Guidelines for rewilding

Carver, S., Convery, I., Hawkins, S., Hertel, S., Fallon, J., Lyons, K., Beyers, R., Locquet, A., Derham, T., Kun, Z. (Eds.)

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The IUCN Commission on Ecosystem Management (CEM) entrusted the Rewilding Task Force (RTF) in 2017, later becoming the Rewilding Thematic Group (RTG) in 2019, with the responsibility of developing an internationally recognised definition of rewilding and establishing a set of universal guiding principles. This work was completed in 2020 and published in Conservation Biology in 2021. The present Rewilding Guidelines have been produced as part of that process, complementing and expanding the original remit. The next steps will involve collaboration with colleagues across all IUCN Commissions, together with the Rewilding Working Group, to use these guidelines in drafting a rewilding policy statement for consideration and approval by the IUCN Council.

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Special thanks go to Angela Andrade, Chair of the IUCN Commission on Ecosystem Management (CEM), for her unwavering support, patience, and encouragement throughout the development of these guidelines. We are also grateful to Steve Edwards from IUCN, whose steadfast support and advocacy helped champion this work, and to the IUCN Editorial Team for their guidance in bringing this publication to completion.

We would like to recognize the many individuals who participated in the seven workshops held to inform these guidelines (see Appendix II), your input was essential and is deeply appreciated.

Above all, we express our heartfelt thanks to the editors and the members of the Rewilding Thematic Group. Since its founding in 2017, the group has worked with dedication and perseverance toward the goal of establishing rewilding guidelines. Given the complex and often contentious nature of rewilding, this has required navigating significant challenges with patience, resilience, and commitment. Once we were given the green light to proceed, the team rose to the challenge of completing this work in just 18 months.

We also honour the memory of influential rewilding figures who are no longer with us—Michael Soulé, Alison Parfitt, and Dave Foreman—whose vision and leadership helped lay the foundations for this work. Michael and Alison, as original founders of the Rewilding Thematic Group, and Dave, as a pioneering voice in the rewilding movement, continue to inspire our efforts.

Finally, this work would not have been possible without the contributions of our dedicated and enthusiastic contributors listed on the Contributors page. Their diverse perspectives and expertise enriched the content and scope of these guidelines. The result is a testament to the power of interdisciplinary collaboration, shared purpose, and the enduring commitment of all those working to advance a rewilding vision.

Preface

The accelerating degradation of Earth's ecosystems demands a bold, science-based, and collective response—one that not only restores nature but also reimagines our relationship with it. Developed by the IUCN Commission on Ecosystem Management (CEM), these *Rewilding Guidelines* represent a landmark contribution toward that goal. They are the result of an inclusive and collaborative process involving experts, practitioners, and communities worldwide, presenting a comprehensive framework for rewilding as a transformative conservation strategy.

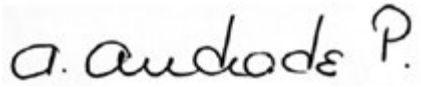
Rewilding is more than an ecosystem management approach; it is a paradigm shift. It calls for the reinstatement of natural processes, the recovery of lost species, and the creation of self-sustaining ecosystems that thrive with minimal human intervention. At the same time, it invites us to reconsider our place within nature—embracing coexistence, reciprocity, and recognition of the intrinsic value of all life. In essence, rewilding is a framework that enables ecological processes and wild nature to regain their autonomy.

The International Union for Conservation of Nature (IUCN) Commission on Ecosystem Management entrusted the Rewilding Task Force in 2017—transformed into the Rewilding Thematic Group (RTG) in 2020—with the mandate to develop an internationally recognised definition of rewilding and a set of guiding principles, completed in 2020 and published in Conservation Biology in 2021. The present *Rewilding Guidelines* complement and expand on that mandate. Their development was rooted in transparency, participation, and global inclusivity. Between 2024 and 2025, seven regional workshops were held across Europe, North America, and Australia, complemented by additional online sessions to ensure accessibility. These dialogues brought together more than 100 individuals from 63 organisations, including IUCN commission members, indigenous representatives, academics, NGOs, and government agencies. The process reflects the diversity of ecological, cultural, and governance contexts in which rewilding is advancing.

Structured in two parts, the guidelines first set out the ecological and ethical foundations of rewilding, before turning to practical strategies for planning, funding, monitoring, and participatory engagement. Anchored in ten guiding principles and five core guidelines, they provide a framework that is both flexible and robust—adaptable to the urgent and complex challenges of our time.

The next steps will build on this momentum, engaging all IUCN Commissions and the Rewilding Working Group established by Resolution 85 of the Marseille Congress, to develop a formal IUCN policy statement on rewilding for consideration by the IUCN Council. This ongoing collaboration will ensure that rewilding is firmly embedded in global conservation policy in a way that is inclusive, evidence-based, and forward-looking.

As humanity faces the interlinked crises of biodiversity loss and climate change, rewilding offers hope—not only for the recovery of nature but also for renewing our relationship with the living world. These guidelines are an invitation to act, to collaborate, and to help restore the wild heart of our planet.



Chair IUCN Commission on Ecosystem Management

Executive summary

Guidelines for rewilding: a global standard for ecological recovery

Rewilding is an increasingly familiar term. It emerged in the 1990's and by 2010 had entered the Oxford English Dictionary and was growing in popularity as a recognised practice in nature conservation (Lorimer et al., 2015; Carver et al., 2025). Various definitions exist but put simply, *'Rewilding is giving nature the space and the time to determine its own ecological trajectory,'* but crucially setting ecosystems on a path towards recovery and resilience.

It is no coincidence that this movement to 'rewild' emerged in parallel with a growing awareness that all was not well with the planet. Earth's life-support systems are under greater pressure than ever before because of the cumulative impact of human activities. In 2009 The Stockholm Resilience Centre contextualised planetary health by proposing a set of 'planetary boundaries.' The assessment was a bleak portrait of a planet moving beyond its range of resilience. Alarmingly, since 2009, the number of boundaries crossed has risen from three to six, indicating an escalation of threats that are jeopardising planetary stability, pushing the planet beyond safe ecological limits. Currently, there are no real signs of improvement in reversing or even addressing these trends.

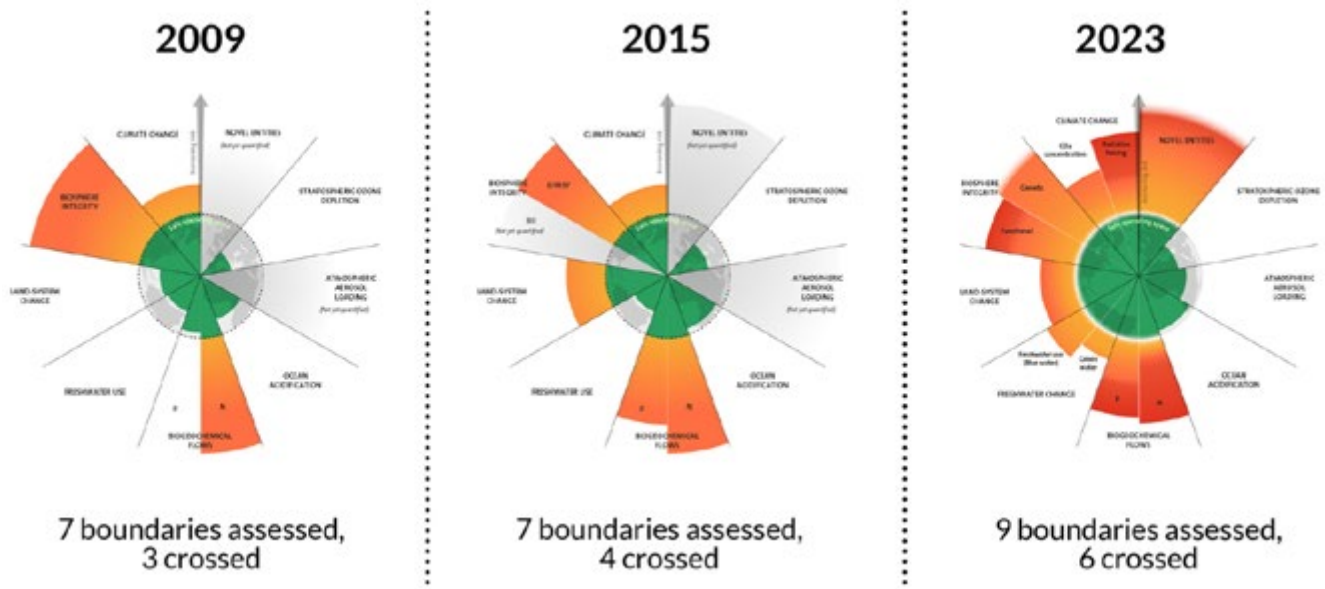


Figure E1. Evolution of the planetary boundaries framework (Licenced under CC BY-NC-ND 3.0 Azote for Stockholm Resilience Centre, Stockholm University and Rockström et al., 2009).

At its core, rewilding has the potential to assist in reversing these trends, if the needs of nature are also integrated into society at large and incorporated into decision making globally. Biosphere integrity requires species diversity at scale and in good health. This is the second most overshot of the planetary boundaries. Restoring the balance of planetary systems depends on how we define human-nature relationships (IPBES, 2024) and how far we are prepared to make the necessary changes. Rewilding proposes a practical method for realigning with ecological realities and reinstating wild nature at a greater scale. It must be supported throughout society for greatest effect, for example by addressing the creation of harmful novel entities and reducing carbon emissions.

Rewilding is an ambitious, science-based approach to ecological restoration, seeking to re-establish lost species diversity, restore natural processes, and ecosystem resilience at scale. Unlike traditional conservation approaches, which often focus on preservation and intensive management, rewilding promotes resilient and self-sustaining ecosystems where natural processes drive recovery and the need for human management is significantly reduced. The degree of degradation determines the level of initial intervention required, ultimately allowing for non-intervention once those objectives have been met. Such interventions may include the reintroduction of extirpated species, the removal of non-native invasive species, or the restoration of landscape connectivity to enable wildlife to express natural behaviours and maintain healthy populations. However, rewilding should not be viewed as the absence of human influence, but rather as an acknowledgement of the agency of non-human elements within ecosystems.

These guidelines offer both a call for change and general guidance for users. The following five guidelines, adapted from the ten guiding principles for rewilding (Carver et al., 2021), provide a foundation for understanding and taking action to prevent further losses in nature, promote the recovery of biodiversity, and support the restoration of ecological integrity.

Guideline #1:	Rewilding is nature-led, functional ecological restoration.
Guideline #2:	Rewilding aspires to large scale restoration through landscape scale planning and collaboration across space and time.
Guideline #3:	Rewilding is informed by evidence and requires ongoing monitoring to inform adaptive management plans.
Guideline #4:	Rewilding embraces dynamism and systems thinking.
Guideline #5:	Rewilding is place-based and participatory.

The full set of ten guiding principles for rewilding are provided in Carver et al. (2021) and are reproduced in Appendix I. These five guidelines and their justification are given in section 3.

The rewilding vision requires a paradigm shift in how we exist and interact with our environment on Earth. Critically, there is still much to develop and discover and the intention is that, through engagement and close monitoring, a better trajectory can be achieved.

The biggest challenge is how we get there. These IUCN Guidelines acknowledge this challenge by framing ecological realities as something to be integrated into current socio-cultural-political-economic considerations while recognising the practical barriers associated with doing this.

The guidelines acknowledge:

- the need for a fundamental shift in the way humanity relates to nature, recognising the intrinsic value of all species and integrating the building of ecological integrity into our socio-cultural and political-economic systems;
- that rewilding should be guided by ecological principles, driven by natural processes such as succession, disturbance, migration, and dispersal, with human involvement facilitating rather than controlling these natural processes;
- that rewilding is not the absence of human influence, but a recognition of non-human agency within ecosystems;
- that its fundamental premise is to reinstate the fullest range of local to regional species that would naturally occur so that their presence is self-perpetuating;
- the need for large-scale planning that reflects the dynamism and interconnectivity of natural systems;
- that rewilding must continually develop our ecological understanding through ongoing research, monitoring, and adaptation; and
- the importance of creating adaptive, interconnected systems that link ecological knowledge with political, cultural, social, and economic frameworks. This approach should promote innovative and progressive thinking that aligns with nature, rather than further compromising it.

Thus, rewilding has the potential to create significant change. By applying a scientific approach that incorporates the latest evidence, rewilding could help restore the ecological integrity of the Earth's biosphere. Its fundamental premise is to reinstate the fullest range of local to regional species that would naturally occur so that their presence is self-perpetuating. Achieving this will require a major shift in societal attitudes, including how we utilise and conserve the planet's limited resources and engage with the diverse range of species we share it with. Rewilding has emerged at a crucial moment when there is increasing awareness of the urgent need for change. It represents an advancement in scientific understanding, highlighting both the limitations of traditional conservation methods and the necessity for conservation alongside rewilding approaches. If embraced and implemented successfully, rewilding has the potential to enhance ecological recovery across ecosystems across all scales, from local, regional, continental, and global levels.

These ***Guidelines for rewilding*** serve as the emerging **global standard** for rewilding practice, providing a **science-based, scalable framework** for application across diverse ecological and socio-economic contexts. Developed through extensive research and collaboration with a broad range of experts in the field, they establish **best-practice guidance** for implementing rewilding projects at local, regional, and global levels ensuring that efforts are **strategic, evidence-based, and adaptable**. The guidelines provide conservation practitioners with the necessary tools to integrate rewilding into broader conservation strategies and land use policies. By adopting these guidelines, practitioners can contribute to large-scale ecological recovery and a future in which nature thrives alongside humanity, rather than apart from it.

The guidelines are in two parts. Part 1 provides a broad introduction to rewilding, creates a vision for rewilding and outlines five basic guidelines. Part 2 provides a more practical overview of rewilding ecology, Social Ecological Systems (SES), funding, implementation and monitoring.

Part one

Flower field. National Park Hoge Kempen, Terhills area, Belgium © Gregoire Dubois

Introduction

1

Dung beetles are keystone species in Serengeti © Rene Beyers

1.1 Why rewilding?

The drastic collapse of food webs, the decline of wild animal populations and the trophic downgrading of ecosystems have resulted in a world so dominated by humans and their domesticated animals that together they account for approximately 96% of Earth's mammals by biomass (Figure 1.1; Greenspoon et al., 2023). Over the past 50 years (1970–2020), the average size of monitored wildlife populations has decreased by 73%, as measured by the Living Planet Index (WWF, 2024). Scientific data indicates that less than 3% of the terrestrial part of our planet is still functionally intact (Plumptre et al., 2021). Since 2009, the number of planetary boundaries humanity has crossed has doubled from three to six, highlighting a worsening ecological crisis with no significant signs of reversal or improvement (Rockström et al., 2009).

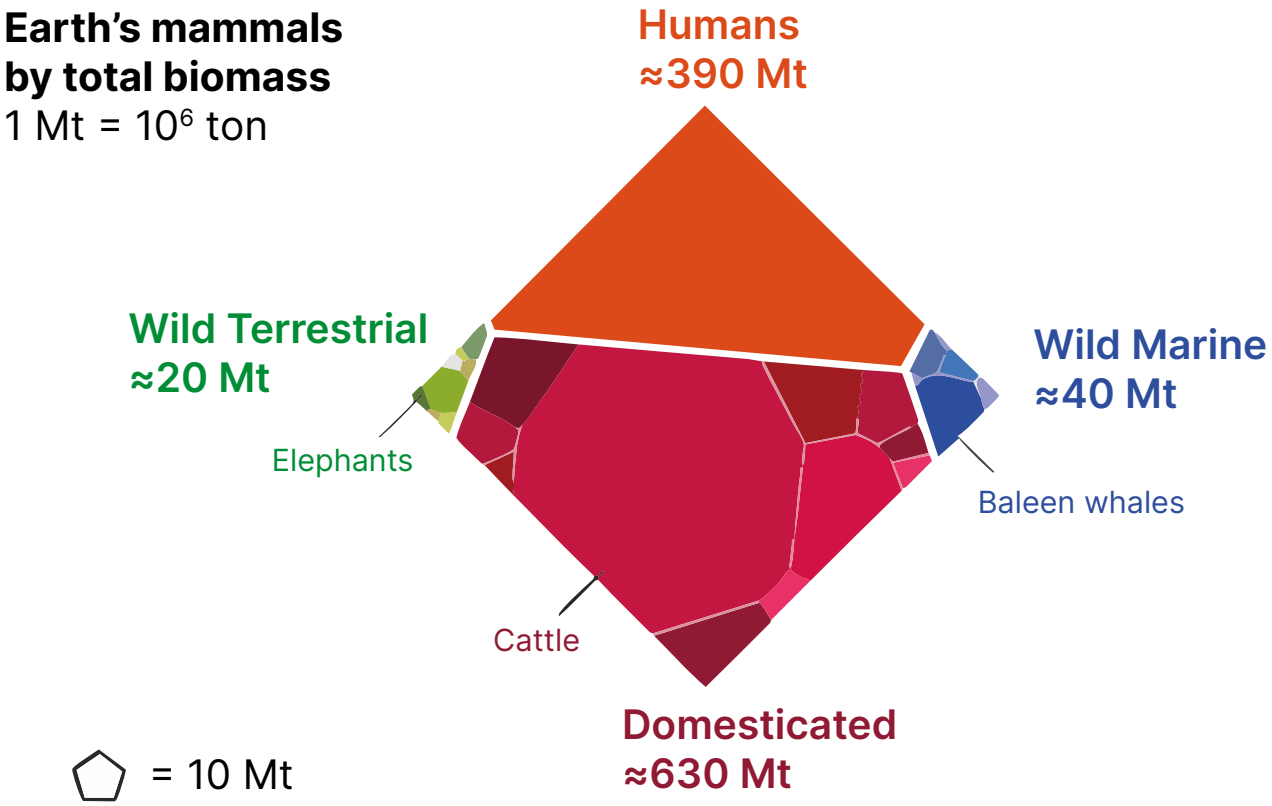


Figure 1.1. Earth's mammals by total biomass [reproduced from Greenspoon et al. (2023) under CC BY-NC-ND 4.0 © 2023 The authors].

'Defaunation' is the loss of animals throughout the animal kingdom, whether through extinction, extirpation or population declines. This is not limited to large-bodied consumers but applies to everything from birds, amphibians, insects and fish. While vertebrates have declined by 25% in forty years, invertebrates are estimated to have declined by 45%. Defaunation affects how ecosystems function (Dirzo et al., 2014), with negative impacts on associated services, such as pollination, pest control, nutrient cycling and decomposition, carbon capture, water quality, flood control, and human health. This ecological downgrading destabilizes ecosystems and adversely affects their resilience to disturbances, including the impacts of climate change.

Rewilding is a simple yet evocative term that disguises a great degree of complexity, which is revealed when considered and understood in its true meaning and context. Rewilding has become synonymous with attempts to return lost species to their former ranges. The last few hundred years we have witnessed drastic losses of wild species, and rewilding speaks to a broader awareness of a time once rich in flora and fauna. But what the term does not readily convey, is the complexity associated with a wide range of interlinked causal factors, stemming from human activity, that have resulted in driving species extinctions and habitat loss at an exponential rate.

While extinctions have happened throughout history, it is the rate of extinction that is different and the significance of the threat this poses beyond natural rates of extinction (Ceballos et al., 2015, Vos et al., 2015). When a species disappears, its functionality is lost which has cascading effects throughout an ecosystem, exacerbating further loss of function. The ongoing destruction of habitats, disruption of biochemical flows, pollution caused by novel entities such as microplastics, radionuclides and GMOs, ongoing over-exploitation of limited resources, and threats posed by invasive and domesticated species, further erode biosphere integrity, compounding the impacts of climate change.

Rewilding should not only focus on the reintroduction of species but also on creating the conditions to sustain viable and effective populations, thereby restoring their role in the food web and their contribution to the integrity of the system. Rewilding aims to restore healthy ecosystems by reinstating natural communities and processes as closely as possible to those before significant disruptions caused by human activity. It seeks to reinstate self-regulating, stable and resilient ecosystems. This also requires redressing an interconnected range of threats and causes of degradation, which include habitat loss, overexploitation, pollution, climate change and the impact of invasive species. While rewilding is inherently a form of ecological restoration, this does not imply that all restoration initiatives qualify as rewilding. There is an important differentiation to be made and understood between rewilding, restoration and nature-based solutions. While restoration typically focuses directly on a defined area, nature-based solutions are designed to enhance direct service-based benefits for human wellbeing. Rewilding is instead geared towards ecological recovery at scale. Rewilding emphasises the importance of allowing ecological processes to function autonomously, valuing the concept of wildness not as the absence of human influence, but as a recognition of non-human agency within ecosystems. This might be characterised as "controlled decontrolling", where the aim is to promote the agency of non-human biophysical processes (Anderson et al., 2019). This is exemplified by rewilding as "nature-led, human-enabled" (Hawkins et al., 2024), indicating that while natural processes should dominate, human intervention can facilitate this transition. Traditional ecological restoration on the other hand is more "human-led, nature-enabled" in that the focus is on us using natural processes to achieve our desired outcomes. This traditional approach of restoration ecology has typically looked at relatively closed systems rather than adopting a broader holistic view of the indirect drivers that compound and culminate in ongoing overall declines. Rewilding takes a systemic view that has implications for all of society, urging greater integration of ecological realities across all industries, sectors, and cultures. The global collapse of ecosystems and the threats to planetary health cannot, however, be addressed solely by rewilders; it requires the involvement of society at every level.

The aim of these guidelines is not to be prescriptive, but instead offer a flexible framework that can be adapted to different ecological and socio-economic contexts, recognising the aspirations and ecological and pragmatic constraints of what the target landscape can accommodate. Whether restoring wetlands, improving connectivity and space for nature, reconnecting forest corridors, or reintroducing keystone species, the overarching goal remains the same: to recognise the intrinsic value of wild nature and create resilient and healthy ecosystems that support native species, natural processes and benefit both nature and human well-being over the long term (see Box 2.1). As global biodiversity continues to decline at an alarming rate, rewilding offers a transformative opportunity to slow and reverse these declines (i.e., 'bending the curve'; Figure 1.2). These guidelines offer tools and principles to promote rewilding as an essential conservation strategy. This approach ensures that natural landscapes can thrive and adapt amidst rapid environmental changes and the increasing dominance of human-altered environments.

The rewilding concept grew out of the awareness that a radical approach was required to counter ecosystem degradation and biodiversity loss. The focus on threatened species and protecting biodiversity hotspots alone will not reverse these trends. A resilient ecosystem with high ecological integrity across all landscapes is the best guarantee for all living creatures on the planet – humans included – to survive and to thrive. Real transformative change will require us to reimagine our relationship with nature, focusing on how we perceive and interact other beings on the planet (Narvaez et al., 2025). It requires a fundamental shift in our relationship with the more-than-human world by moving away from traditional approaches to conservation that often prioritise human needs and view nature as a resource to be managed. There is an increasing range of initiatives and movements aimed at enhancing justice for ecosystems and all species (not just humans). Recognising the Rights of Nature (Box 5.5) supports rewilding Principle 9 relating to the intrinsic rights of nature to exist (Carver et al., 2021, see Appendix I). Other concepts such as Multi Species Justice (Box 5.4) and the notion of Restorative Justice may hold potential value in helping to shift mind sets away from a dominant human superiority perspective, which detrimentally affects all other life on the planet.

While rewilding is fundamentally about benefits to nature, a healthy environment is also essential for human wellbeing from a biological health perspective as well as through the provision of ecosystem services, connecting humans to nature, and creating opportunities for new and sustainable economies. Rewilding can therefore be seen as a foundation for many of the UN's 17 Sustainable Development Goals, especially #13 (climate change), #14 (life below water), and #15 (life on land), but also #3 (good health) and #6 (clean water and sanitation). Improved ecosystem services have the potential to reduce poverty (#1) and inequality (#10) and raise the living standards of local communities (#8). Through its goal of recovering ecological processes and establishing self-maintaining natural ecosystems, rewilding also contributes to the "ecosystem health pillar" of the Sustainable Land Management concept (FAO, no date), making it highly relevant for the United Nations Convention to Combat Desertification (UNCCD, 2018).

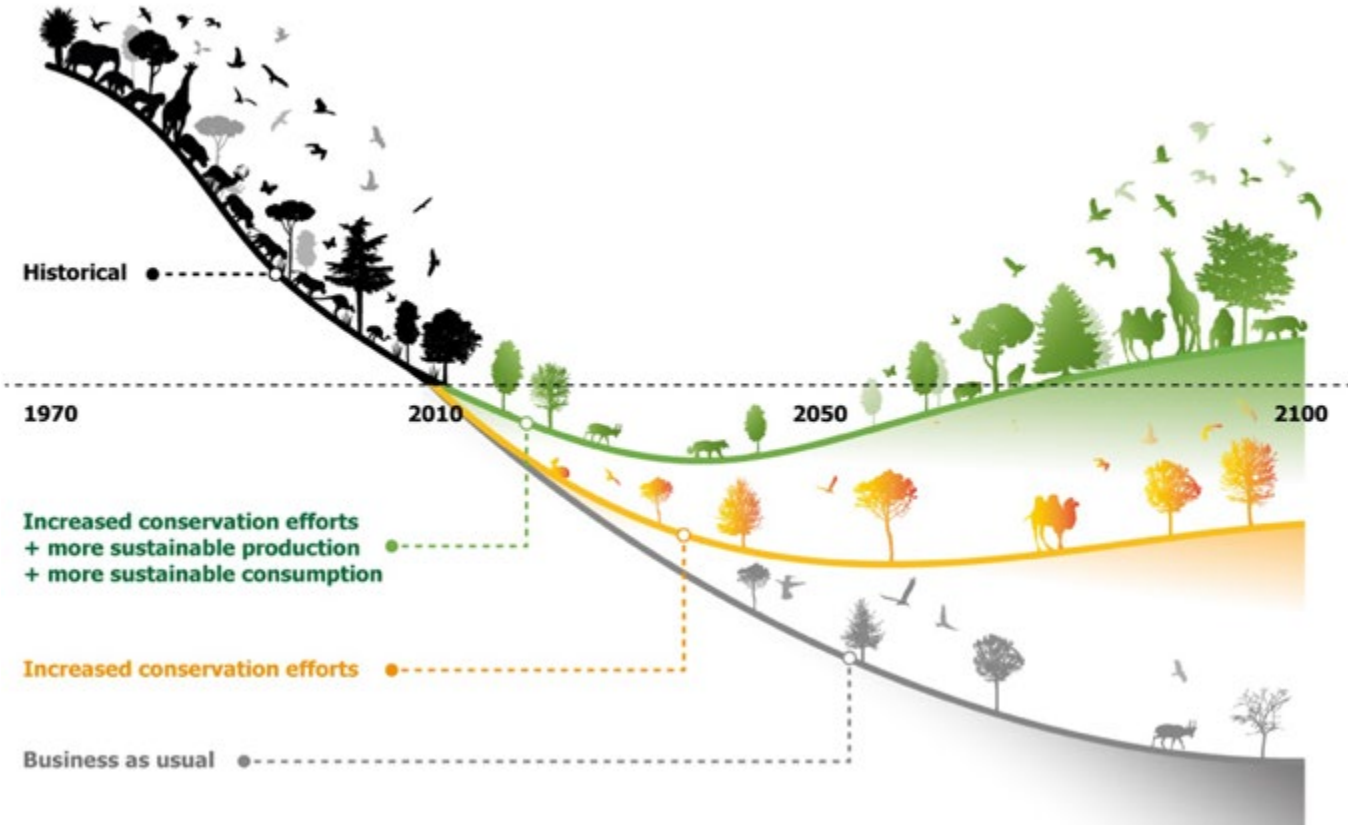


Figure 1.2. Bending the curve of biodiversity loss. Illustration from Leclère and Heyl (2020), credit: Adam Islaam, © 2020 International Institute for Applied Systems Analysis (IIASA).

Rewilding is a direct response to meeting the global objective of creating "ecological integrity" which is one of the founding principles of the 1992 Rio Earth Summit declaration on environment and development, which guides countries towards sustainable futures. We should note that the two are mutually inclusive, and sustainable development without ecological integrity at scale cannot be sustainable. The concept of ecological integrity is embedded in the Convention on Biological Diversity (2022) as well as the Climate Convention (UNFCC, 1992). Rewilding at large scale offers one potential pathway as part of a wider raft of measures for humanity to return to a safe operating space regarding six of the nine Planetary boundaries, namely biospheric integrity, biochemical flows, climate change, ocean acidification, freshwater change, and land system change (Stockholm Resilience Centre, 2023). Rewilding, above and beyond more traditional conservation measures, has the potential to restore biospheric integrity by giving space back to nature as mandated in the Kunming-Montreal Global Biodiversity Framework under Target 2: restore 30% of all degraded ecosystems, and Target 3: Conserve 30% of land, waters and seas. Other proposals such as Half Earth and Nature Needs Half, go much further, suggesting that roughly 50% of the planet needs to be set aside for nature (Locke, 2013; Wilson, 2016).

1.2 The IUCN CEM Rewilding Thematic Group and the *Guidelines for rewilding*

As rewilding gains momentum in conservation policy, practice and public discourse, there is a growing need for clear, practical guidance that reflects both the diversity of rewilding approaches and the shared principles that underpin them. Rewilding is being interpreted and implemented in a wide range of ecological and socio-cultural settings, often with different emphases, objectives, and understandings of success. Without a common framework, the term risks becoming diluted or misapplied, undermining its transformative potential. These *Guidelines for Rewilding* respond to that need, offering a practical, evidence-informed and principles-based foundation for rewilding. They aim to support practitioners, policymakers, and communities in navigating the complexities of rewilding while ensuring consistency, integrity, and alignment with broader sustainability and restoration goals.

The IUCN Commission on Ecosystem Management (CEM) Rewilding Thematic Group (RTG) is dedicated to advancing rewilding practice, policy, and research. Collaborating closely with aligned groups—including the Society for Ecological Restoration (SER), the CEM Ecosystem Restoration Thematic Group (ERTG), and the CEM Social-Ecological Resilience and Transformation Thematic Group (SERT)—the RTG promotes a cohesive approach to ecosystem management, recognising alignment across rewilding principles and wider restoration and sustainability initiatives. The RTG supports the overarching mission of the IUCN CEM to promote ecosystem-based management strategies that foster resilient socio-ecological systems. By developing and disseminating clear guidelines and fostering international collaboration, the RTG contributes to the IUCN's global conservation objectives.

The Rewilding Guidelines respond directly to Motion 100 (WCC 2020 Res 085) on rewilding, adopted at the IUCN World Conservation Congress in Marseille in 2020. This motion highlights the significance of rewilding within the IUCN, calling for the development of working groups and a clear definition of rewilding, as well as practical tools to support implementation.

Recognising the diverse interpretations and applications of rewilding, the guidelines show how the *Guiding Principles for Rewilding* (Carver et al., 2021) can be operationalised in practice. The principles articulate the ecological and ethical foundations of rewilding, offering the rationale—or the "why"—behind rewilding strategies. Building on this foundation, the RTG initiated the development of these practical guidelines to support rewilding practitioners. An initial set of draft guidelines (Hawkins et al., 2024) was produced and then refined through a collaborative process involving seven online and in-person workshops held between June 2024 and January 2025. These workshops brought together over 100 individuals representing 63 organisations (see Appendix II). Participants helped to establish a shared vision for rewilding, clarify areas of the initial guidelines, and ensure that the resulting framework was grounded in both scientific evidence and practitioner experience. Data and insights from these workshops directly informed the vision and practical recommendations presented in these guidelines. These main sections were authored by members of the RTG, while additional sections were contributed by experts relating to that topic (see Contributors). The guidelines were reviewed by experts (see Acknowledgements) and the IUCN.

These guidelines serve three interlinked purposes:

1. They articulate a shared vision for rewilding, grounded in ecological science and supported by social science insights.
2. They offer structured, flexible guidance to help practitioners navigate the practical complexities of rewilding across varied environmental, cultural, and governance contexts.
3. They issue a call to action—urging decision-makers, conservationists, land managers, and communities to integrate rewilding into broader conservation strategies, land use policies, and societal aspirations for a more sustainable and biodiverse future. This recognises rewilding as a legitimate and effective approach to restoring self-sustaining, high integrity and heathy wild ecosystems that works alongside more traditional conservation practice.

Rewilding vision

2

Nutria gigante, Tama Anori y Punchi, Iberá © Rewilding Foundation Argentina

2.1 Creating a vision for rewilding

Carver et al. (2021) defined rewilding as *'the process of rebuilding, following major human disturbance, a natural ecosystem with the aim of restoring natural processes and the complete or near-complete food web at all trophic levels.'* This definition underscores the importance of restoring ecological integrity and ensuring that self-regulating dynamics shape landscapes over time (see section 2.2 on the ecological foundations of rewilding). With an understanding of the ecological, social, and systemic aims of rewilding (Hawkins et al., 2025), the following vision for rewilding was developed from the workshop data.

> ***Rewilding envisions a future where ecosystems—on land, in freshwater, and at sea—are restored to full ecological function, creating vibrant, self-sustaining landscapes that support both nature and people. It refocuses conservation on the relationship between humans and nature—grounded in resilience, reciprocity, and coexistence.***

In other words, rewilding ensures that the necessary conditions exist for nature to thrive unheeded. It is a process of creating a pathway for ecological recovery where humans lend operational support to ensure those conditions are provided.

One such condition can be termed as 'coexistence'. This concept requires societies to learn to adapt, tolerate and accept challenges associated with sharing a planet with more than simply humans. Traditional models of control and domination are outmoded. More egalitarian models are needed wherein all species are catered for and considered active participants in landscapes, where each have a proportional share. Rewilding can draw from holistic and systems thinking (see section 2.3) reflecting the interdependence between human and ecological well-being, ensuring a future where nature is not just protected but where respect for nature is deeply woven into human lives (Narvaez et al., 2025). The elements of this social-ecological vision are depicted in Figure 2.1, showing how rewilding interventions affect social, ecological and systemic change. Rewilding is bold, ambitious, and transformative, requiring a global aspirational vision that acknowledges the long timescales needed for ecological recovery.

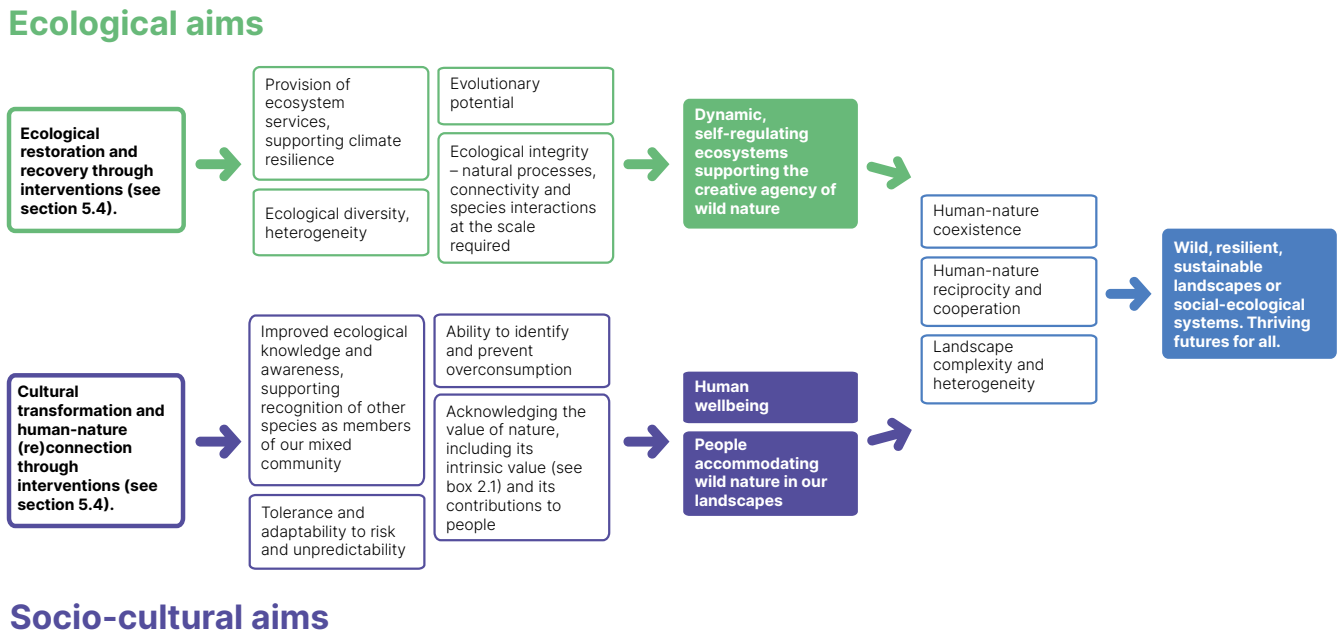


Figure 2.1. Depicting the systemic, ecological and social elements of the rewilding vision (adapted from Hawkins et al., 2025).

While transformation is necessarily gradual, broad aspirations can inspire immediate, localised action. Developing such a unified vision remains a challenge, as different disciplines, regions, and contexts shape rewilding goals in diverse ways (Box 2.2). However, the rewilding vision is adaptable, allowing for local interpretations while still aligning with broader ecological and cultural goals. A key element of such a vision is the role of the next generation of leaders since it is our young people who will be dealing with these issues in the future (see Box 2.3).

2.2 Ecological foundations of rewilding

Rewilding aims to restore our ecosystems to their natural, self-sustaining states exemplified by the community associations and assemblies that are characteristic of particular locations. By understanding and applying the fundamental principles that govern ecosystems (Sinclair and Beyers, 2021), we can reverse the damage caused by human interference and set these systems on a path to recovery.

A core principle in ecology is regulation, where the inherent dynamic equilibrium of an ecosystem at full trophic occupancy adapts and responds to changes and disturbances, whether these are natural or anthropogenic. The capacity of an ecosystem to absorb perturbations is an indication of its resilience. Two limiting factors that affect this dynamic equilibrium are density dependence and density independence. The density-dependent process ensures that the mortality rate (i.e. the rate of at which species are dying) rises as population density increases, preventing overpopulation. Conversely, when population density is low, birth rates increase and/or mortality rates decrease, allowing the population to grow and recover. This dynamic creates a self-regulating system that keeps species within the carrying capacity of their environment, preventing extinction and overabundance.

Box 2.1 Intrinsic value

Mark Fisher

Rewilding is linked to Intrinsic value in Principle 9 of the Guiding principles of Rewilding (Carver et al., 2021). The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) recognised that intrinsic value is an inherent value of non-human species, and which is independent of any human experience or evaluation, as it cannot be attributed to or generated by external valuing agents (such as human beings). While that is rightly respectful of the autonomy of non-human species that cannot speak for themselves, it makes it difficult to communicate that value amongst humans as an encouragement to restore and protect those inherent values.

As rewilders, the instinct is not to attribute value, but rather to think in terms of the intrinsic properties of inherent ecological processes; that it is natural processes themselves that are important, and which are unmanaged and spontaneous, yet capable of creative production in the self-perpetuation of non-human species. Thus, the successional flowering in coastal cliff short-turf grassland, for example, shows the expression of native plant life shaped only by climatic exposure, the intrinsic properties of those species to trap sunlight, grow, flower, and attract pollinators if they need them. It exemplifies an autonomous process of self-assembly and perpetuation. Similarly, for mammals, their natural habitat selection preferences embody the life-history requirements of the needs to acquire food and water, find mates, rear offspring, defend limited resources, and avoid predators. It is the strategies of mammalian wild species for movement and dispersal. Woodland interior is what makes a temperate broadleaved woodland ecosystem support the occupancy and perpetuation of other woodland species, these species drawn from across all domains of cellular life. Thus, it's not just the mammals, birds, and insects, but also the fungi, lichens, mosses, liverworts, and the microbial communities of the soil. Continuity is defining of the ecosystem of these broadleaved woodland interiors, from the constancy of shade and humidity over space and time, to the turnover associated with the life history and afterlife of trees that constantly replenishes resources relied on by other species, from their leaves, seeds, and the associations with microbial and fungal communities, to the decay that creates refuge and further nourishment.

These are the natural lives of non-human species, their self-will of existence. If we are so inattentive to fostering unexploited locations where we may be observers only of the natural lives of wild nature, then there is the real risk that we won't know what those natural lives are, and they will wither, subverted by an enforced and exploitative coexistence with us. Further, we are greatly reducing the evolutionary potential of non-human species through extinctions, but more insidiously through fragmentation and loss of their unfettered living, and which blocks genetic flow between free living populations. That decreasing genetic diversity will continue to decrease even if we protect all species and their current living spaces. As rewilders, we aim to restore and reconnect. It is from unexploited space, free from human agency, that we learn the absolute importance of the self-will of existence of wild nature. Observation of that self-will of existence is a compelling argument for its recovery and reconnection.

Box 2.2 Rewilding and environmental ethics

Tristan Derham

Rewilding happens in mixed multispecies communities, generating a complexity of ethical and political issues (Lynn et al., 2022). While it may be tempting to appeal to science in an effort to avoid such problems, practitioners are urged to become familiar with the inescapable moral and political landscapes of their work (Latour, 2004). Three issues are presented below.

Framing: Early rewilding was explicitly biocentric or ecocentric, extending its moral considerations past human communities to include all living beings, or even all of nature (Johns, 2019). It was sharply critical of an anthropocentric outlook, which takes other beings to be mere resources, always available to be exploited for material human benefit (Foreman, 1991). More recently, proponents have framed rewilding in terms friendlier to business and government, e.g. ecosystem services and natural capital, to broaden the support base or attract project funding (Jepson et al., 2017; Pettorelli et al., 2018; White et al., 2022). However, such framing can introduce perverse incentives (Gordon et al., 2015) and perpetuate the anthropocentric socio-economic systems that created and now sustain the ecological crisis (Crist, 2018). On the other hand, it might inspire incremental shifts in policy, e.g. toward holistic ecological goals and thus preserve rewilding's transformative ambitions (Hawkins et al., 2025; Jepson, 2022).

Local and Indigenous communities: Rewilding tries to make more room for non-human beings in contexts of human overreach. This has often been articulated in a dualistic and coarse-grained fashion, with insufficient recognition of the contributions and rights of local and Indigenous communities in healthy ecosystems and cultural landscapes (Derham et al., 2025; Wynne-Jones et al., 2018; see box 5.3). Supporting social justice for these communities means gaining informed consent, placing them in positions of leadership and participation, and avoiding colonial visions of wilderness or essentialist accounts of a harmful humankind (Lorimer, 2024; Ward, 2019).

Animal wellbeing: Rewilding has consistently venerated wild animal agency but has paid substantially less attention to animal wellbeing and suffering. Duties to wild animals may indeed be limited. However, placing or constraining animals in rewilding projects implicates us in the quality of their lives (Palmer, 2010). Respecting their autonomy does not excuse neglect nor exploitation (Kopnina et al., 2022). Instead, it has been suggested that we treat such animals as collaborators and fellow community members, deserving of justice, compassion, and tolerance (Bekoff, 2015; Carter & Linnell, 2016; Kopnina et al., 2022; Welden, 2023).

Density-independent limiting factors often take the form of extreme disturbances, such as natural disasters, severe weather, invasive species, and pollution. Their effect doesn't depend on the size of the population, so they don't cause a correction when the population size gets too large. Instead, they can lead to erratic, abrupt shifts in population size. Small populations may be at risk of being lost through sporadic, density-independent events. In practice, density-dependent and density-independent limiting factors can interact to produce a dynamic equilibrium within and across ecosystems. Thus, a population may be kept at near carrying capacity by density-dependent factors for a period, then experience an abrupt drop in numbers due to a density-independent event, such as a storm or fire. If there is no bar on recovery from that extreme disturbance, the dynamic equilibrium shifts over a longer scale to the pre-disturbance state.

Competition and predation are two important mechanisms of population regulation. Competition for resources leads to starvation or reduced reproductive success, a bottom-up regulation which is observed in many large herbivores. Predation works from the top down; as prey populations grow, predator populations also increase, leading to greater predation pressure that keeps prey populations below a level where resources become exhausted. This represents a predator-limited ecological carrying capacity.

Disturbances such as bad weather, drought, wind, or fire create fluctuations in animal populations, but regulation counteracts these impacts, thus providing resilience. Ecosystems are adapted to natural disturbances and may even depend on them. Rewilding involves the restoration of essential natural disturbance regimes. If disturbances are too intense or too frequent, the system may shift to another dynamic equilibrium from which recovery may not be possible. Degraded ecosystems are vulnerable to these regime shifts, and enhancing their resilience through rewilding helps safeguard them against such dramatic changes.

Movement ecology (i.e. the use of space by wild animals) is determined by the interaction between their movement and their use of resources, and is thus mediated by habitat selection, the biotic interactions that include behavioural modification, predation, seasonality, and the intrinsic factors of the moving individuals, such as social group size, social group composition, and dispersal to new territory (Börger et al., 2008; Van Moorter et al., 2016). An animal's decision to move is a response to the need to satisfy its requirements for a mate, resources, or refuge. Animals can increase their use of a high-quality resource area by increasing the duration of their visit and/or the frequency of revisits after allowing for regrowth or repopulation. These processes ultimately determine home range size, a geographic area that is very roughly related to mammal size and thus energy intake. Ensuring connectivity and restoring animal movement, dispersal, and migrations are essential rewilding applications of this principle, allowing species to thrive and maintain their populations.

Box 2.3 Young people in rewilding

Rewilding is a transformative conservation movement that is particularly significant for young people in terms of biodiversity, climate resilience, and the legacy for future generations. The IUCN Youth Strategy emphasizes the role of youth in conservation efforts, and rewilding aligns perfectly with its goals. The following quotes and analysis are from a group of final year Geography undergraduates and serve as a reminder as to the importance of futures thinking in rewilding.

"Rewilding gives me some hope for our future… I know that rewilding has the potential to be a key part of restoring our ecosystems." Rewilding is increasingly recognised as a transformative conservation approach with the potential to restore ecosystems, enhance biodiversity, and build climate resilience. For young people, it represents not only a practical solution to environmental degradation but also a source of hope and empowerment. Rewilding is not just about ecological restoration; it is about shaping a sustainable legacy.

"Rewilding to me means not to take the planet back to what it used to be but is more about creating a new space which grows in a natural order." Involving young people in rewilding efforts is an investment in future environmental stewardship. Youth engagement ensures that the next generation inherits not only healthier ecosystems but also the knowledge and motivation to protect them.

"Young people are growing up with disappointment in our current leaders… I think our young people are going to become leaders with urgency for change." This generational shift brings with it a willingness to challenge conventional thinking and embrace innovative, nature-led solutions. Young people are uniquely positioned to lead this movement. Many are growing up with a deep awareness of environmental crises and a growing disillusionment with current leadership. This also highlights a gap in awareness. Despite the growing relevance of rewilding, many young people remain unfamiliar with the concept.

"Realistically, young people like me are aware rewilding has a future, but if I were to ask 80% of my friends about what they think, they likely wouldn't have an answer. I believe this is the issue." This points to the need for greater education and outreach to ensure that rewilding becomes a widely understood and supported movement.

"Participating in conservation projects allows us to see the tangible results of our efforts, fostering a sense of accomplishment and pride." Rewilding also offers a powerful antidote to the digital disconnection many young people experience. By engaging directly with nature, youth can develop a deeper appreciation for biodiversity and ecological processes. This hands-on involvement fosters curiosity, responsibility, and a sense of accomplishment.

"Rewilding can be done well or can be used as a green-washing term… [There is] hope in the ideas and science behind rewilding, but not in our ability or agency as a society to utilise it." Rewilding is not without its complexities with concerns about the term being misused or co-opted for greenwashing, noting that while the science is promising, societal willpower remains a barrier

"Young people should be more than advocates—they need to become active participants, driving rewilding initiatives through education, practical actions, and positive advocacy." Despite these challenges, the overarching message is one of optimism and agency. Rewilding empowers young people to become active participants in shaping a more sustainable and vibrant future.

Greater biodiversity and interactions between species at multiple levels in the food web contribute to stronger regulation, increased stability and ecosystem functioning (Soliveres et al., 2016). Some species have a disproportionately large impact on the ecosystem and are known as keystone species (Paine, 1980). Top predators fall into this category and can enhance biodiversity by controlling dominant species lower down the food chain (Terborg and Estes, 2010). Ecosystem engineers, such as beavers, create habitats that benefit many other species. The disappearance of species, especially keystone ones, can trigger a cascading effect throughout the food web, potentially causing the entire system to unravel (Estes et al., 2011). Reintroducing keystone species to restore lost interactions is an important strategy in rewilding. Many interactions in nature enhance the diversity and stability of ecosystems, including mutualism, commensalism, and parasitism (Mougi et al., 2012). In mutualism, both species benefit from each other, such as insects pollinating flowers. Commensalism involves one species benefiting while the other remains unaffected, such as when elephants clear dense vegetation, creating feeding niches for species such as buffalo and antelope. In parasitism, one species gains advantages at the expense of another.

Ecosystems are not static; they change over time due to environmental changes, particularly climate. Their dynamic equilibrium shifts, which is tracked by regulation. Rewilding should accommodate these long-term changes, allowing ecosystems to "move" and adapt instead of confining them within static boundaries. Providing adequate space and connectivity is essential to support the natural adaptability of ecosystems.

Finally, ecosystems that have persisted and functioned naturally for a long time serve as living libraries of knowledge. They provide fundamental data for understanding food web structures and ecological interactions. They are a benchmark against which human-impacted systems can be compared and inform restoration and rewilding of degraded ecosystems (Arcese and Sinclair, 1997).

2.3 Social-ecological systems and rewilding

Rewilding aims to restore ecological processes, species interactions, and landscape connectivity at scale. It enhances ecological resilience through interventions such as species reintroductions, habitat restoration, and changes in land management. But rewilding is not solely an ecological endeavour—it is also a social-ecological process. It requires humans to re-evaluate their relationship with nature, adapt practices to sustainable levels, and navigate the political, cultural, and economic dimensions of environmental change.

Social-ecological systems (SES) are complex, adaptive systems composed of interdependent human and ecological components (Berkes et al., 2003; Biggs et al., 2015). These systems are nested, meaning that they operate across multiple spatial and temporal scales—ranging from individual organisms to landscapes, and from local governance to global economic trends. Understanding SES is critical for rewilding, because it foregrounds the interactions between social values, land use, governance structures, ecological processes, and environmental change.

For example, a rewilding intervention such as predator reintroduction may have ecological implications (e.g., trophic cascades), but also social consequences related to human livelihoods, cultural identities, and institutional responses. These social and ecological elements do not exist in isolation—they are shaped by larger nested systems, including national policy frameworks, global markets, and bio-geophysical processes such as hydrological cycles or soil erosion.

Rewilding efforts should therefore be designed with careful attention to the historical and current dynamics of SES. This includes evaluating the condition and trends of key ecological components, land use history, the distribution of power and resource access, levels of human tolerance for other species, and how these factors may shift over time. Understanding the nested and dynamic nature of SES helps practitioners anticipate feedbacks, trade-offs, and leverage for transformation.

One useful framework for conceptualising change in SES is panarchy (Holling, 2001). Panarchy describes how complex systems are structured in nested hierarchies and how they evolve through adaptive cycles of growth, collapse, renewal, and reorganisation. Change in one part of the system—such as public attitudes (a fast variable)—can interact with slower variables like cultural institutions, ecosystem functions, or hydrological processes, with cascading effects across scales. These interactions are key to understanding the resilience of rewilding systems.

Resilience refers to the capacity of a system to absorb disturbance and rebound, retaining essentially the same function and structure. In rewilding contexts, this might mean the ability of ecosystems to recover from events like fire or flood. The threat of climate change, caused by anthropogenic activity, is putting pressure on natural systems, testing their capacity to maintain resilience. While rewilding can support mitigation, it raises questions about the ability of ecological communities and human institutions to adapt to new ecological realities caused by such long-term shifts. These shifts are beyond the realm of slower rates of change associated with more natural changes that systems are better able to evolve alongside and cope with. Critical to raise here, is that pushing ecological systems to their limits of resilience may result in irreversible tipping points. Progressing social systems towards being in support of and working with ecological systems is a key element of rewilding. Thus, rewilding advocates for transformation of SES that support ecological recovery.

Monitoring rewilding interventions through a panarchy-informed lens involves identifying both fast and slow variables. For instance, in a beaver reintroduction project, fast variables might include water flow changes or shifts in public perception, while slow variables might include sediment dynamics or institutional land use policies (Jones & Jones, 2023). This adaptive, multi-scalar approach helps ensure rewilding is grounded in systems thinking and capable of responding to both ecological feedbacks and societal shifts (see guideline 4).

2.4 Rewilding and climate change

Limiting global warming to the Paris Agreement's goal of 1.5 degrees Celsius above pre-industrial levels requires all nations to reduce fossil fuel emissions to near zero by, for example, transitioning to clean renewable energy sources and ending deforestation and degradation.

Rewilding can support this goal by restoring natural habitats through the critical function roles animals play in ecosystem processes that can lead to increased net ecosystem productivity and long lived, stable ecosystem carbon stocks including: seed dispersal; ecosystem engineering; trophic cascades; bioturbation; and nutrient cycling (Poulsen et al., 2017; Holdo et al., 2009). Rewilding can also make landscapes more resilient to climate change, for example, through beaver reintroduction that restore wetlands. Many of the reported rewilding carbon impacts are the consequence of restoring the reintroduced mammal species (e.g., buffalo) to their historic population sizes (Schmitz et al., 2023).

Carbon stored in ecosystems is quickly lost but only slowly regrown as biomass and soil carbon stocks increase with age. In forests, most of the biomass carbon is in the woody stems and roots of the larger, older, trees and deadwood biomass. Grasslands and boreal ecosystems have the majority (>80%) biomass carbon below ground (Lecomte et al., 2006; Bai and Cotrufo, 2022). Forests alone store some 650 Gt C with around 268 Gt C in the living component, which is four times what is left of the global carbon budget for 1.5 degrees (Friedlingstein et al., 2025). Avoiding emissions by preventing deforestation and degradation is therefore a critical mitigation action.

In addition to the mitigation value of their accumulated carbon stocks and the avoidance of emissions through reducing deforestation, there are other mitigation benefits to be gained from ecological restoration and rewilding. About one third of the additional accumulated CO_2 in the atmosphere is from the loss and degradation of ecosystems; mainly forests but also grasslands, woodlands, peatlands, coastal and marine ecosystems. This means that about two thirds of the world's remaining natural forests and other ecosystems have a significant carbon storage potential (Walker et al., 2022).

Measuring the specific contribution of a rewilding project to increasing ecosystem carbon sequestration and retention is however a long term and technically challenging task. Therefore, the climate-related benefits of rewilding are best viewed as contributing to the basket of benefits provided by healthy ecosystems (Morgan et al., 2022).

Guidelines for rewilding

3

Ocelote, Balam, Iberá 2023 © Sebastián Navajas, Fundación Rewilding Argentina

The following guidelines support rewilding practice to achieve the rewilding vision. These are derived from and underpinned by the ten guiding principles for rewilding (Carver et al., 2021; Appendix I) and adapted through workshops from an original set developed by Hawkins et al. (2024). The five guidelines have been integrated into the practical steps to implement rewilding given in Section 5, while a practical checklist is included in Box 5.1.

Guideline 1: Rewilding is nature-led, functional ecological restoration

A key part of the rewilding vision is to achieve ecological integrity and resilience to improve the persistence and autonomy of nature from human domination. Successful rewilding ideally leads to self-sustaining ecosystems where native species' populations are regulated through predation, competition, and other interactions. As such, rewilding is fundamentally about the restoration of natural processes with indigenous species and natural non-living components. Achieving an effective reinstatement of the autonomy of nature involves rethinking governance, intervention strategies, and ethical responsibilities, ensuring that the rewilding effort is a collaborative process amongst humans and with the existence rights of non-human species fairly represented.

Guideline 2: Rewilding aspires to large scale restoration through landscape-scale planning and collaboration across time and space.

Rewilding seeks to accommodate large-scale ecological processes, such as migration and natural disturbance regimes, demanding a holistic perspective that transcends traditional conservation boundaries, encompassing whole landscapes, up to continental and global scales. Rewilding at large scales requires a fundamental shift toward a more integrated and collaborative approach. It involves moving beyond localized interventions to embrace larger-scale perspectives, building on efficiencies gained through upscaling conservation efforts, forging strong partnerships across sectors and jurisdictions, incorporating diverse disciplines and knowledge.

Small-scale projects reflecting rewilding principles (focusing on less human control and encouraging natural processes) are useful for conservation and species diversity and could be viewed as a form of partial rewilding. They play a significant social role in engaging communities, inspiring and motivating people to create space for nature, and acting as catalysts for larger rewilding efforts. However, at these scales ongoing human management is necessary, as some essential species or processes may not be present to prevent degradation. While still valuable, it should be recognised that expanding the scale through collaboration and connectivity is a key rewilding ambition.

Guideline 3: Rewilding is informed by evidence and requires ongoing monitoring to inform adaptive plans

Rewilding is grounded in ecological science and requires continuous monitoring to inform adaptive management. Although there is an element of uncertainty due to the variability in natural systems, progress can be assessed against reference systems (i.e., anticipated outcomes and endpoints) to determine whether a system is on track, diverging, or shifting toward an unstable or alternative state, informing decisions on whether to continue, adjust, or redirect interventions. Effective rewilding also demands that appropriate social science approaches are employed to assess obstacles to human acceptance and support, such as education leading to better ecological understanding, access to compensatory systems, and the need to mitigate uncertainty, transforming fear into acceptance and positive outcomes. Achieving this goal will require profound ecological understanding throughout society. Despite the importance of monitoring, there remains a lack of standard monitoring guidance, though several approaches to monitoring rewilding have been proposed (see Section 6).

Guideline 4: Rewilding embraces dynamism and systems thinking

Rewilding acknowledges that both ecological and social systems are dynamic and interconnected. It emphasizes the importance of understanding how ecological processes and human societies influence one another. This calls for a holistic approach—one that integrates ecological knowledge and systems thinking into how we shape and manage social systems. Temporal change, both allogenic (external) and autogenic (internal), is a fundamental attribute of ecosystems and the evolutionary processes inherent in ecosystem function. Allogenic factors include storms, floods, wildfire, and large-scale changes in climate. Equally important are changes from autogenic processes, such as nutrient cycles, energy and gene flows, decomposition, herbivory, pollination, seed dispersal, and predation. Conservation planning for rewilding should account for the dynamic nature of ecosystems and be responsive to individual species range shifts and the disaggregation and assembly of genes, species, and biotic communities. Additionally, the interactions between ecological and social systems add layers of complexity and uncertainty of human acceptance and support, necessitating systems thinking to understand and manage these interconnected processes effectively.

Guideline 5: Rewilding is place-based and participatory

Rewilding is transformative and has a bold vision, but it is also a pragmatic approach to reinstating ecological integrity, balancing the vision with place-based, iterative progress. Participatory, place-based approaches integrate different knowledges and disciplines that intertwine cultural, economic, and governance structures. Meaningful and lasting ecological change cannot occur without considering the social dimensions that shape cultural perceptions of land use and influence conservation outcomes. Rewilding is thus both a vision and a strategy, requiring a balance between transformative ambition and pragmatic action, and which integrates social-ecological systems thinking, iterative progression, participation, and effective communication. This approach ensures that rewilding is both ecologically and socially sustainable, promoting meaningful and lasting change.

See further guidance on participatory approaches in Section 5.2.

Summary

4

American Bison in Yellowstone © Krista Lyons

At its core, rewilding helps nature heal—by protecting Earth's remaining wild places and restoring the life-supporting functions of nature across connected land and sea. Rewilding has a long-term view, and embraces natural solutions to environmental, social, and economic challenges. It is also an ethical shake up, forcing a reconsideration of our role within life on Earth.

To reduce degradation, rewilding initiatives need to think creatively about shaping new opportunities for local livelihoods and the wider economy which are anchored in a more secure future with improved ecological integrity and increased resilience to climate change. Rewilding projects reinstate natural processes to protect the rights and needs of nature. However, we need to ensure the rights, needs and values of local communities and Indigenous peoples are incorporated, particularly as local and Traditional Ecological Knowledge (TEK) can support rewilding efforts (Section 5.2; Box 5.3).

Acknowledging that rewilding can take place at various scales—from individual conservation areas to continental scale—these guidelines promote a comprehensive and interconnected approach for achieving a wilder world. Restoring ecological integrity requires collaboration across numerous stakeholders including, but not limited to, policymakers and government (at local, regional, national, and international scale) conservationists and related scientists, NGOs, local communities, and Indigenous peoples, highlighting that ecosystem recovery is not an isolated endeavour. The success of rewilding relies on cohesive policy and practice, grounded in shared objectives of restoring nature and ecosystem function, fostering coexistence between humans and nature, and addressing the challenges of habitat degradation and climate change.

Central to rewilding is the empowerment of nature to reclaim its autonomy by minimizing human interventions and allowing ecosystems to operate with fewer constraints. This approach embraces ecological processes such as natural disturbances, ecological succession, trophic dynamics, and strategic species reintroductions to bolster ecosystem integrity.

These guidelines focus on establishing self-sustaining ecosystems that enhance planetary wellbeing and support a more harmonious human-nature relationship on a thriving planet where humans support and exist in a more natural and healthy system. Central messages from Part 1 of these guidelines are:

1. **Rewilding is a Response to a Global Ecological Crisis.** Biodiversity loss, ecosystem degradation, and the crossing of planetary boundaries have reached critical levels. Rewilding offers a hopeful, science-based strategy to reverse these trends by restoring ecological integrity and resilience.
2. **Rewilding is Nature-Led, Human Enabled.** It prioritizes the autonomy of ecosystems and the agency of non-human nature. Human involvement is supportive, not directive—facilitating conditions for nature to recover and self-regulate.
3. **Restoring Ecological Processes is Central.** Rewilding focuses on re-establishing natural processes like predation, succession, dispersal, and disturbance. Keystone species and ecosystem engineers play a vital role in rebuilding functional food webs and ecosystem dynamics.
4. **Rewilding Requires Large-Scale, Landscape-Level Thinking.** Effective rewilding must operate across broad spatial and temporal scales. Connectivity between habitats is essential to support species movement, genetic diversity, and climate adaptation.
5. **It is Evidence-Based and Adaptive.** Rewilding is grounded in ecological science and informed by continuous monitoring. Adaptive management is key—plans must evolve in response to ecological feedback and social dynamics.
6. **Rewilding Embraces Dynamism and Systems Thinking.** Ecosystems are dynamic and ever-changing; rewilding must accommodate this variability. Systems thinking helps integrate ecological, social, and political dimensions for long-term success.
7. **It is Place-Based and Participatory.** Rewilding must be tailored to local ecological and cultural contexts. Inclusive engagement with communities, Indigenous peoples, and stakeholders is essential for legitimacy and sustainability.
8. **It Demands a Paradigm Shift in Human-Nature Relationships.** Rewilding challenges anthropocentric worldviews and promotes coexistence with wild nature. It aligns with emerging ethical frameworks like multispecies justice and the Rights of Nature.
9. **A Shared Vision and Common Principles are Crucial.** The IUCN guidelines provide a unifying framework to ensure consistency, integrity, and effectiveness across diverse rewilding efforts. They are built on ten guiding principles and five practical guidelines to support implementation.
10. **Rewilding is a Tool for Global Sustainability.** It contributes to climate resilience, biodiversity recovery, and the UN Sustainable Development Goals. Rewilding is not a silver bullet but a powerful complement to traditional conservation and restoration strategies.

Part two

Blue-grey tanager, Tortuguero National Park © Gregoire Dubois

Implementing rewilding projects

5

Hazel Dormouse © University of Cumbria/Boom Project

5.1 Strategic planning and implementation through theory of change

The Livelihoods and Landscapes Strategy (2007–2011), led by IUCN, used a Theory of Change (ToC) approach to explore what worked in local forest management—and why (IUCN, 2009, 2012). It aimed to influence positive shifts in behaviours, relationships, knowledge, and attitudes among stakeholders at both subnational and national levels. The strategy used a four-step participatory planning process, with the ToC serving as a shared framework to define desired outcomes, the steps needed to achieve them, and the roles of key actors.

This ToC framework has since been adapted to support rewilding projects. It offers a structured approach to planning, implementation, and evaluation, helping teams map out how specific actions contribute to broader rewilding goals. The methodology emphasizes testing assumptions, engaging stakeholders, and fostering transparency throughout the project lifecycle. The five stages for developing a rewilding ToC are shown in Figure 5.1 (adapted from Hawkins et al., 2024).

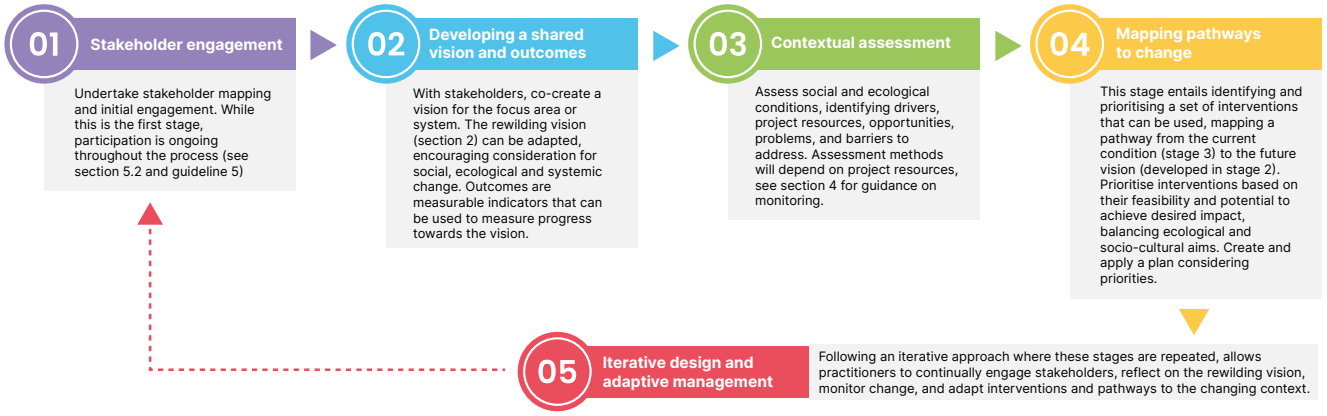


Figure 5.1. Five steps to develop an adaptive, project-specific theory of change.

1. Stakeholder Engagement

Undertake stakeholder analysis and mapping and engage a diverse range of stakeholders, including local communities, conservationists, policymakers, and scientists. While this is presented as the first step in creating a ToC, stakeholder engagement is a continuous process to build trust and enhance the potential for rewilding through co-developing plans that in the process engage, inform and educate stakeholders (see section 5.2 on participatory rewilding). This inclusive approach ensures that multiple perspectives are considered, fostering a sense of ownership and collaboration. Who to engage will depend on the scale of the project, which can be adapted as projects expand in further iterations of the ToC.

2. Developing a Shared Vision

Collaboratively define the desired long-term outcomes of the rewilding project. This shared vision serves as a foundation for aligning objectives and expectations among stakeholders. Reflect on the transformative and visionary intentions of rewilding and adapt the rewilding vision (section 2.1) to your specific initiative. This stage encourages systems thinking by recognising systemic, ecological, and socio-cultural change. Once a vision has been established, outcomes are mapped against the qualities identified in the vision, providing potentially measurable indicators to monitor progress towards the vision (see for example Hawkins et al., 2024).

3. Contextual Assessments

Conduct thorough assessments of social and ecological conditions in the focal area, including assessment of the current ecological state and the drivers of change, specific needs, problems, or barriers to address. This stage encourages initiatives to assess the specific local conditions to inform rewilding plans, rather than trying to replicate approaches developed in other contexts. This reflects the intention for rewilding to be place based (guideline 5). Identify opportunities and resources available, such as land, potential partnerships, or funding sources. This stage serves as ongoing monitoring, as the changing context is monitored through each iteration. See section 6 for further guidance on monitoring and evidence.

4. Mapping Pathways to Change

Based on the contextual assessments, create a long list of potential interventions that may be needed to progress ecological restoration and overcome identified barriers. Table 5.1 can be used to inform this. The initial list of interventions are prioritized based on current feasibility, allowing mapping of causal pathways leading from current conditions to the envisioned rewilded state. Depending on the scale of the initiative, the current ecological state, the governance and institutional regime, and the resources available, several interventions

may be planned, one example being the building of partnerships to increase the scale or scope of the initiative and linking with local businesses to integrate sustainable funding mechanisms.

The vision, context assessment and map of interventions provides a roadmap from the current context to the rewilding vision, forming a ToC for the project.

5. Adaptive Management

Once the ToC has been developed, interventions will be applied over an appropriate timescale. Implement a flexible management approach that allows for adjustments based on monitoring data and emerging insights, and which will ensure that the rewilding process remains responsive to challenges and opportunities. Thus, the ToC can be updated as more data is collected and knowledge evolves by repeating stages 1-4, the iterations helping to keep the project on track. While the best approach may not always be known, ongoing reflection and knowledge sharing can contribute to improving rewilding practice.

This adaptive process also reflects that plans are likely to shift around stakeholder engagement and emerging opportunities for funding or partnerships. Funding and resources through partnerships are fundamental for rewilding and can be encouraged throughout the process of stakeholder engagement, including securing private or public funding, promoting policy incentives, and integrating sustainable livelihood initiatives (see section 5.3 for more on funding).

Box 5.1 Implementing rewilding guidelines: a practical checklist

#1. Nature-led, Functional Ecological Restoration

- Identify Missing Biota and Key Species: Determine missing biota, keystone species and ecosystem engineers that can restore trophic interactions.
- Identify diminished or missing natural processes (e.g. disturbance regimes)
- Identify human-caused barriers preventing rewilding (e.g. (over-) harvesting, habitat loss, pollution, invasive species) and remove those barriers.
- Reduce Human Control: Allow natural processes to shape ecosystems, minimizing human interventions.
- Monitor and Adapt: Continuously monitor ecological changes and adapt management practices accordingly.

#2. Large-scale Restoration through Landscape-scale Planning and Collaboration

- Plan at Landscape Scale: Develop plans that consider core areas, connectivity, and co-existence.
- Collaborate Across Scales: Forge partnerships with government agencies, private landowners, research institutions, and local communities.
- Integrate Small-scale Projects: Link smaller initiatives to broader conservation landscapes to enhance ecological function.

#3. Evidence-based and Adaptive Management

- Use Reference Ecosystems: Base rewilding targets on little disturbed natural baselines and evidence from historical data and expert knowledge (see section 6.3).
- Implement Monitoring Frameworks: Use a variety of methods, including remote sensing, eDNA, and participatory monitoring (see section 6).
- Adapt Plans: Adjust interventions based on monitoring data and emerging insights.

#4. Embrace Dynamism and Systems Thinking

- Facilitate Space and Connectivity: Ensure adequate space and connectivity for ecological processes to unfold naturally.
- Consider Climate Change: Plan projects with medium- to long-term time scales that account for predicted climate changes.
- Integrate Systems Thinking: Reflect on, identify and manage complex interactions between ecological and socio-political factors.

#5. Place-based and Participatory Approaches

- Conduct Contextual Assessments: Assess local social-ecological conditions to inform rewilding plans.
- Engage Local Communities: Involve stakeholders in decision-making processes through consultation, collaboration, and co-management (see section 5.2).
- Communicate Benefits: Highlight the instrumental benefits of rewilding, such as ecosystem services, climate resilience, and mental health.

5.2 Participatory rewilding

In its origins in North America, rewilding operated in a culture of enablement, bringing together citizen conservationists and conservation biologists to craft an evolved idea of conservation, and to apply science to the design and stewardship of protected areas (Foreman 2004). The approach of engaging directly with many regional conservation groups in participatory workshops to develop Wildlands Network Designs based on rewilding was described as "collective impact" a collaborative approach using a structured process that led to a common agenda, shared measurement, continuous communication, and mutually reinforcing activities among all participants (Hannibal, 2013).

While people relate to nature in diverse ways within their local contextual setting, there are some general considerations that may be a barrier to participation, such as the transformation of land use in areas that are important to people; and that cultural and affective connections with long-absent species such as large predators may have been lost and people may fear the unknow consequences of their return.

Interdisciplinary collaboration between social and biosciences through social feasibility studies can enable an understanding of people's needs and views in respect to the proposed changes and make meaningful participation a reality.

- **Building long-term relationships with the diverse interested groups who may benefit or be affected by a rewilding project**. One method to approach this would be to develop a Social Landscape Analysis (SLA) which is described in section 6.4. The understanding that follows can inform participatory and transparent processes that provide opportunities for all groups, including minorities and under-represented people to take part in decision-making across all phases of a rewilding project [see Luyet et al. (2012) for stakeholder identification and involvement].
- **The establishment of a permanent participatory process**. This should involve a permanent communication forum for the exchange of news, information, questions, and suggestions between project management and communities of interest. When people feel they have not been heard and their needs have not been respected they are more likely to reject or retaliate against project decisions (Mogomotsi et al., 2020; Watkins et al., 2021) while clear two-ways communication builds trust (Watkins et al., 2021; Marino et al., 2024).
- **Mutual collaboration across sustainable land uses**. The impact of people on nature varies according to culture and to social equity. In the Global North the restoration of ecosystem dynamics for rewilding may require arresting and reversing human interventions, impact, and control (Tanasescu, 2017; Pettorelli et al., 2018) while in other regions of the globe, the way of life of Indigenous people as they engage in human-wildlife interactions may proportionately have less impact on ecological integrity and ecosystem resilience (Pascual et al., 2023; Derham et al., 2025). Rewilding must be cautious not to jeopardise this by recruiting these areas without consent and participation (Ferdinand, 2021). Ecological feasibility studies can benefit from local or TEK to complement science (Carver et al., 2021; Pascual et al., 2023). Overall, mutual collaboration should be based on equity (see box 5.2); ensuring compensatory opportunities are created not only to provide income streams to landowners, but also to support groups who rely on the primary production from dynamic natural ecosystems for existence.
- **Identifying together the value of potential benefits**. Developing mutual benefits involves understanding both material (ecosystem services, income/job generation, training, infra-structure, compensation) and non-material (health and well-being, cultural, psychological, spiritual, relational) values that matter to communities of interest (Thondhlana et al., 2020). Here both the intrinsic value of all species and ecosystems and the relational value that exists in the connection between people and nature have weight (Mace, 2014; West et al., 2020).
- **Opportunities for capacity building** may be valued as a form of personal development that benefit people, project, and community. Capacity building though volunteering, training, education, and research may reinforce positive human-wildlife interactions, nurturing people's connection with nature, developing knowledge and understanding of natural systems, and providing support to sustainable livelihoods (Noss, 2020).
- **Education, awareness and communication programmes, and engagement strategies**. These benefit from an understanding of people's values, attitudes, feelings, beliefs, and knowledge in relation to different elements of the project. Support from social psychology and human dimensions research should help increase effectiveness of participation (Consorte-McCrea et al., 2019, 2022).

Rewilding offers a powerful narrative of positive action to increase ecological integrity that motivates and inspires people's support. The potential of rewilding as a tool to tackle and to mitigate the impacts of climate change may also be harnessed to build support for rewilding projects. It must whenever possible promote social-ecological justice as part of environmental sustainability, addressing the drivers of habitat destruction while supporting communities that already respect nature and creating opportunities for new sustainable economies.

Multispecies Justice (MSJ) is an emerging ethical and political framework that, alongside the Rights of Nature movement, challenges human-centred justice by recognizing the moral and political significance of all beings—human, animal, plant, and ecological (see Box 5.4). While Rights of Nature (Box 5.5) seeks legal personhood for ecosystems, MSJ takes a broader approach to relational justice across species and systems, aiming to reimagine justice in a time of planetary crisis despite ongoing theoretical and practical challenges. Broader legal issues regarding rewilding are covered in Box 5.6.

Box 5.2 Governance and the exercise of power in rewilding

Alison Martin and Anke Fisher

While rewilding is about natural ecological processes underpinned by ambitions to champion and facilitate nature's autonomy, rewilding is, at its heart, a human aspiration (Drenthen, 2018; Wynne-Jones et al., 2018). Rewilding, somewhat counterintuitively, tends to be shaped by the multilayered interactions between human actors' choices, judgements, values, and interests and thus can be a very managed process (Martin et al., 2021, 2023). This complexity is encapsulated by the notion of governance, which includes formal structures e.g., legislation, but also informal norms and decision-making processes, and a wider range of actors than has traditionally been the case in conservation (Evans and Thomas, 2023). Rewilding guidelines acknowledge that rewilding requires local engagement and community support, however, research demonstrates that rewilding practice often happens in the spaces between guidance and regulation and that control and ownership of land are of critical importance, which can make meaningful local engagement and collaboration challenging (Martin et al., 2023). Key governance considerations for practitioners therefore include recognising the power embedded in land ownership and its influence in rewilding decision-making; moving beyond information and consultation to more meaningful participation to achieve good governance; and working to improve collaboration between landowners to achieve rewilding at scale. Developing a rewilding project, with shared knowledge, ideas, and practice, requires a constructive engagement with disagreement. As such there are many challenges with local engagement and collaboration associated with multi-landowner sites, making rewilding easier in single landowner situations such as large game reserves in Africa, large private estates in the UK or large ranches in North America. Active exploration of differing values and worldviews can help in developing creative solutions to conflicts (Hallgren et al., 2018; Pascual et al., 2021). Ultimately, effective rewilding governance demands a degree of compromise, including potentially with regards to ecological aims. Understanding how rewilding is governed, who is empowered in rewilding efforts and how the benefits and costs of rewilding are realised and distributed, is essential if rewilding is to succeed.

Box 5.3 Indigenous knowledge and rewilding

Maddison Miller, Dharug, The University of Melbourne

Rewilding as a term in an Indigenous context can be polarising and confusing, and therefore place-based and participatory approaches (guideline 5; section 4.2) are especially important when working with Indigenous or First Nations groups. For many Indigenous peoples the concept or idea of 'wild' is uncared for, unhealthy country (Kearney et al., 2023). For other Indigenous peoples wild is a term with no bearing or relevance to their homelands. Wild suggests a new undiscovered frontier which can be at odds with the deep relational and reciprocal ways of knowing (Mata et al., 2020). There can be fundamental differences in how wild is conceptualised in different knowledge systems. For thousands of years Indigenous peoples have cared deeply for the lands and waters to which they belong. The decline of biodiversity because of colonisation, industrialisation and capitalism is a decline in ecosystems that are a direct result of countless generations of ancestral care.

Instead of perpetuating injustice, the transformative vision of rewilding offers the potential to align with Indigenous-led land care. For instance, a key intervention used in rewilding is species reintroduction. Indigenous led reintroduction of species to ecosystems that once held them has the potential to provide many cultural and ecological benefits. From an Australian Indigenous perspective, species hold important cultural and social roles. They can be viewed as kin, part of a vital relational network that holds knowledge passed down and strengthened over generations (Cumpston, 2023). Examples of Indigenous led and directed rewilding show that through an Indigenous framing of bringing species back into relation with Country there are many social, cultural, and ecological benefits (Derham et al., 2025).

The bringing together of Indigenous and Western knowledges is uncomfortable in many ways. It requires us to critically examine the very ways in which we know and asks us to interrogate the power structures that tell us what knowledge is important. Bringing species back into relation with land and waters is a process of healing and 'rematriation' (the process of Indigenous peoples restoring relationships with their ancestral lands and reclaiming their sovereign relationship to sacred lands, waters, and territories). Bringing species back into Country has not only ecological benefits but is an important part of strengthening Indigenous knowledge systems and ways of knowing that are inexorably entwined with healthy ecosystems. Western framings of rewilding must therefore confront the paternalistic and colonial roots of conservation movements that uphold a doctrine of people separate from nature (Fletcher et al., 2021). Bringing species back into relation with their lands and waters must go beyond token engagement with Indigenous peoples, and engage deeply with ways of knowing, being and doing that are drawn from Indigenous relational ontologies.

Box 5.4 Multi Species Justice

Danielle Celermajer & Christine Winter

Multi Species justice (MSJ) theory departs from dominant western theories of justice, which take the human individual as the sole subject of justice. MSJ insists that all animal (including human) beings, and vegetable, elemental, and mineral matter are morally and politically considerable, meaning that they are subjects of justice and that human institutions need to be constructed and to operate in ways that are not impeded, but rather enable their functioning and flourishing. The basis for their being subjects of justice according to MSJ is twofold. First, the default assumption should be that all Earth beings and not only humans have intrinsic value. Second, all Earth beings are bound in entangled relations that enable them all to function and flourish. Intrinsic and systemic value are mutually constitutive, not conflictual (Celermajer et al., 2022, 2025).

MSJ is also a situational theory that is being articulated in the context of the polycrisis, where dominant forms of human life are resulting in dangerous climatic instability, exploding rates of species extinctions, wide-spread and violent terraforming (including undersea), planet-wide catastrophic un-natural disasters, toxin-poisoned soils, waters, and bodies, etc., are a result of a relentless focus on human wellbeing–in the sense primarily of financial wellbeing at the expense of the environment–that assumes (some) human beings may exploit the environment without accounting for either its intrinsic worth nor the entanglement of human welfare with planetary health. Multispecies justice suggests a radical reorientation away from a focus on the isolated human subject towards a one that values and accounts for relationality between all planetary being. Practically this has implications beyond philosophy, theory, and the household and into the political arena.

While MSJ insists that a 'radical reorientation' is required, it refutes universalist claims about 'humans' or 'human societies' and points to the many historical and extant Indigenous societies who care for and enhance multispecies flourishing through well-established protocols, practices and procedures.

In the context of 'rewilding', MSJ affirms attention to socio-ecological relations, emphasizing that it is human institutions that generate violence, harm and injustice. As such, and in the context of the polycrisis, the path towards earthly flourishing requires a transformation of dominant institutions of law, politics, culture and economics such that they are organised around supporting and nourishing just and sustainable relations for all Earth beings (Celermajer et al., 2022, 2025).

Box 5.5 Rights of Nature

Steve Carver & Ian Convery

Rights of Nature (RoN) is a transformative legal and ethical framework that recognizes ecosystems as rights-bearing subjects, challenging traditional legal systems by asserting Nature's inherent and inalienable right to exist, thrive, regenerate and evolve independently of human interests. Rooted in Indigenous worldviews and ecological philosophy, RoN has gained global traction, with countries like Ecuador and Bolivia embedding it in their constitutions (Gilbert et al., 2023).

In rewilding, RoN offers a strong foundation for ecological restoration (Hertel and Luther, 2023). While rewilding has traditionally focused on ecological science, integrating RoN introduces legal and moral legitimacy. Recognizing ecosystems as legal "persons" allows rewilded areas to be protected from exploitation. For example, a rewilded forest could be granted rights to regenerate and maintain biodiversity, with local communities acting as legal stewards (or any other community where relevant). In January 2023, Jefferson County, Washington State became the sixth local government to declare inherent rights for the Southern Resident Orcas of the Puget Sound, where, critically endangered, threatened by pollution, vessels and salmon shortages, fewer than 80 of them remain. Following shortly afterwards in March 2023, the country of Panamá passed a law granting inherent rights of sea turtles and their habitats, recognising their rights to "live, have free passage in a healthy environment, free of pollution and other anthropocentric impacts" (Republic of Panama, 2023). As recently as February 2025, Lewes District Council, Southeast England granted the Rights of the River Ouse Charter, a landmark outcome for the UK. This sees an extensive network of smaller streams spanning across Sussex, join a powerful international collection of rivers, to be recognised as 'living entities' with 'intrinsic rights to exist'. This grants rights to rivers to flow, thrive and be free of pollution.

RoN aligns with rewilding's core principles, such as valuing all species in their own right and restoring natural processes (Carver et al., 2021). It also addresses socio-political challenges, supporting community engagement and legal backing, especially where environmental degradation intersects with Indigenous rights (Hertel and Luther, 2023).

Conversely, rewilding is also a core tenet of RoN, as it represents natural regeneration of Nature and her ecosystems, emphasizing Nature's autonomy and reducing human control (Hertel and Luther, 2023). On the whole, RoN is a natural philosophy with rewilding at its very centre.

By shifting from a utilitarian to an ecological justice perspective (see Box 5.4), RoN reconfigures environmental governance to prioritize ecological integrity (Gilbert et al., 2023; Carver et al., 2021; Kauffman, 2021). Together, RoN and rewilding form mutually reinforcing frameworks: RoN provides legal scaffolding, while rewilding offers practical pathways to realize Nature's rights. This partnership envisions a future rooted in respect, reciprocity, and resilience.

Box 5.6 Rewilding Law

Lifescape Project

Rewilding intersects with legal systems in complex and evolving ways. Because rewilding initiatives often involve landscape-scale ecological transformation, they raise a suite of legal considerations spanning land tenure, planning law, species protection, and public access rights. Unlike traditional conservation law, which tends to focus on the protection of existing species and habitats, rewilding challenges prevailing norms by restoring dynamic ecological processes and facilitating species reintroductions.

At the international level, instruments such as the Convention on Biological Diversity, the Bern Convention, and the Birds and Habitats Directives influence national laws relevant to rewilding. However, tensions can arise where these frameworks prioritise fixed conservation baselines over dynamic ecological processes. Legal tools like conservation covenants, environmental planning regulations, and species licensing regimes are crucial for operationalising rewilding legally and responsibly.

The Lifescape Project and partners have pioneered efforts to bridge these legal gaps. They advocate for a new body of rewilding law - a coherent legal framework that enables and protects rewilding activities while balancing environmental integrity, social justice, and landowner rights. This includes novel mechanisms for long-term site protection, like the Legal Mechanism, which allows landowners to retain use rights while conferring ecological enforcement powers to conservation bodies. As the field matures, there is growing recognition that supportive legal innovation is essential to scaling rewilding effectively and ethically. For more detail, visit the Lifescape Project's dedicated rewilding law hub: https://lifescapeproject.org/rewilding-law/

5.3 Securing and managing funding for rewilding

Rewilding is a cost-effective approach to nature's recovery which aims to decrease the need for human management by restoring absent or weakened ecosystem functions and then letting nature lead (Schou et al., 2021). This is particularly relevant in areas where the level of degradation of ecosystems or sea/landscapes is such that the conservation of target species, habitats or ecosystem services has become dependent on recurring and costly human management.

Although rewilding promises to be cost-effective in the long term, there can be significant costs to initial interventions, and to trigger and push through a shift from management-intensive conservation to rewilding, at the appropriate scale for the ecosystem functions that need to be restored.

The cost of rewilding

Rewilding often involves loss of income for landowners shifting from extractive to regenerative land uses and may also lower the land's financial asset value (Faure et al., 2024). Additionally, rewilding is at a disadvantage when existing subsidies favour dominant land use sectors like forestry, farming, and fisheries. The reintroduction of keystone species may further increase costs for local communities, who must protect assets such as livestock and crops.

To address these challenges, public funding—through grants or fiscal incentives—can help offset initial losses. Environmental markets also present emerging opportunities, enabling landowners to generate income via carbon and biodiversity credit schemes (zu Ermgassen and Löfqvist, 2024). However, to scale rewilding effectively, existing subsidies must be redesigned, which could reduce public spending but impose direct costs on established industries, with potential consequences for consumer prices and social equity (Massenberg, 2025).

Despite these trade-offs, rewilding can foster new livelihoods through ecotourism, sustainable harvesting, and related sectors, such as the sale of branded local products (Rewilding Portugal, no date). Long-term financing is essential for operations and continuous monitoring, and while technologies may lower some costs, human oversight remains indispensable. Large-scale, impactful rewilding will ultimately depend on sustained investment from governments, NGOs, and the private sector.

Multiple sources of finance for on-the-ground action

Due to its interdisciplinary nature and wide breadth of stakeholders, not all rewilding projects can be funded in the same way. In general, projects will need one if not all of the types of funding support shown below to be implemented:

- **Public funding:** Public funding can be hard to track in multi-layered budgets associated with government policies on biodiversity, climate change mitigation, desertification, or other goals. Public funds are also available as grants and subsidies from international agencies, or multilateral funds like the EU's LIFE programme or the Global Environment Facility. Accessing these funds can be challenging due to complex processes, co-financing thresholds, and slow disbursement. Sub-granting from larger to smaller NGOs can be more practical for many rewilders.
- **Sectoral funding:** Rewilding's long-term, multi-faceted approach may not align well with sector-specific, short-term public funding. Successful initiatives often manage multiple grants for different interventions. Some sectoral subsidies can support rewilding, such as support for reducing or removing grazing and closer-to-nature forest management, benefiting landowners or NGOs.

- **Philanthropy and private funding:** Philanthropy, including donations and grants from wealthy individuals and private foundations, is another major funding source for NGOs (zu Ermgassen et al., 2025). Conservation trust funds provide a steady income stream from invested endowments. Crowdfunding is also a potential source (e.g., Adair and Ashmole, 2022), requiring a large supporter base or high-profile campaigns to achieve scale.
- **Private sector:** Corporates with sustainability commitments, such as "nature positive" or "net zero," can provide significant funding for rewilding. These commitments are generally met through the following options: traditional corporate social responsibility (CSR) and brand sponsorships; carbon credits or biodiversity/nature credits to certify and disclose their contributions to biodiversity recovery (Maron et al., 2025); loans, equity, and financial instruments like green and blue bonds from banks, insurance companies, and other institutions; blended finance, combining commercial, public, and philanthropic funding, that can de-risk investments and adjust the scale and duration of funds for rewilding, despite its complexity and high transaction costs; and direct investment in local rewilding projects or businesses.

For further case studies and guidance see (Merckx and Pereira, 2015; Dwyer and Quiroz, 2024; Faure et al., 2024; Kennedy, 2024; Rewilding Europe, 2024b; zu Ermgassen and Löfqvist, 2024; Natura Connect, 2025).

5.4 Rewilding interventions

While an aim of rewilding is to reduce the need for ongoing management by enhancing the sustainability and resilience of wild systems, it often entails active interventions—particularly in degraded or highly modified landscapes. These interventions vary in scale and purpose, but all contribute in some way to the overarching goals of ecological recovery, process restoration, and co-existence with wild nature.

Rewilding approaches can be broadly categorised into **passive and active strategies**, each playing a crucial role in restoring ecological integrity and enhancing biodiversity. **Passive rewilding** relies on the self-recovery of ecosystems, allowing natural processes such as plant succession, natural disturbance, and species dispersal to re-establish ecological dynamics over time. It typically involves minimal human intervention, focusing on removing pressures such as grazing, logging, or hunting, and allowing landscapes to regenerate naturally. This approach can be particularly effective in areas with residual ecological integrity or where human impact has been reduced, supporting long-term ecological resilience.

In contrast, **active rewilding** involves deliberate human interventions to accelerate ecological recovery where natural processes alone are insufficient. This may include species reintroductions (Box 5.7), habitat restoration (Box 5.8), invasive species control, and infrastructure modifications to restore landscape connectivity. Active rewilding often targets keystone species whose presence significantly influences ecosystem structure and function, such as predators or large herbivores, to reinstate lost trophic interactions and ecological processes.

Both passive and active approaches are complementary, with passive rewilding providing a low-cost, long-term pathway for ecological recovery, and active rewilding addressing immediate biodiversity challenges and restoring ecological functionality at a faster pace. The choice between these approaches depends on the specific context, including the degree of landscape degradation, socio-political factors, and the targeted conservation outcomes. Together, they provide a flexible framework for restoring nature at scale, aligned with the overarching goals of the *Guidelines for rewilding*.

Table 5.1 below outlines a range of rewilding strategies and interventions, grouped according to how they contribute to ecological, spatial, and socio-cultural dimensions of rewilding practice. Where applicable, examples from relevant projects and existing guidelines are included for reference. This is not intended to be a comprehensive list, but rather an indicative overview to support context-specific planning and action.

The listed interventions can be grouped into three broad thematic areas—Spatial Planning, Ecological Restoration, and Social Systems. This illustrates the cross-cutting, interdisciplinary nature of rewilding practice and its capacity to integrate diverse forms of knowledge and action.

Table 5.1: A list of interventions or strategies that are associated with rewilding, demonstrating how these are intended to contribute to rewilding aims and the actions that are associated with these. Related projects and guidance are suggested for further reference. This list provides a useful tool to inform rewilding practice and can be used as a starting point for planning. As rewilding is place-based, the interventions may not be suitable in all contexts and there may be other suitable interventions that are not listed here. This table was adapted from Hawkins et al., 2024) and through the guidelines consultation process.

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Protected areas: restoring or repurposing existing protected areas or establishing new protected areas. To protect areas (of land or sea) from unsustainable human activities, to promote wildlife autonomy or other ecological aims of rewilding, forming core areas of regional network designs, and contributing to achieving other rewilding aims.	• Purchasing, reallocating, or legally protecting areas of land to create protected (core) areas for rewilding. • Engaging existing private landowners, managers, communities, or other relevant stakeholders/ decision makers to promote protection of areas for nature and rewilding, including restoration or improvements of existing protected areas. • Engage landowners, managers, communities, or other relevant stakeholders/ decisionmakers to restrict development, exploitation, or activities that cause ongoing ecological degradation. • Limit access or certain types of use, for example through fencing, signage, or law enforcement. • Protecting areas where natural disturbance or habitat does not conflict with human land use.	• North American rewilding proponents view Wilderness Areas and National Park Wilderness as the highest forms of protection, emphasizing fully protected areas free from commercial exploitation as opportunities for core areas in rewilding networks (Noss et al., 1999). However, this ideal is not universally available, and so there must be other policies to re-establish nature into anthropogenic landscapes and society or culture. • While protected areas remain essential for conservation, their role in rewilding must evolve. Moving beyond fenced enclosures to integrated, connected landscapes could foster more resilient ecosystems and challenge conventional ideas about human-nature relationships. • Discrepancies between marine and terrestrial protected area definitions have caused confusion. A single, broadly accepted definition can provide clarity and direction for conservation efforts. • Protected areas should not be static entities but dynamic spaces that contribute to broader landscape-scale connectivity.	• IUCN WCPA guidelines for protected areas and other guidance (Noss et al., 1999; European Commission, 2013; IUCN WCPA, 2013; Rewilding Institute, 2018; Verschuuren et al., 2021; Carruthers-Jones et al., 2022) • Rewilding Argentina (Pettersson and de Carvalho, 2021; Donadio et al., 2022) • Carrifran Wildwood, Scotland (Adair and Ashmole, 2022) • Gorongosa National Park, Mozambique (Pringle and Goncalves, 2022) • Terai Arc Landscape, Nepal/ India (Ram Bhandari and Raj Bhatta, 2022) • Swiss National Park system (Kupper, 2013) • Massane National Nature Reserve, France (Massane Forest, no date)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Connectivity, corridors, and buffers. Expand habitat to accommodate nature around or between protected areas, promoting connectivity, wildlife movement, and coexistence. Connectivity is a fundamental principle in rewilding, ensuring that landscapes function as cohesive ecological networks rather than isolated patches. Large-scale connectivity is crucial for allowing species to move freely, maintain genetic diversity, and adapt to environmental changes.	• Removing barriers to natural processes, especially dispersal, e.g., fencing, dams, or reducing anthropogenic disturbance. • Constructing wildlife bridges or underpasses. • Engaging with stakeholders in target areas to influence land use decisions. • Mitigating human-wildlife conflict in target areas, including engagement to promote coexistence. • Restoration of habitat in target areas. • Identifying opportunities for corridors, e.g., riparian zones, and influence land use in target areas. See landscape mapping. • Designing urban spaces to be more permeable to wildlife movement (i.e., via the establishment of green corridors between habitat patches and over roads and railways) to promote passive recolonization of less mobile species, to be used in conjunction with translocation efforts.	• Infrastructure in and around protected areas, particularly roads, acts as a major obstacle to ecosystem connectivity and a conduit for human disturbance. • Fencing disrupts natural movement patterns, fragmenting habitats and limiting ecosystem processes, while fencing is an intervention that is still used in rewilding to mitigate human-wildlife conflict or to exclude invasive or dominant species. • Alternative approaches, such as coexistence-based models, allow for greater species mobility. Examples include US ranches where private landowners tolerate the presence of large predators like mountain lions and wolves without restricting their movement. • Large-scale connectivity can be achieved by linking small-scale rewilding initiatives through shared approaches and coordinated efforts. Over time, connecting the dots of individual projects can create expansive networks that deliver significant ecological benefits.	• Connectivity guidance (Dobson et al., 1999; Fernández et al., 2020; Hilty et al., 2020; Carruthers-Jones et al., 2022) • Yellowstone to Yukon, US/Canada (Hilty et al., 2022, 2024) • Affric Highlands, Scotland (Trees for Life, no date) • Weald to Waves, England (Weald to Waves, no date) • Terai Arc Landscape, Nepal/India (Ram Bhandari and Raj Bhatta, 2022) • Life Bear-Smart Corridors (Rewilding Apennines, no date) • Aquatic Organism Passage Program (USDA, no date) • Turtle tunnels (Brewster et al., 2025)
Regional network designs and landscape mapping. To provide top-down influence on policy and land use decisions in target areas, encourage landscape-scale approaches, and contribute to monitoring.	• Creating maps to monitor change and identify opportunities and barriers to rewilding or natural movement. • Using maps to engage with stakeholders in target areas to influence land use decisions. • Promote other rewilding interventions in target areas. • Promote collaboration and networking across target areas.	• Diverse interpretations of rewilding create conflicts and misunderstandings across spatial scales. • Balancing large-scale projects for ecological connectivity with more feasible small-scale efforts. • Resistance to top-down interventions creates a need for more meaningful stakeholder engagement and participation across scale. • Economic and policy barriers, such as funding constraints and restrictive land use policies. • Balancing intrinsic ecological value with human-centred goals and cultural heritage can be difficult and creates opportunity for conflict.	• Guidance for opportunity mapping (Zoderer et al., 2019; Carver, 2022) • The Wildlands Network, US (Soule and Terborgh, 1999; Foreman, 2004) • Yellowstone to Yukon, US/Canada (Hilty et al., 2022, 2024)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Restoration of habitat, natural disturbance, and/or natural succession. Restoring ecological structure, function, and heterogeneity based on reference ecosystem or conditions; accommodating wildlife; improving human-nature or human-place connection and provision of ecosystem services. Includes a wide range of habitats including marine, coastal, wetland, riparian, soil.	• Planting of trees and shrubs (can include seed collection and propagation). • Reintroduce fauna that can contribute to natural regeneration (see Species reintroduction below) • Remove barriers to natural regeneration or disturbance, e.g., reduce mowing; reducing anthropogenic disturbance; reducing grazing using fencing, culling, or grazing reform. • Interventions to promote or imitate natural disturbance or limit succession, e.g., prescribed burning, grazing. • Removal or thinning of non-native invasive or dominant species to facilitate a more natural dynamic, e.g., Sitka spruce in areas that were previously used in commercial forestry. • Promoting habitat restoration or natural disturbance to landowners, users, or managers. • Protecting areas where natural disturbance or habitat does not conflict with human land use.	• Balancing the need for active restoration with allowing natural processes to unfold with minimal intervention requires careful consideration of the specific ecosystem and desired outcomes. • Managing natural disturbances like fire and grazing can be controversial, particularly in areas with a history of fire suppression or where grazing practices have led to degraded landscapes. • Defining the 'reference ecosystem' could be difficult and to some extent arbitrary especially if contemporary systems do not exist anymore (see section 5.2. Reference Ecosystems). • Differing views among stakeholders (e.g., landowners, conservation organizations, government agencies) regarding rewilding endpoints and methods can lead to conflict and delays. Collaborative approaches and adaptive management strategies are needed.	• Guidance on habitat restoration via reintroduction (Svenning et al., 2016; Vermeulen, 2021) • Guidance on habitat restoration (Soule and Noss, 1998; Simberloff et al., 1999) • Carrifran Wildwood, Scotland (Adair and Ashmole, 2022) • Gelderse Poort, the Netherlands (Jepson, Schepers and Helmer, 2018) • Wild Ennerdale, England (Wild Ennerdale, no date) • Rangelands Restoration, Australia (Kealley and Burrows, 2022) • Terai Arc Landscape, Nepal/India (Ram Bhandari and Raj Bhatta, 2022) • Indigenous Savanna fire management in Western Australia (Vigilante et al., 2024) • Reflooding the Waza-Logone Floodplain, Cameroon (Moritz et al., 2024)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Species reintroductions play a crucial role in rewilding by restoring ecosystem processes and repairing degraded ecological functions. The aim can be to recover viable populations of extirpated species or augment populations of species at unnaturally low densities, to achieve ecological aims of rewilding and contribute to other rewilding aims. Where missing species are extinct, ecological surrogates can be considered for introduction, to fulfil the ecological roles of extinct species.	• Missing species assessments to identify which species are missing, clarifying their ecological roles or cultural value to aid prioritisation, i.e., as keystone, highly interactive, umbrella species. Many (keystone) species help restore and maintain the natural habitat, e.g., apex predators limit grazing pressure, beavers improve riparian habitats, herbivores limit succession, or disperse seed. • Ecological and social feasibility studies. • Reintroductions of locally extirpated species or, where necessary, introductions of ecological surrogates to fulfil the ecological roles of extinct species [following the IUCN (2013) "guidelines for reintroductions and other conservation translocations" or other local or international legal requirements (see Eagle et al., 2022)]. • Creating appropriate conditions (ecological, socio-economic and political) to increase the chances of reintroduction success. • Ongoing monitoring to understand ecological, social, economic impacts of translocations. • Mitigate risk of human-wildlife conflict, e.g., fencing to limit the movement of reintroduced species or limit access by humans; ongoing engagement and consultation. • Mitigate risks to translocated individuals and their source populations. • Reinforcing cultural connections with reintroduced species if these facilitate the reintroduction process.	• Where restoration includes species translocation, especially of apex predators or large herbivores, conflicts can occur with human land use. Effective communication, conflict resolution strategies, and community engagement are crucial. • Climate change presents new challenges for species reintroductions, requiring consideration of assisted migration to help species adapt to shifting environmental conditions. However, the uncertainty in predicting climate outcomes complicates decisions around translocations and long-term ecosystem stability. • While there is a preference for restoring native species, the introduction of domesticated surrogates for extinct species raises ethical and ecological concerns. • Rewilding must balance ecological integrity with practical feasibility, ensuring that reintroductions contribute positively to ecosystem resilience. • Where species have been missing for a long time, people may have lost cultural connection, influencing their level of support. Interventions to reinforce cultural connections may be crucial for reintroduction success. • While large, charismatic species like wolves and elephants often capture public attention, rewilding extends beyond these to include fundamental ecological processes, such as soil regeneration and microbial restoration, which have been disrupted by modern land use. • Debates over species introductions and managing invasive species can be perceived in different ways depending on socio-ecological positioning.	• Guidance and guidelines for (re)introductions (IUCN, 2013; Svenning et al., 2016; Stanley-Price, 2022) • Rewilding Argentina (Donadio et al., 2022) • Rangeland Restoration, Australia (Kealley and Burrows, 2022) • beaver reintroductions, UK (Prior and Ward, 2016; Jones and Jones, 2023) • guanaco reintroductions, Chile (Root-Bernstein and Guerrero-Gatica, 2024) • Restoration of scavenger populations (ARK Rewilding Nederland, 2018) • Dung beetle release in France (Rewilding Europe, 2023a) • Eurasian lynx reintroduction projects, Poland (Rewilding Europe, 2023b) and England (Hawkins et al., 2020; The Missing Lynx Project, no date) • Reintroducing Bison to Banff National Park (Heuer et al., 2023) • Reintroducing the eastern quoll to mainland Australia (Robinson et al., 2020)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Management of invasive or dominant species. To reduce over-dominant species or remove invasive non-native species that hinder progress of rewilding or related interventions.	• Prioritise the removal or management of dominant or invasive species based on their potential to hinder rewilding or to disperse or to control regionally (would need to be controlled everywhere to be effective). • Assess different methods of control. • Remove or reduce number of invasive or dominant species, e.g., thinning of sitka spruce plantations; removing invasive eucalyptus; culling or deer fencing. • Reintroduce species that may contribute to managing the number or movement of dominant or invasive species. • Promote reduction of stocking densities of domestic livestock, or grazing reform. • Raise awareness of the impacts of domestic, dominant, or invasive species on ecological function. • Prevent the introduction of invasive species, e.g., limiting access, targeting policy on wildlife trade, raising awareness.	• Controlling or removing non-native species can be resource-intensive and may have unintended consequences for other species or ecosystem processes. Careful planning and monitoring are essential. • The presence of non-native species in rewilding is a complex and often contentious issue. While traditional conservation approaches typically seek to remove non-native species, rewilding may require a more nuanced perspective that considers ecological function, ecosystem resilience, and practicality. Not all non-native species pose a threat to ecosystem function; a key distinction should be made for those that negatively impact local ecosystems or reduce the opportunities for rewilding. • Functionality should be a primary consideration when evaluating non-native species, prioritizing action against those that cause significant ecological harm. • Addressing invasive species within rewilding should be guided by cost-effective evaluation methods that weigh ecological impact against management feasibility. • In some cases, integrating certain non-native species may contribute positively to ecosystem function, requiring a shift away from rigid exclusion policies alongside careful monitoring and controls.	• Guidance on invasive species management in rewilding (Simberloff et al., 1999; Lorimer et al., 2015; Sweeney et al., 2019) • Carrifran Wildwood (Adair and Ashmole, 2022) • Rangelands Restoration, Australia (Kealley and Burrows, 2022) • Fragas do Eume Natural Park, Spain (Cidrás and Paül, 2022) • The role of topography in managing invasive species (Brewster et al., 2024)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Mitigating human-wildlife conflict. To enhance potential for coexistence and human tolerance, avoid lethal control of species, and promote wildlife autonomy.	• Implementing strategies to mitigate conflict, including traditional methods (such as shepherding, range riding), modern techniques (e.g., electric fences, green fences, livestock protection collars, GPS tracking of predators), or reform of hunting quotas. • Translocation or lethal control of animals where they are negatively impacting coexistence and tolerance. • Providing compensation for loss of crops, livestock etc, or incentives for implementing mitigation strategies. • Public and policy engagement promoting coexistence, legal protection, mitigating Shifting Baseline Syndrome and improving tolerance and willingness to obey laws and restrictions. To understand local motivations for persecution and mitigate these risks. • Land-use zoning or planning or influencing the distribution of human activities at a landscape scale to reduce potential conflict. Promoting corridors, connectivity, and buffer zones especially where there is likely to be high conflict.	• Spiritual and positive cultural connection to wildlife supports coexistence (Borde et al., 2023), but these cases are understudied in the rewilding context. Research from India highlights socio-cultural mechanisms, including spiritual and cultural reverence for animals, can support coexistence. The Gangetic Delta provides an example where tiger populations thrive despite occasional human-wildlife conflict. A combination of mitigation measures (e.g., fences) and deep cultural reverence for tigers prevents outright antagonism. • The concept of coexistence itself requires a paradigm shift as policy largely reflects a focus on mitigating risks to human interests. True coexistence is not just about limiting risks to humans but also considering the needs and agency of other species. Rather than seeing coexistence as mere conflict avoidance, some suggest a more engaged, relational approach—actively fostering respectful interactions between humans and non-human members of ecological communities. • In a human-dominated world, managing conflict is unavoidable, but rewilding should focus on mitigation strategies that align with long-term coexistence rather than exclusion. • While fences can reduce conflict, they also restrict natural movement and ecological processes, presenting a paradox in rewilding efforts. In some rewilding models, livestock in adjacent areas are left unfenced, and some level of predation is accepted as part of the natural system. These shifts in perspective are crucial for large-scale coexistence.	• Guidance on coexistence (Linnell et al., 2015; Carter and Linnell, 2016; Stone et al., 2017; Frank et al., 2019; Lambert and Berger, 2022) • Andhari Tiger Reserve, India (Johns, 2019) • Velebit Mountains, Croatia (Jepson, Schepers and Helmer, 2018) • Bear Smart community model (Rewilding Apennines, no date), and its application to bison coexistence (Rewilding Europe, no date) • Wood River Wolf Project (Wood River Wolf Project, no date)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Networking and knowledge sharing. Promoting collaboration of rewilding organisations or projects to share learning, extend area for rewilding, and increase influence. Improve the sustainability of results of rewilding. Foster trust, collaboration, and best practice.	• Creating maps or lists of projects and organisations working in areas to promote collaboration, partnerships, and connectivity. • Seeking and encouraging collaborations across different organisations, land managers, policy makers, researchers, disciplines etc. • Aligning visions or aims across rewilding projects. • Sharing knowledge and experiences, e.g., through webinars or publications. • Communication and transparency of organisational/project aims. • Communication of research requirements to promote collaboration with researchers.	• Different organizations and projects may have varying objectives and priorities, making it challenging to align visions and goals across rewilding initiatives. • Effective networking and knowledge sharing require significant time and resources, which may be limited for some organizations, potentially hindering collaboration efforts. • Concerns about data privacy and intellectual property can create barriers to open and transparent knowledge sharing among rewilding projects. • Variations in geographical contexts and cultural perspectives can complicate the establishment of common frameworks and practices for rewilding. • Ensuring consistent and effective communication across diverse stakeholders, including land managers, policymakers, researchers, and local communities, can be complex and resource intensive. • While global networks can provide valuable insights and support, it is essential to balance these with local knowledge and context-specific approaches to ensure relevance and effectiveness. • Existing institutional structures and policies may not always support collaborative approaches, necessitating changes to facilitate better networking and knowledge sharing. • Assessing the impact of networking and knowledge sharing on rewilding outcomes can be difficult, requiring robust monitoring and evaluation frameworks to demonstrate effectiveness and inform future efforts.	• Rewilding Europe and the European Rewilding Network (Jepson et al., 2018) • Rewilding Britain (Rewilding Britain, no date) • Rewilding Institute and the Wildlands Network (Soule and Terborgh, 1999; Foreman, 2004) • Global Rewilding Alliance (The Global Rewilding Alliance, no date) • Indigenous Rewilding Network (Indigenous Rewilding Network, no date)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Promoting or implementing sustainable land management or resource use. Improving habitat and increasing autonomous nature (usually in traditionally anthropogenic areas, e.g., agricultural, commercial forestry, or urban areas), preventing overexploitation, and limiting unsustainable activities to promote connectivity and coexistence. These measures benefit biodiversity overall, although they are not specifically linked to rewilding. However, they can support and complement ongoing rewilding efforts in the area and in general.	• Implementing or promoting regenerative or wildlife-friendly farming, including restoring habitat such as hedges or field margins, reforming livestock grazing, ending the use of insecticides, or diversifying crops/polyculture. • Implementing or promoting reforms to commercial forestry, including ending clear-cutting, selective logging, sustained yield, limiting heavy machinery, increasing species and age diversity in commercial forests, and promoting local use of timber. • Promoting the reform of mining or other extractive practices. • Legal species protections, no-take zones (or protected areas), or limitations to hunting or foraging. • Improving habitat, promoting natural autonomy, or wildlife habitats in urban areas. • Providing or promoting incentives to encourage landowners or managers to restore habitat or accommodate nature, e.g. through compensation schemes for losses caused by natural disturbance or predation or payments for ecosystem services provided by habitat restoration. • Limiting recreational access or other activities to areas when it may negatively impact natural processes, e.g., during nesting season, when there is risk of disease spreading, or when paths are being degraded through overuse. • Public engagement to improve ecological knowledge and raise awareness to promote responsible use of land or resources. • Promoting the reform of policies that promote intensive agriculture or other unsustainable activities.	• Transitioning to sustainable practices can be costly and may not provide immediate economic returns, posing challenges for landowners and managers who rely on traditional methods for their livelihoods. • There may be resistance from stakeholders accustomed to conventional practices, making it difficult to implement new, sustainable approaches. • Existing policies and regulations may not support sustainable land management practices, requiring significant advocacy and reform efforts to create an enabling environment. • Finding a balance between conservation goals and the need for productive land use can be challenging, especially in areas with high agricultural or commercial value. • Implementing sustainable practices requires specific knowledge and skills, which may not be readily available to all land managers. Training and education are essential but can be resource intensive. • Assessing the effectiveness of sustainable land management practices requires robust monitoring and evaluation frameworks, which can be complex and costly to implement. • Social and cultural attitudes towards land use and conservation can influence the acceptance and success of sustainable practices. Engaging local communities and respecting local knowledge are crucial. • Climate change can exacerbate challenges in land management, requiring adaptive strategies that are flexible and responsive to changing conditions. • Providing adequate incentives for landowners and managers to adopt sustainable practices is essential but can be difficult to design and implement effectively. • In highly fragmented landscapes, achieving connectivity and coherence in sustainable land management practices can be particularly challenging, requiring coordinated efforts across multiple stakeholders and jurisdictions.	• Sustainable land use guidance/proposals (Groom et al., 1999; Merckx and Pereira, 2015) • urban rewilding (Maller et al., 2019; Owens and Wolch, 2019) • Knepp Wildland, England (Tree, 2019) • Rewilding Europe (Jepson et al., 2018). • Prosilva integrated forest management approach (Pro Silva, no date)

Strategies and interventions and their contribution to rewilding aims	Actions associated with intervention	Challenges and points of tension	Case studies and further reading
Public engagement and education. Generally promoting rewilding and its aims, and involvement in projects. Aims to improve ecological knowledge and human-nature connection, mitigate Shifting Baseline Syndrome, encourage or inform people to better accommodate or coexist with nature in landscapes, and ultimately (re)integrating nature into culture.	• Use of cultural heritage or the arts to raise awareness of missing species or to achieve other rewilding objectives, e.g., through sharing folk music, storytelling, popular fiction or non-fiction books, spiritual practices, or traditional skills. • Demonstrating sustainable practices or ecocentric cultures, for example sharing the values or practices of certain Indigenous cultures or anarcho-primitivism. • Promoting or offering (sustainable) nature experiences, e.g., nature walks, ecotourism, safari-style experiences, forest schools, or outdoor education and play. • Informational signage in rewilding or nature areas to educate and raise awareness. • Advocating for rewilding in local, national, or global policy. Promoting the benefits of rewilding to societal wellbeing and assisting the public to benefit from rewilding-related incentives. • Promoting ecological science and improving ecological knowledge through science communications and education. • Involving communities or other stakeholders in rewilding, for example through volunteering, consultation, advisory groups, or citizen science.	• Engaging a wide range of audiences with varying levels of ecological knowledge and interest can be challenging. Tailoring messages to different groups while maintaining consistency in the core rewilding message requires careful planning and execution. • Public engagement efforts must be culturally sensitive and inclusive, respecting local traditions and values where these benefit wild nature, while promoting rewilding goals. This can be particularly challenging in areas with diverse cultural backgrounds. • Effective public engagement needs to balance providing factual information with inspiring action. Overloading audiences with technical details can be counterproductive, while overly simplistic messages may fail to convey the complexity of rewilding. • Developing and maintaining public engagement initiatives can be resource-intensive, requiring funding, skilled personnel, and ongoing support. Limited resources can hinder the reach and impact of these efforts. • Assessing the effectiveness of public engagement and education initiatives is complex. It requires robust metrics to evaluate changes in public attitudes, knowledge, and behaviours related to rewilding. • Addressing misinformation and misconceptions about rewilding is crucial. Public engagement strategies must include efforts to counteract false narratives and provide clear, accurate information. • Reconnecting urban populations with nature can be particularly challenging due to the physical and psychological distance from natural environments. Innovative approaches are needed to engage city dwellers in rewilding efforts. • Maintaining long-term public interest and involvement in rewilding projects requires continuous effort and creativity. Engagement strategies must evolve to keep the public motivated and invested in rewilding goals. • Rewilding can involve controversial topics, such as predator reintroduction or land-use changes. Public engagement must navigate these issues carefully to build support while addressing concerns. • Incorporating TEK into public engagement efforts can enhance the relevance and acceptance of rewilding initiatives. However, this requires respectful collaboration with Indigenous and local communities.	• Guidance for community conservation and involvement (RARE, 2014; Charles, 2021; section 4.2) • Terai Arc Landscape, Nepal/India (Ram Bhandari and Raj Bhatta, 2022) • Yellowstone to Yukon, US/Canada (Hilty et al., 2022) • community nature conservancies (Johns, 2019) • beaver reintroduction, Scotland (Prior and Ward, 2016) • Côa Festival of Arts (Rewilding Portugal, 2022) • Community committees in the Central Apennines (Rewilding Europe, 2024a)

Box 5.7 River Rewilding for Gharial Recovery in the Gandak River, India

Samir Kr. Sinha

The Gandak River, a transboundary waterway flowing from Nepal into India, is the focus of a pioneering river rewilding initiative aimed at recovering the critically endangered gharial (Gavialis gangeticus). Spanning over 300 km in India, this project responds to threats including habitat fragmentation, unsustainable fishing, and ecological degradation caused by the construction of a barrage in the 1960s. It exemplifies how rewilding can restore ecological function and resilience even outside protected areas.

Led by the Wildlife Trust of India (WTI), in collaboration with state forest departments, international conservation partners, and riparian communities, the Gandak Gharial Recovery Project integrates both ex-situ and in-situ approaches. Captive-bred gharials are reintroduced into strategically selected riverine habitats based on ecological criteria such as channel depth, flow, nesting substrate, and proximity to human activity. More than 30 individuals have been released by WTI and other organisations in the river in India and Nepal since 2014, and successful nesting has been documented, with hatchling survival bolstered by targeted nest protection.

A Wild Gharial in the Gandak River © Subrat K. Behera

Despite persistent threats—including unregulated fishing, sand extraction, and extreme weather—the project has achieved key milestones: increasing gharial numbers, restoring breeding behaviour, and deepening community engagement. It also provides crucial evidence that rewilding is viable in non-protected, human-dominated landscapes.

The Gandak River Gharial Recovery Project offers a model for rewilding freshwater ecosystems in India and globally. By restoring a top predator, rehabilitating habitat function, and aligning scientific rigor with local engagement, it demonstrates how rewilding can reconcile species conservation with sustainable human use, merging ecological, social, and management dimensions.

Alignment with rewilding principles:

- **Restoring Trophic Interactions through Wildlife Reintroduction**. The gharial, a long-snouted fish-eating crocodilian, functions as an apex predator and a keystone species in river ecosystems. Its recovery helps regulate fish populations, supporting a balanced aquatic food web. The return of this species initiates a rewilding process that restores natural trophic interactions along the Gandak.
- **Recognising Ecosystem Dynamism**. Rewilding acknowledges that ecosystems are dynamic and constantly evolving. The Gandak project reflects this by adapting to changing hydrological regimes, seasonal flooding, and human disturbances. Site-specific management evolves with conditions, supported by long-term ecological monitoring.
- **Anticipating and Mitigating Climate Impacts**. With increasing climatic variability, the project has taken proactive steps to mitigate climate risks to reproduction, including plans for an ex-situ incubation and hatchling rearing centre. These facilities aim to safeguard early life stages from flooding, temperature extremes, and nest disturbance.
- **Grounding Rewilding in Local Knowledge and Science**. The initiative blends scientific methods such as telemetry tracking and nest viability studies with traditional knowledge from local fishers who have long coexisted with gharials. This integration enriches habitat assessments and supports more effective and culturally grounded conservation.
- **Embedding Adaptive Management**. Post-release monitoring using radio telemetry, GPS tagging, and community-based nest surveys feeds into a system of adaptive management. Conservation strategies are revised regularly based on empirical data and stakeholder feedback, ensuring interventions remain responsive to emerging threats like sand mining and electrofishing.
- **Fostering Human-Wildlife Coexistence**. Rewilding requires a shift in how humans relate to wildlife. Through awareness campaigns, informal education and sensitisation programmes and recognition of conservation champions, WTI has built local stewardship and reduced negative interaction with wildlife leading to human-wildlife conflict. Community members actively protect nesting sites and help report threats, transforming potential antagonists into conservation allies.
- **Promoting Ecosystem Resilience and Self-Regulation**. Beyond species recovery, the project aims to restore riverine ecological processes such as sediment transport, seasonal flooding, and prey-predator dynamics. Over time, these interventions build resilience into the river system, reducing dependency on external management.

Box 5.8 Carrifran: Landscape Recovery Through Early Ecological Intervention

Stuart Adair

Carrifran, a 660-hectare glen in Scotland's Southern Uplands, stands as a landmark example of how early, well-planned intervention can catalyse long-term landscape recovery. Acquired by the Borders Forest Trust (BFT) in 2000, the site had suffered centuries of ecological degradation due to intensive grazing and deforestation. The vision was bold: to restore a self-sustaining ecosystem resembling the wild landscapes of 6,000 years ago.

Carrifran valley © Stephen Carver

From the outset, the project focused on immediate action. All domestic livestock were removed by 2004, and over 750,000 native trees and shrubs were planted, guided by detailed ecological planning. Restoration efforts were tailored to local soils, geology, and historical vegetation data, ensuring that woodland types matched natural conditions. Peatland restoration and the reintroduction of rare plant species further accelerated ecological recovery.

The results have been transformative. Formerly species-poor grasslands have given way to thriving heathlands, tall-herb communities, and regenerating woodlands. Rare and notable plant species have expanded their range, and blanket bogs are actively recovering. The landscape now supports a mosaic of habitats that resemble natural ecosystems, despite starting from a highly degraded baseline.

Community involvement has been integral, with volunteers contributing to planting, monitoring, and education. The project has also inspired similar efforts across the UK and contributed to a broader vision of ecological connectivity across southern Scotland.

Carrifran demonstrates that early, decisive intervention—grounded in ecological science and community support—can reverse centuries of degradation. It offers a replicable model for landscape-scale restoration, showing that even severely altered environments can recover when natural processes are given space and support to return.

Carrifran embodies the core principles of rewilding focusing on:

- Restores ecological processes via woodland and peatland recovery.
- Initiated early intervention to reverse centuries of degradation.
- Promotes landscape-scale restoration across Southern Scotland.
- Enhances habitat connectivity with adjacent rewilding sites.
- Reduces human control over time, allowing natural succession.
- Strong community involvement through volunteering and education.
- Uses adaptive management based on monitoring and feedback.
- Prioritizes nature's intrinsic value over human utility.
- Faces challenges restoring full trophic complexity (e.g., predators).
- Serves as a replicable model for long-term ecological recovery.

Evidence and monitoring

6

Student field class, Wild Ennerdale © Stephen Carver

Despite the importance of monitoring in rewilding, there remains a lack of clear guidance on how and what to monitor. Some of the methods and concepts appropriate for rewilding are explored in this section. A key difficulty in developing standard monitoring approaches for rewilding is that conventional approaches in conservation, such as species counts, do not necessarily reveal that natural processes are being restored. Although all species interact within an ecosystem, some species (keystone species) have a proportionally greater impact on the food web and ecosystem processes than others, so we need reliable measurements or indicators to evaluate these effects.

While rewilding does not aim to recreate historical ecological baselines, it is possible to chart a viable trajectory toward a desired future state. This can be guided by a target reference ecosystem (Section 6.3), a theory of change (Section 5.1), and planned interventions with their expected impacts. This approach is grounded in the belief that nature has an inherent capacity to rebuild food web interactions and ecological processes—even if variability and uncertainty shape the path forward. As rewilding progresses, species populations will fluctuate depending on the environment; some species may experience cycles of population growth and decline, as well as (temporary or permanent) local extinction, while others remain stable. Nature's self-governing principles determine when an ecosystem achieves a dynamic equilibrium, with processes unfolding over generations from annual cycles to multiple decades.

These factors of change and timescale significantly influence strategies for ongoing monitoring. Understanding the complexity and interconnections within entire systems is crucial, and strategies should be adapted as evidence of transformation emerges. It is essential for projects to secure funding for a long-term, cohesive monitoring program.

Some theoretical approaches to monitoring rewilding and considerations for how to develop monitoring have been suggested. While these are diverse, they encourage an interdisciplinary approach to monitoring that integrates environmental as well as social change:

- **Extent of Wilderness:** Measuring the extent of wilderness areas in landscapes can provide insights into rewilding progress (Strus and Carver, 2024; see section 6.1).
- **Ecological Integrity:** Monitoring ecological integrity through dispersal, trophic complexity, and stochastic disturbances (Perino et al., 2019).
- **Rewilding progress:** Monitoring the progress and trajectory of rewilding to a defined endpoint (Sinclair et al., 2018).
- **Natural and Social Capital:** Assessing changes to natural and social capital (White et al., 2022).
- **Social-Ecological Outcomes and Interdisciplinary Approaches:** In addition to ecological integrity, there are systemic and socio-cultural rewilding outcomes that could be integrated to provide holistic monitoring or indicators of success. These include landscape heterogeneity, ecosystem services, human-nature relationships, tolerance and adaptability to risk and uncertainty, value for nature, people's ability to identify and prevent unsustainable activities, connection to place, and ecological knowledge (Hawkins et al., 2025).

6.1 Opportunity mapping for rewilding

The wilderness continuum diagram from Carver et al. (2021) illustrates a spectrum of human modification of global ecosystems (Figure 6.1). In essence this is a 1D map representing a landscape transect from an indoor urban setting at one extreme (100% artificial) to a wilderness landscape (100% wild and natural) at the other. Moving from right to left along the transect sees an increase in human land modification, while moving in the opposite direction sees an increase in ecological integrity. The 3Cs diagram (also in Carver et a., 2021, after Soulé & Noss, 1998) is a 2D map representation of landscapes of varying levels of ecological integrity and connectivity of core wild areas through otherwise human modified landscapes (Figure 6.2).

Spatial scale and the ecological context and setting is an important aspect of rewilding opportunity mapping since this determines the approach and degree of rewilding that is possible. Connectivity between rewilding projects/patches is similarly important as it determines effectiveness in terms of species migration/movement between cores, ensuring genetic diversity and ensuring resilience especially in relation to external drivers such as climate change. Connectivity further enables ecological processes of dispersal, competition and metapopulation dynamics. Put simply; the bigger and more connected, the better (see Box 6.4).

Spatial mapping plays a critical role in identifying, prioritizing, and implementing rewilding initiatives at multiple spatial scales. Its relevance is both global and local, aligning ecological restoration with policy objectives and practical action. At larger scales, mapping rewilding potential offers spatially explicit estimates of land area available for ecological recovery, helping to align with and support the achievement of international conservation targets.

By quantifying areas of rewilding potential, spatial mapping becomes a key evidence base for policymakers, planners, and conservation organizations.

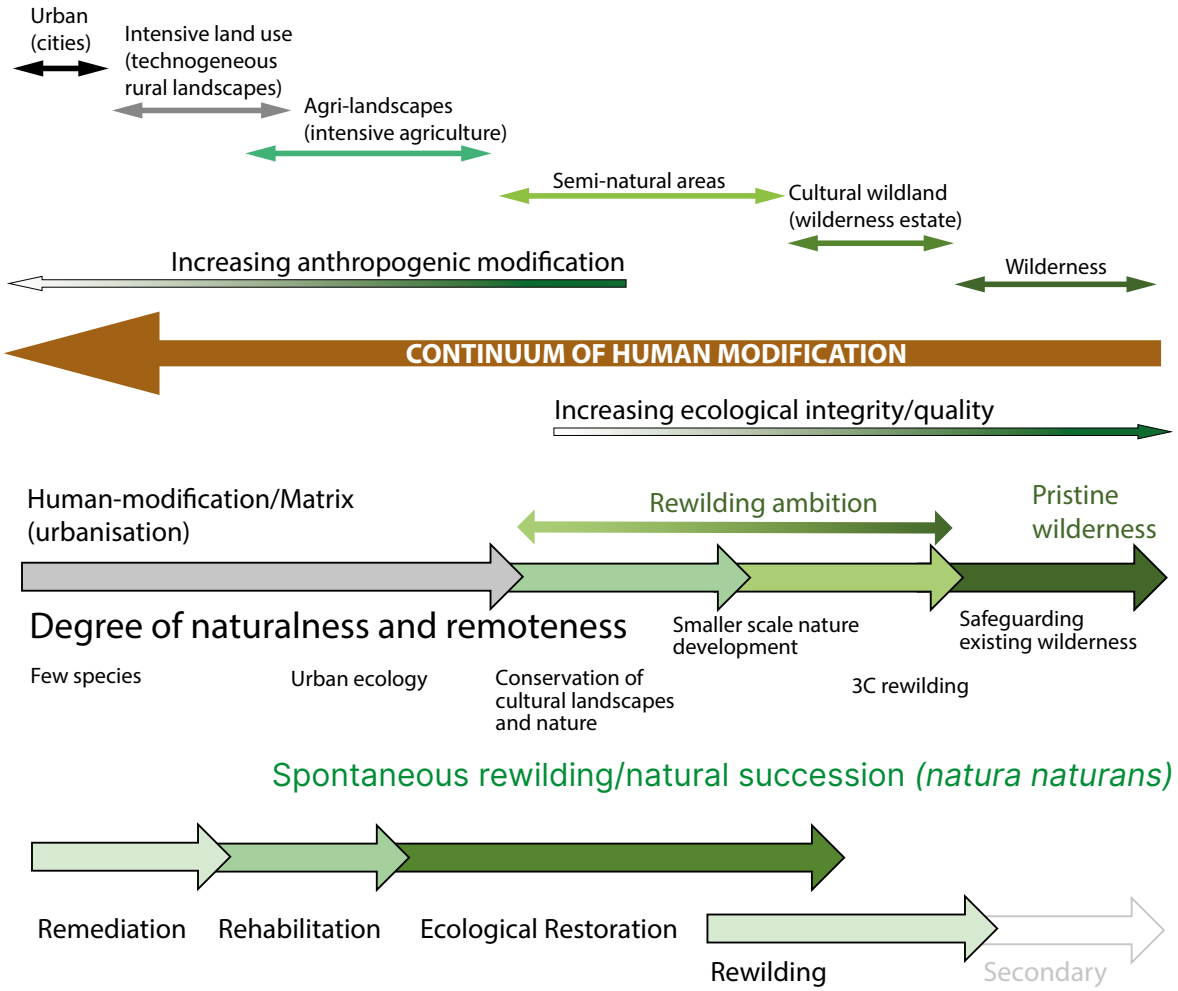


Figure 6.1. The Wilderness Continuum (after Carver et al., 2021 adapted from Carver, 2014; Lesslie & Taylor, 1985; and Van Maanen & Convery, 2016).

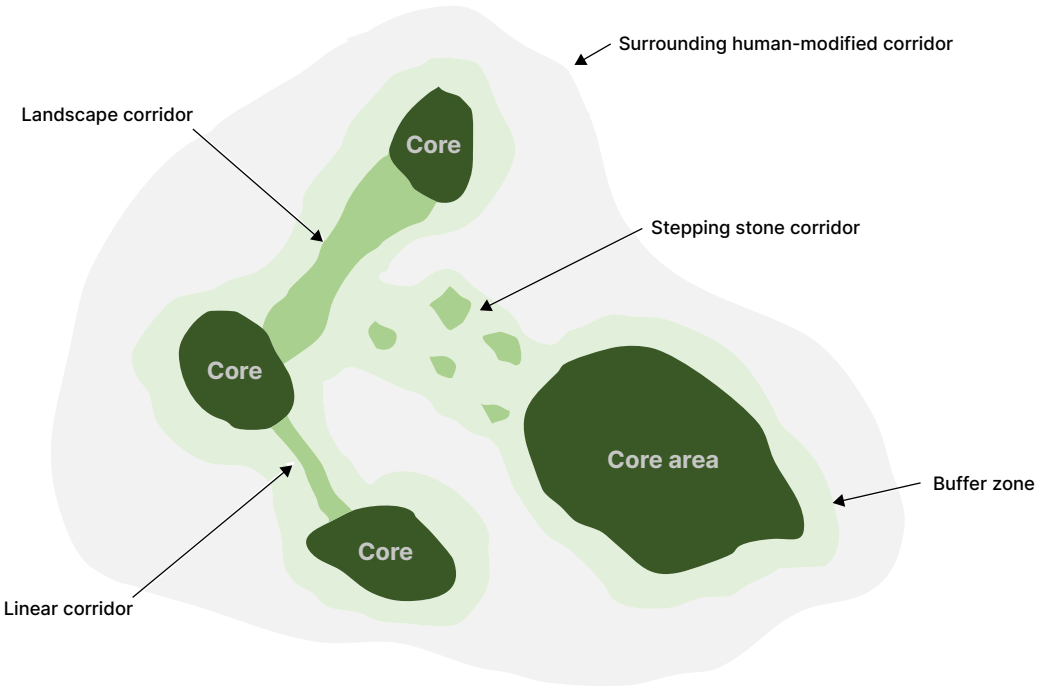


Figure 6.2. The Cores, Corridors, and Carnivores (3Cs) model of rewilding (after Carver et al., 2021, adapted from Soulé & Noss, 1998).

At the regional or site-specific level, spatial mapping helps identify high-priority areas for rewilding interventions based on ecological and socio-economic factors. This enables the targeted implementation of rewilding activities in areas with the highest feasibility or ecological return, efficient resource allocation by focusing investments where they can have the most impact, and local stakeholder engagement, since mapped outputs help visualize opportunities and trade-offs.

Availability and suitability of land for rewilding, its size, context and connectedness can be assessed through remote sensing and GIS-based opportunity mapping. This can be further enhanced to consider edge effects and the ecological, sociocultural and political implications of rewilding schemes. Recent studies have used spatial information technologies to assess opportunity for rewilding and designing wildlife corridors to promote connectivity across landscapes, reducing fragmentation/isolation and supporting species reintroductions. These examples are summarised as follows:

- **Carver (2022)** highlights the value of spatial mapping tools that integrate ecological, social, and cultural data to guide rewilding and engage communities.
- **Fayet & Verburg (2023)** use spatial modelling to show how abandoned farmland in Europe can be repurposed to enhance biodiversity, carbon storage, and ecosystem services.
- **Zoderer et al. (2024)** distinguish between wilderness protection and rewilding, using an ecoregion-based approach to identify priority areas for restoring natural processes.
- **Brown et al. (2024)** assess rewilding potential in the UK, emphasizing ecological connectivity, landscape diversity, and the importance of public acceptance and policy alignment.
- **Bergin et al. (2024)** propose a systematic method for mapping rewilding potential in human-dominated landscapes, focusing on biodiversity, land use intensity, and ecosystem resilience.
- **Araújo & Alagador (2024)** estimate that 25% of Europe is suitable for rewilding, especially in northern and mountainous regions. They differentiate between passive and active rewilding strategies.
- **Cao et al. (2020)** present a framework combining opportunity mapping and connectivity modelling to guide wildland network planning in China, promoting biodiversity and ecological resilience.

Mapping rewilding potential can be a powerful tool for understanding the context of rewilding projects (step 3 of the rewilding ToC framework, section 4). Steps for mapping rewilding potential include:

1. Collect and Analyse Spatial Data
Use GIS tools to gather and standardize spatial data layers (e.g., land cover, species distribution, human footprint), integrating them for analysis.

2. Classify and Map Rewilding Potential
Categorize areas into high, medium, or low rewilding potential based on suitability scores or indices utilising either Boolean, Fuzzy or Multicriteria models.

3. Ground-Truthing and Validation
Validate the mapping results using expert input, field data, and local stakeholder feedback to ensure ecological and contextual accuracy.

6.2 Biodiversity monitoring and ecosystem assessment methods

Ongoing monitoring is a crucial element in guiding and evaluating rewilding efforts, ensuring they align with desired ecological outcomes by providing essential data for adaptive management.

Key Actions for Monitoring in Rewilding:

- **Reference Model Development:** Establish reference ecosystems as trophic baselines, which are relatively undisturbed, self-sustaining ecosystems. In the absence of such baselines, develop models using expert opinion, historical data, and trophic cascade models (refer to Section 3.1 on Reference Ecosystems).
- **Goal and Objective Setting:** Define clear goals and objectives using a specific, measurable, achievable, relevant, and time-bound (SMART) framework, supported by a robust data analysis framework (Likens and Lindenmayer, 2018).
- **Rewilding Targets and Indicators:** Establish rewilding endpoints guided by reference systems. Indicators should capture the attributes of ecosystem functioning and integrity, human stressors, barriers, and specific rewilding interventions. Select indicators that have a measurable, significant relationship with intended outcomes. Utilize data collection methods appropriate to the project area and available resources, e.g. eDNA metabarcoding, camera traps, acoustic recordings, or field surveys (for a list of approaches used in rewilding, see Holmes, Eagle and Hees, 2023).
- **Progress Assessment:** Measure rewilding progress by comparing sites with undisturbed reference models, noting the return of food webs, and evaluating how closely the rewilding site resembles the model (Sinclair et al., 2018).
- **Intervention Effectiveness:** Use BACI (Before-After-Control-Impact) designs to assess the impact of interventions by comparing

treated sites before and after intervention with untreated control sites. Additionally, use BARI (Before-After-Reference-Impact) designs to include reference sites in ongoing change assessments (see Beyers and Sinclair, 2022).

- **Adaptive Management:** Utilise monitoring data to inform adaptive management strategies. Adjust interventions or revise goals if the ecosystem is not meeting milestones, ensuring long-term success through iterative monitoring, evaluation, and adaptation.

Continuous monitoring presents several challenges that must be addressed to ensure effective implementation. It demands a robust scientific framework and specialized expertise that is capable of clearly formulating questions. Selecting the appropriate variables is essential; monitoring too many or the wrong ones can overwhelm resources and inflate costs. Variables should be evidence-based and directly related to desired outcomes.

6.3 Reference ecosystems

Rewilding focuses on the *recovery of ecological processes, interactions, and conditions based on reference ecosystems* (Carver et al., 2021). But what are reference ecosystems and how are they used?

A reference ecosystem is a characterization of the condition the area to be rewilded would have been in if degradation had not occurred. Although that undisturbed condition may no longer exist in the project area, it can be characterized by developing a reference model, based on a suitable number of reference sites – sites that are environmentally similar to the area designated for rewilding, but that have experienced little to no degradation and optimally maintain the full community assembly of characteristic species. Judgements will need to be made regarding the suitability of historic baselines, given that climate and biophysical conditions may now be altered (Millar & Brubaker, 2006), but there must be an awareness of whether contemporary reference areas necessarily capture the full biotic potential so that historic baselines for at least some indicators may be preferable to contemporary reference conditions. It may also be useful to develop projections of anticipated future reference conditions.

To adequately describe the reference ecosystem, reference models must include a wide enough array of indicators to capture the ecosystem condition. Although it is not possible to characterize all aspects of ecological integrity and complexity (Kimmins et al., 2008), best practice is to include at least several indicators each of key attributes: physical condition, composition, structure, function, and external exchanges (Nelson et al., 2024). A well-constructed reference model provides reliable information on both averages and ranges of variability for each selected indicator.

Reference ecosystems reveal the degree of degradation of proposed rewilding areas and can be used to develop rewilding targets based on indicators that are monitored to evaluate recovery. The value of each indicator in the rewilded area relative to its value in the reference model equals the degree of recovery in that indicator. Box 6.1 provides an example of a rewilding reference ecosystem.

6.4 Socio-cultural assessment methods

Rewilding initiatives, traditionally grounded in biophysical and ecological sciences, benefit from a holistic approach that integrates social and political dimensions to ensure project success (Alston et al., 2019; Naundrup & Svenning, 2015; Perino et al., 2019). Assessing sociopolitical factors within target landscapes can be achieved through Social Landscape Analysis which in this context involves the systematic study of the spatial distribution of interrelated social variables within a given biophysical setting (Field et al., 2003).

The approach mirrors the traditional biophysical landscape analysis commonly conducted prior to rewilding projects (Buderman et al., 2018; Klink et al., 2020; Root-Bernstein et al., 2017). However, instead of focusing solely on ecological factors, social landscape analysis examines elements such as human population size, composition, distribution, socio-economic characteristics, land tenure, government structures, employment patterns, education levels, and public health indicators. This analysis captures the human context surrounding rewilding projects, identifying key stakeholders and community interconnections, and which can help create support at the local level for rewilding initiatives through better resource allocation that enhances collaboration and outreach efforts, and taking action to address potential conflicts and bottlenecks (Rowson et al., 2010; Buckingham et al., 2018).

An effective method for conducting social landscape analysis is through a social network analysis that analyses the relationships among individuals and organisations by examining the positions of actors within the network, helping to identify key actors who influence policy, initiate actions, and facilitate knowledge transfer within the project (Paletto et al., 2016). Participatory social network analysis can be conducted using Net-Map or Net-Map LITE (Buckingham et al., 2018), which involves stakeholder groups collaboratively mapping network flows. Social network analysis questionnaires, a traditional method for social network analysis due to their ease of administration and cost-effectiveness, can also be used to map priorities and values, alongside qualitative observation to support the research questions (Schiffer & Hauck, 2010). Data can be analysed using specialised software (Buckingham et al., 2018; Schiffer & Hauck, 2010).

Box 6.1 The Serengeti: A Reference Ecosystem for Rewilding

Rene Beyers

The Serengeti ecosystem, spanning roughly 30,000 km^2 across northern Tanzania and southwestern Kenya, stands as one of the most compelling reference ecosystems for rewilding. Its ecological richness, iconic wildlife migrations [including wildebeest (1.5 million), zebra and Thomson's gazelles] and history of natural recovery make it a model for understanding how ecosystems can rebound when human-caused disturbances are removed.

Once severely disrupted by the introduction of rinderpest—a viral disease that decimated wildebeest and buffalo populations alongside livestock outside the park—the Serengeti experienced cascading ecological consequences, including changes in plant communities, altered fire regimes, and changes in predator and prey communities.

Artificial waterhole in Kruger interfering with natural movement of wildllife
© Rene Beyers

However, the successful eradication of rinderpest through livestock vaccination initiated a remarkable process of passive rewilding. Without direct human intervention, wildebeest populations recovered and became naturally regulated. This led to the recovery of ecosystem processes, including a decline in fire frequency and spread, an increase in trees and bird diversity, enhanced stability of plant communities, and more balanced predator-prey dynamics.

This transformation illustrates the power of rewilding through the removal of human-induced disturbances. The Serengeti now serves as a living laboratory, demonstrating how natural processes, such as herbivore-driven nutrient cycling and predator-prey dynamics, can re-establish themselves over time. It also highlights the importance of long-term ecological monitoring and adaptive management in guiding rewilding efforts.

Despite challenges such as poaching, human population pressure, and overtourism, the Serengeti's recovery aligns closely with rewilding principles: restoring ecological processes, promoting self-sustaining systems, and enhancing resilience and stability. It has even contributed to climate change mitigation by transforming the system from a carbon source to a carbon sink.

As a reference ecosystem, the Serengeti provides critical insights for rewilding practitioners worldwide. It shows that, under suitable conditions, large-scale restoration is possible with minimal intervention, provided that key stressors are addressed and keystone species and processes are restored. Its success offers a blueprint for rewilding initiatives seeking to restore degraded landscapes by prioritizing ecological integrity, resilience, and stability.

The project aligns with the "Guiding principles of rewilding" by:

1. **Restoring ecological processes:** Through the elimination of rinderpest and allowing natural recovery.
2. **Promoting self-sustaining ecosystems:** By stabilizing plant communities and enhancing biodiversity.
3. **Adaptive management:** Tracking changes in wildlife populations and ecosystem health.
4. **Intrinsic value of species and ecosystems:** Recognizing the importance of wildebeest and buffalo in maintaining ecological balance.
5. **Climate change mitigation:** Transforming the Serengeti into a carbon sink through increased carbon sequestration in soil and trees.
6. **Dynamic ecosystems:** Allowing natural processes to shape the ecosystem without rigid management interventions.

In addition to social network analysis, social survey techniques can be used to explore stakeholder attitudes, judgments, beliefs, emotions, knowledge, and likely behaviours (Sheringham et al., 2021), which consists of several customisable steps:

1. Identifying Key Actors: Determine the group of key actors to involve in the analysis process.

2. Gathering Social Landscape Information: Engage the identified key actors in discussion about the social landscape (Buckingham et al., 2018), including the geographical area, scale of the project, participating stakeholders, key questions to be addressed, and overall project objectives.

3. Selecting and Implementing Analysis Methods: Choose and implement appropriate methods for social landscape and network analysis, such as participatory social network analysis or social network analysis questionnaires (signpost for more information).

Box 6.2 Restoring Ecological Functionality in Argentina's Iberá Wetlands

Rewilding Argentina Foundation

The Iberá Wetlands in northeastern Argentina, once heavily degraded by intensive agriculture, cattle ranching, and forestry, have become a leading example of restoring ecological functionality through rewilding. Spanning over 12,000 km^2 and expanding through national park designations, the Iberá Reserve has undergone a transformative recovery led by Fundación Rewilding Argentina (FRA) in collaboration with local, national, and international partners.

Giant Anteater © Matias Rebak

The project's core goal was to re-establish lost ecological processes by reintroducing key species, restoring habitats, and creating a self-sustaining, biodiverse ecosystem. Species such as the giant anteater, pampas deer, and jaguar—once extinct or severely depleted in the region—were reintroduced through captive breeding and active management. These efforts aimed to rebuild functional trophic networks and re-establish natural predator-prey dynamics.

The "Full Nature Model" integrated legal land protection, ecological restoration, and community-based ecotourism. This holistic approach not only revived ecosystem health but also generated sustainable livelihoods for local communities through tourism, infrastructure development, and conservation jobs. Adaptive management, informed by ecological and social monitoring, allowed the project to respond effectively to challenges such as disease outbreaks, logistical constraints, and human-wildlife coexistence issues.

Despite initial setbacks, the Iberá project has demonstrated that restoring ecological functionality is achievable at scale. It aligns with key rewilding principles: reactivating natural processes, fostering self-regulation, and embedding human communities in conservation success.

As a replicable model, Iberá offers valuable lessons for global rewilding efforts. Its success underscores the importance of combining science-based restoration with community engagement and long-term vision. The Iberá Wetlands now stand as a vibrant, functioning ecosystem—proof that degraded landscapes can be revived through strategic, inclusive, and ecologically grounded rewilding.

The project aligns with the "Guiding principles of rewilding" by:

- **Restoring ecological processes:** Through species reintroduction and habitat restoration.
- **Promoting self-sustaining ecosystems:** By establishing functional trophic cascades.
- **Engaging local communities:** Through economic development via ecotourism and active participation.
- **Adaptive management:** Continuously refining strategies based on results and emerging challenges.

A recent analysis of projects whose overall goal was restoring ecosystem function through species reintroduction found that local awareness of the benefits of rewilding, illustrative proofs from existing rewilding projects of its feasibility, and recognition of the intrinsic value of all species, were the factors that were most strongly associated with higher levels of success in rewilding projects (Weber-Hertel and Luther, 2023). The framework of approaches to developing a Social Landscape Analysis presented here provide the tools to help decision-makers and stakeholders identify key social and political success factors for rewilding, and to prioritise what measures need to be put in place before committing significant resources to a rewilding project. Box 6.2 provides an example of restoring ecosystem functionality in wetland landscapes.

6.5 Understanding natural capital

In the context of conservation and rewilding, natural capital serves as a lens to evaluate and advocate for the social value of nature as a public good, while also identifying financial opportunities through monetising ecosystem services. Rewilders can realise the value of natural capital in three key ways:

- **As a language:** Framing environmental value in terms that align with economic concepts and terminology helps influence decision-making, ensuring that environmental considerations are integrated into the broader economic discourse.
- **As a tool:** Natural capital frameworks allow us to account for natural assets much like a financial balance sheet. This can include tracking the depreciation of natural capital—monitoring environmental degradation across various ecosystem components—and measuring the flows of ecosystem services. These services can be quantified in biophysical terms and, when appropriate and supported by data, translated into monetary values (e.g., White et al., 2022).
- **For securing private finance:** Particularly from a project or landowner perspective, understanding natural capital approaches can help to boost feasibility of rewilding by considering opportunities to earn finance through voluntary or statutory nature markets - for example, carbon offsets or biodiversity credits.

Natural capital as a concept forms the foundation for market-based mechanisms—such as biodiversity and carbon credits. These nature markets offer an opportunity for rewilding projects to participate as suppliers of ecosystem services, effectively translating ecological restoration into financial value. At the same time, it's important to differentiate between natural capital as an accounting framework or language, versus the actual trading of these values in nature markets.

There should be caution, however, when rewilders engage with natural capital frameworks, since the conventional economics of natural capital accounts is to assign separate monetary values to individual goods like timber, carbon sequestration, and recreation in a forest, and then aggregating these values to calculate the overall value of the "natural asset." However, such an approach overlooks the important synergistic effects and emergent properties— like ecosystem resilience and microclimate regulation—that rewilding strongly values and actively seeks to improve. These are not easy to quantify in natural capital approaches due to this fundamentally aggregative approach.

Fortunately, natural capital frameworks are more commonly attempting to address these issues by integrating systems-thinking in their tools, as seen in the Principles of Integrated Capitals Assessment (Capitals Coalition, 2021). The overall aim is to harness these frameworks effectively and pragmatically without oversimplifying nature's complexity to the point where significant aspects of value are missed.

Box 6.3 Yellowstone to Yukon: A Continental-Scale Rewilding Vision

Jodi Hilty

The Yellowstone to Yukon (Y2Y) Conservation Initiative is one of the world's most ambitious examples of continental-scale rewilding. Spanning 1.3 million square kilometers across five U.S. states, two Canadian provinces, two territories, and the traditional lands of over 75 Indigenous groups, Y2Y aims to restore and connect ecosystems across a vast, transboundary landscape.

The Boss grizzly, Banff National Park © Harvey Locke

At its core, Y2Y focuses on rewilding through the recovery of large carnivores—such as grizzly bears and wolves—and the restoration of their ecological roles. By promoting habitat connectivity through wildlife corridors, protected area expansion, and ecological restoration, the initiative supports healthy, self-sustaining ecosystems across thousands of kilometers.

Y2Y's strength lies in its collaborative model. Over 700 partners—including Indigenous communities, conservation NGOs, scientists, governments, and private landowners—work together to balance conservation with local socio-economic needs. The initiative also integrates adaptive management, shifting from broad scientific assessments to localized, community-driven projects.

Community engagement has led to increased biodiversity, improved ecosystem health, and economic benefits through conservation tourism. Notable successes include the recovery of grizzly bear populations in parts of the U.S. and Alberta, and the expansion of protected areas across the corridor.

Despite challenges such as habitat fragmentation, climate change, and complex governance across borders, Y2Y has become a global model for large-scale rewilding. It demonstrates how ecological restoration, species recovery, and human well-being can be aligned across vast, diverse landscapes.

As a blueprint for future efforts, Y2Y shows that rewilding at a continental scale is not only possible but essential for long-term biodiversity conservation and climate resilience.

The Y2Y initiative largely embodies the core principles of rewilding, particularly focusing on:

- **Large-scale planning:** Considering core areas, connectivity, and co-existence.
- **Biodiversity restoration:** Emphasizing the role of large carnivores in restoring trophic cascades.
- **Ecological processes:** Using reference ecosystems like the Greater Yellowstone Ecosystem.
- **Dynamic ecosystems:** Adaptive management approach.
- **Local engagement:** Engaging local communities, particularly Indigenous communities.
- **Science and traditional ecological knowledge:** Integrating scientific research and traditional ecological knowledge.
- **Intrinsic value of species and ecosystems:** Consistent with an intrinsic value perspective.
- **Climate change:** Considering climate change impacts in research, planning, and actions.
- **Paradigm shift:** Promoting co-existence between humans and nature.

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APPENDIX I: The Ten Guiding Principles for Rewilding

The ten basic principles for rewilding in Carver et al. (2021) are:

Principle 1

Rewilding utilizes wildlife to restore trophic interactions. Successful rewilding results in, or leads to, a self-sustaining ecosystem in which native species' populations are regulated through predation, competition, and other biotic and abiotic interactions. It is crucial that consideration be given to the role large herbivores and apex predators play in maintaining and enhancing the biodiversity within landscapes. Keystone species (organisms that influence the functioning of an ecosystem disproportionate to their abundance) and ecosystem engineers (organisms that directly or indirectly modulate the availability of resources to other species by causing physical state changes in biotic or abiotic materials) are also important in securing the integrity of the ecosystem and thus enhancing ecosystem resilience. Where appropriate, strongly interacting keystone species that have roles in maintaining the ecosystem should be reintroduced or depleted populations reinforced to an ecologically effective level.

Principle 2

Rewilding employs landscape-scale planning that considers core areas, connectivity, and co-existence. At the landscape scale, it is crucial that core areas provide a secure space that accommodates the full array of species that comprise a self-sustaining natural ecosystem. These areas may be either legally designated or under private management. Restoring connectivity between core areas promotes movement and migration across the wider landscape and improves resilience to the impacts of climate change. Rewilding can build on existing core areas, such as designated wilderness areas, national parks, or privately managed natural areas. Plans for rewilding at the landscape scale should accommodate the need for coexistence between wild species and humans (and livestock) through careful integration of cores and connectivity in functioning ecological networks and zoned systems of compatible low-intensity human land use (e.g., buffers and extensive multiple-use landscapes).

Principle 3

Rewilding focuses on the recovery of ecological processes, interactions, and conditions based on reference ecosystems. Rewilding should aim to restore self-sustaining and resilient ecosystems and specifically the natural patterns and dynamics of abundance, distribution, and interactions between native species. To do this, rewilding should make use of an appropriate ecological reference. Any reference point is ultimately arbitrary, but it is expected to be self-sustaining and resilient. A reference can be based on carefully selected contemporary near-natural reference areas with relatively complete biota where these still exist or appropriate scientific or historical evidence supported by expert Indigenous and local knowledge. Rewilding should allow for natural disturbance within an evolutionary relevant range of variability and take environmental change into account. Key native species that have become globally extinct can be replaced by suitable carefully selected wild surrogates, where legislation permits and their ecological role is deemed important. The surrogate should, where possible, be phylogenetically close to and have similar ecological and trophic functionality as the extinct species and appropriate management and monitoring should be put in place.

Principle 4

Rewilding recognizes that ecosystems are dynamic and constantly changing. Temporal change, both allogenic (external) and autogenic (internal), is a fundamental attribute of ecosystems and the evolutionary processes critical to ecosystem function. Allogenic factors include storms, floods, wildfire, and large-scale changes in climate. Equally important are changes from autogenic processes, such as nutrient cycles, energy and genes flows, decomposition, herbivory, pollination, seed dispersal, and predation. Conservation planning for rewilding should consider the dynamic nature of ecosystems and be responsive to individual species range shifts and the disaggregation and assembly of genes, species, and biotic communities. Rewilding should facilitate the space and connectivity needed for these processes to have free reign, allowing the wider processes of succession, disturbance, and biotic interactions to determine ecological trajectories without impediment or constraint. Rewilding programs must take both genetic and ecologically effective population sizes into account and employ strategies (e.g., connectivity) that ensure ecologically sustainable and genetically healthy populations of animals, plants, and other organisms. Where species of concern are globally rare and in danger of extinction, intervention may be required to prevent this from happening, including more traditional conservation measures, such as reserves and captive breeding.

Principle 5

Rewilding should anticipate the effects of climate change and where possible act as a tool to mitigate impacts. Anthropogenic impacts of climate change are rapid and pervasive, creating the need to anticipate the likely impacts on rewilding. Rewilding projects have medium- to long-term time scales that inevitably span the predicted scales and magnitudes of global climate change as regards warming trends, ice sheet collapse, sea-level rise, storm events, and so forth; thus, climate change needs to be considered when planning such projects. Rewilding can also be considered an example of an NbS with the potential to absorb, ameliorate, and tackle the effects of climate change. This includes mitigating the impacts of climate change on ecosystems and increasing the capture of atmospheric carbon (e.g., through natural regeneration following land abandonment and replacing livestock with wild herbivores) as well as providing ample space and connectivity along environmental and climatic gradients to enhance opportunities for species movements.

Principle 6

Rewilding requires local engagement and support. Rewilding should be inclusive of all stakeholders and embrace participatory approaches and transparent local consultation in the planning process for any project. Rewilding should encourage public understanding and appreciation of wild nature and should address existing concerns about coexisting with wildlife and natural processes of disturbance. Stakeholder engagement and support can reinforce the use of rewilding as an opportunity to promote education and knowledge exchange about the functioning of ecosystems. Although everyone is a potential stakeholder, no one strategy will satisfy everyone all the time and rewilding projects will need to address barriers to acceptance.

Principle 7

Rewilding is informed by science, traditional ecological knowledge (TEK), and other local knowledge. Traditional ecological knowledge provides a complementary body of knowledge to science and collaborations between researchers. Holders of TEK and other local experts can generate benefits that maximize innovation and best management guidance through knowledge exchange, transparency, and mutual learning. This can include, for example, the role of customary institutions that rely on cultural values, such as sharing and eco-reciprocity in relation to transmission of ecological knowledge. All these forms of knowledge are important for the success of rewilding projects and can help inform adaptive management frameworks and gather evidence. Local experts can provide detailed knowledge of sites, their histories, and processes, all of which can inform rewilding outcomes. It is important to acknowledge knowledge gaps and be aware of shifting baselines and the implications of these for rewilding projects while ensuring that traditional practices are sustainable and supported by appropriate evidence. Projects themselves can form the basis for knowledge generation, data, and information of use to future projects.

Principle 8

Rewilding is adaptive and dependent on monitoring and feedback. Monitoring is essential to provide evidence of short- and medium-term results with long-term rewilding goals in mind. This is required to determine whether rewilding trajectories, such as a particular treatment, are working as planned. Participatory monitoring based on (SSG, using) simple crowd-sourced methods with local volunteers coupled with more detailed scientific monitoring can be used to provide the necessary data and information. Rewilding projects should use these data to identify problems and possible solutions as part of an appropriate adaptive management framework. These need to be adequately resourced such that further interventions can be implemented without loss to project budgets and resources.

Principle 9

Rewilding recognizes the intrinsic value of all species and ecosystems. Although there is increasing recognition that natural ecosystems, and the species within them, provide valued goods and services to humans, wild nature has its own intrinsic value that humanity has an ethical responsibility to both respect and protect. This principle emphasizes the values of compassion and coexistence. Rewilding should primarily be an ecocentric, rather than an anthropocentric, activity. Where management interventions are required, these should focus on removal of human control and restoring native species with minimal intervention and nonlethal means wherever possible.

Principle 10

Rewilding requires a paradigm shift in the coexistence of humans and nature. In alliance with the global conservation and restoration communities, rewilding means transformative change and provides optimism, purpose, and motivation for engagement alongside a greater awareness of global ecosystems that are essential for life on the planet. This should lead to a paradigm shift in advocacy and activism for change in political will and help shift ecological baselines toward recovering fully functioning trophic ecosystems, such that society no longer accepts degraded ecosystems and overexploitation of nature as the baseline for each successive future generation. This paradigm shift will also help create new sustainable economic opportunities, delivering the best outcomes for nature and people.

APPENDIX II: Guidelines Development Workshops

A series of 7 workshops were held to inform the development of these guidelines, from June 2024 to January 2025.

Event	Date	Number of Contributors	Contributor Affiliations
IASNR Conference, Cairns, Australia	June 2024	16	University of Queensland Okanogan Conservation District James Cook University University of Wollongong The Cairns Institute Charles Sturt University University of Tasmania Leeds University University of Cumbria Independent attendees of IASNR
WILD12, The 12th World Wilderness Congress, The Black Hills, USA	August 2024	16	Sierra Club Conserve Global Independent attendees of Wild12
Online	5 Nov 2024	24	University of British Columbia University of Cumbria University of Leeds Wild Legacy IUCN France Global Rewilding Alliance University of Oxford University of Gothenburg Rewilding Britain Aarhus University Rewilding Europe Wageningen University Lifescape Project Utah State University Tompkins Conservation Wild Europe Initiative

Event	Date	Number of Contributors	Contributor Affiliations
Online	2 Dec 2024	25	IUCN University of British Columbia University of Cumbria Wild Europe University of Leeds São Paulo State University (UNESP) Swedish University of Agricultural Sciences Plymouth University University of Zurich Rewilding Chile Oxford University University of Newcastle (Australia) Sussex University Advanced Conservation Durham University Canterbury University Radboud University UNEP-WCMC Bioculture Group German Centre for Integrative Biodiversity Research
Online	17 Jan 2025	19	Wild Europe Initiative University of Melbourne University of New South Wales Estación Biológica de Doñana (EBD-CSIC) University of Tasmania South Australia Department for Environment and Water WWF Rewilding Australia Polish Academy of Sciences Rewilding Europe Rewilding Mycology São Paulo State University (UNESP) Aarhus University
CITIZEN ZOO, Cambridge, UK	18 Jan 2025	23	Bristol Avon Rivers Trust University of Reading FAO (Food and Agriculture Organization of the UN) The Danish Nature Agency Wild Ennerdale Rewilding Britain Rewilding Europe University of Manchester Sheffield Hallam University Rewilding SIG Endangered Landscapes and Seascapes Programme Olson Bison Park Providence Ecological Ltd Wild Card Natural England Forestry England

Event	Date	Number of Contributors	Contributor Affiliations
Online	27 Jan 2025	22	University of Helsinki Wildland Research Institute University of Colorado Boulder Hoja Nueva Borders Forest Trust University of British Columbia University of Victoria, Canada UNEP-WCMC WILD Foundation University of Cumbria Wageningen University Wildlands Network The Marsupial Project Australia Flower Hill Institute Griffith University Bangor University

APPENDIX III: Glossary

Term	Definition
Active rewilding	Approaches to rewilding that involve initial human intervention with the intention of re-establishing a functioning ecosystem and then leaving nature to take the lead. For example, projects that reintroduce missing species (like beavers) or re-establish a natural habitat (like woodland).
Adaptive management	A structured, iterative process of decision-making in conservation that allows for learning and adjusting strategies based on monitoring and feedback.
Anthropogenic disturbance	Environmental changes caused directly or indirectly by human activity and presence. A full list of impacts would be enormous but might include deforestation, dam construction, change of wildlife behaviours due to human presence, light, noise, and chemical pollution, habitat fragmentation by human infrastructure, etc.
Autogenic processes	Internal ecological processes such as nutrient cycling, decomposition, and succession that drive ecosystem change.
BACI/BARI designs	Monitoring frameworks: BACI (Before-After-Control-Impact) and BARI (Before-After-Reference-Impact) are used to assess the effectiveness of interventions.
Biocultural diversity	The interconnected and co-evolved diversity of life in both biological and cultural forms, often emphasized in Indigenous conservation practices.
Cores, Corridors, and Carnivores (3Cs)	A rewilding model emphasising the protection of core wild areas, the creation of corridors for connectivity, and the restoration of large carnivores (and herbivores) as keystone/indicator species.
Create Agency	The capacity of (non-human) organisms to actively shape, influence and modify their environment and relationships within ecosystems.
Defaunation	The loss or decline of animal species from ecological communities, often due to human activity.
Dynamic equilibrium (ecosystem)	Ecosystems exhibit dynamic resilience or equilibrium, a state of balance where they are constantly changing and adapting while maintaining stability. This means they can absorb disturbances and recover to a new equilibrium, despite experiencing both natural and human-induced changes.
Ecological integrity	The ability of an ecosystem to support and maintain ecological processes, biodiversity, and resilience over time.
Ecological restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.
Ecological surrogates	Species introduced to fulfil the ecological role of extinct species in rewilding projects.
Ecosystem engineers	Organisms that directly or indirectly modulate the availability of resources to other species by causing physical state changes in biotic or abiotic materials (e.g., beavers).
Ecosystem services	Benefits provided by ecosystems to humans, including provisioning (e.g., food), regulating (e.g., climate), cultural (e.g., recreation), and supporting (e.g., nutrient cycling) services.
Functional ecological restoration	Restoration that focuses on reinstating ecological processes and interactions, not just lost species.
Habitat connectivity	The degree to which landscapes facilitate or impede movement among habitat patches, crucial for species migration and genetic flow.
Intrinsic value	The inherent worth of nature, independent of its utility to humans.
Keystone species	A species that has a disproportionately large effect on its environment relative to its abundance.
Landscape-scale planning	Conservation planning that considers entire landscapes, including ecological processes, human activities, and connectivity.
Multispecies justice (MSJ)	A justice framework that includes non-human beings and ecosystems as subjects of moral and political consideration.

Term	Definition
Natural capital	The world's stocks of natural assets—including geology, soil, air, water, and all living things—that provide ecosystem services.
Opportunity mapping	The use of spatial data and GIS and/or other spatial information technologies to identify areas suitable for rewilding based on ecological, social, and political factors.
Panarchy	A conceptual model describing the dynamic interplay of change and stability in complex systems across scales.
Passive rewilding	Allowing ecosystems to recover naturally with minimal human intervention, often by removing human pressures such as grazing or logging, or through land abandonment.
Reference ecosystem	A model or benchmark used in restoration ecology to guide restoration or rewilding projects and assess outcomes. It represents the state of the ecosystem before degradation, including its flora, fauna, functions, and successional stages and can be used as a target for what a restored ecosystem should or might look like.
Rewilding continuum	A conceptual spectrum from highly managed landscapes to fully autonomous wild systems, used to assess and plan rewilding efforts.
Rights of Nature	A legal and philosophical framework that recognizes the intrinsic rights of nature and the interconnectedness of humans and the natural world. It moves away from the traditional human-centric approach, where nature is viewed as a resource to be exploited, and instead asserts that nature has a right to exist, evolve, and fulfil its ecological functions.
Self-willed ecosystems	Ecosystems that function independently of human control, driven solely by natural processes and species interactions.
Shifting baseline syndrome	The phenomenon where each generation perceives the environmental conditions they grew up with as normal, leading to a gradual acceptance of degradation.
Social-ecological systems (SES)	Integrated systems that include both ecological and human components, emphasising their interdependence and co-evolution.
Social landscape analysis (SLA)	A method for assessing the social, political, and economic context of a rewilding area, including stakeholder mapping and social network analysis.
Species reintroduction	The process of returning a species to parts of its native range from which it has been extirpated.
Theory of change (ToC)	A planning framework that outlines how and why a desired change is expected to happen, used in rewilding to map interventions and outcomes.
Top-down regulation	Ecological control exerted by predators on the populations of species at lower trophic levels.
Traditional Ecological Knowledge (TEK)	Traditional Ecological Knowledge (TEK) is a cumulative body of knowledge, practices, and beliefs passed down through generations, about the relationships between humans and the environment. It's a way of understanding the world, developed over time by observing and interacting with the natural world.
Transformative change	A fundamental, system-wide reorganisation across technological, economic, and social factors, including paradigms, goals, and values.
Trophic cascade	Ecological phenomenon triggered by the addition or removal of top predators, affecting populations and interactions throughout the food web.
Trophic downgrading	The loss of apex consumers from ecosystems, leading to cascading effects on biodiversity and ecosystem function.
Wilderness continuum	A conceptual model representing a gradient from highly modified human environments to pristine wilderness, used in rewilding opportunity mapping (see also Rewilding Continuum).

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