Combined Biodiversity and Carbon Management

Spatial data to support conservation and restoration of biodiversity- and carbon-rich areas

Key messages

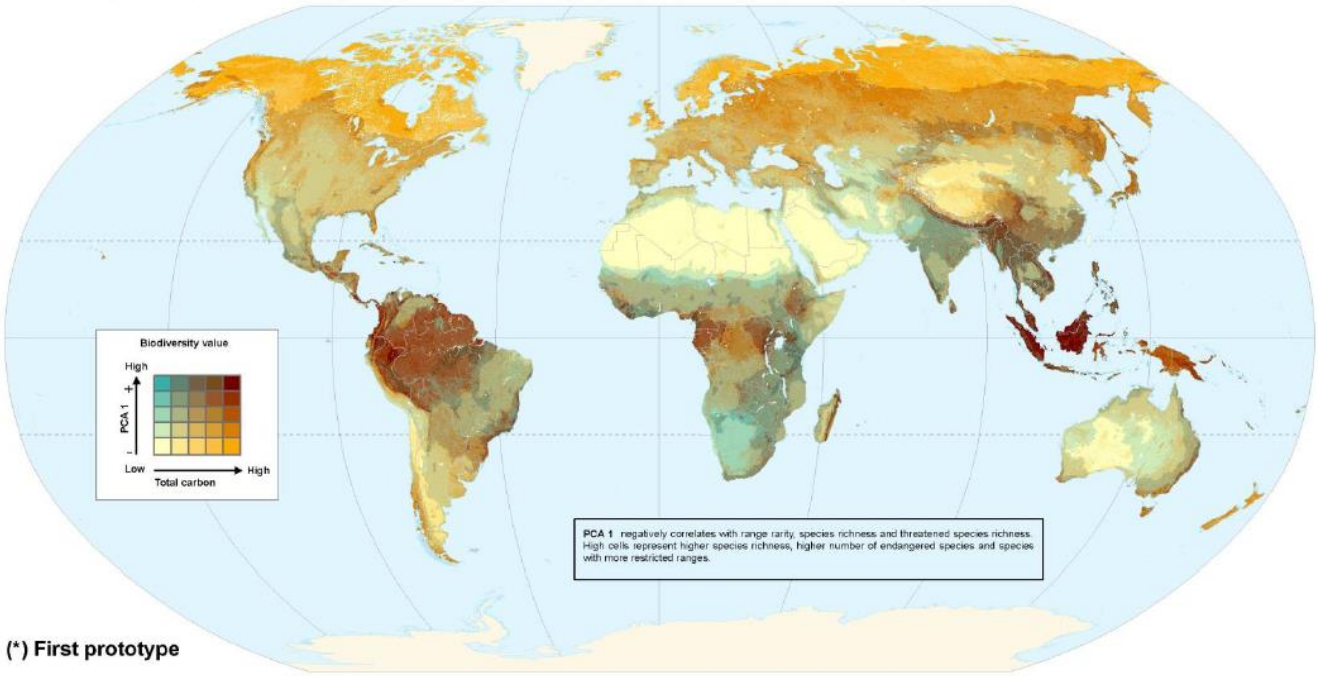
Conservation of intact or near-intact ecosystems and restoration of degraded ecosystems that are high in both biodiversity and carbon is crucial to achieving global goals for biodiversity and climate, such as the Aichi Targets, the Sustainable Development Goals (SDGs), and the aims of the Paris Agreement.

The UN Decade on Ecosystem Restoration (2021-2030) will build political momentum for conservation and restoration outcomes. The private sector is under increasing pressure to take action and contribute towards these global goals.

UNEP-WCMC and partners are developing a prototype spatial data product to help decision makers consider biodiversity and carbon in an efficient way.

There is an opportunity for leading extractives companies to be involved in refining this prototype layer in collaboration with relevant experts to ensure it is fit for use by the private sector.

Figure 1: Organic carbon and areas of high conservation value for biodiversity*. Source: Ravilious *et al.* (2019)[1].



PCA 1 negatively correlates with range rarity, species richness and threatened species richness. High cells represent higher species richness, higher number of endangered species and species with more restricted ranges.

Introduction

The recent global assessment by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), estimates that 75% of the terrestrial environment and 66% of the marine environment have been "severely altered" by human activities[2]. The negative effects resulting from degradation of the natural environment represent losses equivalent to approximately 10% of annual global Gross Domestic Product (GDP), and jeopardise food systems and the well-being of 3.2 billion people worldwide[3].

In 2017, 15.8 million hectares of tropical tree cover were lost, an area the size of Bangladesh, resulting in 4.8 gigatons of greenhouse gas emissions[4]. If it were a country, tropical deforestation would rank third globally in emissions of greenhouse gases, just behind the People's Republic of China and the United States of America. However, protection, management, and restoration of tropical forests could provide 23% of the emissions reductions needed to meet the 2015 Paris Agreement's 2°C target[5].

Approximately 7.1 gigatons of CO_2 emissions could be stopped annually through the sustainable management, protection and restoration of tropical forests, mangroves and peatlands[5]. These actions would also contribute to halting the current biodiversity crisis, and would secure the provision of ecosystem services crucial for economies and human well-being. For example, the potential economic benefits of ecosystem restoration are estimated at USD 84 billion per year[6].

Identifying areas where high biodiversity and high carbon values co-occur can help prioritise offsets and additional conservation actions (Box 1), inform decisions that can deliver multiple-benefits, and enable avoidance of such areas during project development, in accordance with the mitigation hierarchy (Box 1).

In March 2019, the United Nations declared 2021-2030 the UN Decade on Ecosystem Restoration[7]. This aims to accelerate action, and build political and private sector support to restore degraded natural systems[3]. The IPBES global assessment emphasises that ecosystem restoration is included in the range of actions that all actors need to take to safeguard the global environment. The UN Decade represents an opportunity to contribute to the global restoration agenda that goes beyond private sector mitigation activities[3].

In 2018, UNEP-WCMC developed a method to map and combine into one spatial data layer the distribution of global carbon stocks and biodiversity across terrestrial ecosystems (see Figure 1 above).

This briefing note outlines the global context and synergies between conservation and restoration of biodiversity- and carbon-rich areas.

It explores the potential for harnessing existing and forthcoming datasets to develop spatial information that would help the private sector in early environmental risk screening by:

- Identifying areas where high biodiversity and high carbon co-occur so impacts can be avoided.
- Identifying areas where offsets and additional conservation actions might be best employed in relation to biodiversity and carbon, focusing on private sector activities, commitments and/or targets.
- Providing quantitative information on biodiversity and carbon values to reflect potential private sector contributions to achieving global and/or national goals.

Box 1: Key definitions

Mitigation Hierarchy: a tool that aims to help manage biodiversity risk, and is commonly applied in Environmental Impact Assessments (EIAs). Includes the following hierarchy of steps: avoidance, minimisation, rehabilitation, restoration and offset (BBOP, 2010)[8].

Net Gain: additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated (IFC, 2012)[9].

No Net Loss: the point at which the project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to understand on site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (IFC, 2012)[9].

Offsets: measurable conservation outcomes designed to compensate for significant adverse [climate or] biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken (adapted from BBOP, 2010)[8].

Additional Conservation Actions: A broad range of activities that are intended to benefit biodiversity, where the effects or outcomes can be difficult to quantify (Rio Tinto, 2008)[32].

Context and drivers

The current global context

The biodiversity and climate crises are driving ambitious conservation and restoration goals and initiatives worldwide[10]. Aichi Target 15 of the Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity 2011-2020 focuses on climate change mitigation and adaptation by enhancing biodiversity's contribution to carbon stocks, and conserving and restoring degraded ecosystems. The 2015 Paris Climate Agreement committed Parties to "conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases". More specifically, the United Nations Framework Convention on Climate Change's (UNFCCC) Article 4.1 (d) lists "biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems" as important for carbon sequestration. One of the decisions from the UNFCCC's twenty-fifth Conference of the Parties in 2019 highlighted the importance of nature in addressing climate impacts, and taking an integrated approach to address both biodiversity loss and climate change[31].

Under the Sustainable Development Goals (SDGs) 13, 14 and 15 ("Climate Action", "Life below Water", and "Life on Land", respectively), governments have developed national action plans to address climate change and enhance conservation and sustainable use of terrestrial and aquatic ecosystems. Furthermore, over 100 countries have already adopted or are developing policies on the use of biodiversity offsets[11].

The finance sector has also taken steps to integrate the mitigation hierarchy in its risk management frameworks, with 96 financial institutions having adopted the Equator Principles[12]. The International Finance Corporation and other international financial institutions apply the No Net Loss and Net Gain principles with the aim that the impact of project developments is outweighed by positive conservation activities.

As a result of these policies, some companies increasingly focus on avoiding impacts on habitats with high biodiversity and/or carbon values, on the restoration of such areas for compensation purposes (e.g. the World Bank's Forest-Smart Mining case studies[13]), and on additional conservation actions, which could include restoration of degraded land. However, biodiversity offsets and carbon offsets are typically designed and managed separately. There is an urgent need to understand the priorities for ecosystem conservation and restoration so that decisions can be taken based on sound science and therefore deliver on both biodiversity and climate commitments.

The future global context

With the CBD's current Strategic Plan for Biodiversity 2011-2020 coming to an end, new targets will be decided for the post-2020 period. Delivering on those targets will require efforts from a wide range of stakeholders, including the private sector.

Similarly, there is an increasing focus on the role of ecosystems in both climate change mitigation and adaptation[14]. Countries are expected to submit the next round of Nationally Determined Contributions (NDCs) to the UNFCCC by 2020[15], and many rely on private sector involvement. Furthermore, countries are starting to receive results-based payments under REDD+ ("**R**educing **E**missions from **D**eforestation and forest **D**egradation, **plus** conservation, sustainable management and enhancement of forest carbon stocks")[16], and the private sector has a role to play in helping countries achieve the necessary results.

Companies that engage at an early stage in combined biodiversity and carbon management stand to position themselves as front-runners in the field. The benefits are likely to be multiple: operational (by securing continued business activities and reducing the likelihood of disruption, for example through the loss of ecosystem services), financial (by aligning with evolving requirements from investors and rating agencies), and reputational.

Current work and initiatives

Given the increased urgency and relevance of conservation and restoration action, several initiatives have started to develop tools[17] to guide interventions and identify priority areas where positive outcomes for both biodiversity and climate can be maximised[18].

National level

At the national level, IUCN and WRI (World Resources Institute) developed the "Restoration Opportunities Assessment Methodology (ROAM)"[19], while FAO (the Food and Agriculture Organisation of the United Nations) launched the Forest and Landscape Restoration Mechanism, to support planning and implementation of forest and landscape restoration[20]. Additionally, the Mapping Ocean Wealth[21] project focuses on improving the national and local scientific knowledge base to

support marine conservation, restoration, and management.

Regional level

Overarching regional level targets include the Initiative 20x20[22], which was set out to change the dynamics of land degradation in Latin America and the Caribbean by bringing 20 million hectares into restoration by 2020. Similarly, AFR100 (African Forest Landscape Restoration Initiative)[23] targets the restoration of 100 million hectares across Africa by 2030.

Regional restoration-focused projects and initiatives include the European Union's agenda on "Improving the International Ocean Governance Framework"[24], and the Marine Ecosystem Restoration in Changing European Seas (MERCES) project[25], which aims to identify the most effective and economically viable restoration interventions for different marine habitats.

Global level

In 2011, the Bonn Challenge was launched aiming to restore 350 million hectares of forest globally by 2030.

Additionally, WRI launched an Atlas of Forest and Landscape Restoration Opportunities in 2014[26]. The Natural Capital Project developed a tool called ROOT (Restoration Opportunities Optimization Tool), to identify key areas where the provision of ecosystem services could be enhanced by restoration, while a mapping tool for mangrove restoration potential was developed to help focus restoration efforts[27].

More recently, Strassburg et al. published a restoration prioritisation approach capable of identifying synergies and trade-offs between restoration targets, and evaluating the potential impacts of specific intervention options[28] (see Box 2). This approach aims to advise global restoration initiatives seeking to maximise their impact.

Finally, through the NatureMap project[29], UNEP-WCMC is collaborating with the Sustainable Development Solutions Network, the International Institute for Applied Systems and Analysis, and the International Institute for Sustainability, to develop new data layers on global concentrations of biodiversity and carbon stocks. The aim of this project is to support decision makers at global and national levels to identify priority areas to implement their nature conservation and restoration targets.

Developing new spatial data

A wealth of datasets on biodiversity values, land cover, carbon stocks and ecosystem services have become available recently or are currently under development (Annex 1). UNEP-WCMC is involved in several initiatives on the biodiversity and climate nexus, and is leading the generation of many of the relevant datasets. This offers an opportunity to develop spatial information at a global level to support private sector efforts to avoid activities in areas of high biodiversity and carbon value, and to identify opportunities for restoration of degraded land for offsets or additional conservation actions.

There is scope for Proteus Partners and UNEP-WCMC, in collaboration with relevant experts, to generate tailored spatial information on:

- Concentrations of existing high biodiversity and high carbon values to inform the private sector's actions to avoid and minimise impact.
- Concentrations of potential biodiversity and carbon values to guide the design of restoration activities.
- Potential areas for offsetting based on high biodiversity and/or high carbon values.

This spatial information would be developed to be suitable for site-level decisions while remaining globally consistent.

Such spatial information could be packaged in a range of formats. To date, no products have been developed with company involvement specifically to meet private sector needs. Involving companies would facilitate

Box 2: Restoration Prioritisation Approach (Strassburg et al. 2019)

Strassburg et al. (2019) developed a restoration prioritisation approach capable of balancing synergies and trade-offs between biodiversity and carbon values to identify key areas that could be the focus of global restoration efforts.

When this approach was tested for the Atlantic Forest biodiversity hotspot it showed significant gains for biodiversity conservation (257%) and carbon sequestration (105%) outputs, when restoration efforts are planned systematically and based on expected outcomes when compared to a non-systematic restoration scenario.

UNEP-WCMC in collaboration with Strassburg and colleagues and the NatureMap project will develop a global systematic assessment of key restoration areas making use of the latest datasets on biodiversity and carbon stocks available. Such information could be adapted and used by extractives companies to support their implementation of the mitigation hierarchy.

designing and producing a product that responds to the needs of their risk management systems.

A bespoke information resource could also usefully incorporate other parameters relevant to private sector prioritisation and planning. These might include:

- Measures of political willingness for restoration/offsets activities (e.g. existing national frameworks, policies, and regulatory systems[17]).
- Data on key ecosystem services (e.g. hydrological services).

The use case for extractives companies

Political momentum is building for concerted action to address the biodiversity and climate crises. As significant players in the socio-economic and physical landscape, extractives companies can lead efforts to restore historically degraded land- and seascapes. Restoration action is pertinent, but not limited to, the planning and operational requirements of current and new projects.

Mapping where high biodiversity and high carbon coincide in ecosystems can provide extractives companies with a spatially explicit prioritisation approach for implementation of the mitigation hierarchy.

Better articulation, improved prioritisation, and amplified action could enable companies to increase their efforts to meet global goals such as the Aichi Targets, the Paris Climate Agreement, and the SDGs.

This could enable companies to demonstrate their commitment to identifying potentially suitable areas for generating biodiversity and/or carbon offset credits. These contributions to the global goals can all be reported to company stakeholders. They can also be used in reporting on any commitments towards becoming carbon neutral under existing frameworks (e.g. the CarbonNeutral Protocol[30], VERRA/Verified Carbon Standard).

Conclusions and Next Steps

Companies are increasingly recognising the important role they can play in contributing to the global biodiversity and climate agenda, and pressure is building from external stakeholders for them to do so.

Extractive companies in particular have long-standing experience in managing and mitigating their impacts on biodiversity. However, these have not often been linked or coordinated with their climate change mitigation efforts.

Linking, and in many cases combining, such efforts stands to contribute multiple benefits to the environment and wider society. Companies engaging in activities designed to benefit both biodiversity and climate change would show clear leadership and commitment to contributing to progress towards global, regional and national goals for both biodiversity and climate.

With close to a quarter of the world's terrestrial areas in need of restoration[2], extractive companies can contribute to the need for global restoration efforts by going above and beyond the impacts of single projects and implementing offsets and additional conservation actions on a broader scale.

By using spatial data to identify priority areas for restoration of already degraded lands through additional conservation actions and offsets, companies also stand to reap multiple operational, financial, and reputational benefits. For example, by demonstrating that the revenue generated from biodiversity and/or carbon credits has been applied to conservation and/or restoration of biodiverse and carbon rich ecosystems.

Spatial data can support companies through enabling early identification of such opportunities.

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Annex 1: Available or forthcoming data layers on environmental variables related to conservation or restoration.

A non-exhaustive list of datasets of relevance to creating global-scale data layer(s) showing the spatial overlap of areas of high carbon and biodiversity, and potential suitability as restoration or offset locations.

Terrestrial ecosystems		
Map / Layer Name	Status	Organisation/Project
Important biodiversity areas	Under development	NatureMap
Areas of importance for climate mitigation	Under development	NatureMap
Soil carbon at risk	Under development	NatureMap
Biomass carbon	Under development	IIASA
Forest management	Under development	NatureMap
Areas of importance for conservation action	Under development	NatureMap
Areas of importance for conservation action	Under development	International Institute for Sustainability / NatureMap
Hydrological ecosystem services	Under development	NatureMap
Human pressures	Under development	NatureMap
Soil properties and classes	Developed	ISRIC
Species richness	Under development	NatureMap
Threatened species richness	Under development	NatureMap
Range rarity	Under development	NatureMap
Atlas of forest and landscape restoration opportunities	Developed	WRI & IUCN
Land cover and land use	Developed	Copernicus
Species susceptible to climate change impacts	Developed	IUCN
Global concentrations of ecosystem services	Developed	UNEP-WCMC
Marine ecosystems		
Map / Layer Name	Status	Organisation/Project
Mangrove restoration potential	Developed	Mapping Ocean Wealth

See also:

Hill, S.L.L., Arnell, A., Maney, C., Butchart, S.H.M., Hilton-Taylor, C., Ciciarelli, C., Davis, C., Dinerstein, E., Purvis, A., and Burgess, N.D. (2019) Measuring Forest Biodiversity Status and Changes Globally. Front. For. Glob. Change 2:70. doi: 10.3389/ffgc.2019.00070

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