

Climate Mitigation and Biodiversity Conservation

Technical Brief | UNFCCC COP 28
November 2023

Prepared by the Commission on Ecosystem Management (CEM) the International Union for the Conservation of Nature (IUCN)



Summary

A significant proportion of carbon mitigation projects implemented through market mechanisms (e.g., trading and offset) have a focus on energy efficiency, renewable energy, forestry, transport, and industry sectors. At the same time, new natural climate solutions including ecosystem-based carbon credit projects are emerging rapidly. The global increase in carbon mitigation efforts raises concerns about their potentially adverse impacts on natural ecosystems and biodiversity. Recent experience shows that while the carbon market approaches have progressed methodologies and standards for carbon accounting, they frequently do not address biodiversity conservation and wider sustainability issues adequately. **To safeguard ecosystems and enhance biodiversity conservation, we suggest a paradigm shift in carbon mitigation policies. Carbon mitigation benefits from natural ecosystems should be considered as a co-benefit of biodiversity and ecosystem conservation programs, not the other way around.** All carbon mitigation (and wider climate mitigation) projects must be designed to ensure triple-balanced outcomes: carbon mitigation, biodiversity conservation, and social wellbeing. To reliably achieve these outcomes, key steps include the review and realigning of existing policies on carbon pricing and revenue sharing, benefit sharing, and outcomes monitoring for climate mitigation schemes.

Background

Global climate mitigation policies are promoting a radical shift in emission reduction activities to achieve net-zero targets by 2050. Carbon market mechanisms are being adopted as key instruments in national and regional climate mitigation policies. From early initiatives such as the Clean Development Mechanism (CDM) they now extend to many other forms of market instruments including Emission Trading Systems (ETS) (i.e., allowance-based cap-and-trade system), carbon taxes, and voluntary carbon crediting and offset programs (i.e., producing carbon credits through project-based carbon emission reduction or sequestration). Alongside this focus on carbon mitigation, however, new concerns are emerging that suggest the need for improved integration with biodiversity and ecosystem management objectives.

Global carbon mitigation: carbon pricing and trading programs

Globally, as of April 2022, there are 71 Carbon Pricing Instruments (CPIs), including 37 carbon taxes and 34 ETSs, covering around 23% of total global greenhouse gas (GHG) emissions (World Bank, 2022). Most of the CPIs are implemented in Europe and North American regions. East and Southeast Asian (e.g., China, Japan, South Korea) and South American (e.g., Brazil, Argentina) countries have implemented (or scheduled) either carbon tax or ETSs at national or sub-national level. In the Oceania region, New Zealand has adopted ETS, while Australia has chosen to promote carbon crediting mechanisms instead of ETS. Most of the African, Middle Eastern, and South Asian countries (e.g., India, Bangladesh) and Russia are yet to develop and implement a carbon tax or ETS. Around USD 84 billion of carbon pricing revenue was collected globally in 2021, two-thirds of which came from ETSs (World Bank, 2022). Most of the ETSs are applied to major sectors that produce emissions including power generation, industry, domestic aviation, transport, buildings, and waste. The forestry sector is included only in the New Zealand ETS. Most of the ETSs consider only CO₂ emissions, ignoring other greenhouse gases (GHGs) such as methane (CH₄) and nitrous oxide (N₂O) which have high global warming potential from relatively small emission levels.

Alongside ETS and carbon taxes, carbon crediting programs and voluntary carbon offset programs are playing a major role in the global carbon market. Around 4.7 billion tCO₂e of carbon credits have been issued since 2007 through carbon credit programs (World Bank, 2022).

Until 2017, the major share of the carbon credits came through international CDM. However, after 2017, independent carbon credit platforms have become the major players in the global carbon credit market. Meanwhile, domestic carbon credit mechanisms have also grown in recent years, as have the voluntary markets which cater to aspects such as voluntary offsetting or direct investment in climate change mitigation as contributions to corporate social responsibility (CSR) or environmental, social, and governance (ESG) strategies. Most of the carbon crediting mechanisms are geared towards energy efficiency, renewable energy, forestry, transport, and industry sectors. Although carbon offset programs exist alongside the carbon tax and ETS programs, only a limited portion of credits from the carbon offset programs can be utilized in ETS programs depending on the rules of the ETSs.

Natural ecosystems considered in carbon mitigation programs

The carbon crediting programs established around the world are generally focusing on energy and industrial sectors, with less attention to natural ecosystem-related sectors such as forests and wetlands, except in the REDD+ program which exclusively deals with the forest sector. However, as new natural climate solutions are emerging, natural ecosystem-based carbon credit projects can be expected to increase in the future. Forest management projects including afforestation and reforestation, improved forest management, urban forest/tree plantation, or savanna forest management are already included in many carbon credit programs including the California Compliance Offset Program, Verified Carbon Standard (Verra), American Carbon Registry (ACR), and Climate Action Reserve (CAR). Grassland management projects are included in some carbon credit programs (e.g., ACR, CAR, Verra) and peatland restoration projects have been registered by Verra. ACR has registered some offset projects involving coastal and deltaic wetlands. Some voluntary offset programs (e.g., Plan Vivo and Social Carbon) are also trying to include other ecological sectors and issues in their offset programs, with examples including attention to algal blooms in marine environments, private conservation areas, and areas of biodiversity importance. However, these initiatives are mostly at the conceptual and methodological development stage and no projects have, as yet, been registered. As agricultural land use is one of the largest sources of GHG emission, some activities related to agro-ecosystems, such as rice cultivation, soil enrichment, nitrogen management, and agricultural land management, may be also considered by the carbon credit markets and offset programs.

Biodiversity conservation issues in carbon mitigation programs

Carbon mitigation projects may have adverse effects on natural ecosystems and biodiversity. Renewable energy projects including wind, solar, and hydropower plants, which constitute a large share of carbon mitigation projects, have been found to be detrimental to wildlife biodiversity (e.g., birds, bats, fisheries) if their habitat is disturbed by the project activities.

For example, apart from killing of birds by collision with turbines, noise pollution from wind turbines is one of the main concerns that can affect wildlife through influences on survival mechanisms, socializing, or reproductive processes (Bennun et al., 2021). Solar power plants can cause the destruction of natural habitats, death of birds and other animals due to collision with solar photo voltaic (PV) panels and transmission lines, or drowning in the evaporation ponds of Concentrated Solar Power (CSP) type solar plants. Additionally, the materials required for technologies and infrastructure such as turbines or solar panels are often sourced from the mining of rare earth materials, and these activities can have adverse environmental impacts (Bennun et al., 2021).

Hydropower projects that are incentivized by some carbon mitigation programs may have a significant impact on downstream [hydrology, ecosystems, habitats, and wildlife](#). Afforestation/Reforestation or forest management related carbon mitigation projects, which are implemented through all the carbon market mechanisms, are generally thought to have a positive impact on ecosystems and biodiversity. However, there is growing evidence that afforestation/reforestation programs may facilitate the replacement of high biodiversity forests (and other ecosystem types) by less diversified plant communities such as exotic monocultures (New Zealand Government, 2022). Grassland management projects for carbon mitigation may improve biodiversity in grassland ecosystems but there remains concern around specific impacts on some species (e.g., [arthropods](#)). In comparison, wetland and peatland carbon projects can provide a wide range of co-benefits including fish and wildlife habitat protection, with very few potentially negative impacts having been documented in the literature. The biodiversity impacts of agro-ecosystem carbon projects are relatively poorly understood, and this is a fast-moving area of research and development that requires urgent attention.

Recent experience shows that while the carbon market approaches have progressed methodologies and standards for carbon accounting, they frequently do not address biodiversity conservation and wider sustainability issues adequately. Based on a global review of the current state of these approaches we identified five major issues that contribute to these concerns: (a) a lack of biodiversity assessment in the design phase, and monitoring in the operational phase of carbon mitigation programs, (b) inappropriate pricing for carbon credits from nature-based carbon offset projects, (c) gaps in GHG accounting systems of nature-based carbon mitigation projects, (d) inadequate allocation of carbon taxes and direct finance revenues for biodiversity conservation, and (e) lack of appropriate policies and regulations for benefit sharing among stakeholders.

The views expressed in this publication do not necessarily reflect those of IUCN or other participating organisations.

Way forward

In most sectors, a paradigm shift in the practice of planning and implementing carbon mitigation projects is necessary to address biodiversity and ecosystem management issues alongside climate objectives. Specifically, we recommend a shift towards accounting for carbon benefits from natural ecosystems as a co-benefit of biodiversity and ecosystem conservation, not the other way around. Since carbon regulation is one of the key ecosystem services provided by nature, we should maintain ecosystem integrity and support biodiversity conservation as a first priority that takes precedence over opportunities to harness carbon credits. At the same time, it is critical that carbon mitigation projects are designed to support social well-being. Improved systems for the monitoring, evaluation, and reporting of project outcomes towards these three objectives (carbon mitigation, biodiversity conservation, and social wellbeing) are necessary to ensure the accountability of individual projects.

We make the following key recommendations to address the biodiversity and sustainability concerns in carbon mitigation projects and market mechanisms:

- **Upgrade current policies** and regulations for carbon crediting and carbon trading systems to incorporate biodiversity enhancement and conservation issues
- **Develop full-cost accounting and pricing methods** for carbon mitigation projects and programs
- **Develop and implement fit-for-purpose biodiversity assessments** for the evaluation and monitoring of carbon mitigation projects
- **Avoid or minimize impacts on biodiversity hotspots**
- **Allocate more funds** from the carbon tax and ETS revenues from ETS **to biodiversity conservation and ecosystem management** with a focus on addressing legacy issues and future threats to the integrity of key ecosystems
- **Incorporate equitable and well-defined benefit-sharing mechanisms** in the design and implementation of carbon mitigation projects

Further information can be found at:

1. Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. (2021). [Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers](#). Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy.
2. ICAP. (2022). [Emissions Trading Worldwide: Status Report 2022](#). Berlin: International Carbon Action Partnership.
3. New Zealand Government. (2022). Climate Change Response (Emissions Trading Reform) Amendment Act 2020. Version as at 6 August 2022. Wellington: New Zealand Government. Retrieved 12 August 2023 from <https://www.legislation.govt.nz/act/public/2020/0022/latest/versions.aspx>.
4. Shah, M.A.R., Orchard, S., Kreuzberg, E., et al. (2023). Climate mitigation and biodiversity conservation: a review of progress and key issues in global carbon markets, Gland, Switzerland: IUCN (draft)
5. World Bank. (2022). [State and Trends of Carbon Pricing 2022](#). World Bank, Washington, DC. Doi: 10.1596/978-1-4648-1895-0.