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Nature restoration: Strengthening biodiversity, managing land sustainably

STATEMENT | June 2024

SUMMARY, INTRODUCTION, CONCLUSION

Contents

This text is based on a statement published by the German Advisory Council on the Environment (SRU), the Scientific Advisory Board on Biodiversity and Genetic Resources (WBBGR) and the Scientific Advisory Board for Forest Policy (WBW) in April 2024. It has been updated to current developments at EU level. The full reasoning, further details and extensive references can be found in the German-language long text version („Renaturierung: Biodiversität stärken, Flächen zukunftsfähig bewirtschaften“ 🔗).

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Summary

The condition of many ecosystems in Germany has continued to deteriorate over the last few decades despite numerous and often effective nature conservation efforts. Therefore, the remaining nature must not only be protected, but its condition must also be actively improved. The aim of supporting the recovery of a degraded ecosystem is known as restoration. The term is to be understood broadly and also includes nature-friendly practices of land use. Nature restoration should shift protected and cultivated ecosystems towards more natural structures, so that they can continue to provide a range of services in the long term. This goal is enshrined in several international environmental agreements and can be found with specific targets in the 2022 Kunming-Montreal Global Biodiversity Framework. In the European Union (EU), the Regulation on Nature Restoration (Nature Restoration Law) stipulates binding restoration targets for the member states. Therefore, it is time to set the course for an ambitious nature restoration policy at national level, as argued in this statement, prepared jointly by three German expert councils—the German Advisory Council on the Environment (SRU) and the Scientific Advisory Boards on Biodiversity and Genetic Resources (WBBGR) and for Forest Policy (WBW). It gives recommendations for an effective nature restoration policy in Germany and shows how European and national restoration goals can be implemented in practice.

Nature restoration is urgent

The degradation of ecosystems is the result of land use patterns, land-use changes and intensification in agriculture, forestry and fisheries as well as the increase in settlement and transportation areas. These direct land-use effects are exacerbated by eutrophication, pollutant inputs, the spread of invasive species and climate change. The consequences are serious—for us humans as well. Damaged ecosystems can fail or partly fail to provide many of their services, such as food production, carbon storage or the regulation of the water balance. Furthermore, they are less able to buffer disturbances like forest fires or the invasion of alien species. Extreme events caused by climate change, for example droughts or heavy rainfall, increase these risks. Restoration measures are therefore urgently needed to promote the resilience and adaptability of ecosystems and to create synergies with climate change mitigation and adaptation. This applies both within and outside protected areas, as well as to ecosystems heavily shaped by humans such as farmland or urban parks. In general, this necessitates a change in land use practices. However, nature restoration does not always require reducing or even minimising human impacts; often it is precisely a certain type of nature-friendly management that ensures diverse ecosystems.

Nature restoration requires communication, participation and a balancing of interests

The state has a duty to effectively protect the natural foundations of life. This includes an effective nature restoration policy that safeguards the ecological basis of supply with food and other resources, health and well-being. Successful restoration of nature can have macroeconomic benefits in the short to medium term and positive economic effects at the business level over time. It secures valuable ecosystem services and thus contributes, for example, to flood protection or the adaptation of agricultural and forestry production to climate change. However, nature restoration can also present challenges: it can restrict previous uses, affect the scenery of the landscape, or require large initial investments to change production methods. Strategies for dealing with divergent interests and conflicts are therefore crucial. Nature restoration can only be successful if communication, participation and the balancing of interests are considered from the outset. Precisely because both the social negotiation processes and the implementation of measures take a long time, a systematic policy of nature restoration must be initiated as soon as possible. In addition to government action, this also requires the commitment of many social actors, especially private land users. To

this end, intensive and targeted communication on the benefits of nature restoration and, not least, financial incentives are needed.

Nature restoration in Germany must not increase pressure on ecosystems elsewhere

A nature restoration policy that results in increased imports of non-sustainably produced agricultural and forestry products would increase Germany's ecological footprint in the world. Restoration successes at home would therefore come at the price of greater environmental damage abroad. In parallel with improving domestic ecosystems, it is therefore necessary to generally reduce the overall pressure on land. This requires action across a number of sectors: in the food sector, there needs to be a gradual but significant reduction in the proportion of animal products in the human diet, and hence in livestock production, which is very land-intensive. This will necessitate changes in business models—supported by intensive communication, behavioral measures and financial incentives—and modified consumption and behavior patterns of the population. In addition, the cultivation of energy crops and the use of biomass for energy must be reduced. The import of non-sustainably produced products should be limited or made more difficult through appropriate legal regulations and economic instruments, for example through an expanded Carbon Border Adjustment Mechanism, but also through meaningful and verifiable international sustainability certifications.

Specifically, the SRU, WBBGR and WBW make the following recommendations.

Increasing acceptance of landscape change and regional development

Nature restoration can only succeed on the required scale if measures are developed and implemented in partnership with relevant local stakeholders and the public. It is important to utilize and communicate the regional economic opportunities of a nature restoration economy. Agriculture and forest management should be supported in the transition to changed forms of land use.

Defining targets for national nature restoration policy

The EU Nature Restoration Law stipulates that the Member States must draw up restoration plans. It is important that the German federal government effectively involves the states (Länder), local authorities and the public in this process. In order to distribute the tasks fairly, the states and the federal government should agree state-specific quantitative area targets for nature restoration in a cooperative process. These should be included in a federal law to ensure that they are legally binding. To implement the EU regulation, the German government should establish the necessary procedures, responsibilities and tasks, as well as national targets for nature restoration in a national law and draw up a nature restoration plan. Landscape planning could form the basis for restoration measures with site-adapted qualitative objectives. They should, amongst other things, help to strengthen the biotope network, as this is an important and agreed ecological goal in Germany. The federal government could develop a specific federal spatial structure plan dedicated for this purpose. It makes sense to prioritize areas where the defined goals can be achieved at the lowest cost. To ensure long-term effectiveness, nature restoration measures should be accompanied by a monitoring scheme and adjusted if the results are unsatisfactory or undesirable developments occur.

Coordinating nature restoration with other land uses and maintaining success in the long term

Especially large-scale nature restoration projects that cannot be fully integrated into existing land use patterns must be coordinated with other land uses. It may be necessary to keep designated areas free of uses that significantly impede or prevent nature restoration measures or processes. Spatial planning can be used for this purpose, for example by designating special priority areas. In addition, protected areas can be established, even for areas of low nature conservation value, if they have a high potential for restoration. Existing protected area statutes should be reviewed to determine whether they actually contribute to more environmentally friendly land use and should be adapted if necessary. The associated restrictions on use often require financial compensation, for which the legislator should provide sufficient funds. In addition to these instruments, contractual nature conservation should be used to maintain restoration successes in the long term. The catalog of legally protected biotopes in the Federal Nature Conservation Act (BNatSchG) could also be expanded to provide basic protection.

Improving organizational and legal conditions for nature restoration measures by state actors

Nature restoration secures our "ecological livelihood". It should be coordinated by dedicated institutions at the level of states and local communities. Where these institutions do not exist, they should be established to support private nature restoration efforts and to independently plan, prepare and implement other measures. These institutions should be active primarily on publicly owned land. If public land is not sufficiently available, their possibilities to access private land should be improved. Possible means include contractual rights of use, land swaps or purchases, and, in exceptional cases, expropriation. The associated conflicts could be dealt with

as part of the planning approval procedures for land-intensive nature restoration projects and land consolidation procedures. In the medium term, nature restoration requires joint funding from the national and the regional level. Existing funding programs should be expanded and efforts should be made to ensure that nature restoration institutions are adequately staffed.

Making nature restoration more attractive to land users through improved framework conditions

Nature restoration will only be successful with the help of private actors. Of particular importance are agriculture and forestry, whose sectoral legislation should be geared more towards environmentally friendly management. The stringent integration of environmental concerns into the Common Agricultural Policy remains a central demand, especially in the context of nature restoration. The requirements for receiving direct payments (so-called conditionalities) should be critically reviewed in this regard. In order to make nature restoration more attractive to land users, incentives should be created for private projects and appropriate rewards should be given for the provision of public goods, such as soil fertility or water regulation. To this end, and also to improve medium and long-term financing prospects, various instruments can already be strengthened, such as agri-environmental and climate measures. If such remuneration options are not yet available to a sufficient extent, such as for forest management, coherent funding regimes should be created. Contractual nature conservation should be upgraded to focus more on maintaining ecological services in the long term and on facilitating cooperation between private parties in implementing nature restoration measures.

1 Introduction

The state of nature is worrying: globally, but also in Europe and Germany, the habitats of animals, plants and other organisms are dwindling (EEA 2019; IPBES 2019; 2023; JAUREGUIBERRY et al. 2022; TEEB 2010). Because nature is often already in a poor state, the issue of nature restoration is becoming increasingly relevant (DOBSON et al. 1997; UNEP and FAO n.d.). The United Nations have declared the 2020s the "UN Decade on Ecosystem Restoration". With this in mind, the European Union (EU) has drawn up a "Regulation on Nature Restoration" (European Parliament 2024). After controversial discussions, the European Parliament approved the compromise reached in the trilogue and was adopted by the EU Council on June 17th 2024. Consequently, nature restoration is a central task for all EU Member States. Policy initiatives that have been launched at national level to advance nature restoration should be continued. Nature restoration means supporting the recovery of a degraded ecosystem to a good state so that it develops towards more natural and multifunctional structures and can provide a variety of services in the long term (see Art. 3 of the draft EU Regulation on Nature Restoration; Council of the European Union 2023; ZERBE 2019, p. 26). It can take place actively through measures or passively by reducing interventions. Nature restoration aims to maintain or increase biodiversity and the resilience of ecosystems and also supports sustainable land use, climate change mitigation and climate adaptation.

Ecosystems are being altered, damaged, disturbed or eliminated over ever larger areas. Both the biotic composition of habitats and abiotic conditions such as temperature and water availability are changing due to human influence. In addition, the input of pollutants is increasing. In Europe, 81 % of the habitat types of the Directive on the Conservation of natural habitats and of wild fauna and flora 92/43/EEC (Habitats Directive) are now in poor condition (EEA 2021). Around 19 % of European animal and plant species whose status can be assessed are threatened with extinction (HOCHKIRCH et al. 2023). In Germany, the status of 63 % of the species and 69 % of the habitat types listed in the Habitats Directive is classified as "unfavorable-inadequate" or "unfavorable-poor" (BfN 2020), and only 9 % of surface waters are in "very good" or "good" ecological status (BMUV and UBA 2022). The main reason for this is the change in land use (HOCHKIRCH et al. 2023). On the one hand, agricultural use in particular has become more intensive since the middle of the 20th century. For example, inputs of fertilizers and pesticides have increased, the range of crop rotations have become narrower and the proportion of landscape elements such as hedges has decreased. On the other hand, extensive agricultural use is being completely abandoned in some places—with negative consequences for the diversity of landscapes and habitats. At the same time, settlement and transport areas have increased, and the ecological and climate-adapted conversion of forests requires a long time to take effect (BMEL n.d.; 2018; UBA 2023). Climate change and invasive species are increasingly affecting native biodiversity. The consequences of these developments are serious—for us humans as well. Nature not only has value in itself, but

also provides the basis for our lives and economies with its ecosystem services (MA 2005; IPBES 2019): It provides food and raw materials, regulates important material cycles and can positively influence our health in many ways (SRU 2023). Degraded ecosystems can fulfill many of these functions and services only to a limited extent or not at all and are less able to buffer against disturbances such as droughts or floods. Multifunctional and resilient ecosystems are the basis for agricultural and forestry production as well as for fisheries. They also contribute to natural climate protection and are essential for adapting to the consequences of climate change (PÖRTNER et al. 2021).

Halting and, if possible, reversing the degradation of ecosystems is a central component of a transformation towards sustainability. It remains an important concern of nature conservation and sustainable land use to preserve natural or semi-natural habitats. However, this has often not been successful in the past, particularly on areas that are used intensively by humans, such as in agricultural landscapes or in settlement areas. Degradation of ecosystems, such as soil compaction or drainage of peatlands, is usually only partially reversible and can only be restored over long periods of time and often at considerable cost (KOLLMANN et al. 2019; ZERBE 2022). In addition, insufficient funding, competing concerns between different interest groups and a lack of political prioritization have been identified as the biggest practical barriers to nature restoration (CORTINA-SEGARRA et al. 2021). Nevertheless, there are already numerous successful measures such as the rewetting of peatlands, the restoration of watercourses and the return of large wild animals.

Two misconceptions regarding the nature restoration of ecosystems need to be highlighted:

- Firstly, the aim of nature restoration measures is not to bring back a "natural state" free of human influence, which has been virtually non-existent in Central Europe for a long time anyway. Although intensive land use is one of the main causes of biodiversity loss (EEA 2019; IPBES 2019), extensive use by humans can also promote biodiversity in many cases: many species-rich cultural landscapes such as meadows, pastures and heathlands in Europe were created and used by humans. Many of the animals and plants living in them benefit from or are even dependent on extensive management and maintenance of these areas (POSCHLOD 2017).

- Secondly, nature restoration does not mean that a statically defined target state is to be achieved (ZERBE 2019, p. 35). Human activities and environmental changes will continue to have a significant impact on ecosystems in the future. This applies, for example, to climate change, which will also have a substantial impact on existing areas that have been designated for the protection of nature and landscapes (HOFFMANN et al. 2019). Ecosystems can change through human influence in such a way that they differ in function and structure from past and present systems (novel ecosystems) (HOBBS et al. 2009). Native and non-native species occur together and form communities that did not previously exist. The planning and implementation of nature restoration measures should take these aspects into account (FRIETSCH et al. 2023; PERRING et al. 2013; WBBGR 2020; GANN et al. 2019) and enable adaptations to dynamic processes.

At various levels, policy makers have already set targets for nature restoration (ZERBE 2019, p. 471): According to the global biodiversity framework (Kunming-Montreal Global Biodiversity Framework, see UNEP 2022), by 2030

- at least 30 % of the world's land and marine area be under protection and

- at least 30 % of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration.

Similarly, the EU Biodiversity Strategy (European Commission 2020) envisages the following by 2030:

- Significant areas with degraded and carbon-rich ecosystems are to be restored. At least 30 % of species and habitats that are currently currently not in a favorable status should a favorable status or a positive trend by then.

- At least 30 % of both land and marine areas should be be legally protected by then. At least one third of these protected areas—i.e. 10 % each of the land and marine area—should be strictly protected.

These objectives are interrelated and overlap spatially.

According to the EU Regulation on Nature Restoration, Member States shall put in place effective and area-based restoration measures with the objective of jointly covering at least 20 % of the EU's terrestrial and 20 % of its marine areas by 2023. Furthermore, by 2050, all ecosystems in need of restoration must be addressed. The draft regulation also contains specific targets for certain ecosystems and pollinator populations (European Parliament 2024). Until 2030, it places an initial focus on Natura 2000 sites (Art. 4). However, in light of the deteriorated state of nature and the long-term objectives of the regulation, it is evident that nature restoration measures must

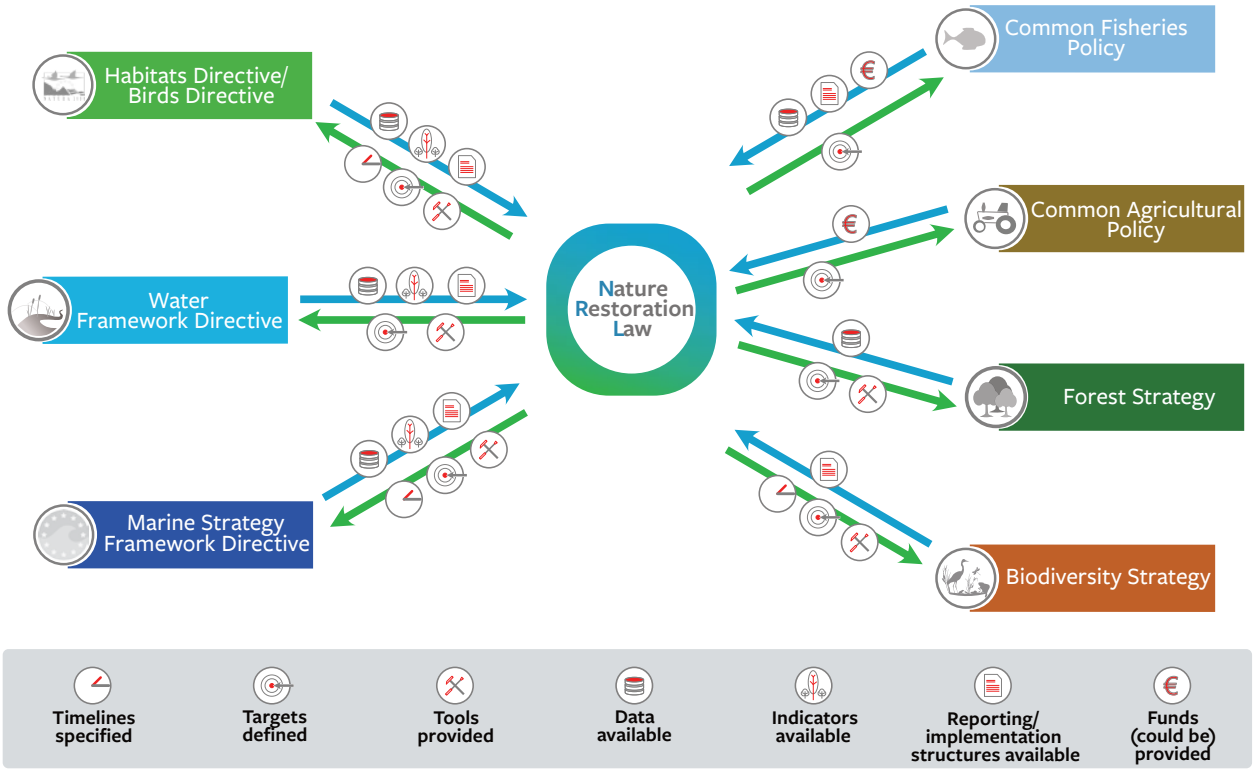
be considerably more extensive. The achievement of the objectives will depend heavily on other European legislation, policies and their implementation that affect the environment and the use of land and water, such as the Water Framework Directive 2000/60/EC and the EU's Common Agricultural Policy (CAP) (HERING et al. 2023; see Fig. 1). An effective nature restoration policy is a legitimate and important concern, also in order to meet national and international obligations. It should be pursued intensively at the national level, to implement the nature restoration regulation of the EU.

In order to advance the important task of nature restoration in Germany, two starting points are central. Firstly, nature and landscape conservation areas must be strengthened in their functioning to better adapt to changes, such as those caused by climate change. To this end, the existing system of protected areas must be further developed both qualitatively and quantitatively (BEIERKUHNLEIN et al. 2023). This also requires improved management of the areas, more closely aligned with specific conservation objectives. This includes appropriately adapted land use. On the other hand, it is also important to improve the condition of ecosystems outside protected areas in the overall landscape, for example in landscapes used intensively for agriculture and forestry. This requires innovations and modified, nature- and environment-friendly forms of land management in these areas.

Nature restoration measures require land, as do efforts to achieve other societal developments and goals. Restoring ecosystems will therefore also involve conflicts over land use economics, and our consumption patterns. They need to be moderated and resolved. Nature restoration is therefore a societal task with far-reaching economic implications. It affects not only nature conservation, but above all the land-use sectors, besides urban and regional planning, especially agriculture and forest management. For this reason, three federal expert councils with complementary expertise in these areas—the German Advisory Council on the Environment (SRU) and the Scientific Advisory Boards on Biodiversity and Genetic Resources (WBBGR) and for Forest Policy (WBW) – have jointly prepared the present statement. It aims to outline the main features of a nature restoration policy that creates synergies between nature conservation and land use interests and minimizes conflicts of interest.

Figure 1

Possible links between the EU Regulation on Nature Restoration and other EU policies



Source: HERING et al. 2023, Fig. S1, modified

5 Conclusion

Only resilient, adaptable and interconnected ecosystems can provide the diverse services that we humans depend on today and in the future. For example, they can mitigate the effects of climate change that are already being felt, reduce nutrient and pollutant inputs to soil and water, and safeguard the productive capacity of agriculture and forestry. The condition of many ecosystems in Germany, Europe and worldwide has deteriorated to such an extent that large-scale nature restoration is urgently needed to preserve them as the foundation of health and well-being. This is also reflected in the international commitments to protect biodiversity. In Germany, the restoration of degraded and disturbed ecosystems is covered in particular by the state's obligation to protect the natural foundations of life (Art. 20a of the German Basic Law). Nature restoration includes a very wide range of measures—both within protected areas that are in poor condition and outside them. Protection and use are still far too often thought of being separate and mutually exclusive rather than together. For the necessary transformation towards sustainability to be successful, an effective integration is needed, especially outside protected areas and in the wider landscape. In order to prevent agricultural and forestry production from being relocated to other countries as a result of domestic restoration measures, and this leakage effect causing environmental damage abroad, effective legislation is needed, for example, to impose due diligence obligations on the import of certain products. Above all, there is a need for changed, less land-intensive consumption and behavior patterns, particularly in the areas of food, housing and mobility. On the production side, new sources of income need to be tapped in some cases. In order to improve the availability of land for nature restoration, alternatives for feed-intensive and therefore land-intensive livestock farming and for energy crop production are particularly relevant. Finally, greater recycling of renewable raw materials is necessary in order to reduce the demand for them and thus the area of land required for their cultivation.

Due to the scale and time horizon of the necessary measures, the restoration of degraded ecosystems is a long-term task. It requires the state to create an organizational, instrumental and financial framework for nature restoration (Fig. 8). In the medium and long term, a coherent, large-scale nature restoration policy is needed. It should be conceptualized nationally in a policy planning law along the lines of the German Federal Climate Protection Act. This requires both a national implementation legislation for the EU Regulation on Nature Restoration and appropriate legal instruments of specialized law. The German federal government should lay down in law both concrete restoration objectives as well as the process, responsibilities and tasks for drawing up a national restoration plan. Restoration policy cannot rely on a voluntary basis alone. The application of a broad range of instruments, a task-oriented organization, appropriate staffing of the administration and adequate funding are necessary in order to pursue an effective nature restoration policy.

The generational task of nature restoration can only succeed if nature restoration measures are developed and implemented together with land users and local residents. In some cases, nature restoration changes landscapes or previous forms of land use. This can open up new regional economic opportunities and increase the attractiveness of the region, for example by improving the recreational value of green spaces. In some cases, however, nature restoration also entails restrictions on use and economic losses or requires an adjustment of previous land uses, for example in agricultural landscapes and forests. Restrictions on land use may have to be compensated for financially. When selecting nature restoration areas and measures, it is important to involve all relevant stakeholders intensively and at an early stage while there is still room for adjustments Relevant stakeholders are, e.g., farms that operate on areas to be restored, local authorities and the general public. Local knowledge and existing networks can be incorporated in decisions to develop and implement suitable solutions and also increase the acceptance of nature restoration projects.

Nature restoration measures should be carefully prepared conceptually by developing, specifying and defining objectives and identifying the necessary areas. The starting point for this is the national nature restoration plan, which must be drawn up by 2026 in accordance with the EU Regulation on Nature Restoration, and which is also independently recommended by SRU, WBBGR and WBW. The German federal government should involve the states, local authorities, environmental associations and the public in the preparation of the plan. It must take into account both the regional distribution of nature restoration projects and synergies with other objectives such as climate mitigation and adaptation. The resulting tasks should be divided up in a cooperative process between the German federal government and the states by means of state-specific quantitative area targets. These could be

based in particular on ecological necessities and responsibilities for ecosystems and species and should be laid down in law at national level. Landscape planning is a suitable means of implementing these targets through concrete measures. To this end, it should be possible to set quantifiable targets for certain ecosystems, for example the proportion of certain landscape elements in the planning area. Uncertainties, dynamic processes and future changes must be increasingly considered. The principles for a nationwide biotope network can be defined in a federal spatial structure plan.

Areas should be made available for nature restoration through planning and the success of the measures should be secured in the long term. The state should prevent land from being used in a way that prevents or

Figure 8

Recommendations for the restoration of ecosystems

SRU, WBBGR and WBW, own representation

significantly impedes the restoration of nature. To this end, priority areas can be set aside through spatial planning. In addition, the possibility of designating protected areas for this purpose should be extended to areas which have little or no nature conservation value, but which can make a relevant contribution to achieving nature restoration goals. Successes can be permanently secured through contracts with land users. Protected areas are indispensable for maintaining a core stock of restored ecosystems. In addition, the catalog of legally protected biotopes in the Federal Nature Conservation Act (§ 30 BNatSchG) could be expanded to protect even smaller nature restoration successes from renewed degradation without lengthy administrative procedures.

The federal, state and local governments should recognize nature restoration as a central challenge for the future and become more involved. They should create the organizational and legal conditions to enable the public sector to carry out nature restoration measures on a larger scale. Already existing and functioning institutions can continue to cover this task. Where dedicated institutions do not yet exist, they could be set up by the states and local authorities to carry out projects. These institutions should primarily be active on areas that are already publicly owned. This promotes the state's role model function in nature restoration. In this context, it is necessary to end the privatization of areas with high restoration potential and to pursue a policy of maintaining or acquiring a sustainable reserve of land. If necessary, it should also be possible to use private land for nature restoration measures, for example through contractual arrangements with the owners. In exceptional cases, expropriation procedures should also be possible. Land consolidation procedures can be used to mitigate the consequences for land owners and users. For these purposes, the implementation of upstream planning approval procedures should be considered for certain nature restoration projects (e.g. the rewetting of peatland). The nature restoration institutions must be equipped with sufficient human and financial resources to cope with these tasks.

In addition to legal requirements, private actors should be increasingly encouraged to provide nature restoration services by changing the economic framework conditions. In order for degraded ecosystems to recover, it is generally necessary to make land use more nature-friendly. Agriculture and forest management play a central role here. The relevant legal requirements should be made more specific and enforceable. The CAP conditionalities should be adjusted accordingly for the funding period from 2028, unless the system of direct payments is dissolved and the funds released are redirected to more effective instruments. However, an overarching concept that involves land users in nature restoration must above all create incentives for nature restoration projects and reward ecological services provided by land owners or users. Regulating ecosystem services (e.g. flood protection or CO_2 storage) are usually public goods that require payment for their provision. In addition, a change in land use needs considerable investment, which only leads to financial benefits after a time lag. This often requires additional financing instruments, sometimes long-term. For agriculture, for example, the eligible Agri-environment-climate measures could be expanded to include specific nature restoration projects. Opportunities to implement these measures cooperatively should be expanded. Private forestry companies should be remunerated for the provision of ecosystem services through a stronger orientation of the various funding programs (e.g. Climate-adapted forest management or the Joint Task for the "Improvement of Agricultural Structure and Coastal Protection"). Ecosystem services not covered by this could be remunerated using various instruments: For example, an ecological financial compensation scheme could provide incentives for nature restoration at local and regional level. It is also conceivable that natural climate protection measures could be financed via the existing emissions trading system or an EU nature conservation fund. In addition, the concrete implementation of private nature restoration measures should be facilitated, for example by publically administering land swaps.

Literature

Beierkuhnlein, C., Stahlmann, R., Geist, J. (2023): Erfüllung der Ziele im Flächennaturschutz bis zum Jahr 2030. Kriterien und Prioritäten. Naturschutz und Landschaftsplanung 55 (7), pp. 16–21.

BfN (Bundesamt für Naturschutz) (2020): Die Lage der Natur in Deutschland. Ergebnisse von EU-Vogelschutz- und FFH-Bericht. Bonn: BfN.

BMEL (Bundesministerium für Ernährung und Landwirtschaft) (n.d.): Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten. Archiv. 1956 und 2001 – 2022. Berlin: BMEL. https://www.bmel-statistik.de/archiv/statistisches-jahrbuch/ (02.11.2023).

BMEL (2018): Der Wald in Deutschland. Ausgewählte Ergebnisse der dritten Bundeswaldinventur. 3., korrigierte Aufl. Berlin: BMEL. https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/bundeswaldinventur3.pdf (02.11.2023).

BMUV (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz), UBA (Umweltbundesamt) (2022): Die Wasserrahmenrichtlinie. Deutschlands Gewässer 2021. Fortschritte und Herausforderungen. Berlin, Dessau-Roßlau: BMUV, UBA. https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/221010_uba_fb_wasserrichtlinie_bf.pdf (20.02.2024).

Cortina-Segarra, J., García-Sánchez, I., Grace, M., Andrés, P., Baker, S., Bullock, C., Decleer, K., Dicks, L. V., Fisher, J. L., Frouz, J., Klimkowska, A., Kyriazopoulos, A. P., Moreno-Mateos, D., Rodríguez-González, P. M., Sarkki, S., Ventocilla, J. L. (2021): Barriers to ecological restoration in Europe: expert perspectives. Restoration Ecology 29 (4), e13346. https://doi.org/10.1111/rec.13346 (25.10.2023).

Council of the European Union (2023): Proposal for a Regulation of the European Parliament and of the Council on nature restoration – Letter to the Chair of the European Parliament Committee on the Environment, Public Health and Food Safety (ENVI). ENV 1361. CLIMA 587. FORETS 187. AGRI 734. POLMAR 57. CODEC 2247. Brüssel: Council of the European Union. 15907/23. https://data.consilium.europa.eu/doc/document/ST-15907-2023-INIT/en/pdf (19.12.2023).

Dobson, A. P., Bradshaw, A. D., Baker, A. J. M. (1997): Hopes for the Future: Restoration Ecology and Conservation Biology. Science 277 (5325), pp. 515–522.

EEA (European Environment Agency) (2021): Conservation status of habitats under the EU Habitats Directive. Copenhagen: EEA. https://www.eea.europa.eu/ims/conservation-status-of-habitats-under (26.07.2023).

EEA (2019): The European environment – state and outlook 2020. Knowledge for transition to a sustainable Europe. Luxembourg: Publications Office of the European Union. https://www.eea.europa.eu/publications/soer-2020/at_download/file (24.07.2023).

European Commission (2020): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy for 2030 Bringing nature back into our lives. COM(2020) 380 final. Brussels: European Commission.

European Parliament (2024): Texts adopted. Nature restoration. European Parliament legislative resolution of 27 February 2024 on the proposal for a regulation of the European Parliament and of the Council on nature restoration (COM(2022)0304 – C9-0208/2022 – 2022/0195(COD)). (Ordinary legislative procedure: first reading). Strasbourg: European Parliament. P9_TA(2024)0089.

Frietsch, M., Loos, J., Löhr, K., Sieber, S., Fischer, J. (2023): Future-proofing ecosystem restoration through enhancing adaptive capacity. Communications Biology 6 (1), 377. https://doi.org/10.1038/s42003-023-04736-y (26.09.2023).

Gann, G. D., McDonald, T., Walder, B., Aronson, J., Nelson, C. R., Jonson, J., Hallett, J. G., Eisenberg, C., Guariguata, M. R., Liu, J., Hua, F., Echeverría, C., Gonzales, E., Shaw, N., Decleer, K., Dixon, K. W. (2019): International principles and standards for the practice of ecological restoration. Second edition. Restoration Ecology 27 (S1), pp. S1–S46.

Hering, D., Schürings, C., Wenskus, F., Blackstock, K., Borja, A., Birk, S., Bullock, C., Carvalho, L., Bou Dagher Kharrat, M., Lakner, S., Lovrić, N., McGuinness, S., Nabuurs, G.-J., Sánchez-Arcilla, A., Settele, J., Pe'er, G. (2023): Securing success for the Nature Restoration Law. Science 382 (6676), pp. 1248–1250.

Hobbs, R. J., Higgs, E., Harris, J. A. (2009): Novel ecosystems: implications for conservation and restoration. Trends in Ecology & Evolution 24 (11), pp. 599–605.

Hochkirch, A., Bilz, M., Ferreira, C. C., Danielczak, A., Allen, D., Nieto, A., Rondinini, C., Harding, K., Hilton-Taylor, C., Pollock, C. M., Seddon, M., Vié, J.-C., Alexander, K. N. A., Beech, E., Biscoito, M., Braud, Y., Burfield, I. J., Buzzetti, F. M., Cálix, M., Carpenter, K. E., Chao, N. L., Chobanov, D., Christenhusz, M. J. M., Collette, B. B., Comeros-Raynal, M. T., Cox, N., Craig, M., Cuttelod, A., Darwall, W. R. T., Dodelin, B., Dulvy, N. K., Englefield, E., Fay, M. F., Fettes, N., Freyhof, J., García, S., Criado, M. G., Harvey, M., Hodgetts, N., Ieronymidou, C., Kalkman, V. J., Kell, S. P., Kemp, J., Khela, S., Lansdown, R. V., Lawson, J. M., Leaman, D. J., Brehm, J. M., Maxted, N., Miller, R. M., Neubert, E., Odé, B., Pollard, D., Pollom, R., Pople, R., Asensio, J. J. P., Ralph, G. M., Rankou, H.,

Rivers, M., Roberts, S. P. M., Russell, B., Sennikov, A., Soldati, F., Staneva, A., Stump, E., Symes, A., Telnov, D., Temple, H., Terry, A., Timoshyna, A., Swaay, C. van, Väre, H., Walls, R. H. L., Willemse, L., Wilson, B., Window, J., Wright, E. G. E., Zuna-Kratky, T. (2023): A multi-taxon analysis of European Red Lists reveals major threats to biodiversity. PLoS ONE 18 (11), e0293083. https://doi.org/10.1371/journal.pone.0293083 (04.12.2023).

Hoffmann, S., Irl, S. D. H., Beierkuhnlein, C. (2019): Predicted climate shifts within terrestrial protected areas worldwide. Nature Communications 10 (1), 4787. https://doi.org/10.1038/s41467-019-12603-w (12.12.2023).

IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) (2023): Summary for Policymakers of the thematic assessment of invasive alien species and their control of the Intergovernmental Platform on Biodiversity and Ecosystem Services. Advanced uned. version Bonn: IPBES. https://zenodo.org/record/8314303 (26.09.2023).

IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn: IPBES. https://doi.org/10.5281/zenodo.3831673 (21.02.2024).

Jaureguiberry, P., Titeux, N., Wiemers, M., Bowler, D. E., Coscieme, L., Golden, A. S., Guerra, C. A., Jacob, U., Takahashi, Y., Settele, J., Díaz, S., Molnár, Z., Purvis, A. (2022): The direct drivers of recent global anthropogenic biodiversity loss. Science Advances 8 (45), eabm9982. https://doi.org/10.1126/sciadv.abm9982 (26.09.2023).

Kollmann, J. (2019): Gesellschaftlicher Rahmen der Renaturierung. In: Kollmann, J., Kirmer, A., Tischew, S., Hölzel, N., Kiehl, K. (Hrsg.): Renaturierungsökologie. Berlin: Springer Spektrum, pp. 87–98.

MA (Millennium Ecosystem Assessment) (2005): Ecosystems and Human Well-being: Biodiversity Synthesis. Washington, DC: Island Press.

Perring, M. P., Standish, R. J., Hobbs, R. J. (2013): Incorporating novelty and novel ecosystems into restoration planning and practice in the 21st century. Ecological Processes 2 (1), 18. https://doi.org/10.1186/2192-1709-2-18 (26.09.2023).

Pörtner, H.-O., Scholes, R. J., Agard, J., Archer, E., Arneth, A., Bai, X., Barnes, D., Burrows, M., Chan, L., Cheung, W. L., Diamond, S., Donatti, C., Duarte, C., Eisenhauer, N., Foden, W., Gasalla, M. A., Handa, C., Hickler, T., Hoegh-Guldberg, O., Ichii, K., Jacob, U., Insarov, G., Kiessling, W., Leadley, P., Leemans, R., Levin, L., Lim, M., Maharaj, S., Managi, S., Marquet, P. A., McElwee, P., Midgley, G., Oberdorff, T., Obura, D., Osman, E., Pandit, R., Pascual, U., Pires, A. P. F., Popp, A., Reyes-García, V., Sankaran, M., Settele, J., Shin, Y. J., Sintayehu, D. W., Smith, P., Steiner, N., Strassburg, B., Sukumar, R., Trisos, C., Val, A. L., Wu, J., Aldrian, E., Parmesan, C., Pichs-Madruga, R., Roberts, D. C., Rogers, A. D., Díaz, S., Fischer, M., Hashimoto, S., Lavorel, S., Wu, N., Ngo, H. T. (2021): IPBES-IPCC co-sponsored workshop report on biodiversity and climate change; IPBES and IPCC. Bonn, Geneva: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Intergovernmental Panel on Climate Change. https://zenodo.org/records/5101133/files/2021%20IPCC-IPBES%20worshop%20report_FRONT_V14_SINGLE.pdf (19.02.2024).

Poschlod, P. (2017): Geschichte der Kulturlandschaft. 2., aktualisierte Aufl. Stuttgart: Ulmer.

SRU (Sachverständigenrat für Umweltfragen) (2023): Umwelt und Gesundheit konsequent zusammendenken. Sondergutachten. Berlin: SRU.

TEEB (2010): Die Ökonomie von Ökosystemen und Biodiversität: Die ökonomische Bedeutung der Natur in Entscheidungsprozesse integrieren. Ansatz, Schlussfolgerungen und Empfehlungen von TEEB. Eine Synthese. Münster: Landwirtschaftsverlag.

UBA (Umweltbundesamt) (2023): Daten. Umweltzustand und Trends. Fläche, Boden, Land-Ökosysteme. Fläche. Siedlungs- und Verkehrsfläche. Stand: 14.03.2023. Dessau-Roßlau: UBA. https://www.umweltbundesamt.de/daten/flaeche-boden-land-oekosysteme/flaeche/siedlungs-verkehrsflaeche (24.05.2023).

UNEP (United Nations Environment Programme) (2022): Decision adopted by the Conference of the Parties to the Convention on Biological Diversity. 15/4 Kunming-Montreal Global Biodiversity Framework. Montreal: UNEP. CBD/COP/DEC/15/4. https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf (05.03.2024).

UNEP, FAO (Food and Agriculture Organization) (n.d.): United Nations Decade on Ecosystem Restoration 2021-2030. About the UN Decade. o. O.: UNEP, FAO. https://www.decadeonrestoration.org/about-un-decade (02.08.2023).

WBGU (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen) (2020): Landwende im Anthropozän: Von der Konkurrenz zur Integration. Hauptgutachten. Berlin: WBGU.

Zerbe, S. (2022): Restoration of Multifunctional Cultural Landscapes. Merging Tradition and Innovation for a Sustainable Future. Cham: Springer International Publishing. Landscape Series. https://link.springer.com/book/10.1007/978-3-030-95572-4 (09.10.2023).

Zerbe, S. (2019): Renaturierung von Ökosystemen im Spannungsfeld von Mensch und Umwelt. Ein interdisziplinäres Fachbuch Berlin: Springer Spektrum.

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