UKCEH

Identifying pathways towards positive nature futures for lakes.

Report from the second PLURALAKES stakeholder workshop, English Lake District, UK, 12/02/2026.

Bethan Thorsby © Sporadic illustration.

Moorhouse, H.L., Spence, D., Linney, G., Olsson, F., Mackay, E., Lazurko, A., Teurlincx, S., and Kuiper, J., (2026).

Table of contents

List of Figures

UKCEH

1. Executive Summary

A summary of the design, findings and research implications of the second participatory workshop on pathway development held in the English Lake District for the PLURALAKES project.

This report describes the activities and discussions which were held at the second PLURALAKES workshop on pathway development in the English Lake District on February 12th, 2026, at Windermere Jetty Museum. The PLURALAKES project is an EU Water4All-funded international consortia which aims to explore the possibilities for positive lake futures through co-created visions and pathways in three lake catchment areas in Europe, using the Nature Futures Framework as a guiding principle. The first English Lake District workshop, held in May 2025, focused on co-developing visions for positive lake futures (detailed by Moorhouse *et al*., 2025). This second workshop was designed to build pathways towards these visions, together with local actors. The activities described in this workshop were designed and facilitated by the PLURALAKES team based in the UK, Netherlands and Stockholm.

This workshop consisted of six activity sessions which were designed to 1) explore the three visions created in the first workshop, using creative writing narratives and ensure participants were still aligned with these visions , 2) prioritise the ecosystem services within these future visions, 3) identify points of intervention to disrupt negative trajectories of change, 4) identify "seeds" of change and the pathways to scale these up, 5) identify barriers which are preventing positive lake futures and how these can be overcome and finally 6) develop narratives on the pathways to positive futures.

This report describes and evaluates the output from each of the activities that were produced by the three vision groups. Throughout the workshop, shared perspectives and points of tension emerged. Across the groups there was a recognition that for lake ecosystems to deliver multiple benefits and services, their ability to function, remain resilient and support biodiversity was paramount, followed by a need for societal change towards increased cultural values, specifically improved connection and stewardship towards nature. There was also a shared sense that addressing and improving wastewater management and land-use was necessary. In addition, all groups identified that the behaviours and actions of visitors were among the greatest sources of pressure on the lakes, and that broader changes to society's value for nature, as well as on the culture of tourism needs to change to reduce this impact. Key areas of tension which emerged included exclusion, with different ideas about where, when and who should be excluded to increase the opportunity for nature to thrive. Many participants were not able or comfortable making decisions around exclusion, though the Nature for Nature group were clearer about complete human exclusion as necessary to protect natural habitats. There were also differences within the groups on how and when enforcement should be used, with the Nature as Culture group seeing it as a necessity to drive behavioural change, whereas the other two groups wanted to see positive reinforcement and evidence from restoration being used to influence organisations and individuals. Finally, groups found difficulty in the prioritisation of ecosystem services, as well as developing the temporal pathways to scale-up "seeds" and scale-down barriers. This may have come from either a discomfort on making decisions that may exclude certain sectors or members of society, the unpredictability of global politics making future visioning difficult and/or reducing participant's sense of agency or control in making future-based decisions, or the sense that all actions are urgent. The latter point is connected with the idea that we already have the knowledge we need to make steps towards positive nature futures, we just need to enact them. It was likely a combination of all these points.

Nearly all participants from the first workshop returned to this second workshop and were joined by 12 additional local representatives from catchment and environmental management to give a total of 18 attendees (not accounting for those who registered and could not attend last minute (21 attendees in total)). Much like the first workshop, there was missing representation from local residents and businesses, agriculture and visitors which was perceived to impact the discussions which took place. Participant workshop feedback indicated several barriers to participation including the length of the workshop, and academic terminology, but overall, participants have found value in attendance with new tools to approach their work. Many participants enjoyed the opportunity to engage creatively via the narratives and characters in the storytelling activities.

The next steps for the PLURALAKES team are to identify and translate the key interventions, seeds and barriers identified in this workshop into modellable pathways and scenarios of change. Different numerical models are being used to test future scenarios at different scales and of different aspects of the socio-ecological Lake District system. Further workshops will be delivered in the Frisian Lake District in the Netherlands and the Koitajoki-Koitere river basin in Finland, designed using the learnings and reflections from this workshop.

2. Introduction to PLURALAKES

This section will introduce the project and the key frameworks and tools used by the project team in their participatory research.

2.1 PLURALAKES: Co-creating pathways to desirable nature futures of temperate lakes

PLURALAKES is a European research consortium examining the real-world implementation of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Nature Futures Framework in the context of freshwater ecosystems, across three case study areas in England, the Netherlands and Finland. The project is funded by the EU Water4All Joint Transnational call on Aquatic Ecosystem Services.

The IPBES Nature Futures Framework (Pereira *et al.,* 2020) is a tool to support the development of scenarios and visions that encompass the diversity of human-nature relationships, but ensures nature remains central to these. PLURALAKES aims to apply this framework in a lake management context, with the desire to improve lake ecosystem outcomes. Inspired by the Framework, we use participatory workshops to co-create desirable futures for the lakes in each case study area with local stakeholders and determine the pathways to realise them. This work will inform data-driven investigations into current and future lake ecosystem states, with a key focus on co-creating pathways (scenarios) to desirable futures, to understand their outcomes and viability. Various numerical models will be used to explore these pathways in different ecological and ecosystem contexts. Specifically, we will examine lake ecosystem responses to river inflow water quality, and associated social-environmental systems, to explore the complexity and multi-faceted nature of lake ecosystem management. Finally, the participatory workshops will feed into broader research on the development and delivery of participatory methods in environmental contexts.

The first PLURALAKES introductory participatory workshop was held in May 2025 at the Windermere Jetty Museum on the shores of Windermere (Moorhouse *et al*., 2025). The workshop aimed to develop value-based desirable future visions. It also briefly explored pathways to the future visions and navigating transformative change. The second PLURALAKES workshop, held in February 2026, aimed to delve deeper into the pathway development towards these visions and encourage dialogue around ecosystem services and human-nature values with participants.

2.2 Introduction to the frameworks and tools used by PLURALAKES

2.2.1 Nature Futures Framework

Developed under IPBES, the Nature Futures Framework (NFF) is a tool used to develop visions and scenarios of desirable nature futures by incorporating diverse human-nature relationships or values. It is depicted as a triangle with each corner capturing a different value perspective, with the idea that each of these value perspectives can lead to better outcomes or futures for nature with appropriate management. While the framework emphasises that these value perspectives can be combined synergistically, with most desirable futures positions towards the middle of the triangle, there is also the acknowledgement that managing or improving nature for one perspective may require trade-offs or conflicts with another.

The three ways of valuing nature are:

(1) **Nature for Nature**, which is the perspective that nature has its own intrinsic value and right to function autonomously.

(2) **Nature for Society**, which is the utilitarian perspective and values the services that nature provides to people.

(3) **Nature as Culture/One with nature** which encapsulates the interconnectedness of tradition, faith, culture and nature.

The NFF is being tested in the PLURALAKES project to evaluate its applicability to freshwaters and their management. It has also been used to frame our participatory and scenario development work.

In the first PLURALAKES workshop in the English Lake District, participants were asked to place themselves within the Nature Futures triangle. Three groups were formed according to their proximity to each of the corners, with the Nature for Society group comprising the individuals most distant from one another and more central than immediately adjacent to the nature for society corner (Moorhouse et al., 2025). Once in their groups, participants were tasked with designing a group name that depicted their desirable nature future for the lakes in the Lake District. These were then graphically interpreted by local illustrator, Bethan Thorsby, Sporadic Illustration and are provided below (Figure 1).

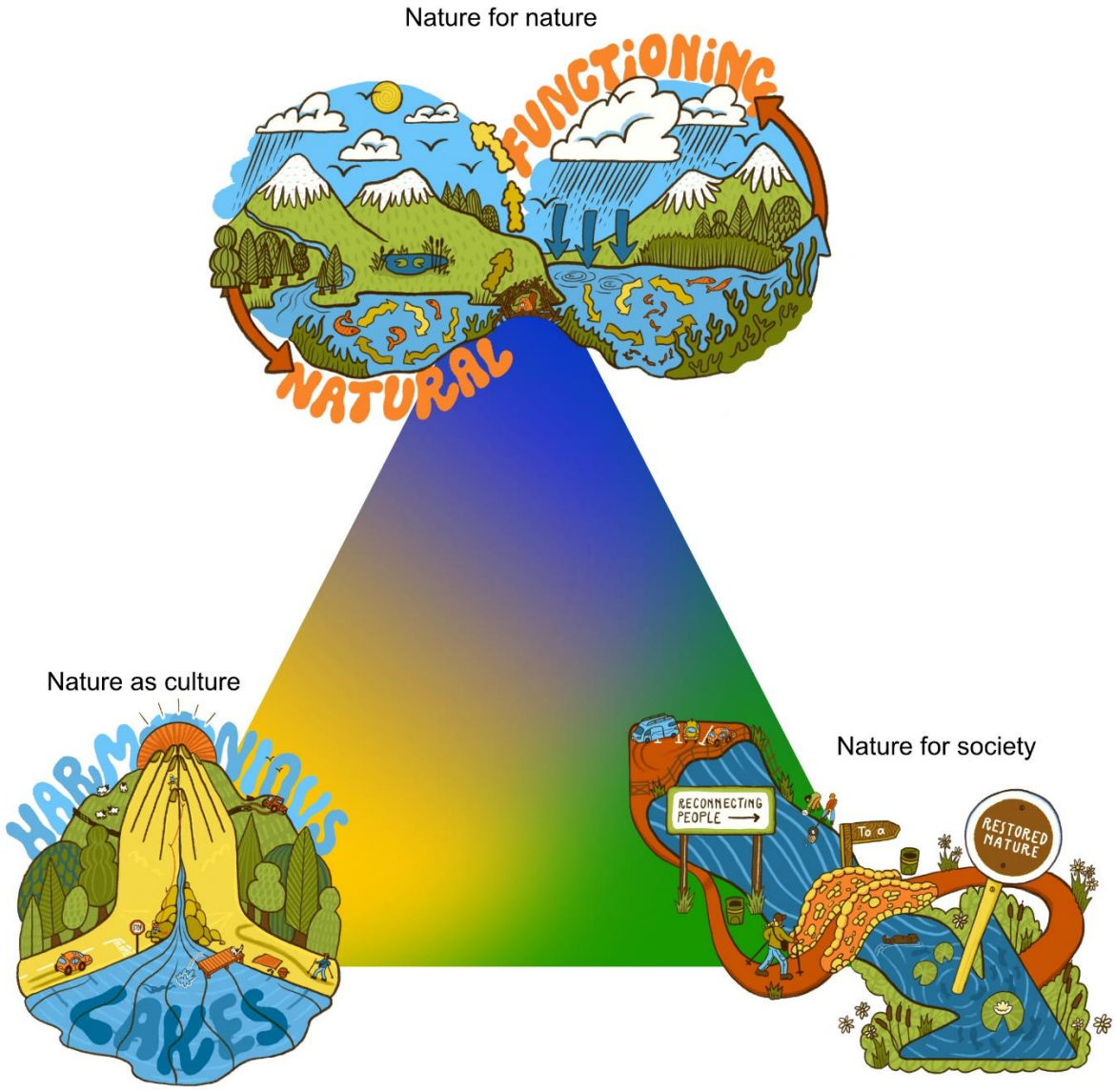

Figure 1. The Nature Futures Framework developed by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. The three value perspectives were designed by Bethan Thorsby © Sporadic illustration.

2.2.2 X-curve

The X-curve is a tool used to facilitate the navigation of sustainability transitions and the build-up and breakdown dynamics that are needed to achieve change (Hebinck et al., 2022). There are now many iterations of the X-curve, all labelled to highlight the different change dynamics. In the middle of the X are turbulent and chaotic changes, as negative aspects of the system are phased out and the bottom-up aspects are built-up (Hebinck et al., 2022). In this early example by Loorbach (2014) the top right quadrant is left open; we have interpreted this space as “positive bottom-up nature futures for lakes” (Figure 2).

The X-curve is being used in the PLURALAKES participatory work to support discussions on transformative change and transitional pathways, as well as navigating uncertainty and conflict as part of this.

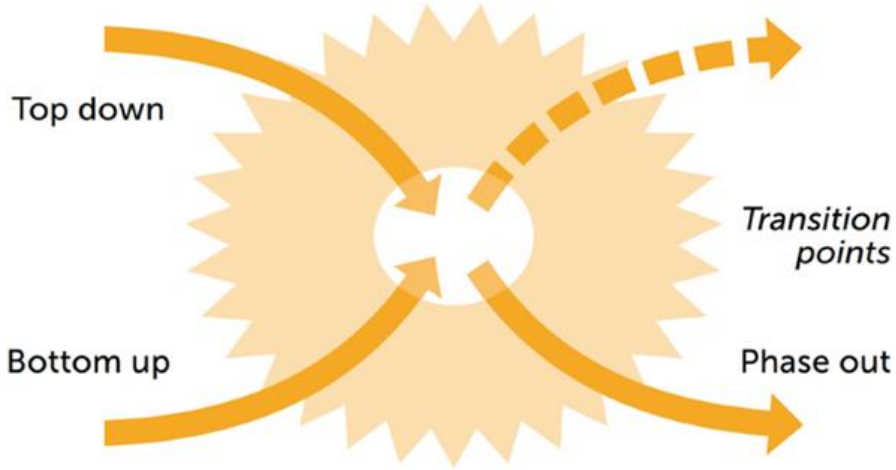

Figure 2. An example of the X-curve taken from Loorbach, (2014).

2.2.3 Causal loop diagrams

Causal loop diagrams (CLDs) are a tool used to map, conceptualise and visualise a ‘system’ to better understand how variables within the system influence one another i.e. cause and effect, whether this be positive or negative (Figure 3). CLDs can identify feedback loops including reinforcing loops which amplify effects, or balancing loops, which help maintain equilibrium in the system (Haraldsson, 2004).

CLDs are being used in PLURALAKES to conceptualise the different systems and interactions in each of the case study areas. They are being used to understand potential trade-offs among ecosystem states and services, and complications, as different aspects of the system undergo management changes, as well as identifying leverage points, where a small well-placed intervention could have a big impact on the system

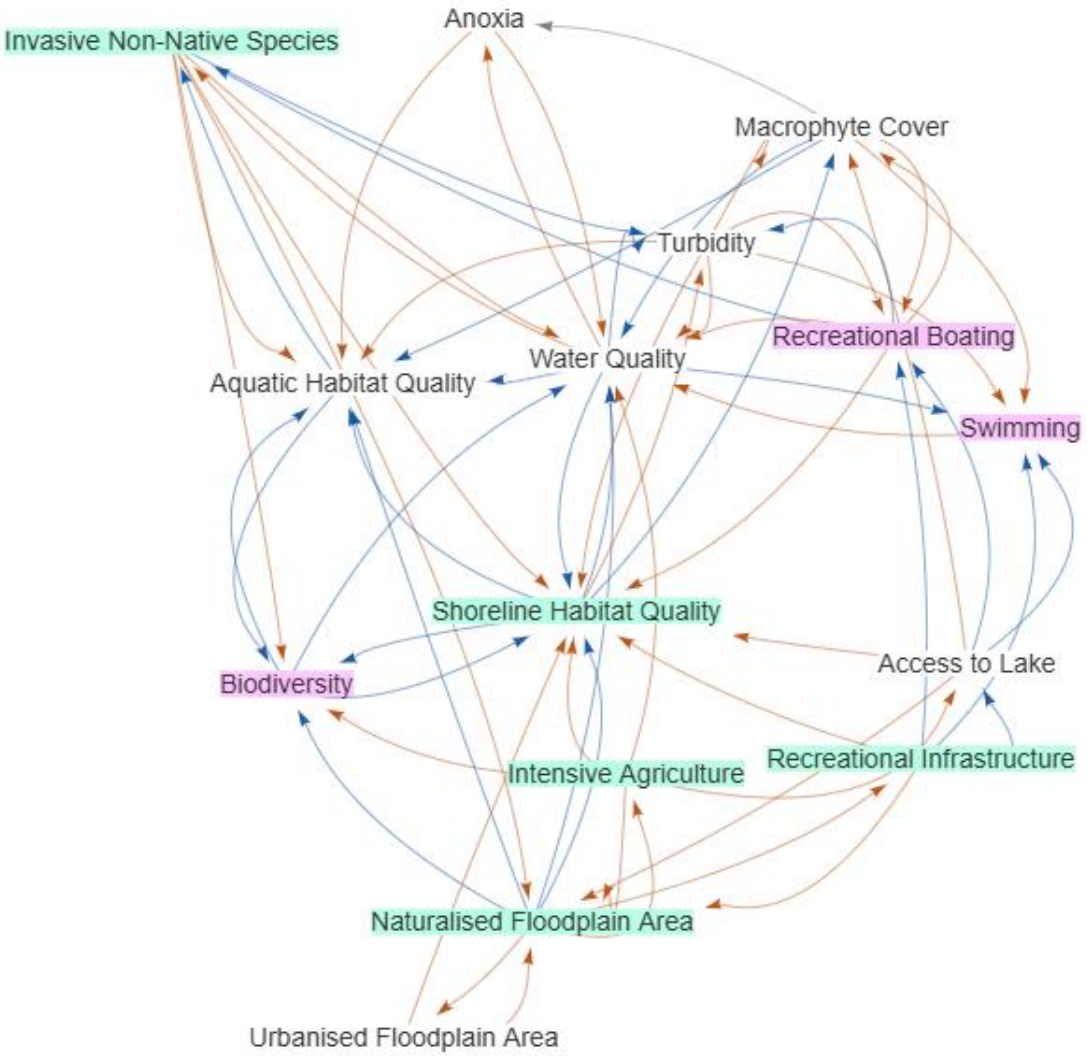

Figure 3. An example draft of a causal loop diagram depicting feedback links to biodiversity and various ecosystem services highlighted in pink. Developed by the UKCEH PLURALAKES team. Intervention points, aspects of the system that can be directly altered through management or policy decisions, are highlighted in light green. Blue arrows depict those interactions which have an increasing or improving effect on the end node (the variable at the arrowhead) and in red are those which have a negative effect. An example of a balancing loop is that improving shoreline habitat quality improves biodiversity which in turn improves shoreline habitat quality, thereby stabilising the system. A reinforcing loop example is increasing invasive non-native species decreases aquatic habitat quality which is then more likely to increase the presence or competitive advantage of invasive non-natives, thereby destabilising the system.

3. Methodology

This section describes the aims and objectives, design and delivery of the second participatory workshop on pathway development for PLURALAKES in the English Lake District.

3.1 Aim of the workshop

To explore the plural values, desirable visions and transformative pathways for positive nature futures for the lakes of the English Lake District through participatory activities.

3.2 Workshop objectives

The objectives of the workshop were as follows:

- To ensure that the visions developed in the first workshop still reflected the stakeholders' desirable future visions and values.

- To associate each vision with priority ecosystem services.

- To create pathways of actions to each vision that are distinct and modellable.

- To use intervention points identified in the lake ecosystem service causal loop diagrams to aid discussions around actions and pathways, exploring values, trade-offs, complexity and barriers.

3.3 Workshop design

A series of activities were designed to achieve our aim and objectives, and these are described below. Much like the first introductory workshop, the activities drew on two core frameworks: the Nature Futures Framework (Activity 1 and 2) and the X-Curve (Activity 4 and 5).

The design of the activities was inspired by participatory workshops delivered by other transdisciplinary projects, that had not only used these two frameworks but also mapped actionable pathways to positive nature futures as part of their work. These were the Horizon Europe funded BIONEXT project on transformative change for the biodiversity nexus and the Land-Use for Net Zero (LUNZ) Hub, a research partnership initiative seeking to drive the transformation of UK land-use needed to achieve net zero by 2050.

The first workshop was joined by local graphic illustrator Bethan Thorsby of Sporadic Illustration, whose sketches captured the discourses and activities as she observed them throughout the day. A series of graphics were produced post-workshop following reflection of her sketches and facilitator notes. These creative outputs have featured in project communications and have been invaluable in describing and exploring this participatory work. For the second workshop, we wanted to continue to draw on creative tools to help engage and connect participants more personally to the visions. We used creative writing to describe the values, emotions and human behaviour detailed in the future visions of the first workshop (Activity 1 and 6).

Below, we detail the workshop activities, and each of their objectives.

3.3.1 Activity 1: Broadcast from 2050: Revisiting future visions for the Lake District.

Objective of the activity:

(Re-)connect participants with the future visions created in workshop one and allow for feedback. Break the ice.

A collective of PLURALAKES team members generated three short stories on “a day in the life” of a character in each of the future visions representing the three NFF value perspectives i.e. Nature for Nature, Nature as Culture and Nature for Society. These short stories are provided in the Supplementary Information. Participants were tasked with dividing into groups of three individuals, reading each of the stories, whether aloud to the group or individually, and discussing what they felt was unique about each vision and what connected each of the visions. Participants were asked how they felt reading the stories, and whether they contained anything that did not represent the visions accurately. They were also asked which vision(s) they felt most aligned to. This was then shared back to the wider group. The participants then joined a group with whose vision they felt most aligned based on the NFF values.

3.3.2 Activity 2. Ecosystem service flowers. Mapping priority ecosystem services.

Objective of the activity:

To associate each vision with 2-3 priority ecosystem services, to help constrain scenario modelling and workshop activities 3-5.

Each of the three groups, aligned with the one of the three NFF value perspectives, were provided with a flower labelled with a different ecosystem service at the end of each petal. These services were selected by the PLURALAKES team as being important for lake ecosystems. Another flower, whose petals were blank, was also provided (Wayfinder, 2018) (Figure 4). Participants were tasked to prioritise 2-3 ecosystem services for the future visions to which their NFF value perspective aligned, colouring the full petals for those services. They were then encouraged to colour part of the petals for mid-priority services (max. 3) and colour an even smaller section for low priority services. The blank flower allowed them to define other ecosystem services they wanted to see, or felt were missing, in the pre-labelled flower. The idea was to get participants to start thinking about management, and how prioritising some services over others might help define future management pathways.

The groups remained the same for the rest of the workshop, i.e., during activities 2-6, with participants working alongside others who had aligned to their chosen NFF value perspective.

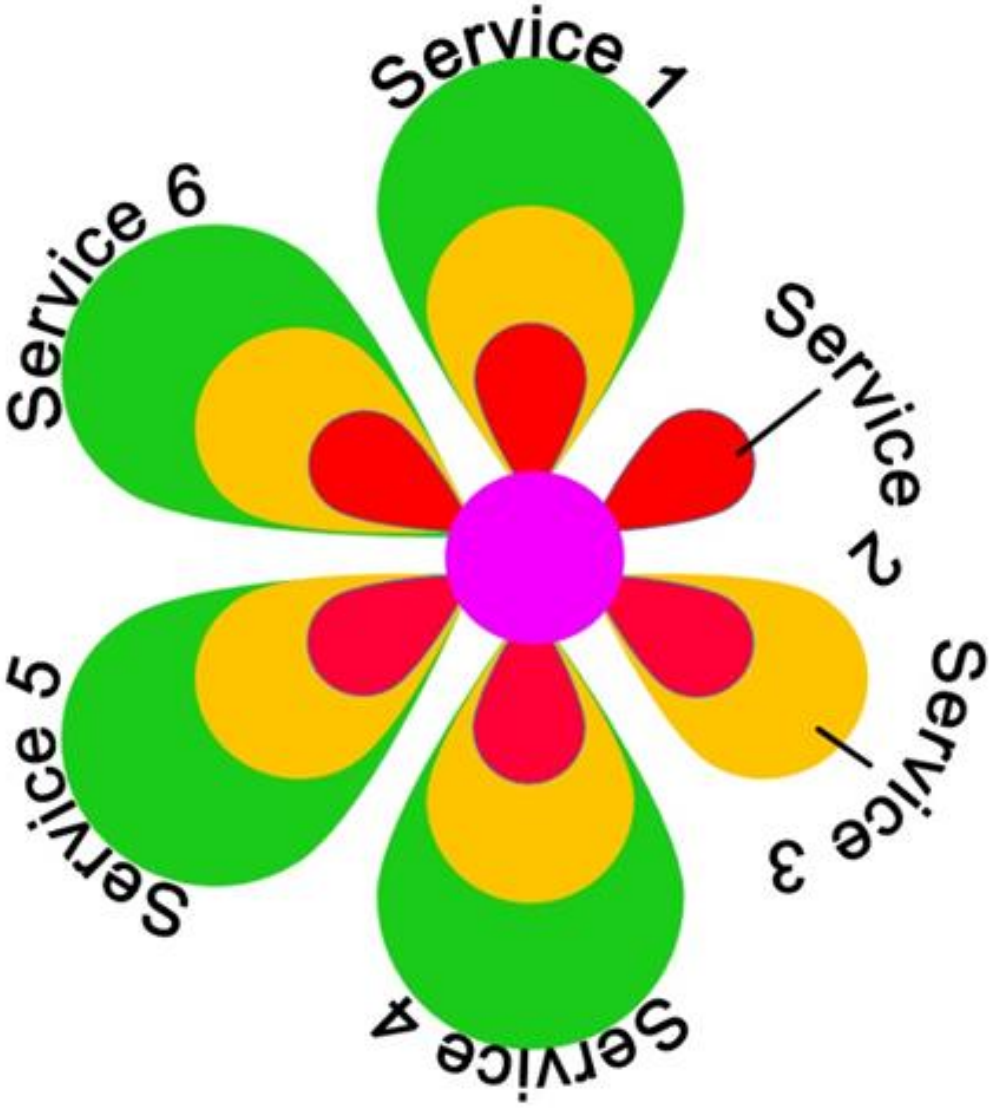

Figure 4. Example of an ecosystem flower. The ecosystem services whose petals are coloured in green are the highest priority (services 1, 4-6), those coloured in yellow are mid-priority (service 3) and those coloured in red are low priority (service 2).

3.3.3 Activity 3: Leveraging complexity. Using causal loop diagrams to identify target areas for intervention.

Objectives of this activity:

1. To introduce causal loop diagrams to participants, as a tool to conceptualise interactions within systems and to highlight complexity, positive and negative feedback, and trade-offs in systems management.

2. To provide examples of management intervention points within a system, dependent on priority ecosystem services.

3. To get participants to consider complexity, the intervention points, and identify any other interventions or seeds of change that may form the management pathways to reaching the desirable future visions.

Example causal loop diagrams (CLDs) were placed around the workshop space, each representing a different lake ecosystem service and the variables and processes which feed into each of these (see section 3.3.4 on how these were created and the Supplementary Information on the versions of the CLDs used in the workshop). Participants were introduced to some examples of positive and negative feedback in these loops, and examples of trade-offs when managing a system for a specific ecosystem service. Each group was provided with a list of intervention points for the different ecosystem services and invited to identify which intervention points could form the pathways to their visions and associated priority ecosystem services. They were also encouraged to discuss any complex interactions or trade-offs that may occur, or need addressing, as part of this intervention. Participants were invited to think of other possible interventions not provided, and to discuss any examples of “seeds of change” i.e. initiatives, partnerships, actors or resources that are currently working towards sustainable, positive trajectories of change for nature in the English Lake District and in lake catchments elsewhere.

3.3.4 Causal Loop Diagram Methodology

Following the first workshop, the PLURALAKES team have been developing CLDs for each of the case study areas. The UK PLURALAKES team have produced multiple iterations of CLDs, beginning by creating a single CLD using algal blooms as its primary node and building the components of the system or variables that feed into and interact with algal blooms around it. The CLD quickly became populated with multiple nodes and was felt to be both too complex and over-simplistic. The team had trouble in constraining the system in a way that didn’t lose key mechanisms of change across multiple scales (i.e. global to national to regional to local). It was then decided that the CLDs could be used as a tool to explore different aspects of a lake ecosystem to help answer hypotheses such as “What impact would reducing non-native fish populations have on native fish populations?” or “What effect does recreation have on drinking water provision?”. With each iteration, the team revisited the purpose of the CLDs, concluding that the CLDs would be most useful as tools to engage stakeholders with lake ecosystem services interactions, feedback, trade-offs and inter-connectedness. The CLDs were redrawn again, starting with six individual lake ecosystem services that were determined by the UK PLURALAKES team to be relevant to the Lake District case study area. They then

brought these together to create a composite CLD representative of the lakes in the Lake District National Park. In the first iterations of the CLDs, the specialist software Mental Modeler (see Mental Modeler - Fuzzy Logic Cognitive Mapping) was used, before switching to the R package visNetwork (Almende B.V. and Contributors, Thieurmel B (2025), R package version 2.1.4) whose outputs and input files enabled easier editing and review. Future iterations of the CLDs will incorporate missed variables and interactions highlighted by the three group discussions in the second workshop. Specifically, the CLDs prior to the workshop focussed on biogeochemical and environmental interactions but, following the second workshop, the PLURALAKES team will attempt to incorporate variables from governance, society, technology and education as addressed in activities 3-5.

3.3.5 Activity 4: Scaling and mainstreaming seeds of change.

Objectives of this activity:

1. To identify "seeds of change" i.e. current initiatives, partnerships, policies and actors that are promoting positive, sustainable actions and the steps required to support and promote these along a trajectory of 25 years.
2. To identify any existing policies which may support this. These seeds and their timescales will feed into scenario modelling.
3. To encourage participants to think positively, pro-actively and beyond feasibility regarding pathways to positive nature futures.

Participants were (re)introduced to the X-curve as a framework to discuss transitionary dynamics. Participants were asked to think about the transition from the present to desirable futures and as such to provide examples of "seeds of change" in the English Lake District or other lake catchments. They were also asked to discuss how each "seed" could be scaled up along the timeline. Facilitators asked participants to consider what would be needed to enable this scaling-up from the following four aspects of society (developed from the elements in the shared socioeconomic pathways listed by O'Neill *et al.,* 2017).

- Governance, politics, economy/finance
- Infrastructure, technology, nature/environment
- Lifestyles, behaviour and culture
- Knowledge, capacity, innovation

Participants were asked when the scaling-up of actions needed to occur and were provided with the choice of short-term (next few years), mid-term (next decade) or long-term (in 20 years). They were invited to discuss who the large-scale enablers of change might be, plus those organisations or individuals who could help implement the changes needed to scale the "seeds". Examples of existing policies that might already be supporting, or could support, this work were also requested.

3.3.6 Activity 5: Breaking down undesirable aspects of the system.

Objectives of this activity:

1. To generate a list of the following: (1) barriers which prevent positive transitions, and (2) actions that could be taken to break down these barriers and when these need to occur over the next 25 years, and (3) to identify any existing policies which may support this.

2. To encourage participants to think positively, pro-actively and beyond feasibility regarding the dismantling of negative nature futures.

This activity followed the same discussion points as activity 4, but instead of focussing on the bottom-up transitional pathway of the X-curve, it looked at the top-down pathway. Participants were invited to detail the dominant aspects of the system that perpetuate negative trajectories of change. These could be localised (i.e. evident in the Lake District National Park) or on a much larger scale, such as global drivers of environmental change (e.g. climate change). Participants were then invited to think about how these barriers could be dismantled, and what actions spanning the four aspects of society (developed from the elements in the shared socioeconomic pathways listed by O'Neill *et al.,* 2017) would be needed in the short, mid and long-term:

- Governance, politics, economy/finance
- Infrastructure, technology, nature/environment
- Lifestyles, behaviour and culture
- Knowledge, capacity, innovation

As with activity 4, participants were invited to consider which actors would be best placed to support this work and whether there were any existing policies which may help.

3.3.7 Activity 6: A journey to 2050.

Objectives of this activity:

1. To create fictional narratives based upon a character's journey to each of the future visions, circling back to the vision narratives of the first activity.

2. To provide a more personal tool in which to consider navigating the transition from the present day to a desirable future.

For the final activity, participants were challenged with creating their own short story written from the point of view of a younger member of society, following their journey from the present to the future vision of their NFF value. Each group produced ideas, and a storyteller was selected from each to narrate the stories back to the collective group.

3.4 The participants

In the first PLURALAKES workshop in the English Lake District, participants represented organisations from multiple sectors involved in freshwater and catchment management (see Moorhouse et al., 2025 for full details). Invitations were sent to representatives of various organisations within the Lake District National Park Partnership, with the motivation to include voices from tourism, water management, land management, and agriculture, as well as statutory agencies, private companies and non-governmental organisations (NGOs). These individuals also have experience of working across-sectors and developing management visions and pathways as part of the National Parks 5- year management plan. The first workshop hosted 11 individuals with a bias towards those involved in freshwater and catchment management. A strategic aim for the first workshop was internal capacity building, as it followed the first PLURALAKES team workshop composed of an international team who had not all met and to whom, for some, these methods were completely new. So, whilst there was a notable missing representation from land management and tourism in this first workshop, it was a much higher priority for these sectors to be represented in the second workshop. The absence of these voices are most likely due to a range of factors, such as limited resources and time for those who are self-employed or from very small organisations, and lack of familiarity with the Aquatic Ecosystems Group at UKCEH (who form the main contingent of the UK PLURALAKES team), whose networks are more closely linked to those in freshwater management.

To broaden representation from different sectors in the National Park for the second workshop, the contacts from the National Park Partnership were invited again, as well as representatives from different working groups within the Love Windermere Partnership. Nine out of the 11 participants from the first workshop registered for the second, alongside 12 additional individuals representing catchment management, with a focus on landscapes and freshwater ecosystems. It must be noted that most of these additional participants were from statutory agencies, the National Park Authority and the local water company (United Utilities), which were already represented, but covered other roles or regional departments of these organisations, providing different insights and context. In addition, there was better representation from NGOs involved in protection and restoration of freshwaters and the Lake District's landscapes. Like the first workshop, representation from agriculture, tourism, residents and businesses remained absent, despite new contacts and interest from local members of these sectors facilitated via the Love Windermere Partnership.

3.5 Research ethics

All participants were informed about the purpose of the workshop and gave prior consent for their participation. Ethical considerations were addressed in accordance with institutional guidelines to ensure voluntary participation, data protection, and respectful dialogue.

4. Results

This section will describe the key narratives and feedback from the activities of the second participatory workshop for PLURALAKES in the English Lake District.

4.1 Activity 1. Broadcast from 2050: Revisiting future visions for the Lake District

The workshop opened with participants forming groups of three individuals, with each person taking turns to read one of the stories describing the future visions of the Lake District for each NFF value perspective to others in their group (Figure 5). In the plenary discussion, participants shared their thoughts about these stories. Overall, participants felt that the stories were an engaging way to start the workshop, and that reading them helped them to better imagine different futures for the Lake District.

In terms of the different vision narratives, participants felt that the more human-centric stories (representing Nature for Society and Nature as Culture) were quite similar, and that the Nature for Nature story felt somewhat bleak. The Nature for Society story was viewed as more representative of diverse values and uses, while the Nature as Culture story was perhaps less realistic and more whimsical, with a “middle-class” lens and was not inclusive of those coming from disadvantaged backgrounds. Additionally, they felt that the stories for both Nature as Culture and Nature for Society did not adequately describe the relationships between humans and nature, as the Nature for Society story was too anthropocentric and lacked important ecosystem services such as clean water and climate resilience. Several raised concerns about the Nature for Nature story, in that it was exclusionary and could potentially be unsustainable if the public was excluded from certain areas in the National Park. Many recognized that the visions these stories were based on were developed by many in the room, who themselves identified as being privileged, and thus felt inclusion of more diverse voices was critical to developing more representative visions for the future of the Lake District. This feedback, and the acknowledgement of the plausibility of these visions, suggested that participants were viewing these through the constraints of the present.

Ultimately, most participants felt drawn to aspects of each vision, and that Nature for Nature is foundational to the other two value perspectives—meaning that without a nature that functions well, the possibilities for nature to provide for society and culture are reduced. Therefore, having some space conserved for nature was viewed as critical to enabling the other value perspectives.

Nature for nature

"Our role as guardians has changed over time. Because attitudes amongst the community and visitors have shifted towards respecting and appreciating the need to give space to nature, we spend less time enforcing. Instead, you will spend most of your time monitoring the functioning of these lakes and educating the community on how they work." ….
"Before I started this job about 20 years ago, there was no shoreline vegetation, hardly any diversity within the lake and in the surrounding landscape, and it all felt so uniform. Yet somehow, people thought it was beautiful. Can you imagine?"

Nature as culture

"You smile and look out across the lake. Several pink floats bob along the surface, indicating the presence of long-distance swimmers, while the brilliant flashes of many different dragon and damselflies dance above. Further along an osprey dives, swiftly returning, clutching a brown trout flicking glistening water droplets as it struggles. In the distance you see the mountains rising from the lake edge, a patchwork of woodland, meadow and montane scrub on the higher slopes. You feel a calm serenity, a harmony, a deep sense of belonging."

Nature for society

"You pass three tourists who are stopped at the well-used boat washing station, rinsing off their kayaks to prevent the spread of invasive species. They shriek and dip down as drones fly a little too close overhead. The drones are off to work, too— pollinating, monitoring, and carrying seeds. *Those little things are everywhere these days.*
"Out of the way, drones!" Measured footsteps approach. A group of citizen scientists who you often collaborate with marches past the swarm."

Figure 5. Excerpts of the future vision stories for each NFF value, set in 2050 in the English Lake District.

4.2 Ecosystem service flowers. Mapping priority ecosystem services.

Following activity 1, participants were invited to join the group representing the NFF value and future vision they felt most drawn to. Participants from the first workshop were told they could switch groups if the vision narratives of another value perspective better reflected their personal perspectives. Only one individual joined a different value from the first workshop, indicating broadly, the narratives described the visions from the first workshop well.

In these self-selected groups, the participants were asked to prioritize 2-3 ecosystem services (ES) with high, mid and low priority in these future visions using the blank and labelled ES Flowers. Most groups struggled with selecting and prioritising ES, given that many were interlinked and fundamental to the provision of other ES (e.g., water quality regulation is critical to the provision of clean water for drinking for example). They also found it difficult to confront that prioritisation may exclude other ES and members of society (e.g. prioritising biodiversity over recreation). Some groups did not align regarding the local to global-scale importance of the ES and which should take priority. One group felt that locally important ES should have priority, suggesting that it might be better to have a greater impact on a local-scale compared to only a limited impact on a global-scale. In contrast, another group felt that ES which feed into globally important ecosystem functions and biodiversity objectives should take priority. Nevertheless, each group chose three ES that they felt were highest priority for management to reach the future visions (Figure 6).

The Nature for Society group prioritized services that they felt provided direct benefit to society, including drinking water supply, hydrological regulation, and culture/wellbeing, while the Nature as Culture group prioritised ES that they felt underpinned the provision of cultural ES, which were drinking water, biodiversity, and carbon sequestration. Instead of thinking of this as prioritisation, the group considered this as a process whereby these integral services should be promoted and enhanced first, as they need to be fully functioning and thriving to then promote or focus on cultural ES. The Nature for Nature group also undertook a similar approach and selected biodiversity/bio-abundance as the most important as it underpins the delivery of other ES such as climate resilience/drought/flooding, and hydrological integrity. The group added bio-abundance to the biodiversity ES as they interpreted biodiversity as the diversity of species or number of different species also known as species richness, with this not including the number of individuals too. In ecology, the term biodiversity has many different interpretations, and some do account for abundance, however, this points to the importance of terminology and how it is interpreted. They also did not like the term “regulation” for hydrological, nutrient and climate regulatory ES as they felt it was a term used to describe societal governance and was too anthropocentrically focussed. This group also didn’t like the term “nature” finding it too idealistic and preferred the use of “landscape”. This highlights the importance of a shared understanding of meanings around scientific terminology and reflects the significance of language and meaning in the narratives and interpretations of the visions.

Additional ES were identified as important to each vision. For example, the Nature for Society group discussed recreation (grouping together swimming, boating, and fishing), food and timber production (currently limited in the Lake District but envisioned as more important in this future), and biodiversity, though in the end recreation did not make it onto their flower. The Nature as Culture group chose well-being, education, and recreation, again grouping together

swimming, boating, and fishing. This group felt that prioritising one recreational activity over another was exclusionary, despite acknowledging that each recreational activity exerts different environmental pressures. The Nature for Nature group chose drinking water, nutrient cycling, and understanding, caring, and connectedness but felt recreation did not serve any intrinsic benefit to nature so was therefore not included.

Despite two out of three groups selecting cultural/relational ES as secondarily important, all groups emphasized the importance of cultural ES. Each group felt that relationships to nature, along with elements of wellbeing, connectivity, inspiration, and understanding, were fundamental to fostering support for and stewardship over the lakes and the many ES they provide. For example, the Nature for Society group added a service termed “cultural and inspirational value” which included landscape appreciation, arts, heritage, and spiritual wellbeing. However, this was not coloured in on their ecosystem flower so its priority level to the group is unclear. The Nature for Nature group added a service that they called “Understanding, Caring, and Connectedness”. Cultural ES were perhaps identified as secondarily important for two reasons: participants found it difficult to articulate people’s relationships to nature, in part because these values are very personal and will vary from one individual to the next. And secondly, because those cultural connections may be best delivered by systems whose other ES are functioning well i.e. a lake with thriving biodiversity would better support connectedness and well-being than one without.

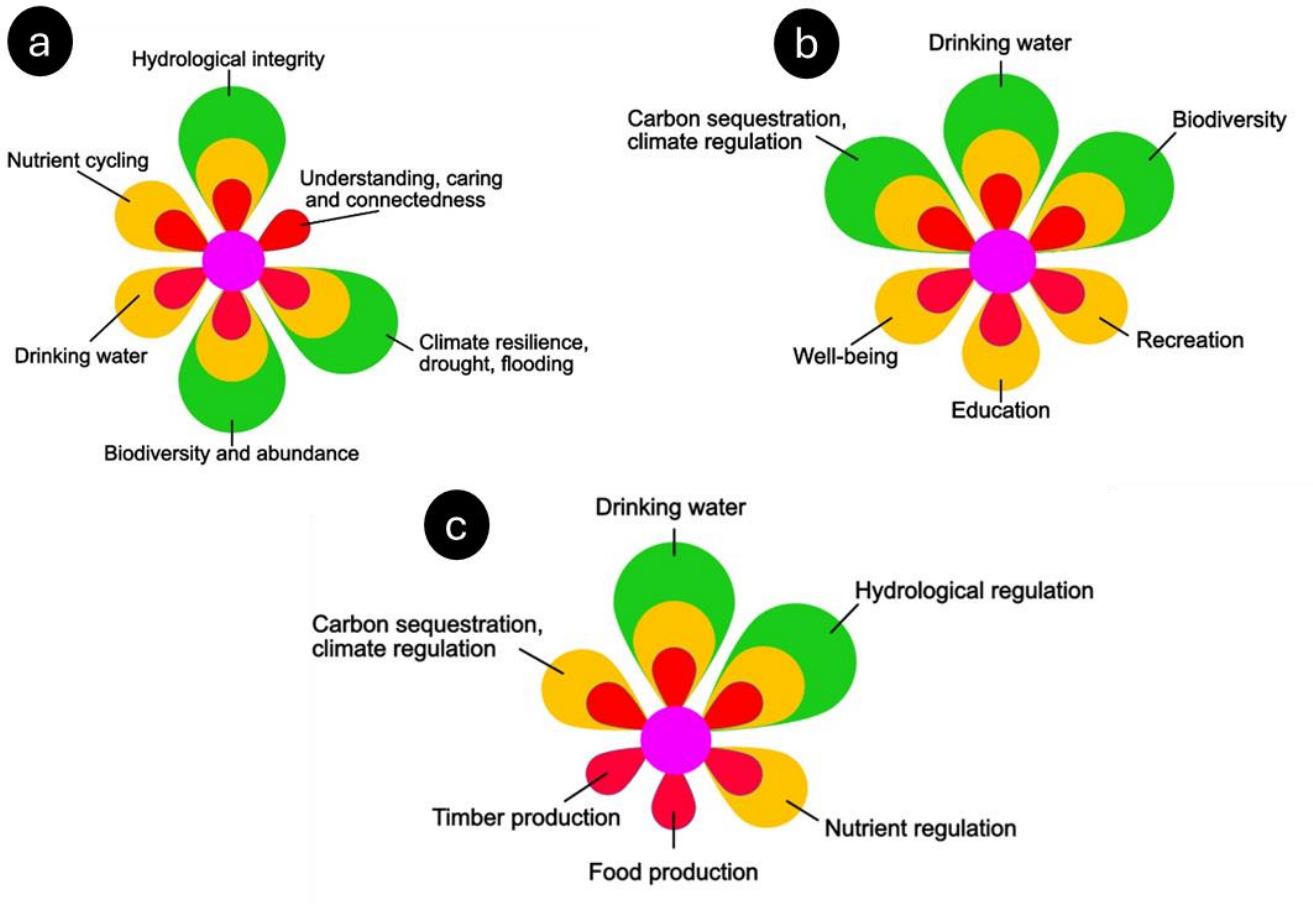

Figure 6. Ecosystem service flowers for the lakes of the English Lake District, created by the groups: (a) nature for nature, (b) nature as culture and (c) nature for society. The petals coloured in green were the services selected as the highest priority for management, those in amber/yellow as mid-priority and those in red, as low priority.

4.3 Activity 3. Identifying points of influence and intervention.

After prioritizing ES for each of the visions, participants used the CLDs and the list of points of influence to identify which areas to target to increase the level of provisioning of their priority ES. The points of influence that were identified provide useful information about where to intervene in the system, which is essential for pathway development, and for informing the type of interventions to include in subsequent project modelling work.

Much like the previous prioritisation exercise, the groups found some difficulty in not only prioritising selected interventions over others but also acknowledging the practicalities of these interventions. Discussions quickly returned to the feasibility of interventions in the context of the present system. Interestingly, all three groups selected wastewater/wastewater treatment as an important point of influence due its importance to overall water quality, and therefore the

delivery of multiple ES from drinking water provision to recreational services. This could also reflect contemporary public and political discourse and the current prevalence of wastewater mismanagement and nutrient pollution in the media.

There were some differences in the intervention points selected by each group, which to some extent, related to their chosen NFF values. For instance, the Nature for Society group discussed a range of interventions, spanning landscape-scale water management (e.g. lake partnerships such as Love Windermere and Cherish Derwentwater, river re-wiggling restoration schemes), to behavioural and social initiatives (permits vs. better public education on appropriate behaviour in National Parks) and finally to regulatory land-use management (land management schemes e.g. catchment sensitive farming and landscape recovery). This reflected the value of managing the environment and landscape for societal benefits. All of these interventions were seen as important to their priority ES of drinking water and hydrological regulation, as well as to cultural and well-being ES. Unlike the other groups, this group listed a range of partnerships, policies and actions already taking place that they felt addressed these various intervention points.

The Nature for Nature group focussed on improving landscape resilience to climate change and hydrological integrity, including large-scale planting of trees and shrubs to promote stream-shading, peatland restoration and fencing to reduce poaching of riparian habitat by livestock. Alongside improving wastewater treatment, increasing resilience to invasive non-native species by better prevention at borders were seen as being key in improving their priority ES of biodiversity and bio-abundance. This group acknowledged that such activity is taking place but needed to be scaled up, and that protocols for recreational events such as “check, clean, dry” are now better enforced by event organisers.

The Nature as Culture group focussed on alleviating visitor pressure and enforcing behavioural changes, possibly as a reflection of their desire to improve people’s relationship with nature. This group were again particularly concerned with not being exclusionary to any group in society and felt that the impact of visitor numbers could be reduced by improved infrastructure and behavioural change. They spoke about the growing popularity of “regenerative tourism” and current work looking at how this could be adapted in the Lake District National Park. Yet, conversely, they acknowledged that reducing visitor numbers would have multiple benefits to their three priority ES of drinking water, biodiversity, and carbon sequestration and that enforcement would be a necessary tool to improve people’s interactions with nature and the landscape of the park in the context of modern society. Throughout the workshop, enforcement continued to be put forward as a strategy to promote nature-positive activity and was interpreted to mean the inspection or monitoring of adherence to a rule, resulting in fines for those who do not comply. Whilst enforcement can result in more serious consequences it was the monitoring and fining which was suggested by participants in the workshop.

In summary, much like activity 2, this activity brought up many questions and sticking points for the groups, particularly around prioritisation and trade-offs. It brought up sensitive questions around access, enforcement and payment. The exception here was the Nature for Nature group, whose overarching priority for nature led to little debate on who or what activity should be prioritised, choosing interventions that focussed on increasing space for natural habitats, restoring land to improve natural functioning and therefore, reducing access for people and livestock. It was clear that Nature for Society and Nature as Culture felt

uncomfortable making clear decisions on the questions of who should pay, and who in society has priority access to the lakes, and the extent to which education and enforcement should be used and their relative success in shifting and influencing negative human behaviours and consequent disturbance of the Lake District landscape.

4.4 Activity 4: Scaling and mainstreaming seeds of change.

All three groups were able to identify "seeds" related to the catchment and to the lakes themselves (Table 1. **Summary of Seeds of Change identified by the three stakeholder groups during the pathways workshop. Developed using Microsoft Co-pilot.**. Many of these "seeds" were identified in the first workshop, with inevitable repetition from recurrent participation and activity design. For instance, in terms of catchment management, all three groups were able to describe various landscape-scale restoration projects within the region (e.g. the RSPB and United Utilities Wild Haweswater project), and various policy-led initiatives such as Catchment Sensitive Farming which aims to advise and fund changes to farming practices to reduce erosion and nutrient losses from farmland to freshwaters (see Catchment Sensitive Farming). All groups noted recent projects and policy changes to improve wastewater management, particularly the growing recognition and focus on septic tanks, which have long been acknowledged as an important yet under researched nutrient source in this rural district. Policies on wastewater, such as nutrient neutrality, where new housing developments must ensure wastewater or run-off losses do not exceed or are less than the current land-use were also noted as improvements to wastewater management (see Nutrient Neutrality).

Similarly, all three groups noted lake-specific "seeds" from shoreline restoration projects led by Natural England for example, to new lake partnerships which are now in development following the model of Love Windermere, whose 33 partners all have an interest and responsibility to address the health of their local lake.

Interestingly, the Nature for Nature group were the only group to identify "seeds" focussed on the prevention of Invasive Non-Native Species and the need to expand and integrate measures, so they are more targeted to tackling this pressure. They identified a need to restrict access in pristine sites and have wash-down stations in popular lake and river access points.

All three groups noted education as both a "seed" and a tool to promote other seeds, seeing it as a means to change behaviour and improve nature connection, with a particular recognition of early years education and citizen science. In terms of education as a "seed" itself, The Big Windermere Survey led by Lancaster University and the Freshwater Biological Association was identified by the Nature as Culture group as being a positive initiative for engaging local communities in water quality monitoring. Nature for Nature and Nature for Society focussed on early years education, citing this as key to engage individuals early in life. Nature for Nature group recommended expanding "forest schools" to include "wetland schools" and other habitats. "Regenerative tourism", an approach which aims to improve visitor engagement and responsibility for the environment through actions such as visitor levies (e.g. Visitor levy - Friends of the Lake District) and sustainable transport, was also identified as a "seed" by the

Nature as Culture group to help improve visitor education around environmental impact. The Nature for Society group touched on the need to improve visitor education too, and that local businesses had a key role in this.

In terms of how “seeds” could be scaled-up, education was again identified as important to promoting broadscale societal responsibility, which would ultimately drive political pressure towards greater government support for the restoration of freshwaters. All three groups referenced green financing to fund “seeds” and promote green technology and skills. Interestingly, the Nature for Nature group suggested the prioritisation of funding towards interventions and the identification of suitable sites for interventions over funding for further monitoring. This comment was made with the clarification that evidence on changing climate futures suggests we must act now to help our freshwaters adapt or become more resilient. In addition, there was a suggestion that sites which had shown recent deterioration like Buttermere should have priority to prevent further deterioration rather than focussing on sites such as Windermere which are heavily populated and utilised for recreation. The Nature as Culture group focused on the need for enforcement to support wider societal uptake of “seeds”, referencing improved enforcement of septic tank maintenance and disposal to reduce diffuse nutrient inputs, now recognised as an important nutrient source in rural west Cumbrian Lake catchments. In contrast, the other two groups suggested enforcement be a last resort and “carrots” should be used to influence behaviour rather than “sticks”.

The key difference and challenge of this activity, compared to the first workshop, arose from asking participants to map out the timelines for scaling-up the seeds. Whilst participants were able to identify the actions needed to scale-up the seeds, as described above, participants found it difficult to confidently determine when these actions should take place, with the desire that they should all happen as soon as possible. This may point to the hesitance in prioritising certain actions over others, as well as an acknowledgement and fear of the uncertainty of the future. It may also point to the interpretation of what timescales mean for management, with the Nature for Nature group interpreting this not as a timescale of prioritising activity but as a timescale for delivery and outcomes i.e. all interventions and management actions should be put in place as soon as possible but outcomes such as improvements to water quality may take longer at some locations compared to others. This indicates future workshops may benefit from having tools to help participants prioritise interventions under uncertainty.

Table 1. Summary of Seeds of Change identified by the three stakeholder groups during the pathways workshop. Developed using Microsoft Co-pilot.

Seeds of Change	Nature for Nature	Nature as Culture	Nature for Society	Notes
Landscape-scale restoration	✔	✔	✔	Present across all pathways
Catchment Sensitive Farming	✔	✔	✔	Universal recognition
Wastewater & Septic Tank improvements	✔	✔ (strong enforcement emphasis)	✔	Shared seed; different attitudes to enforcement
Nutrient Neutrality	✔	✔	✔	Consistently identified policy seed
Shoreline restoration	✔	✔	✔	All groups referenced lake-specific restoration
Lake Partnerships	✔	✔	✔	Love Windermere used as a model
INNS prevention	✔ (unique emphasis)			Only Nature for Nature identified this
Education	✔	✔	✔	Universal; strongest in Nature for Society
Citizen Science	✔	✔	✔	Shared but with different examples
Regenerative tourism		✔		Unique to Nature as Culture
Green financing	✔	✔	✔	All groups identified this as essential for scaling
Enforcement	last resort	✔ (strong emphasis)	last resort	Different between groups.

4.5 Activity 5: Breaking down undesirable aspects of the system.

All three groups discussed three key barriers that are preventing positive nature trajectories for the lakes of the English Lake District: governance, human behaviour and monitoring. In terms of governance, this referred to the UK political system and landscape, which was defined as short-term, fragmented, with a shared apprehension of the rise of right-wing populism. Participants felt that the environment has suffered from a lack of long-term national investment, and shared cross-party interest, with its value and importance overlooked by those in power. It was also felt that global and international pandemics and conflicts have further removed political will and investment away from the environment, despite an acknowledgment of the close links between the environment, conflict and human health and the role the environment has in shaping these forces (e.g. Topluoglu *et al*., 2023). The Nature for Nature group noted that constant changes in the bureaucracy and restructuring of agencies made it difficult to have continued investment and organisational legacy. Often this is done under the guise of improving efficiency, but the reality noted by the group is that it is often at the cost of reduced resourcing and staff support.

In terms of human behaviour, this referred to the actions of visitors to the National Park, which include littering, and disturbance and damage to habitats, all of which have anecdotally increased since the COVID-19 pandemic. These were felt to stem from a lack of awareness around environmental impact, as well as an absence of collective responsibility. There were also suggestions that negative behaviours were also a result of the growth in consumerism and social media and online misinformation. Political parties were blamed for increasing polarisation of the public, rather than trying to bring communities together. Negative behaviours (that were also identified in the first report) included blame culture, with the idea that it is easier for people to blame others rather than focus on what they could do to help (Moorhouse *et al.,* 2025). It was proposed that often individuals outside of ecological management expect “silver bullets” and management to have a rapid and successful response that will have visible and tangible outcomes. In reality, the response of ecosystems to management interventions takes time and the effectiveness of these interventions can be variable and uncertain in complex natural systems. Furthermore, lake managers must work with nature not against it, meaning that natural processes should be integrated into our decisions and behaviours rather than humans trying to control or dominate ecosystems. It was felt that moving towards a culture of kindness and acceptance would better help ecosystem managers to learn and adapt management without fear of blame or retribution.

All three groups suggested the current strategy of water quality monitoring could be a barrier. The Nature for Society group suggested that sensors used in monitoring are often expensive and do not always provide the best data to answer questions on ecosystem health. A simple example of this may be if you have a water quality sensor which measures an increase in a particular proxy at a certain time, but you are not measuring any biological indicators to the same resolution or at all, therefore, you will not know if that proxy had any ecological impact. The Nature for Nature group suggested that monitoring should follow restoration activity rather than information gathering to inform restoration. The motivation behind prioritizing monitoring

following restoration activities is that this data would help influence and reinforce the benefit of action to encourage greater support by those with influence. The Nature as Culture group suggested that whilst open data and increased transparency and scrutiny has been a good thing, this has increased misinterpretation and mistrust of those who conduct water quality monitoring, recommending that resources should be in place to provide better data summaries and interpretations for public consumption. In addition, they noted that environmental pressures are dynamic and rapidly evolving, and that we need horizon scanning to ensure we continue to adapt monitoring to remain focussed on the most pervasive pressures and contaminants.

Unlike the other groups, the Nature for Society group suggested that legacy infrastructure particularly in terms of wastewater and drinking water was an important barrier to positive nature futures. Specifically, this group suggested the existing infrastructure was not designed to support current demands, but that it is costly, therefore challenging, to introduce new, more climate-resilient infrastructure. Similarly, they suggested that current planning legislation was also outdated, with aesthetics often favoured over climate-proofing infrastructure.

Shared ideas about how governance barriers could be broken down were expressed by each group, including reducing bureaucracy, particularly around access to funding and implementation of environmental management strategies. In addition, governance could be improved by better integrating climate change resilience so that it is not siloed but integrated into every aspect of society and future planning. The idea of governments and political parties committing to long-term investment and prioritisation of the environment was seen as necessary to overcome many barriers. The Nature as Culture group questioned whether devolution would help, that is the delegation of centralised power to lower or more regional levels. With the idea that decisions being made by local governments rather than Westminster may help to increase focus on regional environmental matters. The idea of a tourism tax suggested by Nature as Culture group in the “seeds” activity and was identified by the Nature for Society group to address the pressure on tourism infrastructure and help address funding gaps.

In terms of addressing issues around land management, farming schemes eligibility and access to funding, the Nature for Nature group suggested trialling different land ownership schemes to see which scheme improved access to funding for catchment interventions. This is because they noted a major barrier came from the renting of land and that if environmental managers owned more land, it would be easier to instigate large-scale ecosystem improvements.

Considering the negative behaviours, there was no real exploration of exactly how these could be addressed by any group, just ideas for what should replace the status quo. For example, transparency and greater community spirit were suggested by Nature as Culture, whereas having more compatible personalities who listen and collaborate were suggested by Nature for Society. Nature for Nature suggested public openness and acknowledgment of the timeframes of environmental recovery. There were some broad nods to the use of education and visitor engagement but there was no specific interrogation of how this might occur. This may be due to the limited time available for this activity and the fact that it was at the end of a long workshop. It may also be because there is a lack of research on translating evidence to

societal change, with behaviour change interventions often overlooking the key actors who can influence their success (Bowie *et al.,* 2020).

4.6 Activity 6: A journey to 2050.

When tasked with developing their own narratives, all groups had clear ideas about the start and end points of the "journey" to 2050 but found difficulty in describing the transition. This temporal tension follows from the seeds of change activity, where participants found it difficult to assign timeframes for interventions. Such difficulty in assigning timeframes is indicative of inter-organisational stakeholder work (Stjerne *et al*., 2019) and may reflect participant's first-hand experience. This can be evidenced by the lack of embellishment or expansion of the journey and the broader contexts surrounding each character. This may also be a function of the limited amount of time for this activity, as well as fatigue from a packed workshop agenda.

Both the Nature for Society and Nature as Culture group found the future vision narratives middle-class and exclusionary, so independently focussed on a narrative for a young boy from the city, transitioning to a nature-connected adult. Interestingly, whilst the Nature for Nature group also shared this response to the future visions, they wrote their story in the first person, arguably creating a more personal and emotive impact on the listeners. The selection of a young boy was not commented on by the groups but is interesting given that gendered studies on nature connectedness often find females to have higher scores than males (Hughes et al., 2019) and our observations may reflect a subconscious effort by the two groups to address this inequality. Alternatively, it could reflect a bias towards males as key protagonists, particularly in children's or young adult literature (West, 2010; Casey *et al*., 2021).

Certain "seeds" of change, discussed by each group, clearly came through in each of their narratives. The Nature for Society group for instance, discussed the value of education in generating a society that cares for, and respects, nature. They noted the importance of early years education and getting young children outside, which was reflected by the young boy who visits the National Park on a school trip and later becomes a teacher, in a future which places higher value on nature education. The Nature as Culture group discussed the need for greater enforcement and monitoring of non-mains wastewater in their seeds, as well as increasing a sense of community within the National Park for a highly transient visitor population. Within their story, they alluded to both of these with the young man and his friend's clear awareness and engagement with what can be flushed down to a septic tank, and their friend who was fined for not abiding by the rules. A future where the community and visitors care and want to be involved in the restoration and improvement of the environment was documented through the friendship group visiting community events based on lake restoration. Finally, the Nature for Nature group included the names of native species of wildlife in their story; a clear appreciation of the extent to which they valued biodiversity and the prevention of INNS establishment in favour of native species. They were also the only group to touch on "flooding" and the impact climate change may have on people's lives. Their transition to a future filled with nature following the impact of voting to effect change, touches on their discussions around the need for society to work together and push government to rethink the bureaucracy, financing and value of investing in improving nature's function and resilience. Much like Nature for Society, they also touched on the value of early education to inspire a generation of nature enthusiasts.

5. Reflections

This section will firstly describe the reflections of the PLURALAKES team on their observations and experiences of this second participatory workshop. It will then describe the feedback from participants via surveys and interviews on their experience participating in this second PLURALAKES workshop.

5.1 PLURALAKES reflections

Creative processes may better communicate science to broader audiences and invoke emotions, which establish trust (Zaelzer, 2020). Therefore, starting the workshop with reading the vision stories was strategic. We used these stories to introduce new participants to the visions that were co-developed in the previous workshop, remind returning participants of the visions they co-developed in the first workshop, and to immerse the participants in imagining what a transformed future for the Lake District could look like setting the scene for co-developing pathways towards these futures. The visceral response to aspects of these stories was unexpected by the team, who thought participants may be more hesitant or even sceptical to engage with this activity, so both the critical and encouraging feedback of the stories was well-received. It also indicated that there were common aspects of each story which repelled or compelled all readers, suggesting that creating a shared vision rather than having three disparate visions may be possible.

Whilst the stories helped participants to imagine the realities of these visions, as an icebreaker activity, it contrasted to the first workshop, where the icebreaker focussed on recounting memories, resulting in a more personal and bonding experience. In addition, the interest, novelty and excitement of having a graphic illustrator to visually reflect and interpret the groups discussions was missing in this second workshop. Another absence of novelty missing in this second workshop was being joined by the wider European representatives of the PLURALAKES Team, with only a few joining the facilitating UK team. Participants valued having an unbiased presence and learning from others in lake regions elsewhere. These factors plus the more technical content of the activities all shifted the energy of this second workshop to one requiring more concentration of effort and time.

Like the first workshop, the NFF and the X-curve was conducive to the development and framing of the pathways towards desirable lake future visions. These frameworks allowed acknowledgement of the tensions and barriers to achieving these visions. Specifically, the groups all felt that the main barrier(s) to achieving these futures lay in a lack of collaboration and coordination across numerous groups that are working towards similar goals, at the same time as having a lack of resources and supporting governance to implement and enforce existing policy/legislation. Therefore, it was perceived that the primary challenge in this case was not a knowledge gap, but rather an implementation gap. This was further highlighted by activities 4 and 5, where groups were tasked in identifying the timing of actions to build seeds of change and break down barriers, with participants opting for most actions to be undertaken in the short-term. This suggests urgency alongside a confidence in knowing what needs to be done or what actions are required to reach the positive future visions. In addition, monitoring was mentioned as a tool to understand the success of action rather than understanding the system itself. However, it was also mentioned during the breaking down undesirable aspects of the system in terms of horizon scanning, indicating participants recognised the importance of identifying new and changing drivers of ecological and environmental change which may hinder progress towards desirable future visions. In summary, participants are aware of the actions needed to transition towards their visions but acknowledge the reality and importance of changing ecosystem dynamics.

Like in the visioning workshop, most participants in this workshop worked in the realm of freshwater and land management, as either practitioners, researchers, or volunteers.

Therefore, there was a narrowed diversity of experiences and perspectives represented in the visions, as well as the pathways, that have been co-created in these workshops, a limitation also raised by the participants themselves. Much like the first workshop, there was an acknowledgment that those in the tourism and agriculture sectors should have more involvement, though in this workshop there was the recommendation to collect inputs from visitors to the National Park too. While ensuring a diversity of voices are present in the visioning process can ensure that the visions are more representative of diverse perspectives, in the pathways workshop, we felt that there was value in having strong representation from those involved in water management and conservation. These participants are perhaps the ones with the most agency to influence change, given their professional affiliations, and are well-versed in the challenges, impacts, and gaps in freshwater ecosystem management. Therefore, they have the experience and knowledge to understand barriers and what is needed to overcome them to achieve desirable lake futures.

5.2 Participant insights

Following the workshop, participants were invited to share their thoughts and reflections on the day in a survey. The responses to this survey are synthesised below. This feedback will be used by the PLURALAKES team to design future workshops and evaluate the engagement and impact of this participatory aspect of the project.

Most participants attended with a shared commitment to addressing real-world challenges and shaping sustainable futures for UK lakes, noting that the workshop themes aligned closely with their professional responsibilities and personal values. The environment was viewed as safe, respectful, and thoughtfully designed, with methods like the NFF and X-curve enabling participants to draw on their own expertise while exploring issues from new perspectives. Most left the workshop with new insights, a clearer understanding of key challenges, and fresh ideas to take forward.

Some of these key takeaways from the workshop included a better appreciation for how the Nature for Nature value perspective underpins relational (Nature as Culture) and instrumental (Nature for Society) values. Participants proposed specific spatial "zoning" as a potential strategy to balance differing priorities within lake restoration. Participants emphasised the need to incorporate diverse viewpoints on lake restoration into shared goals, a point made throughout the workshop by all groups. Participants acknowledged the importance of sequencing interventions and understanding long-term implications of implementation to avoid unintended outcomes, with these being the intended objectives of activities 3-5. However, participants also identified key barriers to overcome as key takeaways from this workshop, including broader systemic concerns, such as funding constraints, political uncertainty, information-sharing challenges, and the absence of clear coordination across actors. Whilst the first objective of activity 5 was to get participants to consider these barriers, this feedback suggests that the second objective of getting participants to think more proactively and be empowered to address and break these down was not confidently achieved.

In addition to key takeaways, participants identified several workshop activities that they found especially valuable, including discussions around “seeds of change”, actions to scale these seeds up, and the barriers that must be addressed to enable these seeds to grow. Many appreciated the opportunity to (1) grapple with system complexity, (2) reflect on their own assumptions and experiences, and (3) work within a constructive, open environment.

Additionally, participants valued opportunities to learn from different perspectives, especially in small groups. These discussions offered rich insight into both shared challenges and innovative approaches, as well as optimism towards addressing these challenges.

One activity that was particularly well-received was the reading of the stories at the beginning of the workshop, which represented a 'day in the life' in each vision. Participants generally felt these stories were a good representation of the visions that were developed in the visioning workshop. These stories helped deepen participant understanding of different value perspectives, with many feeling that the stories were evocative and brought the visions to life, offering emotional resonance and a compelling picture of possible (and positive) nature futures. On the other hand, others found the stories too long, contrived, difficult to absorb in the time available, and unrepresentative of the natural diversity of lakes in the Lake District. Therefore, no single set of visions for all the lakes would be appropriate. Many anticipated that the future would reflect elements of all three visions rather than a single coherent outcome. It may also point to participants misunderstanding that these futures are desirable and not probable/feasible futures.

One participant commented on a disconnect between what was represented in the artwork created by the graphic illustrator during the first workshop, to that described in the stories. For example, sheep are visible in the Nature as Culture graphic illustrations, but were not mentioned in the creative story, neither were they mentioned in the future vision. It is important to note here that this graphic is an interpretation of a passive witness and not an active participant, who incorporates an additional and unique reflection of each group's discussions. In addition to improving the alignment of the illustrations with the stories, participants suggested incorporating characters from more diverse backgrounds, using more enriching language to heighten the sensory experiences of the characters interactions with nature, and allowing more time to digest and reflect on the visions.

Although participants enjoyed the stories as part of activity 1, and how they brought the visions that were co-developed in the first workshop to life, those who completed the survey were generally sceptical that these visions would be achieved. They pointed to political and funding constraints, bureaucratic complexity, and the scale of land-use change required as major obstacles. They anticipated that site-specific pathways and interventions would be necessary, leading to distinct futures for each lake and again, highlighting their desire for spatially explicit thinking. In contrast, participants were more optimistic about the feasibility of implementing the pathways. Among the pathways considered most promising were improved septic tank monitoring and education to support behaviour change, coupled with the use of fines and incentives.

Participants identified key conditions that would need to be met to enable implementation of these pathways. These conditions included: policy changes that support long-term planning or, alternatively, more locally controlled funding mechanisms; overcoming the current level of polarization; the acquisition of floodplain land to shift land-use priorities; increased transparency and compromise, and better communication, for example about existing improvements in the Lake District. Stronger engagement with farmers, residents, and visitors was viewed as critical to increasing buy-in from these groups, and there was a view that collective responsibility among locals and visitors is essential for the Lake District's future.

Perhaps most important to building a shared sense of responsibility and connection to the future of the Lake District is the need for broader representation of diverse actors in these processes. Although the workshop was generally perceived as inclusive, many felt that key voices were notably absent including farmers, landowners, residents, youth, local businesses, tourism representatives, and people from a wider range of socio-economic backgrounds. Without these voices being included in the visions, the legitimacy of these visions was questioned. Additionally, the technical/academic language used in the workshops was viewed as a barrier to engaging with diverse audiences. Engaging with diverse audiences beyond predominantly environmentalist perspectives is required to capture the full diversity of relationships people have with the lakes and to properly co-develop a shared vision for the future of the Lake District.

6. Next steps

The next steps for the PLURALAKES team are to identify the key seeds and barriers, as well as intervention points that were discussed in this second workshop and to include these in quantitative ecosystems and socio-ecological systems modelling. The models will include river water quality (using QUESTOR, a model developed by UKCEH and the SAGIS-Simcat model), lake ecosystems (PCLake) and socio-ecological modelling (Bayesian Belief Networks). Multiple models are used to enable different aspects of the catchment and socio-ecological interactions to be captured, as well as providing different outputs and therefore, interpretations of the future condition of the lake ecosystems and their catchments.

The final stage of the project and final workshop will look at the model outputs and how they compare to the positive nature future visions of the lakes to understand (1) whether the outputs of the models match the visions, (2) what management is required to achieve certain favourable scenarios and (3) identify the key areas of uncertainty.

Work is ongoing to investigate the current condition of these lakes using the long-term lakes monitoring data alongside land cover data, all collected and generated by UKCEH, to try and understand key differences in the state of these lakes and the multiple stressors acting upon them (both datasets available on the UKCEH Environmental Information Data Centre: Environmental Information Data Centre | EIDC).

Finally, primary (visioning) and secondary (pathways) participatory workshops are planned for the Netherlands and Finland case study sites, both of which will utilise and adapt activities already used in the Lake District case study. Evaluating and reflecting as workshop organisers and participants is therefore integral to best advise these future workshops. Facilitation guides on our participatory workshop methods and activity evaluations have been created to add to the growing interest and uptake of participatory research in science (the first workshop facilitation guide is available via Zenodo: Kuiper, J. J., Albrecht, E., Martin, R., Moorhouse, H. L., & Spence, D. (2026). Co-developing desired visions for lake futures: A PLURALAKES facilitation guide. https://doi.org/10.5281/zenodo.18455489).

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