NatureMap.earth

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

Project overview

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, peatlands, wetlands and other high-carbon ecosystems. Such ecosystems can, if left intact or restored, absorb a significant share of greenhouse gas emissions from the atmosphere. Moreover, most pathways towards decarbonizing energy systems foresee large negative emissions from land-use and food systems. If poorly managed, such mitigation strategies might further accelerate the loss of natural habitats and species.

In October 2020, the 15th Conference of the Parties of the Convention on Biological Diversity (CBD) will convene in China to agree on the 2020-2030 Strategic Plan for the CBD, including 2030 targets for maintaining biodiversity as well as a longer-term vision for nature. Shortly 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 climate change, governments have adopted the long-term target of keeping the rise of average global temperatures to "well below 2°C" above pre-industrial temperatures. Meanwhile, science has established the concept of the 'carbon budget', which allows governments and other stakeholders to translate the political ambition into operational benchmarks, i.e. achieving zero net emissions by 2040 or thereafter depending on whether one aims for 1.5°C or 2°C.

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. Such integrated maps could 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 this gap, the International Institute for Applied Systems Analysis (IIASA), the UN Sustainable Development Solutions Network (SDSN), and the UN Environment World Conservation Monitoring Center (UNEP-WCMC) have launched the Nature Map Earth initiative. With financial support from Norway's International Climate Initiative (NICFI), this initiative will develop improved, integrated maps

on biodiversity, carbon, and other ecosystem values. Royal Botanic Gardens Kew is supporting the analysis of plant taxa for this initiative.

The initiative will synthesize the best available data using methodologies that are globally consistent and draw on local information through consultative evaluation and validation. In this way, Nature Map will help inform decision making at all levels (including CBD/UNFCCC, national, and sub-national) on what post-2020 biodiversity targets would imply spatially. Both global and national perspectives are of course critical to the outcome of the post-2020 process. To maximize policy relevance at national and sub-national levels, we will reproduce the data with the highest possible resolution. Mapped outputs will be made available at the time of the September 2019 United Nations Climate Summit with a view to provide timely input into negotiations leading to the 2020 Biodiversity COP.

Nature Map will focus on synthesizing terrestrial data for biodiversity, carbon, and other ecosystem services. Building on the work of the Bending the Curve Consortium of biodiversity modeling teams and others, the Nature Map initiative will also explore geospatially explicit estimates of restoration potentials across the world. We will also cooperate with other initiatives to combine terrestrial maps with geospatial data for ocean biodiversity and marine ecosystem services.

A particular priority of Nature Map will be to enhance forest management data to support better policies for sustainable forest management and forest restoration that maximize benefits for biodiversity and climate change mitigation. To this end, we will crowd-source forest management data through a Geo-Wiki. Similarly, we will source new distribution data for plant species through a citizen-science campaign on iNaturalist. Together these campaigns will improve the global maps developed through Nature Map.

The information developed by the Nature Map initiative can help prioritize areas for protection or restoration along a scale from minimum (zero) to maximum significance for conservation of biodiversity, carbon and other ecosystem services. This information can then be used to identify potential areas to conserve and/or restore in order to meet different quantitative biodiversity targets for consideration by the CBD. The analysis will allow visualization of what the coverage might look like at global, regional, and national levels.

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 will be shared openly and be submitted to independent peer review through highly ranked scientific journals.

Nature Map will strive for maximum transparency to help stakeholders understand the strengths and weaknesses of the data and aggregation methodologies. We will develop an interactive platform for data visualization comparisons of different area-based targets. Moreover, we will flag data gaps and aim to close them in coming years. To this end, the project will make available periodic updates of the maps and the underlying base data. Throughout, we will highlight gaps and weaknesses in available data.

Throughout, the consortium members will consult 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 will organize expert consultation workshops to discuss key data and methodological issues.

Questions and Answers (Q&A)

Why Nature Map Earth?
The international community has adopted ambitious targets for reducing and reversing the loss of biodiversity and other ecosystems services by 2020, but these targets will be missed. In 2020 the international community will adopt new biodiversity targets at the CBD COP15 in China. Nature Map will develop 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.

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 will not set any targets, but instead develop 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 aims to make the following contributions: (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. On the basis of this work we will also be able to identify major knowledge gaps.

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 will indeed focus 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 by the summer of 2019. As soon as possible we will aim to present integrated maps for biodiversity and ecosystems services in terrestrial, costal, and marine ecosystems.

How will this map be useful for governments, business, civil society, and academia?
- **Governments** can use Nature Map to translate targets into operational spatial objectives at local, national, regional, and global levels. 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.

- **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 aims to inform 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. We hope to help fill this gap. Naturally, some countries have access to more detailed and comprehensive data than can be generated through this initiative. These countries should of course use their more detailed locally available data. Perhaps such countries will still 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.

Which data will you use?
Nature Map aims to consolidate the best available global data. We will organize several consultation and crowd-sourcing campaigns to improve and complete datasets, but we will not collect new data. The initiative focuses on preparing global maps of biodiversity, so our focus will be on data that is available globally with a high degree of consistency. This may include rich data that may be available only for some countries or ecoregions. Over time, we hope to prepare comprehensive, high-quality maps that have global coverage.

How do you ensure transparency and technical rigor?
We will consult extensively with scientific organizations and CBD national focal points to discuss data and methodologies. This will include expert workshops and online consultations. All data will be made publicly available. Indeed, we plan to only work with data providers who agree to make their data available for public use. Findings will go through rigorous scientific peer reviews.

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.

Does Nature Map support ecoregion-based approaches and other forms of zonation?
Yes. Nature varies tremendously between, say, a boreal forest and a tropical rainforest. As a result it is critical to set targets for the conservation and restoration of nature by ecoregions. And since most policies are set at national levels, national-level targets are equally important. The Nature Map data and analyses can support approaches by ecoregion and for each country, but, as mentioned above, the project itself will not provide targets.

How can a pixel-based analysis account for migratory species?
This is indeed a challenge. Several techniques have been developed to account for migratory species in terrestrial and marine landscapes. We will work with the research community to incorporate them as best as possible in the design of Nature Map

What are the upcoming milestones for the initiative and what happens at the end of the project?
We plan to publish a first version of Nature Map around the September Climate Summit organized by UN Secretary-General Antonio Guterres in New York. The work will then be refined and updated in the run-up to the October 2020 Conference of the Parties to the Convention on Biological Diversity in China. Thereafter, we plan to issue periodic updates using new data on biodiversity, ecosystem services, as well as land cover.

Who is behind Nature Map and who funds this initiative?
The initiative was developed jointly by the International Institute for Applied Systems Analysis (IIASA), 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.