

REWILDING

February 2022
Joel Scott-Halkes



REPLANET

INTRODUCTION

Conservation is not enough. It's time to restore nature, reintroduce missing species and return our land and seas to the natural processes that once defined them.

By actively rewilding and protecting at least half the globe, humanity can evolve from being one of nature's most destructive forces to becoming one of its most creative.



THE CHALLENGE

We're on the cusp of one of the greatest transformations in land use since the dawn of agriculture. Breakthroughs in alternative proteins and plant breeding coupled with accelerating dietary change towards plant-based diets in the Global North mean that substantial areas of land could soon be freed for nature restoration. The opportunities for repairing our damaged ecosystems, bringing back lost species and drawing down carbon are huge. However, today the EU and many of its member states are failing to sufficiently plan for, fund or support the scale of rewilding schemes necessary. A radical step up in ambition and action is needed.



OUR SOLUTIONS

- **Actively subsidise nature restoration.**
Redirect the billions spent annually subsidising animal agriculture (see RePlanet's Agriculture Paper) to supporting rewilding and nature restoration instead.
- **Make and implement a EU wide plan to rewild half the European continent.** EU and member state policy makers should make a Marshall Plan-style roadmap for restoring nature at scale, assigning funds and planning for regulatory changes across multiple sectors.
- **Think beyond Net Zero and aim for climate restoration.**
If implemented at scale, natural climate solutions could draw down enough carbon to make our emissions net negative, helping restore our climate to the sweet spot in which our civilisations first emerged.
- **Fund a just transition.**
Workers and communities – not legacy industries – must be generously supported to ensure a just transition to a rewilded Europe that leaves rural people better off.
- **Enhance democracy.**
Wherever possible policy makers should empower local stakeholders to plan for and engage in rewilding through consultation or forms of participatory democracy.



RePlanet Position on Rewilding Europe

WHAT IS REWILDING?

Whilst traditional conservation emphasised the need to protect ecosystems from further degradation and sustainably preserve humanity's footprint as it is today, rewilding offers a radical new perspective¹. Rewilding recognises that humanity's footprint has become too large and that active work is needed to restore ecosystems and shrink the impact of human activities on the natural world.

We have adopted the definition of Rewilding Britain, according to which rewilding is:

"The large-scale restoration of ecosystems to the point where nature is allowed to take care of itself. Rewilding seeks to reinstate natural processes and, where appropriate, missing species – allowing them to shape the landscape and the habitats within."²

Some remarks on how we understand this characterisation:

- Rewilding seeks to reinstate natural processes, but often there is no baseline to which ecosystems will return when they are left to themselves. Our conception of rewilding is compatible with humans taking active measures to shape emerging ecosystems, such as supporting natural succession, enabling the development of natural processes or reducing other human pressures. What type of ecosystem develops will depend in part on these human choices and the underlying human preferences.
- Humans often want to witness wilderness first-hand. While it can be important to restrict or heavily regulate access to sensitive ecosystems, rewilding is, in principle, compatible with human visitors.
- Animals in the wild often experience great suffering. Initiatives to mitigate this suffering in human-curated landscapes are very much in the spirit of a compassionate and humane approach to rewilding.



WHY WE ADVOCATE REWILDING

Wild nature has spiritual and aesthetic value for humans. RePlanet affirms that this makes the restoration and thriving of wild ecosystems valuable beyond the instrumental benefits of rewilding. The benefits of rewilding need to be in balance with human development needs and rights. The most important instrumental benefits of rewilding are:

- Rewilded lands can store carbon. Rewilding land used for animal agriculture can turn a carbon source into a carbon sink and thus help mitigate climate change³.
- Wild nature (particularly forests and wetlands) is often a more effective, more resilient and more biodiverse carbon sink than other comparable land uses such as grazing lands and commercial tree plantations⁴.
- Rewilding is key to promoting biodiversity. The majority of species require self-sustaining ecosystems free from human activity; only a rare handful of generalist species do better in agricultural landscapes^{5,6}.
- Rewilding can provide economic opportunities. In some regions where agriculture or forestry is no longer economical, taking active steps towards rewilding can offer better economic opportunities through nature-inclusive tourism⁷.
- In many circumstances the ecosystem services (such as carbon storage, recreation and flood prevention) of restored land can be worth more than the value extracted from timber extraction, peat mining or farming land⁸.
- Because of the costly subsidisation of agriculture in Europe and the UK, large scale rewilding, combined with a significant dietary shift, would likely make strong economic sense at a national scale as exemplified by changes undertaken in Costa Rica⁹.

At present, wild nature is extremely scarce in many countries of Europe, and there are enormous opportunities for rewilding. What is needed now are policy interventions that urgently enable these opportunities to be taken at scale whilst avoiding, wherever possible, negative side effects on rural communities that currently use our land.



PRINCIPLES OF REWILDING

There are numerous different schools of rewilding and RePlanet recognises that this is an area of rapidly emerging study and research. In general RePlanet affirms the significance of prioritising, where possible, natural regeneration over tree planting and sees the active re-introduction of extirpated species as being an integral activity. RePlanet also recognises that rewilding and traditional conservation can be complementary practices and should not be viewed in opposition to one another.

RePlanet recognizes and supports three principal approaches to rewilding, each with its own site-specific benefits¹⁰:

- **Passive rewilding** – This is essentially a form of land abandonment and allows for the natural regeneration of vegetation from surrounding seed sources or soil seed banks and recolonisation by nearby animal communities. In marine rewilding this can include the implementation of ‘no take zones’ in which fishing or other harvesting of marine life is prohibited.
- **Active rewilding** – In this approach, species – particularly keystone species such as wolves, lynx or beavers – are actively reintroduced and alien, particularly invasive species are eliminated. Tree planting and the seeding of grasses and other forms of vegetation is actively undertaken to mimic natural regeneration and the active management and culling of re-introduced browsing herbivore species such as bison, red deer, moose, wild horses and wild boar may be necessary where carnivores cannot naturally control their populations.
- **Assisted rewilding** – A form of rewilding that is somewhere between passive and active and seeks to minimise human intervention where possible, but makes small interventions such as fencing out deer or sheep populations to allow for natural regeneration to take place.

In all instances the connectivity of rewilded landscapes is essential for healthy ecosystems and genetically diverse wild populations.

HOW MUCH REWILDING DO WE WANT?

The 2021 joint IPBES / IPCC workshop estimated that between 30 to 50 percent of all land and sea needs to be dedicated to intact and effectively protected ecosystems to meet our climate, biodiversity and human wellbeing goals¹¹. Such ambition is not matched by EU policy makers. Whilst the the approved EU Biodiversity Strategy for 2030¹² is promising, it has proposed an overall target to protect at least 30% of the EU land area under an effective management regime, out of which only 10% of EU land would be put under the sort of strict protection compatible with rewilding.



Of course, it's more important to note that across Europe the potential for rewilding differs drastically between different regions, with population density and varying agricultural productivity being two key factors at play. Which of the potential benefits rewilding can offer will also differ between regions.

However, when the enormous land sparing potential of the alternative protein revolution is factored in, RePlanet believes that the IPBES / IPCC workshops' higher target of 50 percent is entirely plausible in Europe, while recognising that more mapping and modelling is needed to assess this figure in detail¹³.

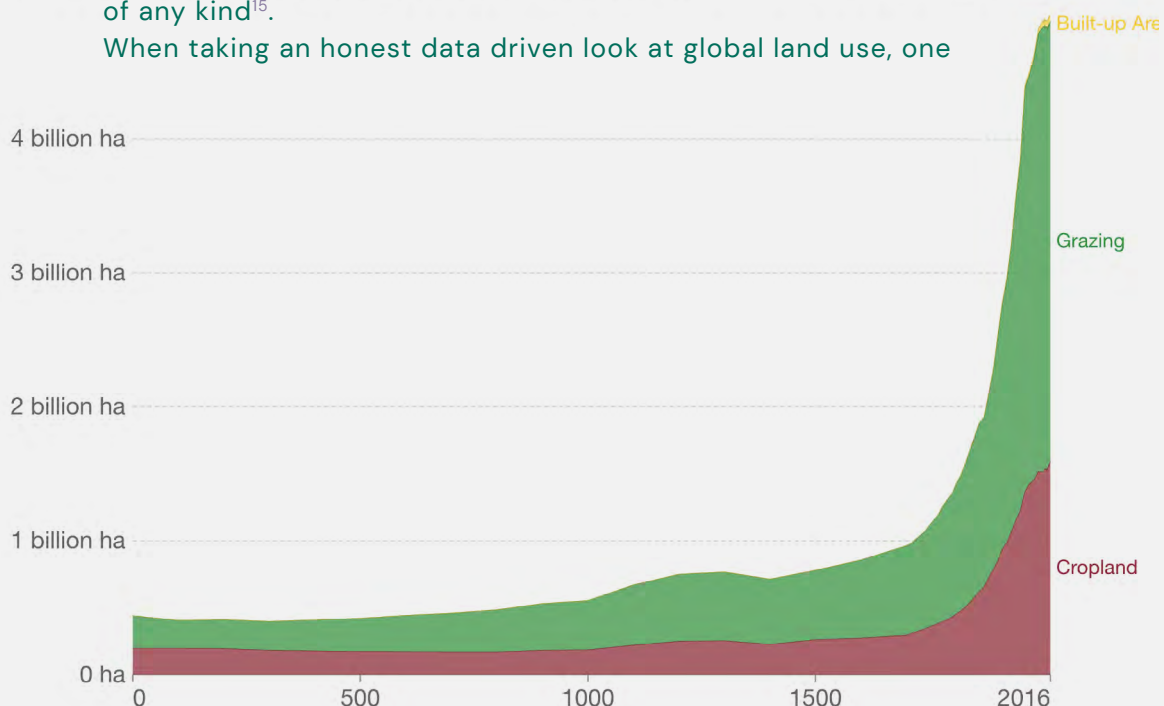
OBSTACLES TO REWILDING

According to the European Environment Agency, "Europe is one of the most intensively used continents on the globe. It has the highest proportion of land (up to 80 percent) used for settlement, production systems (in particular agriculture and forestry) and infrastructure."¹⁴ Indeed, when compared with the rewilding potential already being explored in continents such as Northern America, it is clear that rewilding Europe will be an enormous challenge. However, viewed through another lens, the intensive use and degradation of Europe also means it has great recovery potential and can contribute significantly to global biodiversity and carbon targets.

Land use – agriculture

The biggest priority in enabling large scale rewilding is land sparing: the sustainable concentration of humanity's footprint onto less land so that significant areas can be returned to wild nature. The science is unequivocal: biodiversity fares best in this model and most species and ecosystems cannot flourish or co-exist with agriculture of any kind¹⁵.

When taking an honest data driven look at global land use, one



obstacle to land sparing becomes clear: agriculture.

Globally, farming uses around half of all habitable land, an area of approximately five billion hectares. About one-third of this is used as cropland, while the remaining two thirds consist of meadows and pastures for grazing livestock.¹⁶ In the EU in 2018 agriculture used nearly 40% of the total area¹⁷ and of that land around 70% is associated with livestock farming¹⁸. To us at RePlanet, this means that agriculture, particularly animal agriculture, has the greatest potential for land sparing and will be the sector most affected by rewilding.

As such, policies that support the development and deployment of high-yield food production that can replace animal agriculture, such as precision fermentation and cellular agriculture, will be essential in enabling land to be liberated for nature. While EU policy is today stacked against farmland abandonment, such policies should now be relaxed and active rewilding of abandoned farmland encouraged instead¹⁹.

To learn more about our policies on land sparing and agriculture, please see RePlanet's Agriculture Policy Paper.

Land use – energy

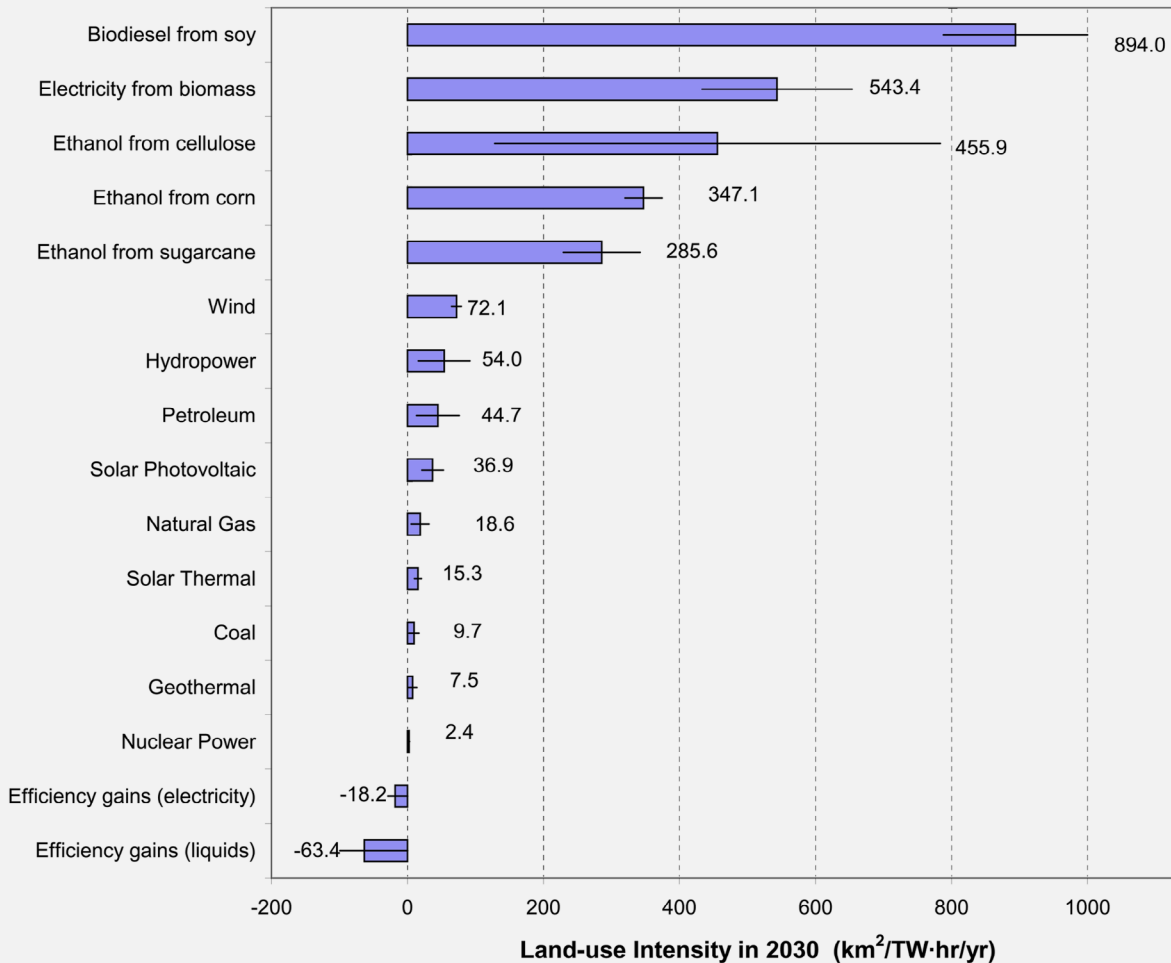
However, a new threat to land sparing is rapidly emerging: renewable energy sprawl. Projected land use by biofuel crops and intermittent renewables such as wind and solar mean that if European countries decide to follow a 100% renewable energy pathway, significant portions of the land spared from agriculture could end up being given over to energy production instead.

For example, while proposals for creating 'gas from grass' sound benign, the maths reveal a different picture. To power the EU's 195 million households using such a fuel would require devoting an area of land twice the size of Finland to monocultural grass plantations²⁰. Meanwhile, to power the Netherlands using onshore wind power alone would need an area of land greater than the Netherlands²¹.

As on land, renewable energy developments in marine environments may also pose a risk to recovering wildlife, in particular certain species of seabirds²². While such impacts are minor with smaller offshore wind developments, when the sheer scale of the renewable energy developments needed to meet our primary energy needs is factored in, the risk to marine wildlife becomes significant. One report calculated that to power just a third of the UK's primary energy consumption from offshore wind would require an area equivalent to the majority of the North Sea²³. If our plans to stabilise our heating climate require industrialising an entire open ocean, it is reasonable to ask if we're on the right path.

The precise land use impacts of future renewable energy deployment need more research and promising techniques for mitigating some of the landscape impacts of renewable energy sprawl are being rapidly developed. Increasing the interconnections between national and regional grids, for example, can allow for land use optimization of variable renewables²⁴ and similarly, while land use by biomass





does compete directly with agriculture and rewilding, this is not necessarily the case for direct land use by solar and wind which can have varying degrees of dual use with agriculture and wildlife. However, despite these mitigations, with energy as with agriculture, a land sparing not land sharing approach should be the guiding principle. RePlanet therefore strongly supports the deployment of energy dense power sources such as nuclear fission and geothermal energy which have the potential to provide abundant zero carbon energy for a fraction of the land use of intermittent renewables or biofuels²⁵. Unsurprisingly, the land sparing potential of energy dense power sources such as nuclear corresponds with better outcomes for conservation and biodiversity²⁶.

However, even viewed through the narrow lens of carbon emissions alone, an energy dense pathway to decarbonised energy is a win-win as rewilding the land saved from renewable energy development provides further carbon sequestration opportunities. Furthermore a fully decarbonized energy system that lacks these energy dense baseload power sources must rely on a large amount of battery storage and redundant intermittent production capacity. Even minor additions of nuclear energy significantly reduce the need for redundant capacity, thereby sparing land. This impact is felt elsewhere in the production line with extensive power sources such as wind and solar requiring more raw materials and thus more land for mining^{27,28}.

All in all, RePlanet’s vision for the future is to maximise the areas of our planet that can be returned to self sustaining nature and to



wilderness. Covering our planet in energy production infrastructure is clearly less desirable than concentrating that infrastructure in a small zone, as allowed by nuclear or geothermal, and providing abundant space for untouched nature elsewhere.

Read RePlanet's Energy Policy Paper for more information on our position on energy.

Culture, Rural Livelihoods and Politics

When imposed from above, rewilding can cause significant social, cultural and political tensions. Although we are only in the early days of the rewilding revolution, skirmishes have already broken out between well-meaning conservation charities and the local people that will be affected by their rewilding projects. This should be avoided.

In a number of indicative examples around Europe, rural communities have strongly opposed – sometimes successfully – rewilding projects that take agricultural land out of production. They have argued that this constitutes an assault on rural livelihoods and rural heritage as their human culture is historically rooted in particular landscapes.

Even with the intrinsic value of nature left to one side, from a human-centric perspective this leaves us with competing claims on our land. On one hand the claims of culture, tradition and rural livelihoods; on the other the wider claims of society for land to act as a carbon sink and a protector of the life-support systems that our ecosystems sustain.

Not unsurprisingly, polling of public opinion also appears to be contradictory. While polling demonstrates consistently high support for rewilding and species reintroductions in principle, our media and culture continues to edify low-yield farming and romanticise the consumption of large amounts of animal products. Put bluntly: the public wants to have its steak and eat it.

Directly forcing people off their land is clearly a bad idea. Similarly, taxing or actively discouraging the public from eating land-hungry animal products is politically inconceivable. RePlanet sees two key intervention points that can help to sidestep or transcend this conflict: changing subsidies and enhancing democracy.

INTERVENTIONS IN FAVOUR OF REWILDING

Subsidising harm

Each year the EU spends billions actively preventing rewilding from taking place.

We seek to rethink and replan the way subsidies are affecting land use, especially in terms of agriculture today. Subsidies are a powerful instrument to gradually introduce a new kind of land management, keeping in mind farmers' situations and needs but also involving



more citizens with non-agriculture backgrounds in land care and food chain-related processes.

The European Union's common agricultural policy (CAP) accounts for about a third of the EU budget, with some €54 billion in farming subsidies going to the bloc's 27 member states each year. Of this between a half to two thirds go to livestock farms or farms creating fodder for livestock²⁹ which in total occupy 71% of agricultural land. The CAP basic payment scheme is only available for land kept in an agricultural state; land reverting to nature becomes ineligible for the basic payment.

But direct CAP payments are not the only support that props up today's land use status quo. The EU also directly funds marketing campaigns to encourage certain diets, especially those heavy in red meat.³⁰

Today it is likely that the vast majority of extensive animal agriculture such as the grazing of ruminants would not be financially viable without such subsidies. In the UK for example, 90% of an average livestock farm's profits come from subsidies.³¹ Meanwhile, think tanks such as RethinkX and major industry players are projecting that land-efficient precision fermentation and cellular agriculture will be far more efficient and able to outcompete traditional agriculture even with the state support it currently receives.³² Whilst such technologies have the benefit of iterative decision processes and an associated downward cost curve, there is very little one can do to increase the efficiency and profitability of a cow. Thus, RethinkX projects the overall bankruptcy of the livestock industry by the mid 2030s.

Viewed through this lens, the EU is actively distorting the market not only against rewilding but in favour of a declining industry that threatens to leave millions of livelihoods and billions of euros of assets stranded when the effects of the alternative protein transition have fully hit.

RePlanet therefore believes that national and EU policymakers must urgently begin a phase-out of subsidies for animal agriculture and begin to progressively transfer the funds to (i) paying farmers and land managers for rewilding and habitat restoration (ii) research and development of biotechnology and innovations in plant breeding and cultivation key to land-efficient novel food production (iii) generous state support for farmers and associated professions to retrain, or where appropriate retire. In this regard we should prioritise protecting people, not industries. More research is required in this area to evaluate which specific welfare interventions that best support a just transition.

Paying for regeneration

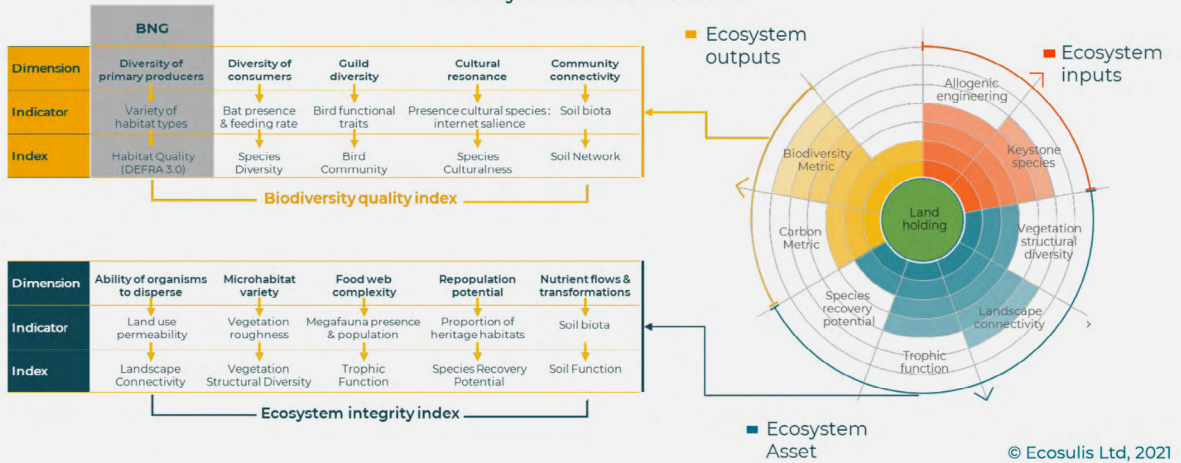
But how do we put a price on rewilding? The value of subsidies for rewilding could already be determined using internationally agreed carbon pricing³³, but additional ecosystem benefits could also be calculated such as flood prevention³⁴ and, in the case of marine rewilding, the benefits of spillover on nearby take zones. However,



there are risks associated. Attaching the value of rewilded land to a potentially volatile carbon market could suddenly see recovering ecosystems become valueless. RePlanet sees the intrinsic value of such wild spaces and therefore believes that subsidising their recovery is a worthy use of public funds, when this is proportionate to other human requirements for this funding.

INDEXING NATURE RECOVERY

We have created scientifically rigorous indices for ecosystem function, directly evidenced with data



RePlanet sees potential in setting an EU-wide ecosystem recovery target using an **Ecosystem Integrity Index** as a metric alongside tonnes of carbon. Whilst further research is needed, using such an index would reward ecosystem recovery (not just carbon sequestered), paying land managers over multiple decades for stewarding nature’s return and, in the same brushstroke, weighting subsidies against biodiversity-poor biofuels plantations. Particularly degraded sites would, in theory, command a greater financial incentive to restore because of the recovery gap present.

Enhancing democracy

In some ways, the dire situation of Europe’s land-orientated subsidies reflects a failure of democracy. Can it really be the will of a well-informed general public to pour billions of their own tax money into industries that are actively destroying their futures?

Such a democratic failure can also be seen at a rural and local level. Inequality of land ownership means that the vast majority of people have no control over how our land is used. In many landscapes farming and its associated industries employ only a tiny percentage of even the rural population and yet hold a monopoly of decision-making over how that land is used. At an EU level only 4.5 percent of the population are employed in the agricultural sector.

RePlanet advocates for urgently enhanced democratic processes over how our land is used. Rewilding should see more people involved



with decisions over land use, not fewer. RePlanet strongly opposes any form of coercive removal of existing land users from land. Whilst each nation and region is unique, we identify the following as promising lines of enquiry for achieving this aim:

- Advisory Citizen's Assemblies on rewilding and the future of agriculture
- Creating a national 'rewilding plan' with broad engagement and consultation with stakeholders from across society, not just agricultural industry bodies and environmental groups.
- Referenda on subsidy reforms
- Local government public consultations that invite stakeholders from all rural sectors to co-create a vision for the future of their local landscapes
- Community right-to-buy schemes that enable community buy-back of land from large landowners for the purposes of rewilding
- In our envisioned process, local communities and citizens are actively involved to create and shape a future system that leaves everyone better off. Whilst we recognise the severe harm caused to our natural environment by traditional agriculture, this process should not blame food producers and farmers for environmental problems and biodiversity loss.

Just transition

Although only 4.5 percent of the EU population are employed in agriculture this still represents tens of millions of livelihoods and families that will be affected by the transition towards a more rewilded Europe. This prospect must urgently be met head on by governments. Policies that seek to kick the can down the road and hope that this transition can be solved by market forces alone would be reckless in the context of the scale of changes to this sector envisaged.

RePlanet encourages policymakers to fund innovative and progressive programmes that help agriculture workers retrain and find new employment before they face redundancy. With sufficient planning, a truly just transition could and should leave employees in the agricultural sector and their communities better off.



REFERENCES

1. "Recoverable Earth: a twenty-first century environmental narrative | Ambio." 09 June. 2018. <https://link.springer.com/article/10.1007/s13280-018-1065-4>
2. "Rewilding and Climate Breakdown | Rewilding Britain Report." Accessed 14 Jan. 2022. <https://www.rewildingbritain.org.uk/news-and-views/research-and-reports/rewilding-and-climate-breakdown>
3. "Nature-based solutions can help cool the planet - if we act now | Nature" 12 May. 2021. <https://pubmed.ncbi.nlm.nih.gov/33981055/>
4. "Rewilding and Climate Breakdown | Rewilding Britain Report." Accessed 14 Jan. 2022. <https://www.rewildingbritain.org.uk/news-and-views/research-and-reports/rewilding-and-climate-breakdown>
5. "Mixed biodiversity benefits of agri-environment schemes in five" 12 Jan. 2006, <https://onlinelibrary.wiley.com/doi/10.1111/j.1461-0248.2005.00869.x>
6. "Land use, food production, and the future of tropical forest species in" 6 Jul. 2010, <https://www.repository.cam.ac.uk/handle/1810/245197>
7. "Rewilding and the Rural Economy | Rewilding Britain Report" Accessed 14 Jan. 2022. <https://www.rewildingbritain.org.uk/news-and-views/research-and-reports/rewilding-and-the-rural-economy>
8. "The economic consequences of conserving or restoring sites for nature | Nature" 08 March. 2021. <https://www.nature.com/articles/s41893-021-00692-9>
9. "9 "Payments for Environmental Services Program | Costa Rica | UNFCCC." <https://unfccc.int/climate-action/momentum-for-change/financing-for-climate-friendly-investment/payments-for-environmental-services-program>
10. Jepson, Paul & Blythe, Cain. Rewilding: The radical new science of ecological recovery. Icon Books, 2020.
11. "IPBES-IPCC Co-Sponsored Workshop Report on Biodiversity and" 10 Jun. 2021. <https://www.ipbes.net/events/ipbes-ipcc-co-sponsored-workshop-report-biodiversity-and-climate-change>
12. Article https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF
13. "Rethinking Food and Agriculture 2020-2030 | RethinkX Report" 19 September. 2019. <https://www.rethinkx.com/food-and-agriculture-executive-summary>
14. "Land use | European Environment Agency." 23 November. 2020. <https://www.eea.europa.eu/themes/landuse/intro>



15. Balmford et al., 2018. The environmental costs and benefits of high-yield farming. *Nature Sustainability*, volume 1, pp. 477–485. <https://doi.org/10.1038/s41893-018-0138-5>
16. “Land use in agriculture by numbers | Food and Agriculture Organisation of the United Nations” <https://www.fao.org/sustainability/news/detail/en/c/1274219/>
17. “Land use | European Environment Agency.” 23 November. 2020 <https://www.eea.europa.eu/themes/landuse/intro>
18. “Feeding the Problem: the dangerous intensification of animal farming in Europe | Greenpeace Report” 12 February 2019. <https://www.greenpeace.org/eu-unit/issues/nature-food/1803/feeding-problem-dangerous-intensification-animal-farming/>
19. Silvia Ceaușu et al., 2015. Mapping opportunities and challenges for rewilding in Europe. *Conservation Biology*, Volume 29, Issue 4, Pages 1017-1027. <https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/cobi.12533>
20. Ecotricity, the company behind “gas from grass” in the UK says that 3,500 homes could be powered using 3,000 acres of land. If 195.4m EU homes were gas connected and powered at this efficiency this is 167,485,714 acres; roughly double the total area of Finland of 83,630,345 acres. “Gas From Grass Could Be An Eco-Friendly Biofuel | Clean Technica” 24 May. 2018. <https://cleantechnica.com/2018/05/24/gas-from-grass-could-be-an-eco-friendly-bio-fuel/>
21. “Fact check: ‘If windmills want to meet our energy demand, we have to build the whole of the Netherlands’” Jelmer Mommers. 29 April. 2016. <https://decorrespondent.nl/4413/factcheck-willen-windmolens-aan-onze-energievraag-voldoen-danmoeten-we-heel-nederland-volbouwen/487811373951-2bd0e797>
22. Article <https://www.scirp.org/journal/paperabs.aspx?paperid=62939>
23. Article <https://www.lucidcatalyst.com/hydrogen-report>
24. A study by the JRC showed that if the European grids are coupled and the renewables are placed on the most optimal zones, 3% of total EU land would be needed for solar and 15% for wind. By comparison over 40% is currently used for agriculture. <https://ec.europa.eu/jrc/en/news/converting-just-1-land-renewable-energy-production-can-provide-eus-electricity-consumption>
25. Article <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0006802>
26. Article <https://conbio.onlinelibrary.wiley.com/doi/10.1111/cobi.12433>
27. The UNECE report states that for solar, the direct land use is dominant. But for wind turbines, coal and nuclear, it is the indirect land use (from mining) that is largest. <https://unece.org/sites/default/files/2021-10/LCA-2.pdf>



28. The JRC also concludes that land use from coal is the largest of all sources, while nuclear has the lowest. https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf (page 51).
29. Article <https://www.greenpeace.org/eu-unit/issues/nature-food/1803/feeding-problem-dangerous-intensification-animal-farming/>
30. Article <https://www.euronews.com/green/2020/11/25/become-a-beefatarian-says-controversial-eu-funded-red-meat-campaign>
31. Article https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740670/agri-bill-evidence-paper.pdf
32. Article <https://www.rethinkx.com/food-and-agriculture-executive-summary>
33. Article <https://www.rewildingbritain.org.uk/news-and-views/research-and-reports/rewilding-and-climate-breakdown>
34. Article <https://www.nature.com/articles/s41893-021-00692-9>



Publication by RePlanet.ngo
Other Position Papers



ENERGY



**GLOBAL
PROSPERITY**



AGRICULTURE

Find them here: www.replanet.ngo/positionpapers



REPLANET