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Policy brief

Opportunities to improve synergies between climate and biodiversity policy

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Executive Summary

Biodiversity loss and climate change are among the most pressing global challenges, yet they are often treated independently in policy and research. Treating them separately risks counterproductive outcomes, inefficiencies and aggravated crises. Improving synergies is highly beneficial for both domains, but crucial for biodiversity, as biodiversity loss cannot be halted without ambitious climate change mitigation, while climate change mitigation options can lead to biodiversity loss. Because of this mostly unidirectional impact, it is crucial that biodiversity considerations are taken into account in climate mitigation policy formulation.

Ambitiously addressing both goals simultaneously is crucial. The policy agendas can support each other individually, but cannot 'bend each other's curves'. Integration is needed not only for more efficient response strategies, but to increase the overall impact in both domains. Synergy should not be a substitute for ambition: only with the increased ambition and more efficiently aligned response options can both global targets – halting biodiversity loss and staying well below 2°C – be met simultaneously.

Systemic, demand-side approaches are most effective. They are highly effective and low-cost. Moderate diet change already has a large effect: 50% convergence towards the EAT-Lancet diet by 2050 would lead to nearly two thirds of emission cuts and about a 60% reduction in species habitat loss. In Europe, added pressure on species of open agricultural habitats can be addressed through the Common Agricultural Policy and the Nature Restoration Law.

Reaching climate targets depends on cutting emissions rather than large-scale forestation programmes. Carbon uptake in existing forest and non-forest ecosystems is critical; land conservation both avoids emissions and adds carbon uptake. At high levels of afforestation and reforestation, the biodiversity benefits of climate policy are largely lost because new forests replace open habitats, while the near-term climate gain is small.

Mining for renewables has mixed effects. Much of the mining of energy transition minerals takes place in or near areas important for biodiversity. The net benefits of climate policy outweigh these impacts, be it on different temporal and geographical scales. Planning mining in areas with the lowest regional and global impacts, and applying circular economy principles, can reduce this trade-off.

There is a need for an integrated approach to climate and nature-related risks. Climate and nature risks interact and propagate through the economy and financial system, with many feedback loops that need to be considered to avoid underestimating systemic risk. Policy and research programmes should prioritise cross-sectoral and nexus-based approaches, and sufficient funding should address key gaps in IAMs and scenario studies to strengthen the linkages between the two policy domains.

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1 Introduction and motivation

Biodiversity loss and climate change are two of the biggest problems faced by humanity. Although both issues are interrelated in a complex way, they have generally been addressed largely independently thus far in policymaking. To some extent, this also holds for the research communities focused on climate change and conservation. Both issues are politically addressed globally in their own conventions: for biodiversity: the Convention on Biological Diversity (CBD), together with the United Nations Convention to Combat Desertification (UNCCD), and for climate change: the UN Framework Convention on Climate Change (UNFCCC). Biodiversity and climate change are also addressed scientifically in their own intergovernmental bodies: The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC). Recognition that the global climate and biodiversity crises are interlinked has grown. In the past, there have been efforts to improve collaboration between the two domains (See Box 1 for several examples). So far, the CBD has taken more initiative in terms of working towards collaboration between both domains than the UNFCCC, e.g. by addressing climate-related considerations in setting biodiversity targets (Terton et al., 2022). The UNFCCC has not yet made integrating biodiversity considerations into its deliberations a priority, although many important decisions for biodiversity are taken in the climate change realm. A key reason for this imbalance is that CC targets can be met without BC policy (although this is more difficult and costly). However, CC policy is crucial for BD, especially in the long term, where unmitigated CC could pose the largest pressure for BD loss. Another important reason is that CC mitigation measures can have both positive effects (e.g. land protection) and negative effects (e.g. large-scale bioenergy production) on BD, while BD policies generally synergize with CC policies (see the first section in Findings).

The main risk of treating the two crises separately is counterproductivity, when measures in one domain negatively affect goals in another (i.e., trade-offs). This may further result in administrative and financial inefficiency, fragmented governance and ultimately in exacerbation of the compounding crises (Pettorelli et al., 2026).

The goal of this Policy brief is to explore how the climate and biodiversity pathways to achieve the objectives of the Paris Agreement and the CBD Kunming-Montreal Global Biodiversity Framework (GBF) can be combined more effectively, to maximize synergy, minimize trade-offs and strengthen the combined realization of climate and biodiversity policy targets. We mainly focus on recent scientific insights, notably from integrated assessment models (IAMs) and scenario-based studies, to identify opportunities for improving policy design and the science-policy interface.

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2 Methodology

A key objective of this policy brief is to provide an overview of the synergies and trade-offs between biodiversity conservation and restoration, climate change mitigation and climate change adaptation, and the potential consequences of addressing multiple policy goals simultaneously. Based on the literature, we first provide a general overview of the main linkages. Secondly, we illustrate several of these key linkages with results from recent scientific studies and their policy implications. Because of the generally global focus of scenario studies, the policy brief's key conclusions and recommendations are scoped globally. However, key learnings also apply to local to regional scales, which is exemplified at the EU level.

In preparation for this policy brief, the included topics and scientific studies have been discussed during a stakeholder workshop in Brussels, on April 29th 2026, organized by Bruegel and PBL, as part of the PRISMA project, named: "Biodiversity, climate change, and the financial sector – reducing risk and generating policy synergies". Aim of the workshop has been to validate the relevance of the selected topics and to collect relevant considerations brought forward by the stakeholders (35 Participants from the European commission, environmental NGOs, European Central Bank, national banks, IMF, agricultural lobby and the PRISMA IAM teams). Another aim has been to understand the policy makers' view on improving the science-policy interface regarding this topic. See Box 2 for the relevant conclusions from the workshop and Box 3 for a description of the capabilities and limitations of IAMs and IAM-based scenario studies aimed at understanding climate and biodiversity linkages to support policy making.

The following Findings section starts with a general overview of the trade-offs and synergies between CC and BD, followed by descriptions of scientific studies of several of the key linkages between the policy domains.

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3 Findings

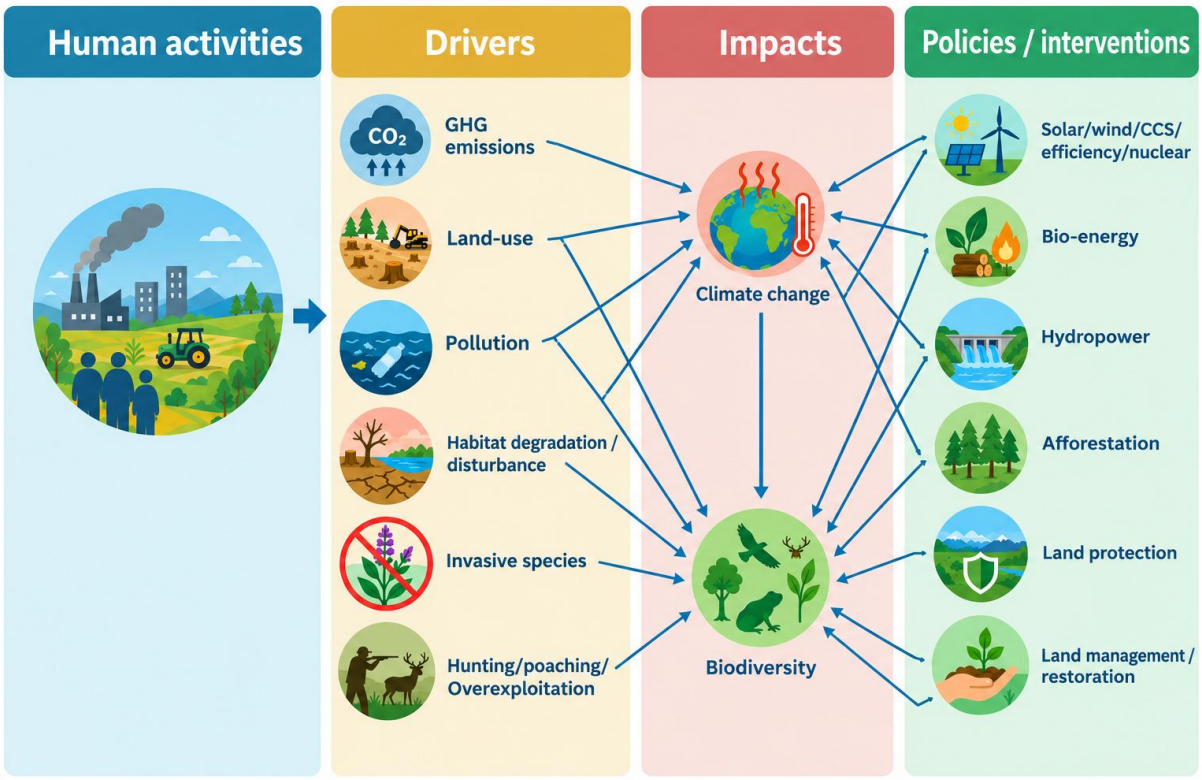

Figure 1: Linkages between the drivers, impacts and policy response options

Figure 1 provides a schematic overview of the key interactions between the drivers and impacts of climate change and biodiversity loss, as well as the policy response options. The key common driver of both impact categories is land use, in particular through agriculture and forestry. The proliferation of ecologically simplified landscapes shaped by industrial farming practices leaves little space for wild species to inhabit or move across landscapes, while the conversion of intact ecosystems significantly contributes to global greenhouse gas (GHG) emissions. Another common driver is air pollution, but this has a much smaller effect (especially on biodiversity) and is projected to show a downward trend in almost all global scenarios, because of improvements in air quality policies and technologies. In addition, climate change itself is a major driver of biodiversity loss, especially in the longer term. It reshapes ecosystems and biodiversity via changing precipitation patterns, increasing temperatures or changing temperature patterns and ocean warming and acidification. Response options can affect both climate and biodiversity, generally positively for climate, but in mixed ways for biodiversity. Table 1 shows the potential trade-offs and synergies between the policy responses of the relevant policy categories: CC mitigation and adaptation and BD conservation and restoration (note: BD conservation and restoration refer to different activities, but both support climate regulation through carbon uptake by ecosystems).

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A key insight from the current literature is that CC policies (especially mitigation) have a wider spread of both positive and negative repercussions of BD outcomes than BD policies have for CC (which are by and large positive). For example, non-bioenergy renewables might require additional infrastructure (e.g. electricity grids, wind turbines, dams, storage) and mining. Bioenergy production may compete with land conservation, and afforestation and reforestation might comprise biodiversity-poor monocultures or might reduce available habitat for non-forest species, of which many are already under pressure today. In contrast, important trade-offs of BD policies regarding CC mitigation are local and global constraints on key carbon dioxide removal (CDR) options, such as bioenergy and bioenergy+CCS deployment and re-/afforestation, in order to conserve or restore intact (non-forest) ecosystems. BD policies as described here are also referred to as nature-based solutions (NbS) or nature-climate solutions, a wide range of measures (reforestation, conservation, restoration, organic farming, regenerative farming, reduced intensity grazing, agroforestry etc. (Griscom et al., 2017) that have multiple co-benefits for both CC mitigation (carbon storage in vegetation and soils) and CC adaptation (resilience, lower or fewer impacts), next to the benefits for biodiversity. Because of this mostly unidirectional impact of CC mitigation on BD policies, it is crucial that BD considerations are taken into account in CC mitigation policy formulation. It also illustrates the need to develop integrated net-zero emission, yet nature-positive pathways. Lastly, systemic measures, which lower consumption or make production systems more sustainable, benefit all CC- and BD- related objectives. This includes a reduced energy and material demand (e.g. through a more circular economy) and shift to healthier, more plant-based diets. Even a partial shift to healthier diets creates substantial benefits for CC mitigation and BD conservation, while lowering costs for public health. From both a CC and BD standpoint, these can be considered no-regrets solutions, which lower overall costs and reduce dependence on other measures.

In the following sections, we provide examples and further analyses of these key linkages.

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Table 1: Tradeoffs and synergies between climate change (CC) and biodiversity (BD) policy goals

Effect of:	On:	Policy	Synergies	Tradeoffs
CC mitigation	**BD conservation and restoration**	Non-bio renewable energy	Lower climate pressure, lower fossil fuel extraction and related pollution, improved air quality	Mining of critical minerals (pollution, land use change), infrastructure, hydropower: aquatic ecosystem disruption
		Bioenergy + CCS	Lower climate pressure	Natural land competition, land-use change
		Afforestation / reforestation	Lower climate pressure, Habitat creation	Monoculture, natural land competition
		Enhanced weathering of minerals	Lower climate pressure, Lower ocean acidification	Pollution from mining and leaching from placed material
BD conservation and restoration	**CC mitigation**	Nature-based solutions (NbS): conservation, restoration, organic farming, regenerative farming, reduced intensity grazing, agroforestry	Carbon storage	Constraints on carbon dioxide removal (CDR) potential (e.g. bioenergy and CCS, and forestation)
CC adaptation	**BD conservation**	Coastal & river flood protection	Habitat protection	
		Enhancing water storage	Lower drought pressure	Hydrological disturbance
		Drought-resistant crops, regenerative farming	Lower natural land competition	
		Urban greening	Habitat creation	
BD conservation and restoration	**CC adaptation**	Nature-based solutions (NbS): conservation, restoration, organic farming, regenerative farming, reduced intensity grazing, agroforestry	Resilience / lower disaster risk	
Systemic measure	**BD / CC**	Reduced meat and dairy consumption, Lowered food waste	BD (more natural land, lower climate pressure)	
			CC (lower emissions)	
		Reduced energy and material consumption	BD (more natural land, lower climate pressure)	
			CC (lower emissions)	

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Ambitiously addressing both goals simultaneously is crucial

Prior studies have shown how the BD and CC policy agendas can support each other individually, but cannot 'bend each other's curves' (Kok et al., 2023; Neumann et al., 2026), meaning to halt biodiversity loss (BD) and to stay well below two degrees C warming (CC). Integration of the two agendas is needed, not only to have more efficient response strategies, but to increase the overall impact in both domains. It is important that synergy should not be a substitute for ambition. Only with the current ambition level and more efficiently aligned response options can both targets be met simultaneously.

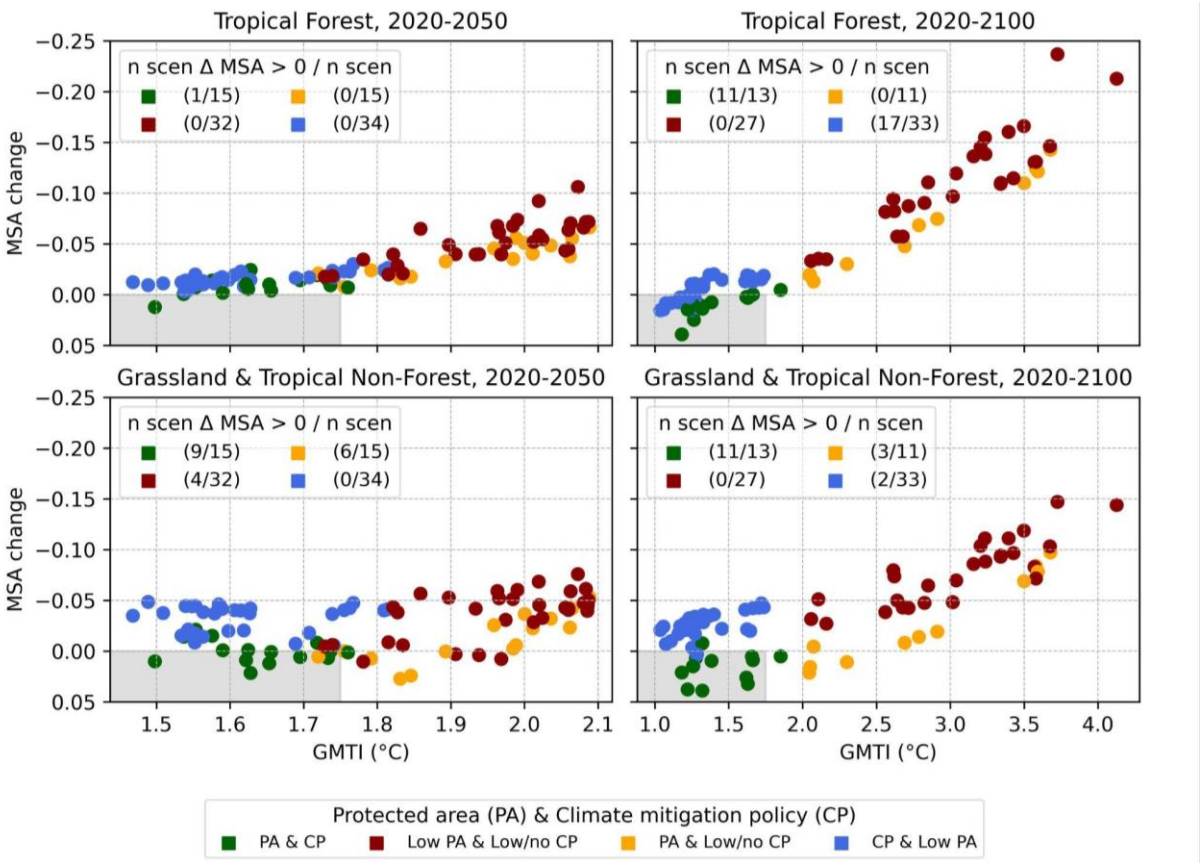

Figure 2: Global mean species abundance (MSA) change versus global mean temperature increase (GMTI) 96 IMAGE model scenarios. From: Ambrosio et al, 2024). Scenario results for 2050 (left) and 2100 (right) show changes in MSA relative to 2020 in relation to GMTI for Tropical Forest and Grassland and Tropical Non-Forest. The y-axis is reversed to reflect that the closer to the origin, the better it is for biodiversity and climate change. The colors represent protected areas (PA) and climate mitigation policy (CP) levels. The lower left grey area represents the concept of a target space (van Vuuren et al 2022) for recovering biodiversity to 2020 levels (positive MSA change) and keeping global warming well below 2 °C (represented as 1.75 °C GMTI). The upper left boxes in each graph indicate the total number of scenarios on each PA and CC mitigation status and how many presented a positive MSA change in the period.

Figure 2, based on Ambrosio et al, 2024, illustrates this need for ambitious action in both domains. It shows the global mean species abundance (MSA, an indicator of BD richness) change (compared to 2020) and global mean temperature increase (GMTI) in 2050 and 2100 in 96 scenarios that have been

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produced by the IMAGE IAM (Stehfest et al 2014; Van Vuuren et al 2021). The grey area indicates the 'target space', where both global policy targets are met (i.e., halt BD loss (MSA change >= 0) and limit GMTI to 1.75 degrees C.). The upper panels show the results for tropical forests (TF), the bottom panels the results for grassland and tropical non-forest (Grass & TnF). The key distinction here is the difference between the green markers (scenarios with ambitious climate policy (CP) and globally more than 30% protected land area (PA)) and blue markers (scenarios with CP, but without PA). Particularly for Grass & TnF, scenarios without PA effectively cannot avoid biodiversity loss (with the exception of 2 out of 33 'blue' cases in 2100). Also for tropical forests, PA significantly contributes to the success rate of scenarios, underpinning the importance of pursuing both policy agendas.

However, there is an imbalance in the relationship between the two. CC targets can be met without BC policy (albeit with more difficulty and at higher costs), but not the other way around. CC mitigation is crucial for BD, especially in the long term, illustrated by the orange and red markers (scenarios without ambitious CP), all of which move strongly upward between 2050 and 2100, far away from the target space. For BD, it is clear that integrated and ambitious action is needed across all targets of the GBF (Leadley et al., 2022). Halting BD loss is only feasible with less livestock-intensive food systems, ambitious conservation and restoration, and lowered threats to biodiversity: climate change, invasive species, pollution and overexploitation (Leclere et al 2020, Kok et al., 2023, Veerkamp et al., 2020).

Systemic, demand-side approaches are most effective

A shift to healthier, more plant-based diets not only reduces costs of public health and food production, but also creates substantial co-benefits for the environment (Bodirsky et al., 2025). Importantly, evidence shows that shifting to healthier diets is not an all-or-nothing affair. Every step towards more varied and nutritious plant-based food intake matters. In a recent study published in Nature Sustainability, von Jeetze et al. (2025) assessed how a convergence to healthier, plant-based diets would drive outcomes across nature conservation, GHG emissions, food accessibility and agricultural productivity. The authors also considered different levels of convergence to a healthier diet. The healthier diet follows the EAT-Lancet planetary health diet, which sets minimum intakes for legumes, fruits, vegetables and nuts, and maximum intakes for sugar, red meat and dairy. A 50% convergence towards this diet by 2050 would reduce global calorie intake from livestock products by about one third (see Figure 3). The analysis shows that on a global level, a 50% convergence achieves almost the same reduction in habitat loss as a complete dietary shift, and almost two-thirds of the reductions in cumulative GHG emissions.

However, in many developing countries, which also cover areas of high global importance for conservation, diets contain few resource-intensive livestock products. Here, a shift towards healthier diets would mainly involve reducing the calorie supply from staple foods in favour of more varied and nutritious plant-based foods with a lower productivity per hectare than staples. The additional conservation and climate benefits of a complete dietary transition as compared to a partial transition are therefore limited, particularly across tropical Africa and Asia. Despite these limited regional effects,

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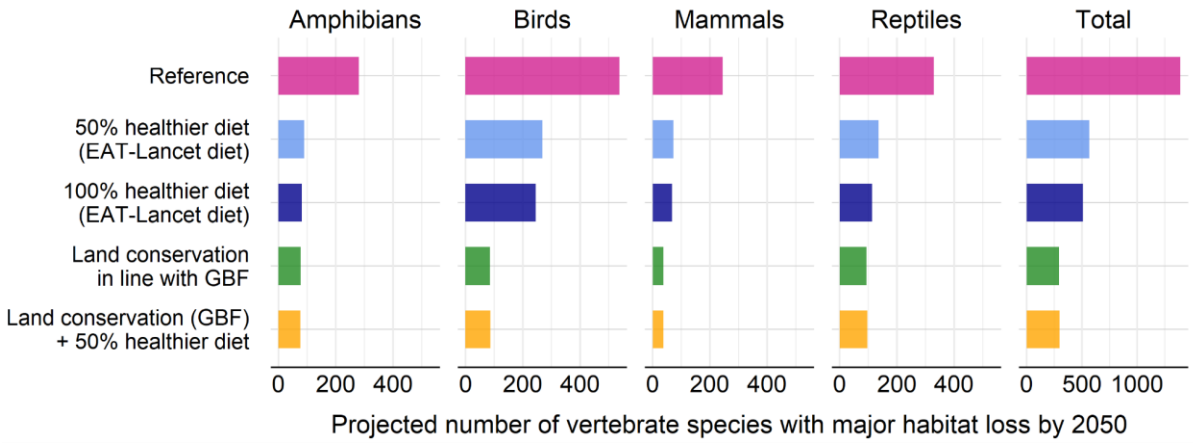
a partial shift to healthier diets would still substantially reduce habitat loss from agriculture on the global scale, specifically due to the demand shifts in developed economies and Latin America.

In Europe, by contrast, a partial dietary transition would be associated with calorie intake reductions of 40% for meat, 28% for dairy, and 30% for sugar, in favor of higher intakes of plant protein and fruits, vegetables and nuts. However, if pastures and rangeland are reduced because of falling demand for cattle and sheep, dietary change could also lead to increases in habitat loss and added pressure on species that depend on grassland and other open farmland habitats (see Figure 3), which have already seen strong population declines over recent decades (EEA 2026; Burns et al., 2021).

In the same study, von Jeetze et al. compared the outcomes of dietary change with more targeted conservation action in line with the Kunming-Montreal Global Biodiversity Framework (GBF) and showed that targeted conservation planning under the GBF, which balances different conservation needs across forest and non-forest habitats, could effectively protect biodiversity, even under current demand trends. However, under current demand trajectories this would globally require considerable productivity increases (+22.5 %), more agricultural imports (+3.5 %), and higher food expenditure (+13 %). Notably, they also show that a 50% convergence to healthier diets would fully offset these added costs from implementing the GBF. Although biodiversity conservation is a spatial problem that depends on the type and quality of targeted habitats and not on the quantity of “spared land” per se, the authors could show that every step towards healthier diets would substantially facilitate the implementation of targeted conservation planning under the GBF that would address current biodiversity decline.



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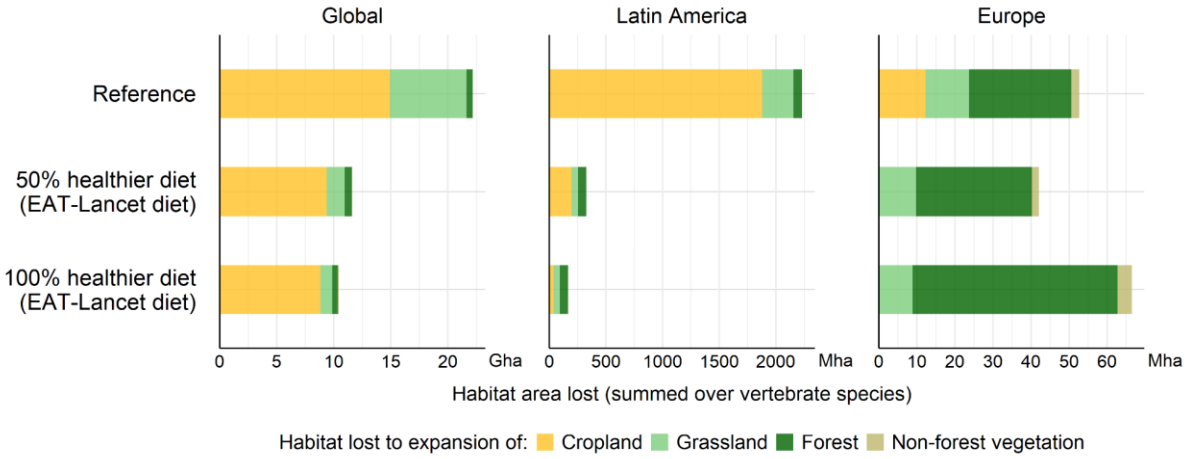

Figure 3: Vertebrate species with major habitat loss by 2050, under various human diet and land conservation conditions. **Top panel:** Projected number of vertebrate species with habitat loss. **Bottom panel:** Habitat area lost, summed over vertebrate species by natural land cover type and region (Global, Latin America, Europe)

Reaching climate targets depends on cutting emissions rather than large-scale forestation programmes

Tree planting has become one of the most popular measures against climate change. It is a comparatively low-cost option for removing CO_2 from the atmosphere and is included in many national climate pledges and international initiatives such as the Bonn Challenge. Where native forests are restored on land that was once forested, tree planting can restore lost habitat and important ecosystem functions. However, large tree-planting programmes are often undertaken on land with low opportunity costs, which frequently includes grasslands, savannas and other non-forest land. Converting these areas into forest reduces habitat for species adapted to open landscapes, many of which are already under pressure from cropland expansion or shrub encroachment.

In a recent study, von Jeetze et al. (2026, under review) assessed how different scales of afforestation and reforestation (AR) would affect biodiversity and the energy transition under pathways in line with the Paris Agreement (see Figure 4). The largest scenario assumed 350 million hectares (Mha) of AR by 2050, an area slightly larger than India. Climate policy that avoids the conversion of natural ecosystems would reduce the number of vertebrate species facing substantial habitat loss by nearly one-third compared with business as usual. At high levels of AR, however, this benefit is largely lost because new forests replace open habitats. This is consistent with emerging evidence that AR beyond roughly 200 Mha carries increasing sustainability risks (Deprez et al., 2024; Fesenmyer et al., 2025).

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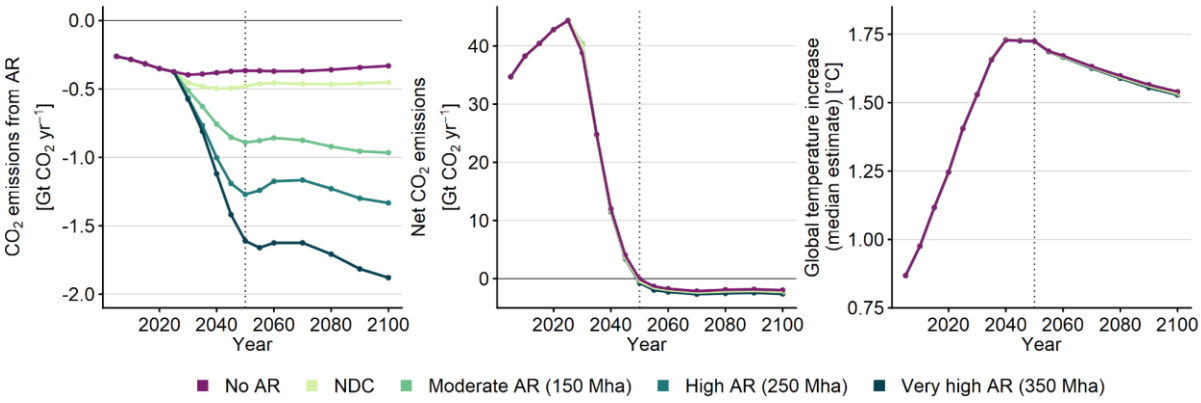

Figure 4: Global CO_2 uptake under different scales of afforestation and reforestation (AR)

The near-term climate benefit of large-scale AR is also limited. By 2050, 350 Mha of AR would only remove an additional 18.3 $GtCO_2$, which corresponds to about 41 % of global CO_2 emissions in 2025 alone. This would delay the required emission reductions by only about five months. Near-term emission cuts are therefore far more important for meeting the Paris targets than the scale of AR. In the long run, AR can still help stabilize temperatures after mid-century, with an additional 87 $GtCO_2$ of cumulative uptake by 2100.

The study took a conservative approach and assumed that planted forests in the AR programmes would grow like naturally regenerating native vegetation. Fast-growing plantations can take up carbon at substantially higher rates (Braakhekke et al., 2019), but they lead to larger trade-offs in terms of biodiversity and other ecosystem services (Hua et al., 2022). At the same time, existing forests, including young secondary forests, already provide substantial carbon uptake (Robinson et al., 2025). Protecting forest and non-forest ecosystems thus avoids emissions and habitat loss and also secures carbon uptake from existing forests.

Spatial planning can reduce some of the biodiversity trade-offs of large-scale tree planting. In their analysis, von Jeetze et al. also find that when land protection in global biodiversity hotspots was prioritized over afforestation programmes, the number of species facing habitat loss under 350 Mha of AR was halved. Losses among open-habitat species, however, were still only partly avoided and would require further targeted conservation action. Climate policy should therefore give more weight to protecting and restoring both forest and open ecosystems. This would considerably reduce trade-offs with biodiversity while the effect on the energy transition required to meet the Paris targets is small.

The role of mining: the mixed effects from climate policy on biodiversity

The energy transition reduces the need for coal, oil and gas. Scenario studies suggest that total mining to build the renewable energy system will decline as fossil extraction falls, even with a steep rise in metal mining (Nijnens et al., 2023). However, climate policy poses a tradeoff between fossil fuel extraction and the mining of renewable energy critical materials. Renewables require many different

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minerals, which causes the mining landscape to change quickly. This is a risk for biodiversity, because much of the mining of energy transition minerals takes place in or near areas important for biodiversity (Sonter et al., 2020, Barbarossa et al 2026). Our own analysis (de Haes et al. in prep.) shows a substantial overlap between mining-disturbed areas (which include a range of 10km around mines) and the current protected area network. Under the Kunming-Montreal Global Biodiversity Framework, countries agreed in 2022 to effectively conserve at least 30% of land and sea by 2030 (Target 3, "30x30"). We therefore also assessed a scenario in which protected areas expand toward this target, based on the expansion scenario of Kok et al. (2023), which allocates additional protected areas per ecoregion. In this scenario, the overlap with mines containing energy transition minerals increases considerably with protected areas.

While the mining implications of climate policy constitute both synergies and trade-offs with biodiversity, the net benefits of successful climate policy outweigh the negative mining impacts. However, it is difficult to weigh the gains of phasing out fossil fuels against the losses from mining for renewable energy because they fall in different places and on different timescales. The benefit of lower emissions is global and builds up over decades. The costs of mining are local and start immediately: deforestation, soil pollution and erosion, and the pollution and depletion of water (De Haes & Lucas, 2023; De Haes & Brink, 2024). Nickel illustrates this. Much future supply is expected to come from deposits under tropical forests, especially in Indonesia (Hyman et al., 2026). The time dimension also works the other way. Mining leaves legacies that can last for centuries, such as tailings and acid mine drainage. Rehabilitation is complex and costly, so it is often postponed or incomplete, and it will never return an area to its former state. A mine opened for the energy transition may still affect its surroundings long after the technologies it supplied with materials have been replaced.

Sonter et al. (2020; 2023) warn that without strategic planning regarding mining locations on a regional/global level, the net gain of climate policy for biodiversity will decrease. In addition, energy policy choices determine how much and which materials the transition needs. This makes energy policy a strong leverage point, where material demand can be steered most effectively. A circular economy approach can reduce the trade-off at its source: longer product lifetimes, reuse, recycling and less material-intensive technologies lower the demand for primary mining. Scenario studies suggest that recycling could substantially reduce the need for future mining for the energy system (Nijnens et al., 2023). Every tonne that does not need to be mined is a trade-off that does not need to be made.

The need for an integrated approach to climate and nature-related risks

Climate change, biodiversity loss and ecosystem degradation are closely interconnected challenges that reinforce each other, amplifying risks to economic activity, financial stability and societal resilience. Climate hazards such as droughts, floods and heatwaves can accelerate ecosystem degradation, while the loss of ecosystem services can increase the vulnerability of economic activities and society to these hazards. Conversely, healthy ecosystems provide essential functions, including water provision, flood protection, soil stabilization and climate regulation, which support economic production and help mitigate impacts of climate change. Assessing climate and nature-related risks

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separately may therefore underestimate their combined economic and financial consequences, particularly where multiple hazards and ecosystem degradation interact.

Ceglar et al. (2025a) find that 72% of analyzed euro area companies are highly dependent on at least one ecosystem service, while approximately 75% of corporate loans to these companies, equivalent to €3.2 trillion, are extended to companies with high ecosystem-service dependencies. Water-related ecosystem services, particularly surface and groundwater provision, together with flood protection and soil erosion control, emerge as especially important (Figure 5). The study also identifies substantial exposure to compound climate–nature risks: more than 40% of the analyzed corporate loan portfolio is associated with companies that are both highly exposed to drought and highly dependent on surface water provision. Similarly, nearly 60% of loans are associated with companies facing unmet flood protection needs, highlighting how ecosystem degradation can amplify the economic consequences of climate hazards. These findings demonstrate that nature-related risks are not confined to environmentally sensitive sectors but can propagate across economic activities and financial institutions.

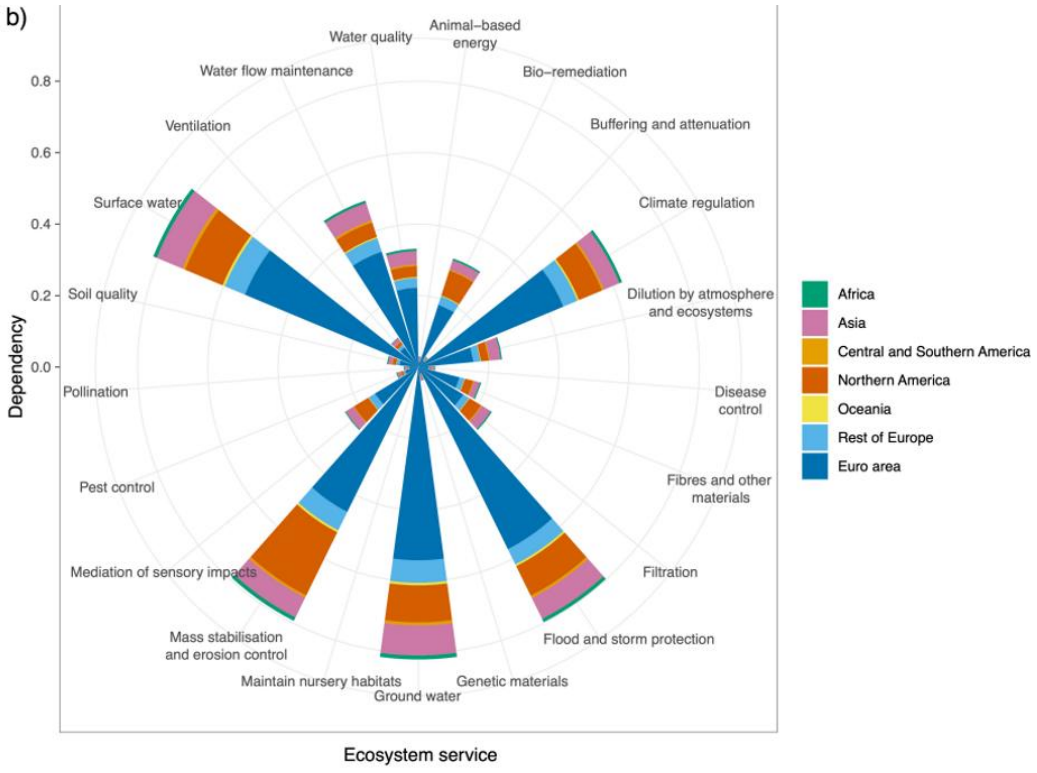

Figure 5: Dependency of euro area companies on ecosystem services. Source: Ceglar et al., 2025.

The economic relevance of nature extends beyond exposure to environmental risks. Natural capital represents an essential input into production and contributes directly to human well-being, yet its economic value is often insufficiently reflected in market prices and investment decisions. This can lead to underinvestment in ecosystem conservation and restoration, despite their potential to strengthen long-term economic resilience. Integrating natural capital into economic and financial

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decision-making requires both improved measurement of ecosystem-related risks and economic frameworks that explicitly account for the role of natural capital in production, long-term growth and societal welfare (Ceglar et al., 2025b).

These findings have important implications for policy and financial risk management. First, integrated climate–nature risk assessments should account for interactions between climate hazards, ecosystem degradation and economic dependencies, including potential nonlinearities, cascading effects and cross-border transmission through supply chains. Second, improved spatially explicit data on ecosystem conditions, ecosystem-service provision and economic dependencies are needed to identify where risks may be most material. Third, closer collaboration between climate, ecological and economic modelling communities is necessary to develop integrated scenarios that capture alternative pathways of climate change, ecosystem degradation and restoration, and their implications for economic and financial resilience. Building on emerging integrated climate–nature scenario frameworks, future work should strengthen the representation of ecosystem dynamics, economic dependencies and alternative policy responses in forward-looking assessments. Such advances would support more comprehensive climate–nature stress testing, enable a more systematic evaluation of the economic and financial implications of different policy pathways, and help integrate nature-related risks more effectively into financial risk management and supervisory frameworks (Stevanovic et al., 2024).

An integrated approach can also improve the effectiveness of public and private investment by identifying interventions that simultaneously reduce climate risks, protect ecosystem functions and support long-term economic resilience. This is particularly relevant for ecosystem-based adaptation and nature-based solutions, where investments in healthy ecosystems can contribute to multiple policy objectives. Strengthening the integration of climate and nature considerations into economic planning, financial risk assessment and investment decisions would therefore support more coherent and effective responses to interconnected environmental challenges.

BOX 1: Initiatives in the past to improve the collaboration between the biodiversity and climate policy domains

This box describes several recent examples of collaborations, without being exhaustive:

- In 2019, the CBD updated the voluntary guidelines for ecosystem-based approaches to contribute to climate change adaptation and resilience (CBD, 2019).
- IPBES and the IPCC have jointly organized and sponsored a workshop on biodiversity and climate change (Pörtner et al., 2021).
- There have been several attempts to find entry points for a common work programme at CBD COP-16 in Cali, Colombia (Oct-Nov 2024). This conference emphasized aligning national biodiversity

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strategies (NBSAPs) with climate targets (NDCs) to maximize synergies.

- The Joint Liaison Group (JLG) between the Rio conventions, which includes the secretariats of the CBD, UNFCCC, and UNCCD is founded to strengthen collaboration and goal alignment. At the UNFCCC COP30 in Belem in November 2025, the relevance of the JLG and its goals was emphasized in a joint statement expressing the need for better collaboration, without making concrete commitments.

BOX 2: Outcomes from the PBL-Bruegel-PRISMA Stakeholder workshop "Biodiversity, climate change, and the financial sector – reducing risk and generating policy synergies" 29 April 2026

This stakeholder workshop was aimed at collecting feedback as a validation of the relevance of the topics addressed in this policy brief. In addition, several insights emerged from the workshop, that illustrate the positions of the stakeholders that were present (35 Participants from: EC (DG Agri), environmental NGOs, EU, European Central Bank, national banks, IMF, agricultural lobby, JRC, PBL, UU, CMCC, PIK) and which are relevant for this policy brief.

As biodiversity regulation currently falls short (globally and in the EU), there is a **tendency to make better use of financial institutes and instruments** in the hope of more success.

Regarding strengthening biodiversity policy in the EU using financial instruments, there appear to be **two schools of thought** (not necessarily mutually-exclusive)**: 1) Market-based instruments** which have thus far not been very successful and 2) **Risk-based approaches** aimed at showing the risks in value chains of companies, dependencies on ecosystem services and the financial implications this has at a system level.

Environmentalists and companies speak different languages. For instance the key performance indicators (KPIs) used by insurance companies do not include climate/biodiversity benefits. There is a need for natural capital accounting in order to improve this.

Regarding policy formation; there is a **need for emphasizing ecosystem services in restoration projects** that synergize with climate action (e.g. climate change adaptation, flood risk reduction).

There is a need for linking IAMs to central bank models. IAM-based scenario studies are too long-term focused and not detailed enough to be directly used in financial assessments.

There is concern that a single 30% "Environment and Climate" in the next **EU Budget (2028 - 2034) does not prioritize biodiversity. A common budget does not ensure policy alignment.**

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BOX 3: What Integrated Assessment Models can and cannot do. The current state of the art of scenario-based climate-biodiversity research (Aschi et al., 2026, Azuero Pedraza et al., 2026, Neumann et al. 2026).

This Box explains how IAMs can provide policy support, what the current limitations are of scenario-based studies and how future funding could be directed to improve this.

Integrated Assessment Models (IAMs) have been used as one of the main tools to bridge biodiversity and climate change policy research. The integrated and interdisciplinary nature of IAMs, and their ability to capture the direct and indirect effects of different assumptions, makes them well-suited to exploring potential synergies and trade-offs of various measures, technologies and policies for climate and biodiversity. Historically, IAMs have focused on assessing energy systems and climate change. Consequently, IAM-based scenarios tend to focus on climate change mitigation rather than biodiversity conservation. However, over the last decades there has been an increased focus on other sustainability aspects, and the linkages between climate and biodiversity are gradually being represented more in IAM-based studies.

Usually this is done following two different methodological approaches:
(1) By using future land cover and/or climate change projections derived from IAM-based socio-economic scenarios as input for biodiversity models or IAM-linked emulators to estimate biodiversity impacts. With this type of approach, the models contribute to answering questions such as: How does mitigation affect biodiversity? How to think about conservation in the context of climate change? And how does biodiversity policy affect climate policy? (Pörtner et al, 2021).
(2) Economic models that assess how climate-driven biodiversity loss affects economic growth and human well-being represent biodiversity at a more aggregated and abstract level. In these models, biodiversity loss is typically integrated in climate damage functions, focused on (monetized) ecosystem services instead of biodiversity indicators.

However, there are several key limitations in the representation of biodiversity and its linkages with climate in IAMs and IAM-based studies:

- IAMs still have not been used to address how biodiversity can promote climate change adaptation, in part because biodiversity is often assessed as a post-processing step rather than directly coupled to the IAM (i.e., without feedback loops).
- Most IAM studies still use only one biodiversity indicator to describe biodiversity, limiting a direct comparison between studies and potentially leading to ambiguous interpretation of single-model studies.
- The model-dependent representation of land use in IAMs (e.g., differences in the level of detail and spatial land-use allocation) makes it necessary to assess impacts on biodiversity across multiple models and biodiversity indicators in order to capture the range of uncertainty.
- Important drivers, such as pollutants and overexploitation are missing, which could be particularly relevant, for example, for mitigation pathways with increased fertilizer use, or relying on increased fish consumption as a response to diet change.
- The coarse spatial representation of land use and its intensity in IAMs do not yet provide the level of detail required to simulate the effects of specific agricultural management strategies (e.g., crop diversification, agroforestry) or to represent mixed, multifunctional landscapes, which are key to biodiversity-based adaptation. IAM-based scenario studies are generally also too long-term focused and not detailed enough to be directly used in financial assessments (e.g. like central banks)

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- The focus so far has been on habitat quantity, and not quality, which could be reflected in underestimated impacts. In addition, only terrestrial ecosystems have been analyzed, excluding freshwater and marine ecosystems.
- The connection between biodiversity and ecosystem services, and therefore a representation of how the economic system depends on biodiversity, is often lacking, or backed by weak empirical support.

As a consequence, there are still very few "bending the biodiversity curve" scenarios that can inform and support the implementation of the Kunming-Montreal Global Biodiversity Framework targets. Closing these gaps will enable the development of more comprehensive understanding on the interactions between biodiversity and climate policy. It is therefore imperative that sufficient future funding is directed to improve these issues (such as the spatial representation of land use, or the direct coupling of biodiversity to IAM models) in model development projects, to strengthen the linkages between the two policy domains.

4 Conclusions and policy recommendations

The findings in the studies presented in this Policy Brief point to an asymmetric relationship between climate and biodiversity policy. Biodiversity policies, including nature-based solutions, generally deliver co-benefits for climate mitigation and adaptation. Climate mitigation policies, by contrast, have more heterogeneous effects on biodiversity. They benefit it substantially through avoided warming, but they can also cause local, and sometimes long-lasting, damage through bioenergy, afforestation and the mining of energy transition minerals.

Neither agenda can reach its objectives without the other. Integrated net-zero emission, yet nature-positive pathways are needed. Scenario analyses indicate that halting biodiversity loss requires ambitious climate policy, while climate policy without extensive area-based conservation largely fails to avoid biodiversity loss, particularly in grasslands and tropical non-forest ecosystems. Synergies can make the response more efficient, but they cannot substitute for ambition in either domain.

Three further conclusions follow.

- **Demand-side measures are no-regrets options.** Even a 50% convergence towards healthier, more plant-based diets yields most of the habitat benefits of a complete dietary shift, and it offsets the additional costs of implementing the Kunming-Montreal Global Biodiversity Framework.
- **Large-scale afforestation and reforestation contribute little to near-term mitigation.** An expansion of more than 350 Mha by 2050 would delay the required emission reductions by only about five months, while posing substantial risks to species of open habitats.
- **Climate and nature-related risks interact and propagate through the economy and the financial system.** Assessing them separately is therefore likely to underestimate their combined consequences.

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Policy recommendations

Integrate biodiversity safeguards into climate mitigation planning. *Directed at: Parties to the UNFCCC (NDCs and long-term strategies) and the CBD (NBSAPs); in the EU, the European Commission and Member States in implementing the 2040 climate framework and National Energy and Climate Plans.* Mitigation pathways should be assessed explicitly against biodiversity targets. NDCs and NBSAPs should be developed coherently, with the aim of net-zero, nature-positive pathways.

Prioritise emission reductions over large-scale forestation. *Directed at: UNFCCC Parties and initiatives such as the Bonn Challenge; in the EU, the LULUCF Regulation and the Carbon Removals and Carbon Farming Certification Regulation.*

- Land-based removals should not substitute for near-term emission cuts.
- Removal targets should take account of evidence that sustainability risks rise beyond roughly 200 Mha of afforestation and reforestation globally.
- Safeguards should prevent afforestation of grasslands, savannas and other open ecosystems.
- Restoration of native ecosystems, and protection of existing forests including young secondary forests, should be favoured over plantations.

Protect and restore open ecosystems alongside forests. *Directed at: CBD Parties (GBF Targets 2 and 3); in the EU, the Nature Restoration Regulation, the Biodiversity Strategy for 2030 and the Common Agricultural Policy (CAP).* Expansion towards 30x30 should be ecologically representative and include non-forest habitats. Land abandonment and forest encroachment is the dominant driver of nature loss in the EU. CAP instruments should therefore support extensive management of high-nature-value grasslands and open farmland, so that falling demand for livestock products does not cause further loss of these habitats.

Support a transition to healthier, more plant-based diets. *Directed at: national governments (dietary guidelines, public procurement, fiscal instruments); in the EU, the European Commission in food system and public health policy and the CAP.* Policy should recognise that partial shifts already deliver large benefits. Efforts to reduce livestock consumption should focus on high-consuming regions, notably developed economies and Latin America. In low-income regions the priority should be greater nutritional diversity.

Reduce primary material demand and plan mining strategically. *Directed at: in the EU, the Critical Raw Materials Act, the Ecodesign for Sustainable Products Regulation, the Batteries Regulation and the Circular Economy Action Plan; internationally, producer-country governments and development finance institutions, including the European Investment Bank.*

- Selection of strategic projects and financing decisions should apply strict biodiversity criteria and avoid protected and high-biodiversity areas, including areas designated under 30x30.
- Binding, financially secured rehabilitation obligations should be required.

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- Energy policy should favour material-efficient technologies, longer product lifetimes and recycling to lower demand for primary extraction.

Integrate compound climate–nature risks into financial risk management and supervision. *Directed at: the European Central Bank and national supervisors, the European Banking Authority, the European Systemic Risk Board and the NGFS; the European Commission regarding sustainability reporting (CSRD/ESRS) and the EU Taxonomy.* Supervisory stress tests should capture interactions between climate hazards and dependencies on ecosystem services, such as drought exposure combined with dependence on water provision. Corporate disclosure should support identification of these dependencies.

Strengthen integrated data and modelling. *Directed at: research funders, including Horizon Europe; the European Environment Agency and Copernicus; the IPCC and IPBES.* Priorities are spatially explicit data on ecosystem condition and economic dependencies, and integrated scenarios that link climate, ecological and economic models. Further joint IPCC–IPBES assessments would support coherent policy advice across both domains.

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