



ROUTLEDGE
ENVIRONMENT AND
SUSTAINABILITY
HANDBOOKS



Routledge Handbook of Rewilding

Edited by Sally Hawkins, Ian Convery,
Steve Carver, and Rene Beyers

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ROUTLEDGE HANDBOOK OF REWILDING

This handbook provides a comprehensive overview of the history, theory, and current practices of rewilding.

Rewilding offers a transformational paradigm shift in conservation thinking, and as such is increasingly of interest to academics, policymakers, and practitioners. However, as a rapidly emerging area of conservation, the term has often been defined and used in a variety of different ways (both temporally and spatially). There is, therefore, the need for a comprehensive assessment of this field, and the *Routledge Handbook of Rewilding* fills this lacuna. The handbook is organised into four sections to reflect key areas of rewilding theory, practice, and debate: the evolution of rewilding, theoretical and practical underpinnings, applications and impacts, and the ethics and philosophy of rewilding. Drawing on a range of international case studies the handbook addresses many of the key issues, including land acquisition and longer-term planning, transitioning from restoration (human-led, nature enabled) to rewilding (nature-led, human enabled), and the role of political and social transformational change.

Led by an editorial team who have extensive experience researching and practising rewilding, this handbook is essential reading for students, academics, and practitioners interested in rewilding, ecological restoration, natural resource management, and conservation.

Sally Hawkins is an environmental social scientist at the University of Cumbria, UK. She is a core member of the IUCN CEM Rewilding Thematic Group and a founding trustee of the Lifescape Project.

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‘Over the course of three to four decades, rewilding has progressed from a rather obscure concept associated with radical environmentalism to a well-accepted and even mainstream paradigm for comprehensive ecosystem restoration worldwide. This handbook, edited by four founding members of the IUCN Rewilding Thematic Group, is a much-needed overview of the history, theory, practice, and debate surrounding rewilding.’

Reed F. Noss, *Ph.D., Florida Institute for Conservation Science,
Conservation Science, Inc.*

‘A much-needed source of information and inspiration for the growing community of people working to help Nature heal, the *Routledge Handbook of Rewilding* teaches us how to restore missing species, including large carnivores and other keystone species; reconnect wildlife habitats; expand wilderness and parks; and coexist with all our neighbours, wild and human. “Rewilding” has taken root and ramified widely in the decades since North American wilderness champions coined the term; and this book—which will challenge as well as motivate all readers—shows how the varying branches of work can rewild lands and waters from Scotland to Argentina, from Australia to the Yukon.’

John Davis, *Executive Director, The Rewilding Institute (rewilding.org)*

‘With only 2–3% of land and sea functionally intact, rewilding is as necessary as it is exciting, and presents us with the opportunity to both address the past and current damage done by human “development” as well as to create a new relationship between ourselves and nature. This book comes at a pivotal time, framing the history, practice, practitioners, and promise of the rewilding work that is essential to addressing the twin crises of climate breakdown and the extinction emergency. Rewilding is a pathway to a new and hopeful future.’

Magnus Sylvén, *Co-Director, Global Rewilding Alliance (GRA) and Vance G. Martin*,
WILD Foundation; GRA; Wilderness Specialist Group (IUCN/WCPA)

‘This book provides a rich and diverse contribution to our understanding of the theory, principles, and practical application of rewilding from around the world.’

Rebecca Wrigley, *Rewilding Britain*

ROUTLEDGE HANDBOOK OF REWILDING

*Edited by Sally Hawkins, Ian Convery,
Steve Carver, and Rene Beyers*

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This book is dedicated to Dave Foreman, Alison Parfitt, and Michael Soulé.



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FOREWORD

PIONEERING A REWILDING PARADIGM

For me the road to rewilding has been a long one. In 1990, my husband Doug left Esprit, the company he co-founded, moving from global capitalist to dedicated ecologist. His next mission in life was what he called, ‘paying rent for his life on Earth’, which included saving the world, species by species and place by place. Soon enough, I retired from my job as CEO of Patagonia, and joined him in the southern extreme of South America.

At first, we worked to create large new national parks in Chile and Argentina, with the mission to restore wild nature where human destruction had taken its toll and protect still-pristine areas. Over time, we realised that protecting the land was not enough; we came to learn that ecosystems needed all their members present to be healthy and fully functioning. In some places, like the Ibera wetlands, so many native species had already disappeared. When we arrived there in 1997, no one was keeping track of these losses. But we knew that bringing back these species could make these environments self-sustaining again.

In modern times, the loss of keystone species was evident at least 150 years ago. With some exceptions, the work to bring back extirpated species only began over the last 45 years. In our case, the commitment towards rewilding work had to begin in the 1990s with the recognition that we humans are inextricably connected with the natural world, all of it. When nature thrives, so do we. We were first inspired by an example out of North America. In 1991, the she-wolf Pluie was fitted with a radio collar in Alberta, Canada. Her subsequent journeys revealed the little-known lives of wolves. Traveling over 10,000 miles, she showed us the role wolves play as architects of ecosystems, revealing the mystery and beauty these predators bring to our forests and grasslands. Unfortunately, she also showed us how these great predators meet abrupt ends at human hands. Pluie herself was killed in a hunting party after travelling for four and a half years between the United States and Canada. Many species, especially large predators, and others key to the proper functioning of our natural ecosystems, have suffered a dizzying decline, causing environments to lose their integrity, making environmental crises soar to intolerable levels. We witnessed the great beauty of nature fading fast.

These messages were not ignored. Scientists of a high academic level were recognising the destruction but, most importantly, people of great social commitment and respect for all forms of life such as Dave Foreman, Michael Soule, and Reed Noss began to meet to form what would become known as the Wildlands Project. The Wildlands Project was a point of pride and

joy for Doug who funded the Project from the beginning. He saw early on that if territories were to become whole again, they needed to be 'Big, Wild, and Connected', a concept that was new and allowed conservationists to realise goals much more strategically than was understood before the Wildlands Project birthed these ideas.

Very quickly those meetings grew to include a large group of enthusiastic thinkers, scientists, and activists. It was here that the conceptual basis of rewilding was defined; we must conserve or restore key species, especially large carnivores, in extensive core areas connected by a system of corridors. Although the definition was later mutated and new variants of the term appeared, all of them refer to the conservation of large spaces where key species are present and in sufficient numbers to carry out their ecological roles that structure and regulate the ecosystems they inhabit. Within the Wildlands Project, we not only set out to discuss and define this new way of doing conservation, but we also committed to disseminating it widely. For this we printed thousands of copies of a newsletter called Wild Earth and distributed it to different key actors, especially NGOs and government agencies that had to embrace this conservation strategy for it to have an impact.

The reintroduction of the wolf to Yellowstone was a global conservation milestone and a great accolade for highlighting the role of keystone species and the need for rewilding. Of course, it was not the only one: the recovery of the sea otter on the Pacific coast or the bison on the vast American prairies are other examples of species that returned and along with them, verifying the rebirth of ecosystems. In other parts of the world and especially in Africa, rewilding had begun to be implemented several decades before, although without calling it that way and perhaps with less diffusion. The spectacular return of the wildebeest in the Serengeti is a very good example. One can also cite other incredible recoveries of numerous species in many countries of this continent, among which we find elephants, lions, rhinos, leopards, cheetahs, and wild dogs.

In the Southern Cone of South America, our foundation acquired vast tracts of land to eliminate the threats that had degraded these incredible environments so that nature would recover. It was important to donate the land in good condition as national parks, which belong to all citizens. So far, we have helped protect nearly 15 million acres of land, an area larger than the country of Costa Rica, through the creation or expansion of 15 national parks in Chile and Argentina.

However, from the first moment Doug had realised that some of the species would not return simply by eliminating the threats that had caused them to disappear. This was especially notable for some species of large carnivores, herbivores, and frugivores that play key roles in the ecosystems they inhabit and that without their presence in sufficient numbers, these ecosystems degrade and even collapse. This was particularly evident in northeastern Argentina, where we began acquiring land to build the huge Iberá park, which today encompasses 1.8 million acres of wetlands, grasslands, and dry and humid forests. There we began to execute an ambitious rewilding programme in 2006 aimed at bringing back key species lost in this territory. This programme is continued today by Rewilding Argentina and its evolution occupies one of the chapters of this book.

Rewilding is revolutionising conservation culture worldwide because it implies a shift towards active management practices, among which the translocation of key species for reintroduction or supplementation purposes plays a very important role. This implies a change in the way of perceiving conservation, which has traditionally been focused on conserving natural environments and remaining species, above all through the elimination of threats. We must continue to expand protection in all corners of our planet, but we must go one step further and regain what we have lost. That is what rewilding is all about, to recover extinct or rare species,

especially those that are found in the upper trophic levels of the food chain, in order to recover their ecological roles and the interactions of these species.

In this sense, rewilding challenges and improves on already established tools such as the red list of endangered species, since recovering ecological roles often implies recovering species that are not necessarily threatened at a global or national level. Rewilding has also shown us that many of the areas that we consider pristine or well conserved (including many national parks) are actually deprived of many of their keystone species and therefore suffering varying levels of degradation. In this sense, it challenges the traditional ways of measuring the effectiveness of the management of these areas, more focused on the type of actions that we carry out to manage them than on the integrity of their ecosystems. Even the much-needed 30x30 movement is questioned: do we want 30% of the planet legally protected but without most of its key species present in these ecosystems?

The proactive and active conservation agenda of rewilding generates hope and inspiration for the widespread conservation movement. By necessity, rewilding implies changing how we relate to nature, and learning to coexist with species that demand large territories and that even compete with us. It forces us to become more dedicated and make more concessions, accentuating the need to understand that all species have the right to live on this planet.

Rewilding not only delegates conservation to public institutions but also incorporates private owners or community lands in this conservation strategy, especially through wildlife observation and ecotourism activities on private and community-held lands, helping communities build durable futures through nature-based economies.

Finally, rewilding constitutes a nature-based solution to face the grave environmental crises on our planet, such as the loss of biodiversity, climate change, and the appearance of pandemics, all related to the degradation of ecosystems and the loss of key species.

After 30 years of working in conservation, my own motivation remains stronger than ever. I've been fortunate enough to experience my connection with the wild in tangible ways, such as bottle-feeding baby giant anteaters, hoping that these orphans will become strong enough to join those already released into the wilds of the Ibera wetlands. They deserve a wild future. There is no greater feeling than being part of these rewilding teams whose daily effort is making jaguars and red-and-green macaws roam free again in Ibera, and bringing other species back to the diverse array of ecosystems where we work in throughout southern Chile and Argentina.

Rewilding is undoubtedly part of this change for ecological and cultural health, for our health. I see the *Routledge Handbook of Rewilding* as a valuable contribution arriving just in time, addressing our most urgent crises at a time when the practice of this conservation strategy becomes more mainstream. Its editors are all founding members of the Rewilding Thematic Group, created by the IUCN (International Union for the Conservation of Nature), which already embraces this strategy. The *Rewilding Handbook* offers a comprehensive overview of the history, theory, and current practice of rewilding, organising it in four parts: the evolution of the concept, its theoretical and practical underpinnings, the application of rewilding principles, and rewilding ethics.

The content was developed by an outstanding group of academics in social and natural sciences researching the practice of rewilding. As experienced practitioners and wildlife managers, they are on the frontlines of the battle against the biodiversity crisis, making key decisions about rewilding projects on a daily basis. We hope that their experience in bringing species and ecosystems back to life can help a growing number of emerging enthusiasts entering the fascinating world of restoring nature through rewilding. They represent the hope of creating large scale rewilding actions in a world more in need of it every day.

Foreword

In Doug's words, 'Are you ready to do your part? Everyone is capable of taking on their role and using their energy, political influence, talent, and financial or other resources to be part of a global movement for ecological and cultural health. Everything will be useful. There is important and significant work to be done. To change everything, everyone is needed. Everyone is welcome.'

Kristine Tompkins
President of Tompkins Conservation
UN Patron of Protected Areas

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This book originates from various workshops and discussions held by the IUCN Commission for Ecosystem Management Rewilding Thematic Group (which we will now thankfully abbreviate to IUCN CEM RTG) as we worked on developing a set of rewilding guiding principles between 2017 and 2019. In that process, we saw the need for a handbook on rewilding that took a global perspective, started at the beginning, didn't shy away from the difficult questions, and offered practical guidance to those considering rewilding projects that is true to its foundational principles. To achieve these wide-ranging aims we have been fortunate to bring together a distinguished field of authors, all of whom have addressed rewilding from different experiences and perspectives.

Little did we know, of course, back in our early book meetings in Autumn 2018, that a global pandemic was just around the corner. COVID-19 has thrown a lot at the contributors to this book, and we are forever grateful that you have stuck with us and delivered some fabulous chapters despite experiencing setbacks that would derail most book projects. Your commitment and enthusiasm for rewilding is inspiring.

Special thanks are due to Katie Stokes, John Baddeley, and Hannah Ferguson at Routledge, who have been extremely patient with the Editors, keeping us on track and always responding supportively to our various questions and concerns. We would also like to thank our colleagues in the IUCN CEM RTG, especially Zoltan Kun, Mark Fisher, Adam Eagle, Jessica Rothwell, Simon Whitehead, Rob Morley, and Cao Yue, all of whom have provided encouragement and guidance, and our IUCN CEM chair Angela Andrade, who has consistently championed our rewilding group and provided wisdom when we need it the most. A huge thanks is also due to Steve Edwards, our IUCN guru and counsellor, for taking us under his wing.

Finally, we dedicate this book to the memory of Dave Foreman, Michael Soulé, and Alison Parfitt. They both contributed greatly to rewilding science, and their presence can be felt throughout the pages of this book. We cherish their friendship and mourn their passing.



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PART I

The evolution of rewilding



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1

INTRODUCTION

What is rewilding?

Sally Hawkins, Rene Beyers, Steve Carver, and Ian Convery

Researchers and practitioners active within the field of rewilding have been grappling with this question for many years. Simultaneously, there has been a continual increase in the number of rewilding-related projects, organizations, and research, all bringing different characteristics, cultures, and intentions to the field. During this time society has become increasingly aware of the severe and complex nature of global threats, including climate change and biodiversity loss. At the same time, the foundations of our societies have been thrown into question and confidence in our political systems and science has eroded. This is a challenging context for rewilding to evolve in as a discipline, but it provides opportunities to bring forth innovative solutions for the testing, wicked, problems of our time.

The IUCN CEM Rewilding Thematic Group, of which the editors are founding members, spent over two years reviewing the literature and talking with rewilding and restoration experts before publishing, together with many of these experts, the following definition of rewilding (from Carver et al., 2021):

Rewilding is the process of rebuilding, following major human disturbance, a natural ecosystem by restoring natural processes and the complete or near complete food web at all trophic levels as a self-sustaining and resilient ecosystem with biota that would have been present had the disturbance not occurred.

This will involve a paradigm shift in the relationship between humans and nature. The ultimate goal of rewilding is the restoration of functioning native ecosystems containing the full range of species at all trophic levels while reducing human control and pressures. Rewilded ecosystems should—where possible—be self-sustaining. That is, they require no or minimal management (i.e., *natura naturans* [nature doing what nature does]), and it is recognized that ecosystems are dynamic.

While these words on paper seem straightforward and capture the history and trajectory of rewilding, there remain many questions about the task at hand: Which biota? From when? At what point does resource use become unsustainable? How does one start a paradigm shift within entrenched cultures? Who is best placed to answer these questions? Rewilding, it would seem, is simultaneously unwieldy and visionary.

At its most basic definition, rewilding is about affecting change. John C. Maxwell (2007) famously noted that ‘most people don’t like change. They revolt against it unless they can clearly see the advantage it brings. For that reason, when good leaders prepare to take action or make changes, they take people through a process to get them ready for it.’ Given the scale of challenges presented by the climate and biodiversity crises, it is vital that we make a compelling, positive, and inclusive case for change to broaden support and increase the potential to achieve rewilding’s transformative goals.

The chapters in this book all explore the kinds of change that rewilding is looking to promote—ecological, socio-cultural, or systemic—at various levels from local to global, looking inwards at how we undertake our research and practice, and outwards at ecosystems, landscapes, and society at large. The book is organised into four parts to reflect key areas of rewilding theory, practice, and debate: the evolution of rewilding, theoretical and practical underpinnings of rewilding, applications and impacts of rewilding, and the ethics and philosophy of rewilding. Within these sections we explore who or what has influenced the rewilding concept, why it is necessary, what it is trying to achieve, how it is practised and then look more deeply into the fundamental (and sometimes difficult or conflicting) values and ethics that rewilding embodies.

The concept of rewilding emerged in North America in the 1980s, where it was originally concerned with safeguarding and restoring native biodiversity through large-scale, interconnected networks of reserves established primarily to protect and restore interacting keystone species and their trophic relationships (Power et al., 1996). The concept was largely developed by a group of conservationists, academics, and activists involved with the Wildlands Network, driven by increasing knowledge of ecological processes and the failures of traditional conservation practices (especially confined protected areas and single-species conservation) to stem the tide of biodiversity loss. Soule’ and Noss (1998) published a landmark paper describing the scientific basis for rewilding. They describe three key features: large core protected areas, ecological connectivity between those areas, and keystone species, especially carnivores, for their influential roles in the ecosystem. This is the ‘3Cs’ model of cores, corridors, and carnivores that continues to inform rewilding practice in the Americas. Fisher and Carver discuss the roots and history of rewilding in North America in more detail in Chapter 2, while Hilty et al. (Chapter 14) and Donadio et al. (Chapter 16) present examples of this in North and South America.

During this period conservationists in Europe began to question conservation policies which relied on static reserves and intensive management to ‘freeze living systems in time’ (Monbiot, 2013: 152) and on maintaining prescribed ecological conditions based on agricultural practices (Vera, 2000; Taylor, 2005). Increasing rural land abandonment created areas where nature flourished without management, spurring on many to advocate for ecological restoration based on passive rewilding or letting nature take care of itself. Locquet and Carver give an overview of European rewilding history and perspectives in Chapter 3. Rewilding in Europe diverged somewhat from North America to adapt to a landscape dominated for millennia by intensive exploitation, sparking debate about what constitutes natural ecosystems. However, while the roots of these rewilding approaches differ, what they share is a desire to change both the practice and culture of conservation biology, towards a more proactive, optimistic, and ecologically sound foundation to tackle the seemingly unstoppable ecological degradation of the Anthropocene era.

Rewilding has continued to grow in popularity and is now practised or considered as a conservation option around the world. It has also continued to adapt and evolve to suit different conditions. Despite these differences, there are similarities which can be used to unify the field of rewilding. Hawkins in Chapter 5 proposes a framework for rewilding based on its

social-ecological aims. There are certain values and principles that have become commonplace within the concept of rewilding through experience and improved ecological understanding. One example, as demonstrated in the case studies presented in this book (e.g. Pringle and Goncalves, Chapter 17; Donadio et al., Chapter 16), is that ecosystems change over time and that change is often unpredictable. Rewilding practice, therefore, must be adaptable. Species in an ecosystem have co-evolved, they interact and are inter-dependent. Rewilding therefore relies on restoring these interactions based on reference ecosystems from which we can know which species work together in a system. The complexities of this logic are explored by Clarke and Hebblewhite, Chapter 6 and Stanley-Price, Chapter 7. Another key concern is that the causes of ecological degradation are mainly socio-cultural, and therefore in order to affect transformational change, rewilding must address the drivers of that degradation. Rewilding must therefore include people. These and other principles of rewilding can be found in Box 1.1 and these were used to inform the structure of the book and many of the discussions herein. This book therefore forms part of our continued work towards mainstreaming these principles in human society and engaging the rewilding concept with other evolving principles and standards for ecological restoration (Gann et al., 2019), Nature-Based Solutions (Cohen-Schacham et al., 2019), and the Convention on Biological Diversity (CBD) Ecosystem Approach (Smith & Maltby, 2001).

Box 1.1 Guiding principles for rewilding (from Carver et al., 2021)

Principle 1: Rewilding utilises 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 recognises 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 programmes 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 maximise 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 recognises 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 emphasises 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 towards 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.

One fundamental principle of rewilding is the required paradigm shift in the relationships between humans and nature which is elaborated on in practical terms of co-existence by Lambert in Chapter 23 and from a philosophical and practical view in Part IV edited by Kate Rawles. Many of the human aspects of rewilding extend beyond rewilding and the culture of conservation and are being grappled with in other fields promoting change—whether ecological, systemic, or cultural—and there is knowledge and experience to be shared across disciplines. Several chapters in the book are devoted to these connections and how different sectors, such as agriculture (Aglionby and Field, Chapter 23), health (VanVolkenburg et al., Chapter 25), resource exploitation (Beyers and Hawkins, Chapter 26), education (Prince, Chapter 27), and recreation and adventure travel (Loynes, Chapter 28) can engage with the rewilding concept.

This book does not seek to present rewilding as a neat, complete concept. We have purposefully avoided the ‘echo-chamber’ approach that bedevils so many edited collections. Many chapters highlight uncertainties or question assumptions about the concept or culture of practice, for example epistemological paradigms (Fenton and Playdon, Chapter 12), ethical stances (Kopnina et al., Chapter 32), and measures of success (Root-Bernstein, Chapter 11). Even those chapters that deal with ecological theories underpinning rewilding, such as trophic cascades (Clarke and Hebblewhite, Chapter 6), demonstrate that there is still much need for research and careful experimentation to deal with uncertain ecological outcomes. Rewilding itself assumes limitations to human knowledge of how ecosystems work, inherent in its aims to let nature be itself and look after itself, and therefore some humility on our part is required. Rewilding and conservation research reveal biases towards the most obvious or appealing biota and we must broaden our views to include all the important ecosystem actors. Satori and Wainhouse help us with this in their treatment of the role of fungi in rewilding in Chapter 24.

There remain contradictions within the concept of rewilding. For example, while Bekoff in Chapter 30 explores how biocentrism might inform a rewilding ethic that values life above all, Kealley and Burrows in Chapter 18 demonstrate that lethal control of invasive species is essential

for rewilding in parts of Australia. While we are aware that change is most likely to work when it is instigated by communities or stakeholders, rewilding or conservation is often instigated or influenced by external organisations, government policy, or funding streams. In reality, we must therefore rely on both top-down and bottom-up approaches to change. The case studies presented here demonstrate different degrees of community or stakeholder involvement.

Rewilding is an evolving term and we expect (and hope) that this continues to be the case; uncertainty, adaptability, and experimentation are part of the DNA of rewilding. We acknowledge, therefore, the impossibility of trying to present a complete picture, and admit that there may be themes, such as broader economic and political aspects of rewilding, which were missed or given insufficient coverage. To address this and to acknowledge the value of knowledge gained through experience, we have particularly called on rewilding practitioners to share their experiences in the rewilding case studies.

Rewilding will continue to adapt to global, national and local forces, such as with the recent Covid-19 pandemic, climate change, political instability, food insecurity, or with emerging or changing understanding, such as with rewilding's continued engagement with problems related to colonialism and imperialism (e.g. Taylor, 2005; Ward, 2019). The original '3Cs' model has itself evolved to include climate resilience (Carroll & Noss, 2021), compassion (Bekoff, 2014; Kopnina, Leadbeater, & Cryer, 2019), and coexistence (Johns, 2019). We hope that the field of rewilding continues to evolve and lead to new insights and profound solutions to avert the collapse of ecosystems.

We see the need for rewilding guidelines that provide steer but that are likewise adaptable across a range of landscapes, ecosystems, and social contexts. Hawkins (Chapter 5) offers a framework based on the aims of rewilding, but other chapters look at elements which can inform guidelines and frameworks from an ecological (e.g. Beyers and Sinclair, Chapter 10) or social (e.g. Root-Bernstein, Chapter 11) point of view. Because the definition and guiding principles require broad support to provide a basis for the advancement of rewilding as adapted to differing ecological and socioeconomic systems around the world, our overarching objective was to provide unifying focus for the field of rewilding to enable identification of gaps in knowledge and tailoring of research so that concepts can be further refined and contribute to robust rewilding guidelines. The purpose of this book is to continue this work.

We are also concerned that rewilding risks becoming mainstreamed to such an extent that it effectively just becomes conservation by another name. This should not be allowed to happen, and whilst we recognise the need for rewilding to work within a range of human contexts (Principles 6 & 7), we will not get the paradigm shift we so urgently require (Principle 10) if we persist with an approach posited in some corners that restrict our thinking and ambitions in a way that ultimately frames rewilding as yet another anthropocentric approach. This is wrong, and risks rendering rewilding meaningless and empty. Rewilding is not a one-size-fits-all model, it cannot be everywhere and everything. Rewilding challenges the shifting baselines towards accepting degraded nature as the norm and confronts cultural norms of narrow targets and controls across both conservation and society. It instead reintegrates nature into our lives and across landscapes, allowing it the time and space to heal itself from human-driven degradation, to thrive. This work needs to be done urgently. Time is running out because the more degraded natural ecosystems there are, the more difficult it becomes to rewild ecosystems that support the biospheric functions vital to all life on Earth.

The time is now, and the place is here.

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