Evaluating the biodiversity implications of nature-based carbon credits

PROPOSER

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CLIENT: CARBON DIRECT

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OBJECTIVES

This project aims to evaluate, within the context of the voluntary carbon market, the role of nature-based carbon credit projects in conserving and uplifting biodiversity. The project team will:

1. Analyze nature-based carbon credit projects and their ecological importance based upon their geographic location, species composition, climatic suitability, and other relevant project characteristics.
2. Conduct a case study either a) within a specific geographic region, or b) containing a specific species, to evaluate the effects of the selected projects on habitat connectivity and suitability, ecological uplift, and local communities' well-being.
3. Develop recommendations for how carbon credit project protocols can prioritize biodiversity conservation and community engagement in the design, implementation, and selection of nature-based projects, and how demand signals could amplify implementation.

IMPLICATIONS

The planet is facing the interconnected threats of anthropogenic climate change and widespread biodiversity loss[1], presenting the need to simultaneously reduce carbon emissions and conserve and uplift biodiversity. Within the private sector, one mechanism for mitigating climate change is the voluntary carbon market (VCM). The VCM facilitates the purchase of carbon credits by organizations working to meet voluntary emissions reduction targets. Carbon credits can represent avoided carbon emissions, emissions reductions, or the removal of carbon dioxide from the atmosphere and its subsequent storage[2]. An additional distinction is that carbon credit projects can rely on engineered solutions (e.g., direct air capture or improved fuel efficiency)[2] or be nature based (e.g., centered around forestry and agricultural practices)[3]. Nature-based solutions harness the ability of ecosystems to remove carbon from the atmosphere and store it within soils and plant biomass[4,5]. As carbon credit projects, they encompass numerous practices including forestation, improved forest management, mangrove forestation, agroforestry, and regenerative agriculture[3].

While protecting biodiversity is crucial for social, environmental, and economic well-being, investments in nature are falling short of conservation goals. Current estimates suggest that US$598–824 billion more per year is required to finance the global conservation of biodiversity[6].

Given the scale of the problem, and the limited additional funding available from public sector and philanthropic organizations, the private sector must play a key role in these efforts[6]. As such, VCM investments in nature-based solutions may serve as a funding source for conservation alongside their primary goal of carbon emissions reductions and removals. Promisingly, there is growing demand within the VCM for high-quality carbon removal credits[7] and for credits that generate co benefits for communities and the environment[8].

Nature-based projects are subject to potential trade-offs between carbon sequestration, biodiversity, and project costs and revenues. For example, commercial tree plantations, often consisting of a single species (i.e., monocultures), can sequester carbon and support local economies in the short-term, yet they may be more vulnerable to pests, disease, and extreme weather in the long-term, increasing the risk that the carbon stored may be re-released[4]. In addition, planting non-native trees, or planting trees in areas that did not previously support forests, carries the risks of altered fire behavior, increased water scarcity, and the introduction of invasive species[4,9]. Plantations are increasingly popular nature-based solutions: almost half of the land committed for restoration under the Bonn Challenge, an international initiative to restore forests, will become commercial tree plantations[10]. It is therefore important to evaluate the tradeoffs or synergies between biodiversity conservation and carbon sequestration in the VCM.

For carbon credits to play a role in supporting biodiversity protection, nature-based projects must assess functional diversity, species adaptability, and ecological suitability alongside carbon removal potential, though this has yet to become standardized practice. While some carbon credit registries have begun developing biodiversity standards, there is no widely accepted framework by which to evaluate biodiversity within carbon credit projects[11]. Furthermore, there has been no comprehensive assessment of where nature-based carbon credit projects are sited in relation to protected areas, biodiversity hotspots, and land use change hotspots. Through studying the ecological characteristics and geographic locations of existing nature-based projects on the VCM, this project will fill this information gap and provide stakeholders with insight into how carbon credit projects may influence biodiversity goals.

EQUITY

High-quality carbon removal projects must involve and empower local communities throughout the lifecycle of the project. This entails community involvement in the decision-making process and equitable access to the economic, social, and environmental benefits of a project[3]. While community engagement work is outside the scope of this group project, the team will research and evaluate whether different credit certification standards (e.g., Verra's Climate, Community, and Biodiversity Standards) require community consultation and how they approach community engagement. In addition, the team will assess how many and what types of projects are certified under each standard, where they are geographically concentrated, and what this may mean for equity and justice on the ground. These findings, and ideas for protocol improvements, will be incorporated into the group's recommendations for how carbon crediting protocols can ensure communities are engaged in and benefit fairly from nature-based crediting projects.

CITATIONS

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10. Lewis, S. L., Wheeler, C. E., Mitchard, E. T. A. & Koch, A. Regenerate natural forests to store carbon. *Nature* (2019).

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12. Harfoot, M. B. J. *et al.* Using the IUCN Red List to map threats to terrestrial vertebrates at global scale. *Nat Ecol Evol* **5**, 1510–1519 (2021).

January 8, 2024

Group Project Committee
Bren School of Environmental Science & Management
2400 Bren Hall
Santa Barbara, CA 93106

Dear Bren Group Project Committee,

We are writing to express Carbon Direct's support for and commitment to the Master of Environmental Science and Management Group Project Proposal **"Evaluating the biodiversity implications of nature-based carbon credits"** for the 2024-2025 project period. We are excited about this opportunity to work with students to advance our collective understanding of nature-based carbon credit projects and their impacts on biodiversity conservation.

Carbon Direct is a carbon management firm committed to providing scientific expertise to help clients measure, reduce, remove, and report their carbon emissions. Our team prioritizes connecting clients with durable, high-quality carbon removal credits. We have been receiving inquiries from clients interested in understanding the conservation impacts of carbon removal projects, and whether and how their investments in these projects are providing co-benefits for ecosystems.

Over the summer, we would be thrilled to support one student from the project team as a paid contractor with Carbon Direct. The contractor would spend time advancing the group project's goals and objectives, which could include building out the credit projects database and conducting original research. In addition, the contractor would have opportunities to engage with other ongoing work projects at Carbon Direct and to learn about carbon accounting, carbon removal pathways, and additional topics of interest.

We understand the importance of mentorship for students. Dr. Sarah Federman, our Director of Landscape Decarbonization, would be the primary mentor for the team of students throughout the project timeline. She is an experienced ecologist and capable of providing advice and guidance to lead students through conducting the required analyses and producing the desired deliverables.

As a final note, given the global nature of carbon markets and related research, there may be additional opportunities for students to connect and collaborate with some of our colleagues, including those at Kew Gardens, the University of Exeter, and Yale University. We believe in cultivating a broad professional network and in the value of cross-disciplinary and inter-continental collaboration.

Thank you for your consideration of our proposal. This project would fill a key information gap in our knowledge of nature-based carbon credit projects and provide a multitude of opportunities for students to expand their skills in research, analysis, collaboration, and communication. We look forward to working with Bren students and the Bren School.