

DEVELOPING A FRAMEWORK FOR BIODIVERSITY CREDITS THAT CREATE
EFFECTIVE CONSERVATION OUTCOMES WITH THE WORLD WILDLIFE FUND

by

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Executive Summary

As the devastating impact of the biodiversity crisis comes into clearer focus, there has been heightened interest in alternative means of financing critical conservation work, including how to engage on the growing momentum around “biodiversity credits.” Through work with the World Wildlife Fund for Nature (WWF), the report considers the efficacy and suitability of biodiversity credits as an economic instrument to incentivize investing in nature. The proposed financial mechanism outlined herein is designed to channel payments directly to communities acting as nature stewards in exchange for the achievement of positive, measurable conservation outcomes. The scope of this study considers how WWF intends to define biodiversity credits, as well as what monitoring techniques should be used to ensure credits are measurable and equitable, with the intention of implementing the recommendations in a pilot project in the Maya Forest of Mexico beginning in late 2023.

Ultimately, we determined that biodiversity credits can be a viable method of privately financing conservation if they are equitable, transparent, measurable and comparable across time and space. We recommend WWF pursue biodiversity credits, not biodiversity offsets, and avoid including carbon stocks when measuring a Biodiversity Unit. Finally, we found that a limited number of monitoring tools can be sufficient for ensuring transparency and reliability in most cases.

1. Introduction

Nature has intrinsic, as well as material, value, and unprecedented biodiversity loss threatens to trigger economic tipping points. But while biodiversity is declining faster than anytime in human history, the gap between what is being spent on biodiversity conservation and what is needed to halt the loss of biodiversity is widening (IPBES, 2019). In 2020, it was estimated that between \$722 and \$967 billion is needed per year to adequately protect biodiversity, but that current spending was between \$124 and \$143 billion per year (Paulson Institute, 2020). It should be noted that the fundraising needs to protect biodiversity pale in comparison to the estimated cost of biodiversity loss: losses of ecosystem services - like food provisioning and air filtration - are now estimated to cost the world between \$4 and \$20 trillion per year (Kapnick, 2022). The gap between the funding needed to avert biodiversity loss and current fundraising demonstrates that there is a strong opportunity for the private sector to engage in blunting the impacts of biodiversity catastrophe.

2. Objectives

A small team within the World Wildlife Fund for Nature (WWF) was awarded funding through the WWF Cross-Practice Innovation program to consider whether biodiversity credits could be used to attract private second financing and create positive outcomes for biodiversity and the communities that live in the most biodiverse regions. This proposed economic instrument would generate financing for conservation via the sale of fungible biodiversity units, and payments would be channeled to communities acting as nature stewards upon the achievement of positive,

measurable conservation outcomes. Interest in biodiversity credits is not unique to WWF: The 2022 Kunming-Montreal Global Biodiversity Framework specifically calls for private finance to stimulate “innovative schemes such as... biodiversity offsets and credits” and boutique biodiversity crediting schemes currently exist, although, at such a limited scale, we determined they were incomparable and lacking access to a formal market (Kunming-Montreal Global Biodiversity Framework, 2022; Taskforce on Nature Markets, 2023).

Through the Innovation Funding, the team focused on two objectives: 1) Defining what fair, effective, measurable biodiversity credits could look like and where they should and shouldn't borrow from existing private financing for nature mechanisms and 2) identifying the right suite of monitoring tools and technology providers, taking care to balance cost-effectiveness and the ability to deploy the technologies with limited barriers to entry. It is important to qualify that these objectives focus on the supply side i.e. the ability to deliver equitable, traceable, measurable credits. Further study into the demand side, particularly willingness to pay, is critical to success.

The tools we identified would be deployed in a pilot project in the Calakmul Biosphere Reserve in the Maya Forest of Mexico in late 2023. This area was selected both for its high levels of biodiversity, as well as ongoing work in the region by WWF focused on private financing for conservation.

3. Existing economic instruments for biodiversity financing

We started by reviewing existing economic instruments for financing biodiversity conservation. We considered Wildlife Conservation Bonds, Wildlife Credits, biobanking and biodiversity offsets, Payment for Ecosystem Services schemes, and carbon markets. We conducted an extensive literature review, with a focus on reporting from multilateral development banks, policy institutes and global conventions. We also sought expert counsel, both in the form of an established “Expert Panel” within WWF, as well as with carbon credit verifying organizations, other entities looking to develop biodiversity credits, and service providers.

Economic instrument	Definition	Example	Notable for biodiversity credits
Wildlife conservation bonds	Outcome-based bonds in which issuer makes Conservation Success Payment (proportional to population success) to Noteholders at maturity (World Bank, 2022)	Rhino Bond: 5-year, \$150m sustainable development bond issued by the International Bank for Reconstruction and Development that uses outcome-based model to protect and increase black rhino populations in South Africa (World Bank, 2022)	Shifts risk and economic burden of funding from donors to investors
Wildlife credits	Payments made to landholders based on measurable conservation performance (IIED, 2020)	Namibia Wildlife Credits: financial incentive designed to minimize human/wildlife conflict by providing payments in exchange for positive conservation performance (wildlife sightings, breeding success, land management) (IIED, 2020)	Relies on proprietary scoring methodology for monitoring wildlife and improvements
Biodiversity offsets	Compensation that can be purchased in the case of unavoidable habitat damage and	Biodiversity Offsets Scheme (New South Wales): program based on offsets generated by landholder stewardship	Designed to offset the destruction of biodiversity and habitat elsewhere, rather than incentivize

	biodiversity loss resulting from development; represents comparable habitat being protected elsewhere (OECD, 2016)	agreements that can be purchased and retired by developers to offset the unavoidable destruction of biodiversity (NSW Government, 2021)	making an investment in nature
Payments for Ecosystems Services	Scheme to support the exchange of payments designed to compensate custodians who commit to taking management actions that provision ecosystem services (IIED, 2020)	Chimpanzee Trust and the International Institute for Environmental and Development: approach that pays farmers and landowners to conserve, rather than convert, habitat, thus minimizing forest loss to agriculture (Chimpanzee Trust, 2019)	Requires sustained funding and strong community engagement at national, regional and local levels
Carbon markets (offsets and credits)	Economic instrument that is used to finance climate action through the creation and sale of credits (IIED, 2020)	REDD+ projects (Reducing Emissions from Deforestation and Forest Degradation): designed to provide incentives and funding for people living in remote areas to protect the ability of nature to sequester carbon (UNFCCC, 2020)	Governed by independent standard bodies (Verified Carbon Standard, Gold Standard) that issue credits upon verification

There were two notable decision points that arose from the literature review: 1) whether to instead engage in the biodiversity offsets (not credits) market, which is already relatively robust and 2) whether to include carbon stocks in the measurement of a biodiversity unit.

We recommend moving forward with biodiversity credits, which should be designed to make investment in nature more financially attractive, rather than used to offset the destruction of biodiversity and habitat elsewhere. In this way, biodiversity credits are better suited to buyers

(private sector, government, other) interested in fulfilling voluntary ESG or nature-positive commitments.

As far as whether to include carbon stocks in a biodiversity valuation, there are obvious biodiversity and carbon market synergies, especially with REDD+ projects and the addition of biodiversity-specific certifications, like Verra's Climate, Community and Biodiversity Standard. Carbon stocks are already being included in other biodiversity crediting schemes and are relatively easy to integrate as, unlike biodiversity credits, they have a distinct and replicable unit of measurement (one tonne of GHG equivalent) and thus are easily compared over time and space (ValueNature, 2023; IIED, 2020). However, we felt it was important to recognize the value of biodiversity distinct from carbon markets, especially in light of questions around additionality, permanence and the presence of leakage. These concerns, in addition to equity and transparency, are ones the biodiversity credits market will need to navigate, however our recommendation is to focus on buyers looking to fulfill voluntary nature-positive, not net-zero, commitments.

We ultimately defined biodiversity credits as “a financial mechanism based on conservation performance payments intended to channel payments directly to communities who act as nature stewards in exchange for successful achievement of positive biodiversity conservation outcomes.” These credits should exist within a globally recognized framework and serve as a market mechanism designed to drive investment toward monitoring and enhancing biodiversity. These credits are not designed to be tied to a company's supply chain but instead represent a voluntary action towards biodiversity protection. The credits should not focus on a specific species (like Wildlife Credits and Wildlife Conservation Bonds) or be tailor-made for a local

approach, but instead represent the sum of ecosystem services provided in an area, combining habitat, ecological connectivity, and key species.

4. Elements of biodiversity and monitoring for change in state over time

Having made the decision to move forward with a crediting, not offsetting approach, and to move away from including carbon stocks in the credit calculation, it was important to identify the elements of biodiversity that could be clearly monitored for a change in state over time, as well as appropriate monitoring tools, which could be piloted in the Maya Forest in 2023.

Elements of biodiversity that can be used to measure change in state over time:	Tools for measurement:
Connectivity (structural, functional)	Remote sensing, <u>TerrAdapt</u> , camera traps, surveys, collaring, Protected Area Isolation Index
Habitat (size, quality)	Remote sensing, satellite imaging
Ecosystem Integrity	Ecosystem Integrity Index
Flora (presence, abundance, richness, trends)	Surveys, eDNA, photo identification (key species)
Fauna (presence, abundance, richness, trends)	Camera trapping, surveys, collaring, acoustic sensors, IUCN Red List, eDNA
Species extinction risk (STAR) (threats, restoration)	Calibrated STAR value
Soil health	Nematode indicators

Working with experts at WWF and beyond, we determined the pilot should focus on the monitoring technologies that could be most reliably applied to the largest number of determined

ecosystem indicators: remote sensing, soil analytics and eDNA. We also identified the technology providers that will be used in the Maya Forest pilot.

5. Elements of a Biodiversity Unit

While we did not formally establish a formula for a “Biodiversity Unit” (BDU), our structural recommendations take notes from carbon credits. To monitor progress and assess payments for improvements or losses, a BDU at a minimum needs to be 1) transparent, 2) linked to a specific geographic region and biome but comparable across space and time, 3) measurable against an established baseline, 4) valid for an established period of time, and 5) suitable for monitoring.

For instance, we considered an approach that calculated a relative value by comparing the current status of biodiversity ($\leq 100\%$) vs. a fully intact status (100%) over a period of time. Once calculated, a payment would be released to the custodians only if the current status was either the same or improved over an agreed upon period (first instance, one year). Once the agreed upon period had elapsed, a new calculation of the current status would be performed.

6. Pilot in Maya Forest

Using the above recommendations, WWF plans to pilot a biodiversity crediting program in the Calakmul Biosphere Reserve in the Maya Forest in 2023. The Maya Forest, which extends into Belize, Guatemala and Mexico, is the most extensive tropical forest in Mesoamerica and one of only a few with a viable population of jaguars and other threatened species, like the white lipped

peccary and scarlet macaw (WWF, 2021). The protected areas of the forest cover more than four million hectares and are surrounded by a diverse population of nearly 600,000 people (WWF, 2021). The area is experiencing deforestation, habitat loss and biodiversity loss due to illegal logging, conflict with livestock, forest fires, illegal wildlife trade, oil palm plantations, road construction, human settlements, drug trafficking, mining, and oil exploration (WWF, 2021).

This location was not only chosen for the pilot because of its high density of biodiversity and the presence of imminent threats, but also because WWF has already been testing community-led conservation financing in surrounding communities via a Jaguar Bond. (The Maya Forest supports one of the highest densities of jaguars after the Amazon.) Due to this ongoing work, WWF already has much of the available data needed to establish a BDU baseline, including: species richness; relative abundance of key species; species comparison across communities; and absence/ presence of key selected species. The data to be collected in the pilot by identified technology partners will include forest cover analysis (remote sensing); soil diversity analysis and eDNA (general diversity analysis and/or direct search to key species).

7. Results

In sum, biodiversity credits can be a viable method of privately financing conservation if they are equitable, transparent, measurable and comparable across time and space. We recommend WWF pursue credits, not offsets, and avoid including carbon stocks when measuring a Biodiversity Unit. Finally, a limited number of monitoring tools can be sufficient for ensuring transparency and reliability in most cases.

8. References:

- Ajarova, L. (2019, February 27). *Conserving chimpanzees through a PES scheme (2010 - 2019)*. Chimpanzee Trust. <https://ngambaisland.org/pes-scheme-2010-2019/>
- Brondizio, E. et al., (2019, May 4). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES. <https://doi.org/10.5281/zenodo.3831673>
- Biodiversity Offsets Scheme*. NSW Environment and Heritage. Retrieved April 24, 2023, from <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme>
- COP15: Final text of kunming-montreal global biodiversity framework*. Convention on Biological Diversity. (2022, December 22). <https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222>
- Deutz, A., et al., (2020, October 14). *Financing Nature: Closing the Global Biodiversity Financing Gap*. Paulson Institute. https://www.paulsoninstitute.org/wp-content/uploads/2020/10/FINANCING-NATURE_Full-Report_Final-with-endorsements_101420.pdf
- Grey, C. (2022, December 9). *How biodiversity credits can deliver benefits for business, nature and local communities*. World Economic Forum. <https://www.weforum.org/agenda/2022/12/biodiversity-credits-nature-cop15/>
- How Wildlife Credits Works*. Wildlife Credits. Retrieved April 24, 2023, from <https://wildlifecredits.com/how-we-work>
- International Bank for Reconstruction and Development (2022, March 28). *Wildlife Conservation Bond Prospectus Supplement*. <https://thedocs.worldbank.org/en/doc/23c9e8870f7775ac02b103d1bea61e0e-0340022022/>
- Kapnick, S. (2022, May 9). *The economic importance of biodiversity: Threats and opportunities*. J.P. Morgan Asset Management. <https://am.jpmorgan.com/us/en/asset-management/adv/insights/portfolio-insights/sustainable-investing/the-economic-importance-of-biodiversity/#:~:text=Biodiversity%20loss%20has%20financial%20impacts,USD%20200%20billion%20per%20year.>
- OECD. (2019). *Biodiversity: Finance and the Economic and Business Case for Action*, report prepared for the G7 Environment Ministers' Meeting, 5-6 May 2019. <https://www.oecd.org/environment/resources/biodiversity/biodiversity-finance-and-the-economic-and-business-case-for-action.htm>

- OECD (2016, November) *Biodiversity Offsets Effective design and implementation*.
<https://www.oecd.org/environment/resources/Policy-Highlights-Biodiversity-Offsets-web.pdf>
- Porras, I., et al., (2020, March). *Making the market work for nature*. International Institute for Environment and Development. <https://www.iied.org/16664iied>
- The world's first biodiversity credit for the voluntary ecological market*. ValueNature. Retrieved April 24, 2023, from <https://valuenature.earth/#credits>
- Waterford, L. (2023, April). *Biodiversity Credit Markets: The role of law, regulation and policy*. Taskforce on Nature Markets. <https://www.naturemarkets.net/publications/biodiversity-credit-markets>
- What is REDD+?* UNFCCC. Retrieved April 24, 2023, from <https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd#:~:text=REDD%2B%20is%20a%20framework%20created,carbon%20stocks%20in%20developing%20countries.>
- World Bank Group. (2022, March 24). *Wildlife Conservation Bond Boosts South Africa's Efforts to Protect Black Rhinos and Support Local Communities*.
<https://www.worldbank.org/en/news/press-release/2022/03/23/wildlife-conservation-bond-boosts-south-africa-s-efforts-to-protect-black-rhinos-and-support-local-communities>
- World Economic Forum. (2022, September). *Biodiversity Credits: Unlocking Financial Markets for Nature-Positive Outcomes*.
https://www3.weforum.org/docs/WEF_Biodiversity_Credit_Market_2022.pdf
- World Wildlife Fund Mesoamerica. *Maya Forest*. WWF. Retrieved April 24, 2023, from https://www.wwfca.org/en/landscapes/maya_forest/