

Nature Map

An integrated global map of biodiversity, carbon storage, and other nature services to support decision making on national, regional, and global targets

Motivation

The world is losing biodiversity, carbon stocks, and ecosystem services at unprecedented rates. On current trends the Aichi targets for biodiversity and the 2020 biodiversity targets contained in the Sustainable Development Goals (SDGs) will be missed by a wide margin. A failure to conserve habitats and halt species extinction would have knock-on effects on the objectives of the UN Framework Convention on Climate Change (UNFCCC), since significant greenhouse gas emissions result from the destruction and degradation of forests and other high-carbon ecosystems. Such ecosystems can, if left intact or restored, absorb a significant share of greenhouse gas emissions from the atmosphere. If poorly managed, such mitigation strategies might further accelerate the loss of natural habitats and species.

China will convene the 15th Conference of the Parties of the Convention on Biological Diversity (CBD) in 2021 to agree on the next Strategic Plan for the CBD, including 2030 targets for maintaining biodiversity as well as a longer-term vision for nature. Thereafter, countries will convene under the UN Framework Convention for Climate Change (UNFCCC) to review the level of ambition of Nationally-Determined Contributions (NDCs) and to submit their long-term Low-Emission Development Strategies (Art. 4.19 Paris Agreement) that lay out how countries will achieve the long-term objective of the convention, which requires zero net emissions of greenhouse gases.

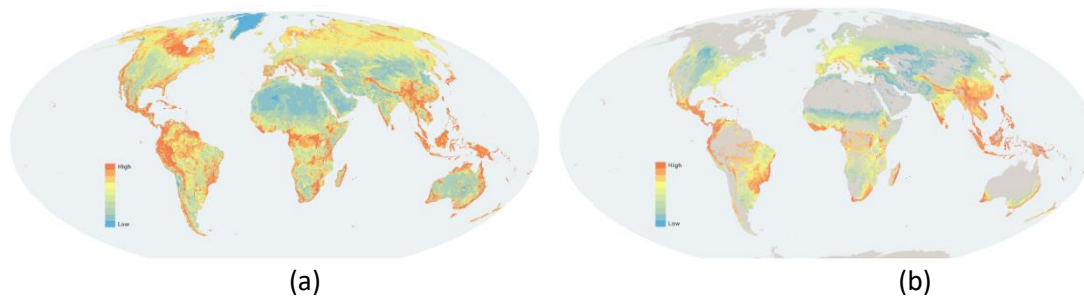
Meeting the ambitious objectives of the UNFCCC and the CBD requires clarity on how ambitious targets can be translated into national policies. In the case of biodiversity and other ecosystem services, the world lacks fully integrated, science-based analyses to translate politically agreed levels of ambition into operational targets at local, national, regional, or global levels. Since habitats, biodiversity, and ecosystem services are highly location specific, high-resolution maps of significant terrestrial biodiversity and carbon storage as well as corresponding restoration potential using the best available scientific data can support decision making.

Yet, today's climate strategies – the Nationally Determined Contributions (NDCs) – do not contain actionable maps. Similarly, the vast majority of Nationally Biodiversity Strategy Action Plans (NBSAPs) under the CBD lack maps. Yet, such integrated maps are critical to support governments in translating politically agreed levels of ambition into geospatially explicit policy objectives that can be pursued and monitored using locally appropriate policy tools and data sources.

The project

To fill these gaps and to support stronger NDCs and NBSAPs, the International Institute for Applied Systems Analysis (IIASA), Instituto Internacional para Sustentabilidade (IIS), the UN Sustainable Development Solutions Network (SDSN), and the UN Environment World Conservation Monitoring Center (UNEP-WCMC) launched the Nature Map initiative. With financial support from Norway's International Climate Forest Initiative (NICFI), this initiative has developed new spatial data on the distribution of species, carbon stocks, and clean water. The data has been integrated using state-of-the-art multi-criteria decision analyses tools, to identify spatially where the greatest synergies exist for conservation and restoration efforts that promote Nature-Based-Solutions for climate change mitigation, biodiversity conservation and clean water. Nature Map methods are globally consistent, use the best spatial data available, and draw on local information through consultative evaluations.

Initial Nature Map results: Areas of global significance for (a) conservation and (b) restoration of biodiversity and carbon storage



The consortium members have been working with the CBD, the UNFCCC, national governments, the scientific community, civil society, and business actors to identify the best available data and discuss the strengths and weaknesses of different methodologies for aggregating and prioritizing conservation and restoration opportunities. We have organized a series of expert consultation workshops to discuss key data and methodological issues.

A priority for Nature Map is to improve knowledge of the global distribution of species that have been poorly mapped in the past, such as plants. Thanks to our own modelling work and our partnership with Royal Botanic Gardens Kew, IUCN, Botanic Garden Conservation International and Botanical Information and Ecology Network, we were able to mobilize existing but unpublished range maps, or generate new range maps for some 200,000 plant species in total, corresponding to about 41% of all plants known to science. Nature Map constitutes the largest spatial dataset of plant species ranges. Our own modelling has also been supported by new primary observations generated through a citizen-science campaign on iNaturalist, exceeding 34,000 new submissions and generating some 2,100 new species records.

In future, satellite data on land-use change can be combined with the Nature Maps to assess how biodiversity, carbon storage, and other ecosystem services change over time and to track progress towards meeting the objectives of the CBD and the UNFCCC related to biomass carbon as well as biodiversity. They will also identify knowledge gaps that the scientific community and other partners need to fill. For this reason, the data, methods, and findings are shared openly and have been submitted to independent peer review through a highly ranked scientific journal.

Nature Map strives for maximum transparency to help stakeholders understand the strengths and weaknesses of the data and aggregation methodologies. We designed an interactive web platform for expert visualization, Nature Map Explorer, to facilitate peer-review and consultation with CBD national focal points and other interested parties. To this end, the project is making available periodic updates of the maps and the underlying base data. Throughout, we highlight gaps and weaknesses in available data.

First local applications of Nature Map have started in Argentina and Mexico to support enhanced public commitments to protect forests and biodiversity. Through our work, we have been able to push the agenda forward regarding the need for spatial planning tools in biodiversity and climate strategies, such as Nature Map, and created significant interest from other national agencies, governments, stakeholders and NGOs in integrated spatial planning tools in their decision-making.

We now focus on supporting interested countries in strengthening their national mapping and land-use planning frameworks for biodiversity and carbon – particularly with a view towards strengthening national strategies for climate (NDCs) and biodiversity (NBSAPs). In parallel we aim to strengthen the global data layers and analytical tools.

Questions and Answers (Q&A)

Why Nature Map?

The international community has adopted ambitious targets for reducing and reversing the loss of biodiversity and other ecosystem services by 2020, but these targets will be missed. The international community will adopt new biodiversity targets at the CBD COP15 in China. Nature Map is developing integrated maps of conservation and restoration opportunities that allow policymakers, civil society, and businesses to operationalize targets by translating them into geographically explicit priorities for conservation and restoration. These tools are urgently needed to help countries include actionable spatial maps and targets in their climate and biodiversity strategies.

Will Nature Map set targets for biodiversity and how does it relate to the Aichi Biodiversity Targets and proposals, such as Half Earth?

Targets for biodiversity and other ecosystem services must be set by governments. Civil society organizations and businesses may adopt their own science-based targets. Nature Map is not setting any targets, but instead develops decision-support tools to help countries decide on international targets and translate their political commitments into operational strategies that tackle conservation and restoration priorities.

Many biodiversity maps are available, so what's new about Nature Map?

Indeed, a lot of biodiversity data is available as maps and some integrate across several dimensions of biodiversity. Nature Map's contributions are to: (i) identify and integrate new data layers, including but not limited to reptiles, plant taxa, soil and biomass carbon, and hydrological services; (ii) crowd-source new data, particularly on forest management, and identify areas of greatest uncertainty so that they can be filled through scientific research; (iii) aggregate the information at the highest possible resolution and rate each area (pixel) by how much biodiversity and carbon it contains; and (iv) generate new information on areas of greatest restoration potential.

What does "nature" mean?

We use the term "nature" to describe the different dimensions of biodiversity, carbon contained in soils and biomass, and other ecosystem services, such as hydrological flows.

Why does Nature Map only cover terrestrial biodiversity and ecosystem services?

Nature Map focuses its technical work on consolidating data for nature on land. We are coordinating with other initiatives that are developing maps of ocean and coastal conservation as well as restoration priorities. Working with National Geographic Society, Nature Map is seeking to integrate maps for biodiversity, carbon, and ecosystem services in terrestrial, coastal, and marine ecosystems.

How may Nature Map be useful for governments, business, civil society, and academia?

- **Governments** can use Nature Map to strengthen national data and to translate targets into operational spatial objectives. Of course, this alone will not guarantee success, as countries must also develop and implement strategies to meet these objectives. However, the human pressures on habitats and species are so high that the absence of clarity on how to translate high-level goals into priorities for conservation, restoration, and sustainable development would almost certainly lead to failure in halting the loss of biodiversity or in pursuing large-scale restoration. For this reason, a particular focus of Nature Map is to help strengthen national climate and biodiversity strategies by supporting the inclusion of actionable maps.
- **Businesses** can use Nature Map to develop their own science-based targets and understand the impact of their activities and supply chains on biodiversity, soil and biomass carbon, as well as

other ecosystem services. They can also use the information to identify and mitigate risks in each of their markets.

- **Civil society** can use Nature Map for identifying conservation and restoration priorities, promote integrated approaches to ecosystem services management, monitor progress, and advocate for a higher level of ambition.
- **Academia and researchers** will be able to identify and help close data and other knowledge gaps in our understanding of conservation and restoration priorities. They can also use Nature Map to develop long-term pathways toward sustainable land-use and food systems that show how the SDGs and objectives of the Paris Agreement can be achieved.

Why focus on global maps when some countries have better national data available?

Nature Map informs the global discussions around the 2020-2030 framework of the CBD as well as the implementation of the Paris Agreement on climate change. Many countries lack integrated, geospatial data that can assist them in making their targets for conservation and restoration operational, as evidenced by the absence of maps in national climate and biodiversity strategies. Naturally, some countries have access to more detailed and comprehensive national data, and such data should of course take precedence over global data. In our experience, such countries benefit from some of the data layers made available through Nature Map as well as the methodology for combining the data layers and prioritizing areas for conservation and restoration. We are currently working with partners in Argentina and Mexico, and we are available to support other countries.

Which data do you use?

Nature Map consolidates the best available global data, including through crowd-sourcing campaigns. We focus on data that is available globally with a high degree of consistency.

How do you ensure transparency and technical rigor?

We consult extensively with scientific organizations and CBD national focal points to discuss data and methodologies. This includes expert workshops and online consultations. All data is made publicly available through the UN Biodiversity Lab, and findings have been submitted to rigorous scientific peer reviews.

Who is behind Nature Map and who funds this initiative?

The initiative is implemented jointly by the International Institute for Applied Systems Analysis (IIASA), the Instituto Internacional para Sustentabilidade (IIS), the UN Sustainable Development Solutions Network (SDSN), and the UN Environment World Conservation Monitoring Center (UNEP-WCMC). It is funded by Norway's International Climate Initiative (NICFI). The funder has no influence on the scientific findings of Nature Map, which will all undergo scientific peer review.

How can I find out more and contribute to Nature Map?

We welcome help and support in building Nature Map. Up-to-date information on the initiative will soon be available at www.naturemap.earth. You can then contact us at info@naturemap.earth.