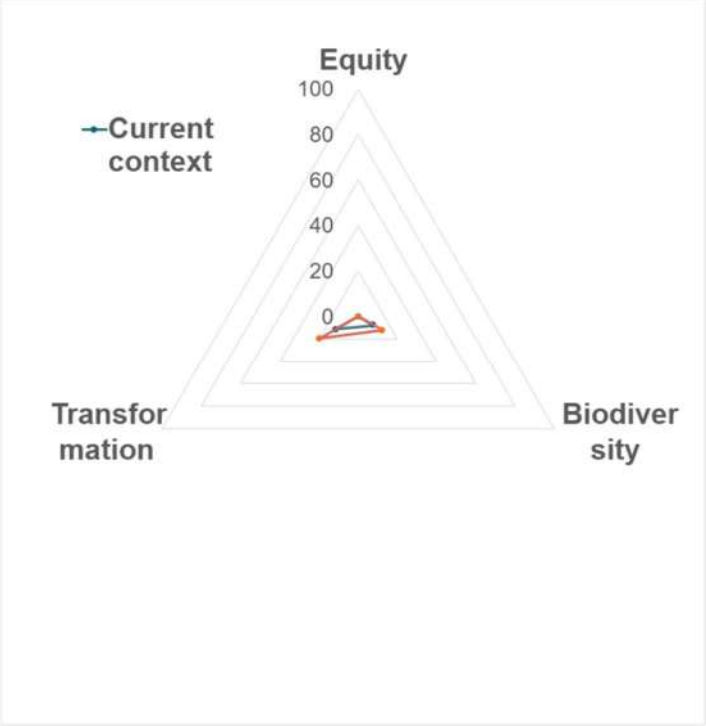
🌱 **Future potential: Alignment with Darwin Core vocabulary could increase use. It is a useful tool but it will always be reliant on quality data collected and action being implemented based on data**	**TRD2 assessment**: 
Biofuels Inc biomass	*Renewable energy sources derived from biological materials such as plants, agricultural residues, and organic waste. Biomass refers specifically to energy produced by burning or converting organic matter*
Domain: Agri-food & Energy ✅ **Strengths: Alternative crop and income source for farmers. Aid in reduction of fossil fuel usage** ⚠️ **Risks: Land use change, deforestation to make room for biofuel crops, large-scale monoculture agriculture** 🔑 **Enablers / requirements: Appropriate legislation, responsible business practices and research** 🌱 **Future potential: Can contribute a portion of fuel usage, although may be overshadowed by other fuel types and developments (e.g. electric vehicles)**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium-High* Transformative potential in the long term for equity: *Low* **TRD2 assessment**: 

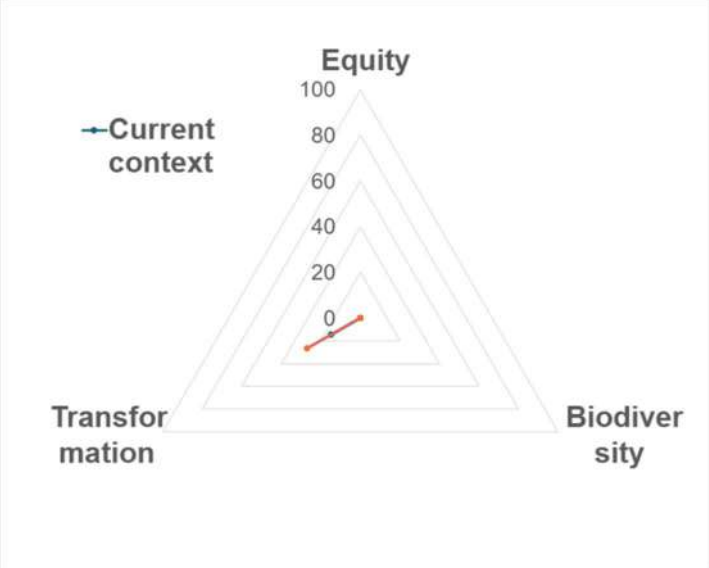
Blockchain for transparent & equitable business/ decision-making/budgeting	*A decentralised, distributed digital ledger technology that records transactions across multiple computers in a way that ensures data integrity, transparency, and immutability. Each record (or 'block') is linked to the previous one, forming a secure chain.*
Domain: Other (Digital infrastructure and cross-sectoral technology) ✅ **Strengths: Transparent decision making and supply chains can aid in consumer decision making and support sustainable and equitable business** ⚠️ **Risks: High energy use. Overreliance on technological fixes. Misuse of technology and exclusion of some communities** 🔑 **Enablers / requirements: Increased use of value-chain certification systems. Appropriate legislation. Increased education and awareness** 🌱 **Future potential: Anticipated increased use in the future with a wide range of applications e.g. voting which may increase participation and thus societal equity**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Low* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
Circular design in the building industry	*An approach that prioritises the reuse, regeneration, and recycling of materials and systems throughout a building's lifecycle.*
Domain: Urban and regional development	Transformative potential in the short/ medium term for biodiversity: *Medium- low*

✅ **Strengths: Reduced resource use** ⚠️ **Risks: Reduced feasibility and inequitable access (and associated benefits) due to high cost** 🔑 **Enablers / requirements: Reduced costs to enable more widespread adoption. Regulatory changes.** 🌱 **Future potential: Could help to greatly reduced biodiversity impact of infrastructure development**	Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Medium-low* **TRD2 assessment**: 
In vitro methods for plant conservation e.g. Cryopreservation	*Preservation of plant genetic material under controlled laboratory conditions. One key technique is cryopreservation, which stores plant tissues at ultra-low temperatures*
Domain: Agri-food ✅ **Strengths: Can protect species from loss of genetic diversity and extinction, and support restoration efforts** ⚠️ **Risks: Limited accessibility and inequality due to need for technical resources and knowledge. Neglect of in-situ conservation and preventative action. Privatisation and corporate control of genetic resources**	Transformative potential in the short/ medium term for biodiversity: *Medium- high* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-high* Transformative potential in the long term for equity: *Medium-low*

🔑 **Enablers / requirements: Open access data and information sharing. Legal and ethical safeguards. Funding to support long-term research and equal access to resource** 🌱 **Future potential: It can play a globally important role in conserving species and can be used to support in-situ conservation and restoration. Its impact can be improved through integration of local knowledge and democratisation of the scientific infrastructure**	**TRD2 assessment**: 
Nudges and Choice Architecture	*Nudges are subtle interventions that steer people toward certain decisions or behaviours without restricting their freedom of choice. Choice Architecture is the design of different ways in which choices can be presented to people, influencing their decisions.*
Domain: Education ✅ **Strengths: Small behavioural prompts can increase participation, awareness and engagement and influence short-term decision making** ⚠️ **Risks: Lack of long-term change or impact. Social exclusion/lack of reach to diverse groups and particularly those with low digital literacy** 🔑 **Enablers / requirements: Embedding within broader strategies to encourage true change in value and behaviour.**	Transformative potential in the short/ medium term for biodiversity: *Medium- low* Transformative potential in the short/ medium term for equity: *Medium-low* Transformative potential in the long term for biodiversity: *Medium-low* Transformative potential in the long term for equity: *Low* **TRD2 assessment**:

Monitoring of impact and considered design of nudges to target audiences and encourage desired behaviour. 🌱 **Future potential: As a supportive tool it can be used to encourage certain behaviours but further testing and evaluation is needed**	
Smart wildlife collars	*GPS-enabled, sensor-equipped devices fitted to animals to track their movements, behaviour, and physiological data in real time.*
Domain: Other (Biodiversity monitoring and research) ✅ **Strengths: Enables tracking and detailed research into animal behaviour and can aid in mitigating human-wildlife conflict** ⚠️ **Risks: Stress and harm to wildlife from collar and collaring process. Harm or poaching of vulnerable species if data falls into the wrong hands** 🔑 **Enablers / requirements: Community involvement and support. Expert knowledge for data analysis and animal welfare considerations** 🌱 **Future potential: As technology develops it can be used on a wider range of species and collect more data over longer periods of time. Making data accessible and engaging**	Transformative potential in the short/ medium term for biodiversity: *Medium* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Medium* Transformative potential in the long term for equity: *Low* **TRD2 assessment**: 

with local communities can help increase transformative potential	
CRISPR/Cas9	*Powerful gene-editing technology that allows scientists to precisely modify DNA within organisms.*
Domain: Agri-food ✅ **Strengths: More precise and efficient gene editing with potential for a broad range of applications** ⚠️ **Risks: Uncertain impact of gene modification on natural ecosystems. Reliant on technological fixes e.g. de-extinction removes urgency to address current biodiversity crisis. Inequitable access to technology globally, concentration of patents** 🔑 **Enablers / requirements: Public research and ownership over corporate control and research on impact prior to commercialisation and release into the environment. Specialised technical skills and knowledge** 🌱 **Future potential: While it is technological innovation with potential to impact biodiversity and equity the risks of harm are very great**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Low* Transformative potential in the long term for equity: *Low* **TRD2 assessment**: 
Vertical farming	Growing of crops in stacked layers or vertically inclined surfaces, often in controlled indoor environments using hydroponics, aeroponics, or aquaponics.

Domain: Agri-food ✅ **Strengths: Improved food security outcomes with reduced needs in land, and lower transport cost if developed in urban settings** ⚠️ **Risks: Increased focus on high yield crops and monocultures. High energy and water demands having negative impact on environment. High capital and technology inputs limiting social diffusion** 🔑 **Enablers / requirements: Investment in technology and equipment. Ensuring of equitable access to food produced for local communities** 🌱 **Future potential: Integration with smart agriculture and clean energy could increase efficiency and reduce energy inputs**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Low* Transformative potential in the long term for equity: *Medium* **TRD2 assessment**: 
GM food crops	*Plants used in agriculture whose DNA has been altered using genetic engineering techniques to introduce desirable traits*
Domain: Agri-food ✅ **Strengths: Potential to improve crop resilience against pest species, climate changes and nutritional deficiency** ⚠️ **Risks: Increased focus on high-yield crops and monocultures. Genetic contamination to other crops**	Transformative potential in the short/ medium term for biodiversity: *Low* Transformative potential in the short/ medium term for equity: *Low* Transformative potential in the long term for biodiversity: *Low* Transformative potential in the long term for equity: *Low* **TRD2 assessment**:

and non-target species. Corporate ownership and use of patents reducing open access and causing societal inequity 🔑 Enablers / requirements: Development through public agricultural research institutes with open-source technologies and no patenting 🌱 Future potential: GM food crops have a long history of overpromising and under delivery when it comes to benefits for farmers, consumers and the environment so no great future potential is anticipated