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Economics of Ecosystems and Biodiversity: nature conservation and climate policy are mutually beneficial (Germany)

A new study has assessed the value of ecosystem-based approaches to mitigating climate changes and conserving biodiversity in Germany. The researchers highlight the trade-offs and synergies between climate adaptation and nature conservation and suggest that effective ecosystem-based climate policy requires improved coordination between different sectors, such as agriculture, forestry and energy.

Many EU countries have ambitious policies aimed at mitigating the potential impacts of climate change. For example, the German government aims to reduce greenhouse gas emissions by 55% (compared to 1990 levels) by 2030. Climate policy can affect ecosystems and land use in variety of ways, either complementing or occasionally conflicting with policies aimed at conserving biodiversity.

Nature-based solutions — those which use or imitate natural processes — can benefit both biodiversity and climate-change adaptation and mitigation. The ecosystem approach in relation to climate policy involves the sustainable management of ecosystems to implement mitigation and adaptation actions, for example, by conserving forests to protect natural stores of carbon within trees and decrease soil erosion or water flows, thus reducing the impacts of floods. On the other hand, climate-change adaptation measures, such as the strengthening of grey flood defences, may in some instances interfere with natural processes in rivers and along the coast and therefore, affect biodiversity.

Using national assessment reports from the German TEEB (The Economics of Ecosystems and Biodiversity) initiative[1, 2], this study reviewed the impact of Germany's climate policy to analyse how the ecosystem approach can contribute to climate-change mitigation and the protection of ecosystem services and biodiversity. The researchers identified synergies and trade-offs for climate policy and lessons were drawn from major land-use sectors, including agriculture, peatlands, forests, wetlands and coastal and marine ecosystems.

The researchers outline how actions within different sectors can contribute to climate policy and biodiversity conservation. For example, within agriculture they recommend that high-nature-value grassland be conserved, thereby contributing to climate mitigation; the conversion of 5% of high-nature-value grassland in Germany into arable land has been estimated to lead to additional emissions of 88–187 tonnes of carbon dioxide equivalent (CO_2 eq) per hectare (ha). Should high-nature value grassland not be conserved, the total emissions would sum up to about 6.2 million tonnes of CO_2, resulting in costs for climate damages of €435.8 million annually (based on damage costs of €70 per tonne of carbon dioxide equivalent (CO_2 eq.)[3].

The protection and restoration of peatlands is another important area, as these form the largest terrestrial carbon store in Germany, on only 8% of agricultural land. It has been estimated that, based on the implementation of the National Biodiversity Strategies and Actions Plans (NBSAP), under Article 6 of the UN Convention on Biological Diversity (CBD) — the restoration of 300 000 ha of peatland in Germany could lead to climate benefits of around €217 million annually[4]. The calculations are based on a greenhouse gas (GHG) reduction potential of 3.1 million tonnes per year and damage costs of €70 per tonne of CO_2 eq. The protection of peatlands can also help with the conservation of nature and water resources.

Continued on next page.

1.Hartje, V. *et al*., 2015a. Naturkapital und Klimapolitik – Synergien und Konflikte. Naturkapital Deutschland – TEEB DE report (Natural capital and climate politics: synergies and conflicts. *The Economics of Ecosystems and Biodiversity – Germany report*). Technische Universität Berlin, Berlin; Helmholtz-ZentrumfürUmweltforschung – UFZ, Leipzig.

2. Hartje, V., *et al*., 2015b. Natural capital and climate politics: synergies and conflicts. Summary for decision makers. *The Economics of Ecosystems and Biodiversity – Germany report*. (See footnote 1 for publisher details.)

3. Matzdorf, B., *et al*. (2010). Bewertung der Ökosystemdienstleistungen von (HNV-Grünland: Gutachten-Vorstudie; (continued on next page)

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(continued)

Ecosystem-based measures can also provide cost-effective adaptation solutions. In another example, the researchers point to the two roles played by aquatic ecosystems and near-natural floodplains: First, they provide mitigation services by reducing GHG-emissions mainly through avoided carbon losses; and second, they can contribute significantly to climate change adaptation by providing preventive flood-protection areas. A likely consequence of climate change is an increase in extreme weather events (for example flood events). Thus, an increase in floodplain areas will contribute to climate change adaptation by providing space for water. A case study for the river Elbe demonstrates that the economic benefits of flood protection measures due to dike relocations, with a total amount of 35,000 ha additional floodplain area, are three times higher than their costs[5].

The study also examines current research which provides useful information on the interaction between land-use and climate mitigation, including the agricultural supply model RAUMIS (Regional Agricultural and Environmental Information System)[6] —which covers the whole of Germany's agricultural system — and the C-HWP model for forestry (carbon in harvested wood products).

The researchers say that to successfully implement ecosystem-based climate policy in Germany there needs to be improved coordination between different sectors (e.g. agriculture, forestry and energy), and they identify three main recommendations to this end:

- **Ecosystems with high natural carbon storage (e.g. peatlands and forest) should be protected** and form a key part of an ecosystem-based climate policy.
- **Cost-effective measures should be pursued where possible**, due to the high costs of ecosystem conservation and restoration.
- **Climate-orientated land-use strategies should be developed**, with appropriate targets and measures to ensure effectiveness. Adequate means (regulatory instruments, incentives, funding, etc.) are required to develop such strategies.

The researchers suggest various actions for implementing an ecosystem-based climate policy. These include: promoting technological efficiency and innovation; encouraging cooperation between sectors through funding mechanisms such as agri-environment schemes; and the development of nature-friendly production systems; and the reduction of harmful land-use or land-conversion practices.

Additional suggestions include regular roundtable discussions between different legislative institutions in environment, energy, forestry and agriculture, and the development of a fund for supporting climate and biodiversity-related measures.

Overall, the researchers suggest that ecosystem-based strategies have the potential to significantly increase societies' resilience to climate change. The study concludes that future research could focus on land-use options to develop land-use systems towards climate mitigation and adaptation and to conserve biodiversity and ESS. The researchers add that a quantitative model, in which an overall improvement of the environmental situation would be the main objective, would provide progress towards understanding the synergies and trade-offs between nature conservation and climate policy.

(Footnote 3., cont.) Abschlussbericht Juni 2010. Leibniz-Zentrum für Agrarlandschaftsforschung, Müncheberg.
4. Wüstemann, H., *et al.* (2014). Financial costs and benefits of a program of measures to implement a National Strategy on Biological Diversity in Germany. *Land Use Policy*, 36 (2014), pp. 307–318.
5. Grossmann, M., *et al.* (2010). Ökonomische Bewertung naturverträglicher Hochwasservorsorge an der Elbe. *Naturschutz und Biologische* Vielfalt 89, Bundesamt für Naturschutz: Bonn).
6. Henseler, M., *et al*., 2015. The mitigation potential and cost efficiency of abatement-based payments for the production of short-rotation coppices in Germany. *Biomass Bioen*ergy 81, 592–601.