

# Debate about Rewilding: a new biodiversity conservation strategy

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## Introduction

Planet Earth is on its way to the sixth mass extinction of species, caused mainly by humans. Although measures have been taken for the conservation of species and the creation of natural reserves for a century, the factors that erode biodiversity continue to operate on a global scale.

In recent years, a new conservation strategy known as Rewilding has been developed, focused on the restoration of natural ecological processes that operate on a large scale and that are therefore a source of spatial and temporal heterogeneity, and, consequently, of biodiversity. Rewilding aims to generate functionally autonomous ecosystems that in turn generate socioeconomic opportunities. The characteristics of any Rewilding project must be based on the recovery of abiotic processes (disturbances) and biotic processes (trophic complexity) that operate at large scales (large areas connected to each other).

However, because Rewilding is an emergent conservation strategy, many debates arise about it. The concept itself has been developed and criticized from many points of view, so **what is Rewilding?** Furthermore, depending on the time reference we consider, **what should we recover?** And no less important, to recover ecological processes, **what species should we introduce?** Many are probably extinct! Obviously, the presence of disturbances such as fires or keystone species such as large predators can generate conflicts, therefore, **is Rewilding compatible with humans?** And in any case, due to the need for large areas of territory and the demographic situation of many continents, **is there physical space for Rewilding?** Finally, and usually due to these difficulties, many Rewilding projects do not strictly comply with all theoretical requirements (disturbances, trophic complexity, and large extensions). Therefore, **what is and what is not Rewilding?**

There are few **practical examples** of Rewilding projects, and a very great variability in terms of the degree of ambition and success around it. Due to the complexity surrounding the Rewilding conservation strategy and the absence of universal formulas applicable to all situations, in the classroom we discuss this topic in the form of a debate.

## References of the video

- Barnosky AD *et al.* (2011) Has the Earth's sixth mass extinction already arrived? *Nature* 471: 51-57. <https://doi.org/10.1038/nature09678>
- European Environment Agency. Distribution of nationally protected sites (CDDA) in Europe according to their IUCN category classification. <https://www.eea.europa.eu/data-and-maps/figures/distribution-of-nationally-protected-sites-cdda-in-europe-according-to-their-iucn-category-classification-1> Accessed 24/10/2023.
- Lorimer J *et al.* (2015) Rewilding: Science, Practice, and Politics. *Annual Review of Environment and Resources* 40: 39-62. <https://doi.org/10.1146/annurev-environ-102014-021406>
- Mace GM (2014) Whose conservation? *Science* 345(6204): 1558-1560. DOI: [10.1126/science.1254704](https://doi.org/10.1126/science.1254704)
- Perino A *et al.* (2019) Rewilding complex ecosystems. *Science* 364: eaav5570. DOI: [10.1126/science.aav5570](https://doi.org/10.1126/science.aav5570)
- Rohde RA and RA Muller (2005) Cycles in fossil diversity. *Nature* 434: 208-2010. <https://doi.org/10.1038/nature03339>
- Sáez *et al.* 2004. *Reseda jaquinii* subsp. *litigiosa*. in: Bañares *et al.* 2004 (eds.). Atlas y Libro Rojo de la Flora Vasculare Amenazada de España. Dirección General de Conservación de la Naturaleza. Madrid, 1069 pp.
- Wagner DL *et al.* (2021) Insect decline in the Anthropocene: Death by a thousand cuts. *PNAS* 118(2): e2023989118. <https://doi.org/10.1073/pnas.2023989118>
- Wilson 2017. Half-Earth. *Our Planet's Fight for Life*. Liveright Pub Corp, New York, USA.
- World Bank. Terrestrial protected areas (% of total land area) - Fragile and conflict affected situations. <https://data.worldbank.org/indicator/er.lnd.ptld.zs?locations=F1&view=map> Accessed 24/10/2023.

## Development of the debate

The activity must start viewing the introductory video. This resource can be shown in the classroom or viewed by students independently. We recommend that the students had

enough time (for example two weeks) between watching the video and the presentation they must make, and that they have access to the video to have it as support at all times.

The debate should take place in the classroom, in person, and we recommend that, if the number of students allows it, they work in groups of approximately 4 people. Each group must prepare a presentation (for example Power Point slides) related to one of the theoretical foundations (main questions of the video, which are also shown in this document) or with a practical example (both those that appear in the video and those shown in this document), responding to the questions or problems that arise, trying to point out the strong points (for example improvements) and weaknesses (for example risks) of each aspect.

The debate session should last about 2 hours, and the presentations should last about 10 minutes, leaving 15 minutes maximum for debate with the rest of the class. Therefore, a 2-hour session can accommodate a maximum of 4 presentations. We recommend that half of the presentations be on theoretical foundations and the other half on practical examples, and the presentations to be made in this order. Probably not all groups will be able to present. In this case we recommend the delivery of a presentation of some of the foundations or examples presented, for evaluation by teachers.

Teachers must dynamize the session as appropriate. You can choose to maximize the number of foundations or examples prepared by students, or plan which foundations or examples should be prepared and presented. You can opt for a general debate, in which each group will participate based on the aspect it has prepared, or plan which groups will prepare which aspect and therefore debate among themselves (with the information available or with delimited positions, for example for a certain aspect, one group in favour and another against Rewilding).

### **Note for teachers**

We recommend that teachers organize the debate around two resources that they must give to students.

1. The video.

2. A document that must be prepared, specifying the organization: day and period, organization in groups and material to be prepared by each group, order of presentations and interventions -e.g. one group presents and another group discusses-, evaluation. This document must include the entire text that follows, which includes the general and specific bibliography to prepare the debate and the questions or examples to be presented.

### **Theoretical foundations**

We recommend that all groups read a book or review that provides general information for each of the aspects discussed in the debate.

Lorimer J *et al.* (2015) Rewilding: Science, Practice, and Politics. *Annual Review of Environment and Resources* 40: 39-62. <https://doi.org/10.1146/annurev-environ-102014-021406>

Bakker ES and J-C Svenning (2018) Trophic rewilding: impact on ecosystems under global change. *Philosophical Transactions of the Royal Society B* 373: 20170432. <https://doi.org/10.1098/rstb.2017.0432>

Palau. 2020. *Rewilding Iberia*. Explorando el potencial de la renaturalización en España. Lynx Edicions, Barcelona.

The groups in charge of preparing any of these theoretical foundations of Rewilding, organized around each of the questions posed, should read and present some of the papers shown in one of the questions. The presentation must be focused on the content of the paper that helps answer the question in general and specifically to try to resolve the debate raised in that part of the video. As the scientific bibliography is extensive and more knowledge is periodically added to scientific repositories, we encourage students (and a positive evaluation by teachers) to search for papers that provide similar information, for example by using keywords in Google Scholar, or searching directly among the articles that have subsequently cited those provided in the bibliography of the debate.

### **- What is Rewilding?**

The scientific community, despite extensive debate, is beginning to agree on the concept of Rewilding:

Carver S *et al.* (2021) Guiding principles for rewilding. *Conservation Biology* 35: 1882-1893. <https://doi.org/10.1111/cobi.13730>

Students must emphasize the three main axes of the strategy (disturbances, trophic complexity, and connectivity):

Perino A *et al.* (2019) Rewilding complex ecosystems. *Science* 364: eaav5570. DOI: [10.1126/science.aav5570](https://doi.org/10.1126/science.aav5570)

As well as in the strategy itself within the context of ecological restoration:

Higgs E *et al.* (2014) The changing role of history in restoration ecology. *Frontiers in Ecology and the Environment* 12(9): 499-506. <https://doi.org/10.1890/110267>

### **- What should we recover?**

When we talk about Rewilding we talk about restoring ecological processes, but from when?

Willis KJ and HJB Birks (2006) What is natural? The need for a long-term perspective in Biodiversity Conservation. *Science* 314: 1261-1265. DOI: [10.1126/science.112266](https://doi.org/10.1126/science.112266)

Soga M and KJ Gaston (2018) Shifting baseline syndrome: causes, consequences, and implications. *Frontiers in Ecology and the Environment* 16(4): 222-230. <https://doi.org/10.1002/fee.1794>

A fundamental reference about the different types of Rewilding and temporal references:

Corlett RT (2016) Restoration, reintroduction, and rewilding in a changing world. *Trends in Ecology and Evolution* 31(6): 453-462. <https://doi.org/10.1016/j.tree.2016.02.017>

### **- What species should we introduce?**

To recover ecological processes, Rewilding proposes introducing keystone species, normally from higher trophic levels:

Donlan CJ *et al.* (2006) Pleistocene rewilding: An optimistic agenda for twenty-first century conservation. *The American Naturalist* 168(5): 660-681. <https://doi.org/10.1086/508027>

Svenning JC *et al.* (2016) Science for a wilder Anthropocene: Synthesis and future directions for trophic rewilding research. *PNAS* 113(4): 898-906. <https://doi.org/10.1073/pnas.1502556112>

See a general criticism of Rewilding, and another focused on the uncertainty and unwanted effects of the strategy:

Rubenstein DR and DI Rubenstein (2016) From Pleistocene to trophic rewilding: A wolf in sheep's clothing. *PNAS* 113(1): E1. <https://doi.org/10.1073/pnas.1521757113>

Nogués-Bravo D *et al.* (2016) Rewilding is the new Pandora's box in conservation. *Current Biology* 26: R87-R91. <https://doi.org/10.1016/j.cub.2015.12.044>

See a practical example (wild vs domesticated species):

Ratajczak Z *et al.* (2022) Reintroducing bison results in long-running and resilient increases in grassland diversity. *PNAS* 119(36): e2210433119. <https://doi.org/10.1073/pnas.2210433119>

### **- Is Rewilding compatible with humans?**

Disturbances and wildlife can generate risks and social conflicts. Can we imitate natural processes to obtain good results free of inconveniences?

Gordon IJ *et al.* 2021. Rewilding Lite: Using traditional domestic livestock to achieve Rewilding outcomes. *Sustainability* 13: 3347. <https://doi.org/10.3390/su13063347>

Cromsigt JPGM *et al.* 2013. Hunting for fear: innovating management of human-wildlife conflicts. *Journal of Applied Ecology* 50: 544-549. <https://doi.org/10.1111/1365-2664.12076>

Licht DS *et al.* 2010. Using small populations of wolves for ecosystem restoration and stewardship. *BioScience* 60(2): 147-153. <https://doi.org/10.1525/bio.2010.60.2.9>

### **- Is there physical space for Rewilding?**

This is an eminently practical aspect and therefore we encourage students to consider the particularities of their territory (it can be done on a local, regional -e.g. country or continent-, or global scale). It should be evaluated whether there are large areas of unoccupied territory, or a trend towards depopulation and rural abandonment, and whether the latter situation represents an opportunity for Rewilding. Likewise, it should

be evaluated (surface area, recovery of processes and keystone species, population density and economic activities, etc.) if it is possible to establish Rewilding projects in protected natural spaces (National Parks, Natural Parks, etc.) or on public estates (for example National Hunting Reserves) or private estates (of large extensions). It is necessary to indicate what characteristics these projects should have, as well as the potential conflicts and solutions at a socio-ecological level. We propose reading these two works as a reference:

Ledger SEH *et al.* (2022) Wildlife comeback in Europe: Opportunities and challenges for species recovery. Final report to Rewilding Europe by the Zoological Society of London, BirdLife International and the European Bird Census Council. London, UK: ZSL.

Freese CH *et al.* 2014. A management framework for the transition from livestock production toward biodiversity conservation on Great Plains rangelands. *Ecological Restoration* 32(4): 358-368. <https://doi.org/10.3368/er.32.4.358>

### **- What is and what is not Rewilding?**

Analyse this paper, paying special attention to the degree of Rewilding of the restoration of ecological processes.

Moorhouse TP and CJ Sandom (2015) Conservation and the problem with “natural” – does rewilding hold the answer? *Geography* 100(1): 45-50. <https://doi.org/10.1080/00167487.2015.12093953>

Search for and critically analyze papers that are considered to establish strategies or management measures focused on Rewilding. Make this evaluation considering the characteristics that a Rewilding project should have (following Perino *et al.* 2019: disturbances, trophic complexity, and connectivity).

Some examples:

Garrido P *et al.* (2019) Experimental rewilding enhances grassland functional composition and pollinator habitat use. *Journal of Applied Ecology* 56: 946-955. <https://doi.org/10.1111/1365-2664.13338>

Lehmann S (2021) Growing biodiverse urban futures: renaturalization and rewilding as strategies to strengthen urban resilience. *Sustainability* 13: 2932. <https://doi.org/10.3390/su13052932>

### **Practical examples**

Groups in charge of preparing any of these practical examples of Rewilding should actively seek available information on the characteristics of one of these projects. The presentation should be focused on analysing the fundamental characteristics of the Rewilding project, taking as reference the paper of Perino *et al.* 2019, and to qualitatively analyze the success of the project, taking as references the papers of Torres *et al.* 2018 and Segar *et al.* 2022. As new Rewilding projects appear over time, we encourage students (and a positive evaluation by teachers) to search for practical examples that provide similar information.

Perino A *et al.* (2019) Rewilding complex ecosystems. *Science* 364: eaav5570. [DOI: 10.1126/science.aav5570](https://doi.org/10.1126/science.aav5570)

Torres A *et al.* (2018) Measuring rewilding progress. *Philosophical Transactions of the Royal Society B* 373: 20170433. <https://doi.org/10.1098/rstb.2017.0433>

Segar J *et al.* (2022) Expert-based assessment of rewilding indicated progress at site-level, yet challenges for upscaling. *Ecography* 2022: e05836. <https://doi.org/10.1111/ecog.05836>

-Chernobyl Exclusion Zone (Ukraine and Belarus)

-Knepp (England)

-Esteros de Iberá (Argentina)

-iSimangaliso (South Africa)

-American Prairie Reserve (United States)

- Yellowstone National Park - Yellowstone to Yukon Conservation (United States and Canada)

-Oostvaardesplassen (Netherlands)

- Any of the landscapes or points of the Rewilding Europe network

