Advancing Priorities Through the Global Biodiversity Framework: Irrecoverable Carbon Ecosystems

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Over the past decade, countries have made ambitious international climate and biodiversity commitments. Signatories to the Paris Agreement committed to a global climate goal of holding temperature rise to 1.5^{C} through, among other things, nature-based solutions. In 2022, Parties to the Convention on Biological Diversity (CBD) adopted the Kunming-Montreal Global Biodiversity Framework (GBF), committing to halt and reverse biodiversity loss by 2030 through targets on climate, species and ecosystems. Prioritizing action in places with high levels of carbon and biodiversity is key to achieving both commitments. This brief outlines recommendations for how countries can incorporate high-carbon ecosystems into their National Biodiversity Strategies and Action Plans (NBSAPs) under the CBD to achieve 'win-wins' for both biodiversity and climate.

This document is one in a series of policy briefs that Conservation International is compiling to support countries' efforts on their NBSAPs. This brief will be particularly useful for countries with large remaining tracts of high-carbon ecosystems such as mangroves, peatlands, and old-growth forests and opportunities for increasing area-based conservation.

Importance of High Carbon Ecosystems for Addressing Climate Change and Biodiversity Loss

Climate models show that avoiding **every fraction of a degree** of global warming will prevent additional climate change impacts and reduce the risk of reaching 'tipping points' into catastrophic natural regime changes – and every inch of avoided sea level rise or square foot of glacial melt will make a difference for vulnerable people and natural ecosystems around the world.

When it comes to preventing incremental temperature rise, some places and actions matter more than others. Recent research led by Conservation International scientists found that **some ecosystems store vast amounts of carbon that humanity simply cannot afford to lose** to effectively address climate change. We call this '**irrecoverable carbon**' because, if lost, this carbon could not be re-sequestered before mid-century – too late to avoid the worst climate impacts. Analysis shows there are 139 Gigatons (Gt) of irrecoverable carbon – the equivalent to 15 years' worth of all global fossil fuel emissions – stored in natural ecosystems, such as peatlands, forests, **mangroves, wetlands, and marshes.** These areas are also essential to maintaining biodiversity."

Coastal blue carbon ecosystems, including **mangroves, seagrasses and salt marshes,** are the most efficient natural carbon sinks on Earth on a per area basis. These ecosystems are also home to rich biodiversity, sustain livelihoods of coastal communities, and protect coastal regions from increasingly intense storms. However, blue carbon ecosystems are threatened – half of global mangrove forests have already been lost – and once degraded or destroyed, their carbon, biodiversity, and ecosystem services that people depend on are lost. National biodiversity policy can **prioritize action in coastal blue carbon ecosystems to achieve win-wins for people, climate, and biodiversity,** as well as attract increased investment and needed capacity for these critical places.

Prioritizing action to avoid losing these places is critical for climate change mitigation, adaptation, and for conserving biodiversity[1]. About **75% of the world's irrecoverable carbon and habitat for 91% of terrestrial vertebrate species can be found in less than 14% of Earth's land, with key overlaps in tropical countries** (Figure 1). The confluence of high carbon ecosystems and biodiversity in many of the same places is not an accident, as the two support each other. For example, seed-dispersing animals often play a key role in encouraging tree growth, which

[1] This concept is supported by the 2021 IPCC-IPBES report. Pörtner, H.O,. et al. 2021. IPBES-IPCC co-sponsored workshop report on biodiversity and climate change; IPBES and IPCC. DOI:10.5281/zenodo.4782538.

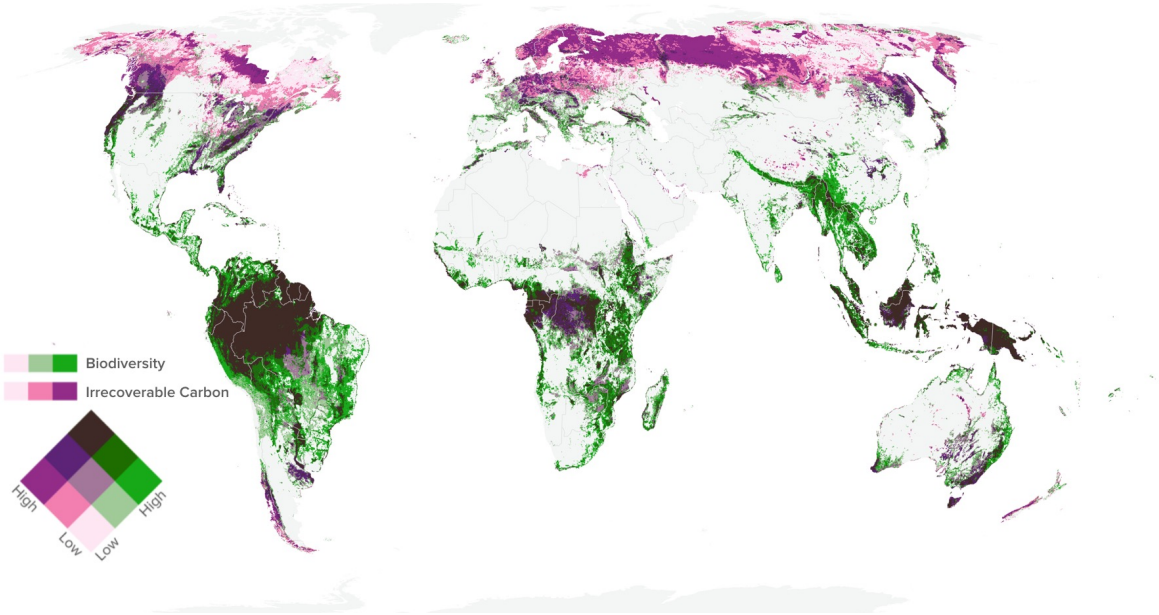

Figure 1: In pink/purple, this map shows Earth's irrecoverable carbon – the vast stores of carbon in nature that are vulnerable to release from human activity and, if lost, could not be restored by 2050. From Noon et al. 2021. Mapping the irrecoverable carbon in Earth's ecosystems. Nature Sustainability. https://www.nature.com/articles/s41893-021-00803-6. In green, the map shows the habitat ranges of all terrestrial vertebrate species known to science. This data is adapted from expert range maps compiled by BirdLife International and IUCN Red List that have been filtered for intact habitat based on up-to-date satellite data. The summed range size rarity data used here shows the global importance for all terrestrial vertebrate species (birds, amphibians, reptiles, mammals) that are present in a given location, with the ability to subset for endangered and threatened species. The darkest areas on the map show where irrecoverable carbon overlaps with the highest number of terrestrial vertebrate species.

more diverse species often store more carbon, in part because different species respond differently to disturbances or stressors, such as fires or pests, making the forest as a whole more resilient. Because biodiversity has been shown to increase carbon storage in ecosystems, strategies to help species adapt, such as the establishment of corridors for wildlife migration, may also help to ensure long-term carbon storage in those same ecosystems.

Biodiversity loss and climate change are two sides of the same coin, and their solutions can often be found **in the same places**. Spatial prioritizations, such as the one shown at the global level in Figure 1, can help countries and multilateral institutions design area-based conservation strategies for maximum impact.

Using the National Biodiversity Strategy & Action Plan Update as an Opportunity for Conserving High Carbon Ecosystems

The GBF is the new global framework for halting and reversing biodiversity loss by 2030. It will be implemented over the next decade, starting with countries developing **national targets** to align with the new global goals in 2024. Once national targets are set, countries will expand upon them in their full updated NSBAPs, to include detailed information on how national targets will be implemented and monitored. For the purpose of this brief, the "NBSAP update" process refers to both national target-setting and the full NBSAP update.

The NBSAP update is a **key, near-term opportunity to prioritize irrecoverable carbon and high carbon ecosystems as part of how countries will achieve relevant GBF targets in national public policy**. This can contribute to several of the GBF targets, including target 3 (area-based conservation of 30% of the planet), target 8 (minimize impact of climate change on biodiversity), target 10 (sustainable management of production systems), and target 11 (restore, maintain, and enhance nature's contributions to people).

How to Prioritize High Carbon Ecosystems in NBSAPs

The policy context in each country is unique, however, there are general steps and tools available for all countries to develop an effective policy framework for high carbon ecosystems within their NBSAP:

I. Create an Inclusive Policy Setting Process

Recent research has found that 33.6% of Earth's irrecoverable carbon lies in designated IPLC lands[2]. This is more than the amount currently in government-designated protected areas, and an underestimate since it includes only IPLC lands with legal tenure. Therefore, active participation and, where possible and appropriate, leadership of IPLCs is crucial to setting national targets around high carbon ecosystems, along with the rights to customary sustainable use and of Free, Prior and Informed Consent (FPIC). This approach to inclusive participation is consistent with GBF target 22, in which countries committed to ensure full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making.

[2] Noon, M.L., Goldstein, A., Ledezma, J.C. et al. Mapping the irrecoverable carbon in Earth's ecosystems. *Nat Sustain* **5**, 37–46 (2022). https://doi.org/10.1038/s41893-021-00803-6.

Mangroves along river's edge in Northern Rupununi, Guyana. © Pete Oxford/iLCP

II. Map High Carbon Ecosystems

There are a number of scientific resources and data sets available to countries that want to utilize irrecoverable carbon and biodiversity mapping to support the NBSAP update process:

- Conservation International developed an interactive Resilience Atlas[3] platform to explore irrecoverable carbon concentrations (tonnes/hectare) in any area. Additional layers on protected areas, forest loss since 2000, and the irrecoverable carbon–biodiversity overlay are also available to layer into mapping efforts. These maps are available at 30-meter resolution, allowing users to easily zoom in to areas of interest, and are compatible with other widely used satellite imagery.
- The Irrecoverable Carbon and Biodiversity Explorer[4] can be used to estimate the carbon and biodiversity values for any area by selecting a country, drawing a polygon, or uploading a shapefile. To use the tool, indicate the area of interest and the app will automatically calculate carbon and biodiversity statistics.
- Conservation International also offers specific country profiles[5] with irrecoverable carbon maps along with statistics on protection, recent loss, and the overlap of carbon and biodiversity, and a full report on irrecoverable carbon publicly available on their website. Additional country-level data and maps are available upon request.

All of these tools can be used to map out and designate areas for action, creating the basis of a national target.

III. Determine Actions: Conservation & Sustainable Management

Once high carbon ecosystems have been mapped, this data can be combined with existing national maps and used to create, supplement, or update integrated land-use mapping and planning processes at the national and relevant sub-national levels. Questions for countries to ask to inform priority actions may include:

- How do high carbon and biodiversity areas interact with other land uses and production areas?
- Can land-use planning be used to reduce pressure on 'irrecoverable' places?
- What is the conservation status of mangroves and peatlands, the ecosystems with the most concentrated irrecoverable carbon globally?
- Are there opportunities to create new areas of protection/conservation in places with high carbon and biodiversity?
- Are there 'gaps' in the protected area network that could be connected to facilitate movement of species and carbon storage?
- Could scientific information on carbon values be used to increase attention and funding to areas that are also important for biodiversity?
- Where are IPLCs currently living and managing areas of high carbon and biodiversity? Can their rights and resources be strengthened?

[3] Irrecoverable Carbon Resilience Atlas: https://irrecoverable.resilienceatlas.org/

[4] Irrecoverable Carbon and Biodiversity Explorer: https://sparc-apps.shinyapps.io/irrecoverable_carbon_biodiversity_app/

[5] Irrecoverable Carbon Country Profiles: https://www.conservation.org/projects/irrecoverable-carbon

IV. Determine Policies and Implementation Approaches

Mapping and land-use planning for irrecoverable carbon ecosystems should be used to guide the national target setting process. Currently, 23.0% of Earth's irrecoverable carbon lies in protected areas, and 33.6% is managed by Indigenous peoples and local communities, with 8.3% overlap in both categories. **This leaves more than half of Earth's irrecoverable carbon without a clear conservation status.** These ecosystems are essential to keeping global temperature rise under 1.5[C]. **Policy and implementation approaches for high carbon + biodiversity lands may include:**

- Designating **Protected Areas** at various scales (e.g., national, regional, municipal, or local level), **Indigenous Community and Conservation Areas**, Other Effective Conservation Measures (OECMs), Conservation Agreements with local landowners, and/or community-managed forests.
- Better managing existing conservation areas for carbon and biodiversity values by **allocating sufficient resources**, encouraging the participation of communities, building capacity for management, encouraging innovative conservation financing mechanisms, and **developing climate resilience plans**.
- **Halting and reversing legal changes** to ease restrictions on protected areas, shrink their size, or eliminate them altogether – a phenomenon known as Protected area downgrading, downsizing and degazettement or PADDD.
- Sustainably managing high carbon and biodiversity lands through policies and actions across a larger landscape, including production areas. Approaches may fall into two broad categories:
  - ***Command-and-control options*** – such as zoning, permitting, or other property-rights based measures – can be useful for implementing land-use plans and meeting specific conservation targets. For example, Brazil's Forest Code mandates legally binding protection instruments for conservation on private lands[6].
  - ***Economic policy instruments*** – including taxes, subsidies, trading/market measures, and pricing schemes – can be effective to guide private sector and community behavior toward more sustainable practices. For example, Costa Rica's fossil fuel tax and payments-for-ecosystem services (PES) program generates incentives for landowners to implement forest conservation, restoration, and agroforestry.

Increasingly, multilateral funds such as the Global Environment Facility (GEF) and the Green Climate Fund (GCF), as well as private foundations such as the Bezos Earth Fund and the Walton Family Foundation are looking for projects that contribute to both climate and biodiversity objectives. Therefore, incorporating high carbon ecosystems into NBSAPs could create opportunities for countries to access new and additional funding by highlighting how NBSAP targets also contribute to global climate goals.

V. Target Setting

While more detailed guidance for updating NBSAPs and submitting national reports is still being developed, the decision on implementation adopted at COP15 (CBD/COP/DEC/15/6, page 8) provides initial direction, including a template for the submission of national targets. The table below contains a hypothetical example of a national NBSAP target for high carbon ecosystems for mangroves.

National Targets				
National target	Alignment with global goals, targets and enabling conditions	Degree of alignment	Explanation, including which aspects of the goal or target are covered (optional)	Indicators to be used to monitor this national target
Increase area-based conservation of mangrove areas by X%	Goal B ☑ Target 3 ☑ Target 8 ☑ Target 11 ☑	High ☑ Medium ☐ Low ☐	Prioritizing mangroves in area-based conservation target contributes to 30x30 under target 3 and the maintenance of ecosystem services under goal B and targets 8 & 11.	Climate regulation services provided by ecosystems by ecosystem type (using UN SEEA methodology)

Figure 2: National Target Template

[6] Climate Policy Initiative. (2015) Brazil's New Forest Code: How to Navigate the Complexity. https://www.climatepolicyinitiative.org/wp-content/uploads/2015/11/Policy-Brief-Part-I-How-to-Navigate-the-Complexity.pdf.

NBSAP Case Studies: Liberia, Guyana & Philippines

The following are examples of the previous NBSAPs from countries from Africa, Americas and Asia-Pacific. These case studies are intended to illustrate the variety of ways NBSAPs can prioritize high carbon ecosystems with or without using language specific to 'carbon'.

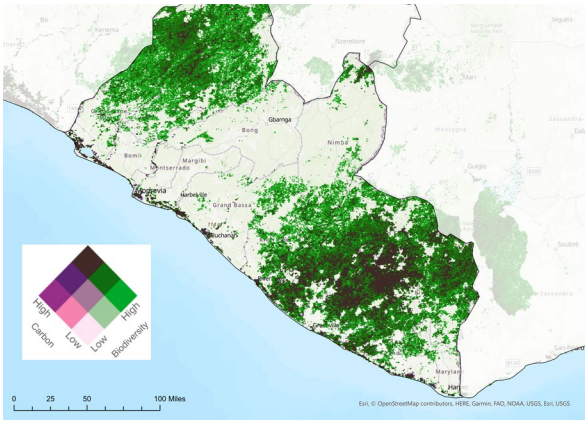

Figure 3: Irrecoverable Carbon and Irreplaceable Biodiversity: Liberia

Africa: Liberia

Country

Liberia is home to a significant portion of West Africa's remaining rainforest and has biodiverse coastal ecosystems – both of which contain high amounts of carbon. Liberia's mangroves cover fragmented blocks along the coast, edges of lagoons, riverbanks, and estuaries and in widespread areas of swamps, and support fisheries, recreation, ecotourism, and other ecosystem services.

Country's Approach

The importance of high carbon ecosystems is reflected strongly in Liberia's 2017-2025 NBSAP.

Priority Actions in NBSAP

The 2017-2025 NBSAP is structured around goals and targets consistent with the Aichi targets, several of which prioritize high carbon ecosystems, including the goal to "enhance the benefits to all from biodiversity and ecosystem services." To achieve that goal, the NBSAP includes the target to enhance the ecosystem resilience and the contribution of biodiversity to carbon stocks through the protection of additional forest ecosystems under Liberia's REDD+ program by 2018. Importantly, Liberia's National REDD+ Strategy includes the strategic priority of protecting high carbon stock and high conservation value forest by preventing clearance of those areas in agricultural and mining concessions.

Key Takeaways

Liberia's efforts to structure their previous NBSAPs in alignment to Aichi targets provides a strong foundation for the national target setting process that all countries committed to undertake to align with the GBF. Further, the connection between the NBSAP and REDD+ strategy illustrates Liberia's recognition that prioritizing action in high carbon ecosystems contributes to climate mitigation and adaptation as well as to the resiliency and ability of ecosystems to provide goods and services.

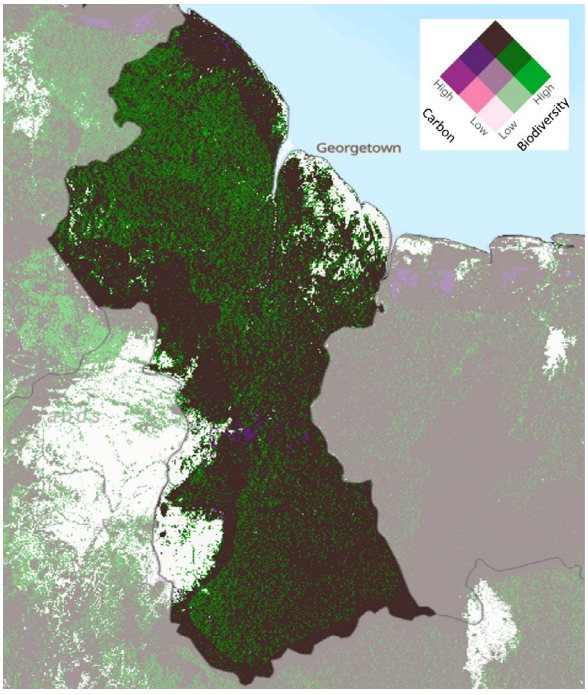

Figure 4: Irrecoverable Carbon and Irreplaceable Biodiversity: Guyana

Americas: Guyana

Country

Guyana is a highly forested country with vast swaths of mangroves and coastal ecosystems that contain large amounts of carbon. Guyana's mangroves and swamp forests are among the most carbon-rich in the world.

Country's Approach

Guyana recognizes the importance of high carbon ecosystems as articulated in their 2012-2020 NBSAP and corresponding national policies.

Priority Actions in NBSAP

Guyana's 2012-2020 NBSAP contains a suite of strategic objectives, each with priority actions. Several of the strategic objectives focus on the conservation, restoration, and sustainable management of Guyana's high carbon ecosystems, including:

- An objective focused on mangrove species mapping and inventory; rehabilitating, restoring, and protecting mangrove belts; and exploring new models to combine ecological restoration and the creation of small businesses in mangrove areas, all in line with Guyana's Low Carbon Development Strategy (LCDS), National Climate Change Policy, Nationally Determined Contribution (NDC) and Mangrove Management Action Plan.
- An objective on promoting the conservation, sustainable use and value of biodiversity into key productive sectors used for growth, expansion and diversification of the economy in line with Guyana's LCDS and National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+), which identifies coastal ecosystems, specifically mangroves, as important for sequestering significant amounts of carbon, designating them 'blue carbon' ecosystems, and prioritizing them for restoration, management and expansion.

Key Takeaways

Guyana's LCDS outlines how the country intends to protect at least 17% of the country's land area by 2025. This sets the basis for how they will achieve 30% conservation by 2030 in alignment with GBF target 3 and illustrates a useful example of how to link NBSAPs and national policy towards ambitious action on the ground[7].

[7] Guyana is currently advancing these efforts through GEF7 Early Action Support project on the development of updated national targets to align with the GBF and updated NBSAP.

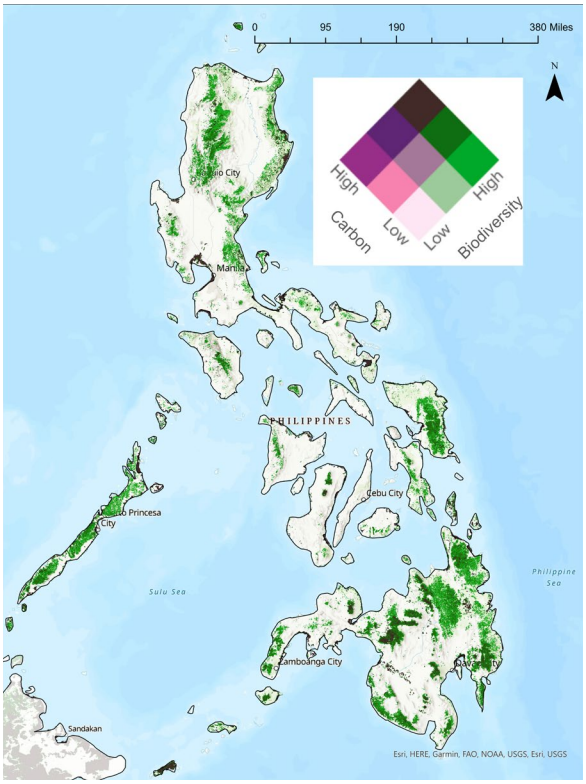

Figure 5: Irrecoverable Carbon and Irreplaceable Biodiversity: Philippines

Asia Pacific: Philippines

Country

The Philippines is chain of islands with high carbon ecosystems concentrated on the coasts in mangroves and seagrasses, as well as in some inland and upland forests. The coastal ecosystems are important for protecting the country against typhoons by reducing storm surge, serve as hatching sites and nursery grounds for marine biodiversity and support food security.

Country's Approach

The importance of high carbon ecosystems is reflected in the Philippines' 2015-2028 NBSAP and corresponding national policies.

Priority Actions in NBSAP

The Philippines' 2015-2028 NBSAP aims to restore biodiversity and maintain ecosystem services, with targets on increasing the conservation and management of the country's high carbon ecosystems.

- A target committing to enhancing the ecosystem services provided by key biodiversity areas through improved conservation, using the amount of estimated carbon stocks in forest areas in the Philippines as the key indicator for measuring achievement.
- A target committing to no net loss of coral cover, mangroves, and seagrasses by 2028, to be achieved by integrating effects of climate change impacts in plans and programs for biodiversity conservation, rehabilitating priority inland wetlands including peatlands, and promoting ecotourism as a conservation strategy for inland wetlands.

Key Takeaways

The Philippines' 2015-2028 NBSAP targets directly connect to the Philippines National REDD+ Strategy (PNRPS), which was designed to conserve biodiversity and maintain ecosystem functions and services. The PNRPS applies a "Triple Bottomline Approach," where carbon, community, and biodiversity are seen as equally valued benefits to REDD+ development and implementation. This approach is also reflected in their NBSAP – a map showing where sustainable management of forests could be implemented as an activity under REDD+ that also contributes to biodiversity conservation. Further, the recent 2023-2028 Philippine Development Plan (PDP) includes restoration and protection of high carbon ecosystems through REDD+ implementation as part of the country's national strategy to address climate change, illustrating how conservation priorities can be linked from NBSAP to national policy.

Conclusion

The recommendations in this brief are meant to support the inclusion of high-carbon ecosystems in countries' updated NBSAPs and related policy-planning processes. Prioritizing action around these places can achieve multiple objectives at once and may open up opportunities to increase ambition through international support and funding.

For more information, contact

Jill Hepp, Senior Director, International Policy, jhepp@conservation.org

Florence Laloe, Senior Director, Climate Policy, flaloe@conservation.org

Allie Goldstein, Director, Irrecoverable Carbon Program, agoldstein@conservation.org

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