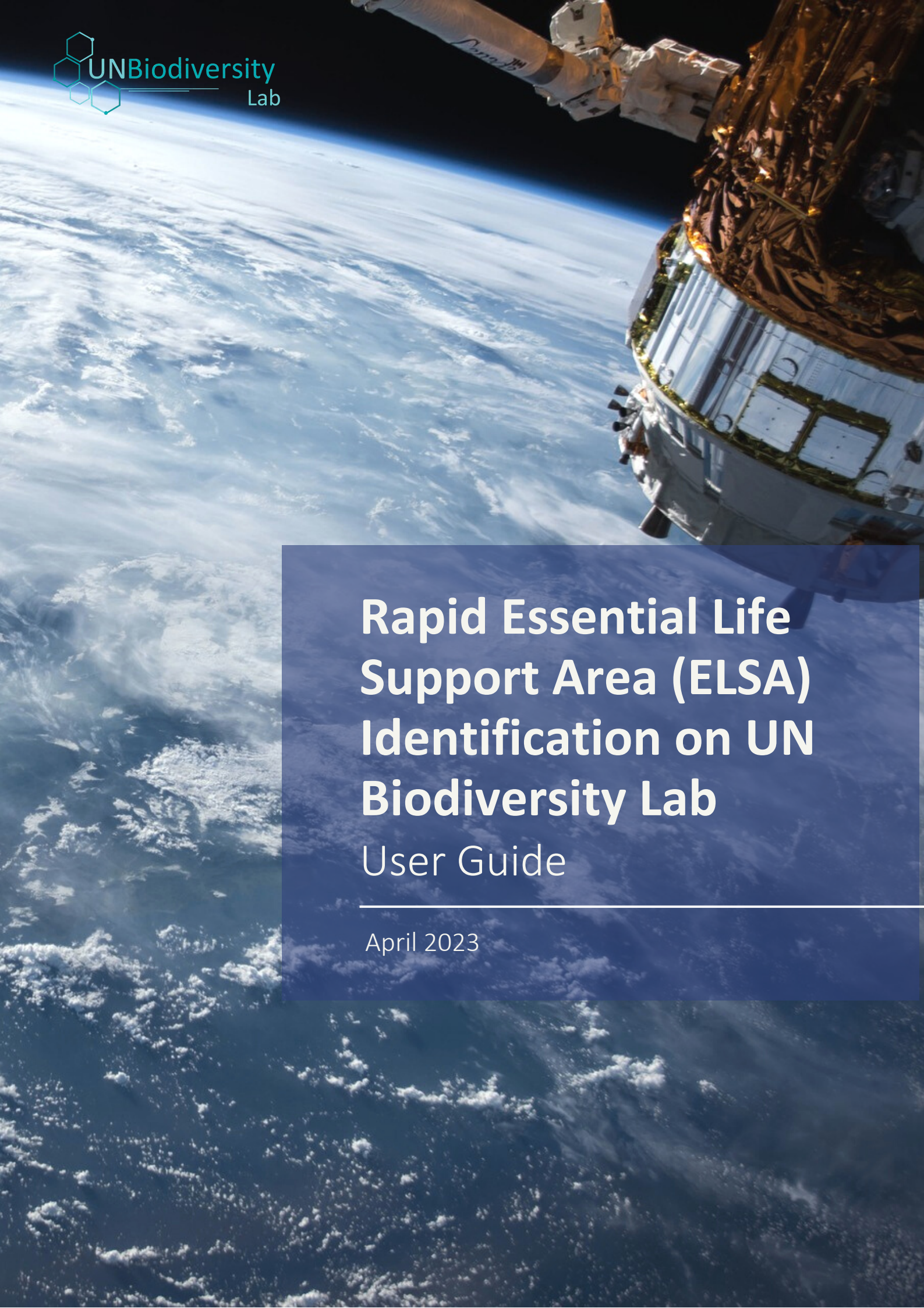

UNBiodiversity Lab

Rapid Essential Life Support Area (ELSA) Identification on UN Biodiversity Lab

User Guide

April 2023

Acknowledgements

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Executive Summary

This user guide provides a concise summary of how to use the ELSA tool on the UN Biodiversity Lab (UNBL) to rapidly identify Essential Life Support Areas (ELSAs). The ELSA tool on UNBL is initially available as a proof of concept for Colombia, Costa Rica, and South Africa. Chapter 1 of this user guide provides background information on the science and policy behind the rapid ELSA analysis. Chapter 2 provides step-by-step instructions on how to operate the ELSA tool on UNBL to view the results and iterate the analysis.

1. Introduction

Background

Nations around the world are increasing their ambition for nature by making bold commitments to address the dual challenges of biodiversity loss and climate change. While there is significant commitment to protect, manage, and restore ecosystems around the world, limited resources and competing land uses leave governments not always knowing how and where to prioritize actions to achieve these commitments on the ground. A user needs assessment of 60 Parties to the Convention on Biological Diversity (CBD) conducted by the United Nations Development Programme (UNDP) in 2018 identified four significant barriers to integration of spatial data into national policy:

1. Spatial data is inaccessible,
2. Spatial data is unusable,
3. Spatial data is not nationally validated, and
4. Governments lack the capacity to use spatial data.

Although earth observations are available and have potential to support implementation of global policy commitments on nature, climate, and sustainable development, many countries are not utilizing them for decision-making. This 'data gap' takes a toll on national efforts to safeguard nature and related ecosystem services. Governments, communities, and other stakeholders need tools that help them to translate that commitment into a geographically explicit plan of action. Without this technical support, countries are likely to continue to face hurdles in deciding where and how to take action, with land use planning occurring in sectoral silos.

Project Objectives

To address this need, the United Nations Development Programme (UNDP) and stakeholders in 12 pilot countries have developed an approach to create national 'Maps of Hope' that identify Essential Life Support Areas (ELSAs). These are places where action to protect, manage, and restore nature can sustain critical benefits to humanity, including food and water security, sustainable livelihoods, disaster risk reduction, and carbon sequestration. The result is a map

that governments can use to harmonize nature and development policies and prioritize areas for protection, management, and restoration as they seek to implement the post-2020 global biodiversity framework.

The ELSA approach differs from many conservation planning exercises through its consideration of how four different nature-based actions – protection, restoration, management and urban greening – can together have the maximum benefits for achieving policy commitments to nature, climate, and sustainable development. This approach enables countries to go beyond simply considering the role of protected areas in conserving biodiversity to consider wider landscapes and the actions taken therein. It also provides a flexible web-based platform for engaging stakeholders and decision makers through real-time scenario analyses.

The *Mapping Hope: A Rapid Approach to Identify Essential Life Support Areas* project has streamlined the pilot approach with the goal of being able to support 100 countries to rapidly map their ELSAs by 2024. As a proof of concept, it has applied this approach for Colombia, Costa Rica, and South Africa to produce three concrete final products: (1) a first iteration Map of Hope; (2) a national policy brief showing how this analysis can support national priorities; and (3) an online ELSA tool available on UN Biodiversity Lab (UNBL) to support national refinements of the analysis. UNBL is an open source, spatial planning platform that is freely accessible to governments around the world, and provides the foundation to make ELSA accessible to all.

This work is led by UNDP and Impact Observatory (IO), working in close partnership with the UNBL partnership and an ELSA Expert Advisory Committee composed of national authorities of Colombia, Costa Rica, and South Africa, as well as leading global scientists and environmental policy experts. It is funded by the Gordon and Betty Moore Foundation.

What is the UN Biodiversity Lab?

The UN Biodiversity Lab (UNBL) is a free, open-source platform that enables governments and others to access state-of-the-art maps and data on nature, climate change, and human development in new ways to generate insight for nature and sustainable development. Developed jointly by the Secretariat of Convention on Biological Diversity (CBD), UNDP, the United Nations Environment Programme (UNEP), and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), UNBL is freely available online to governments and other stakeholders as a digital public good.

UNBL provides an invaluable resource to nations around the world to take transformative action. Users can now access over 400 of the world's best available global spatial data layers; create secure workspaces to upload and view national data alongside global data; use curated data collections to generate insight for action; and more. Without specialized tools or training, decision makers can leverage the power of spatial data to support priority-setting and the implementation of nature-based solutions. Dynamic metrics and indicators on the state of our planet are also available.

Theory of Change

Our theory of change is that map-based, credible, high-quality information combined with direct relationship and capacity building at the national level will drive the transformative change needed to address our biodiversity and climate crises. We promote a three-tiered approach, drawing from the Intergovernmental Panel on Climate Change (IPCC), that recognizes the need for concerted action from global to sub-national scales to drive systemic change to address our planetary crisis. This includes:

1. *Tier 1 - Rapid ELSA Identification:* Standard framework and approach using global data to conduct a national analysis to create a Map of Hope.
2. *Tier 2 - National ELSA Identification:* Customized approach to create a Map of Hope based on national priorities and capacity.
3. *Tier 3 - Focused ELSA Identification:* Highly tailored approach to create a Map of Hope based on the needs of a sub-national region or use case.

Global level data and maps can provide a foundation to support national action (Tier 1) and ensure that all countries, regardless of their capacity, have access to common spatial data and tools that have the potential to guide implementation, monitoring, and reporting for their commitments on nature and sustainable development. Governments often need further, customized support to use local data at the national (Tier 2) and subnational (Tier 3) scales to implement policies and projects based on unique national priorities for nature and sustainable development.

Rapid ELSA Identification on UNBL

The project *Mapping Hope: A Rapid Approach to Identify Essential Life Support Areas* broadens access to the ELSA methodology by scaling the approach used in the initial 12 pilot countries to create a tool that any county can use for rapid ELSA identification based on global priorities and data. First, UNDP and the ELSA Expert Advisory Committee worked to identify 10 priority global policy targets related to nature, climate, and sustainable development from internationally negotiated agreements (Figure 1). We also identified common definitions and area-based targets for land protection, management, restoration, and urban greening (Figure 2). We then identified and collected global spatial datasets that can be used as a proxy to map these commitments (Figure 3, Annex 3). Based on these inputs, global scientists used systematic conservation planning approaches to develop a rapid ELSA analysis that can be applied and customized for any country in the world. For this proof of concept, we applied the rapid ELSA analysis for Colombia, Costa Rica, and South Africa, leading to the creation of a first iteration 'Map of Hope' of each country's essential life support areas, or 'ELSAs'. Finally, Impact Observatory developed an ELSA Tool on UNBL that national stakeholders can use to view and refine the results of the rapid ELSA analysis.

This work differs from the initial work in 12 pilot countries in three key ways to enable efficient scaling: (1) use of global policy targets that are relevant to all signatory nations to frame the analysis, (2) use of global data that are customized to national context using the rapid ELSA methodology, taking into account factors such as country size, ecosystem types, and development level; (3) use of a user-friendly ELSA webtool on UNBL that can be customized to run the analysis for any country in the world. The resulting Map of Hope produced through this process shows where nature-based solutions can best support national efforts to achieve the 10 priority global policy targets, enabling widespread relevance for countries around the world.

For further links and resources on the ELSA approach, please see Annex 1.

Figure 1: The 10 priority global policy targets used to guide rapid ELSA identification.

Figure 2: Area-based targets for land protection, management, restoration, and urban greening.

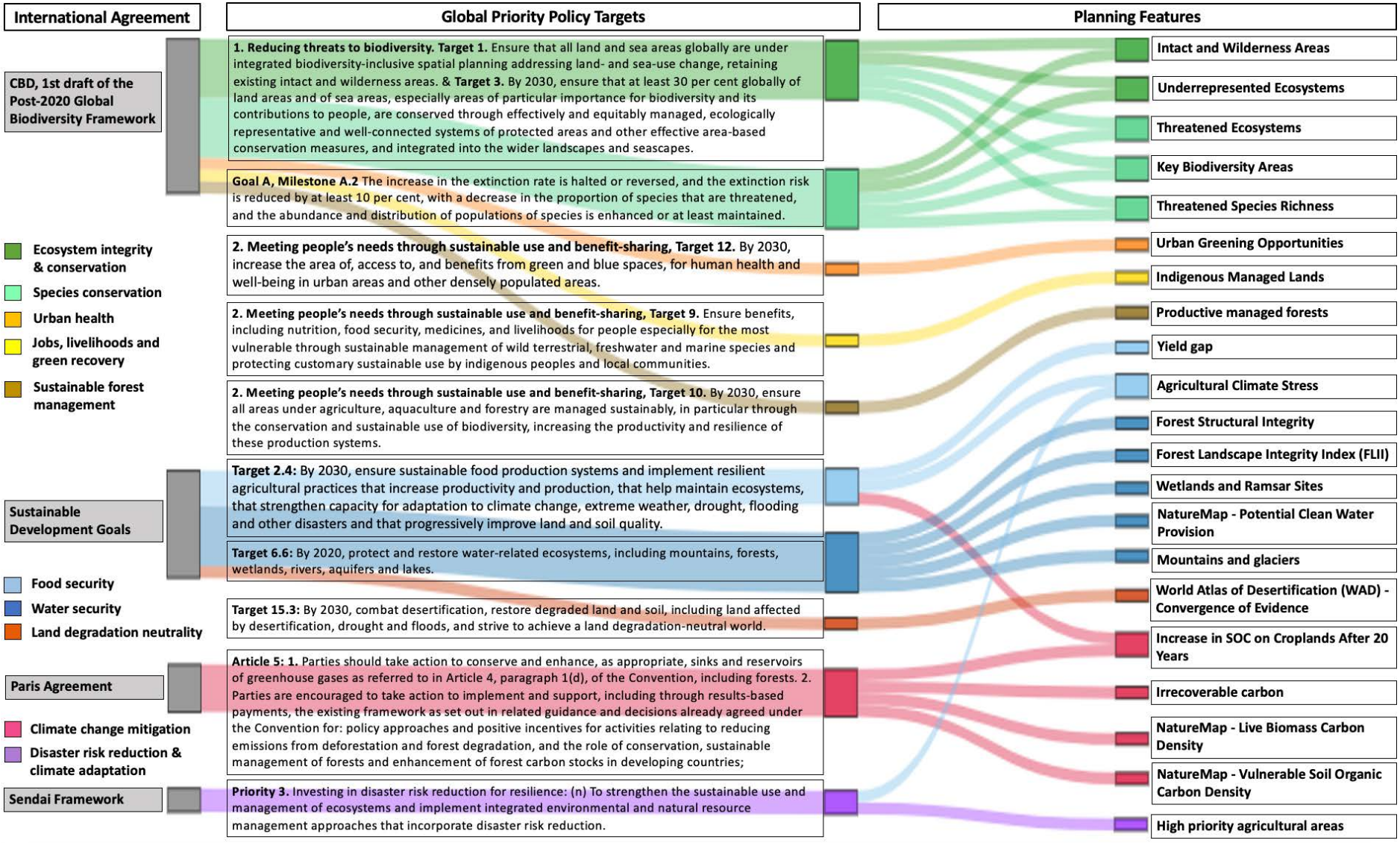


Figure 3: Relationship between international agreements, priority global policy targets and planning features.

2. ELSA Tool Guidance

2.1. ELSA Tool on UNBL

The ELSA tool on UNBL enables any UNBL workspace user to rapidly identify essential life support areas for their country based on global priorities and data. It is currently available as a proof of concept for Colombia, Costa Rica, and South Africa. The ELSA tool does not require any coding or modeling skills and is easy to use for people who are not spatial data experts.

The rapid ELSA analysis uses prioritizr as a spatial optimization tool to run the analysis. The prioritizr package implements integer linear programming techniques to provide a flexible interface for building and solving systematic conservation planning problems. It supports a broad range of objectives, constraints, and penalties to create a tailored analysis. With the support of prioritizr, users can run ELSA analysis quickly (typically in less than five minutes). It can therefore be used to generate and refine conservation, restoration, sustainable management, and urban greening plans in real-time, and contribute to a more transparent, inclusive, and defensible decision-making process.

The ELSA tool is available to registered users who already have UNBL workspaces. UNBL workspaces are open to any non-commercial user. To request a workspace, please see the instructions below in section 2.2.

What the ELSA tool on UNBL can be used to accomplish

Users with a UNBL workspace can use the ELSA tool to refine and iterate the proof-of-concept rapid ELSA analysis for Colombia, Costa Rica, and South Africa. They can:

- Select the country of interest.
- View global datasets used in the rapid ELSA analysis.
- View the priority global policy target(s) that correspond to the input dataset.
- Change the area-based target (%) allocated to each nature-based action zone (protect, restore, manage, and urban greening).
- Change the criteria about where each nature-based action can be implemented based on national context.
- Edit weights for each input data layer (known as planning features) based on its relative importance and accuracy for the country.
- Request national data be used in place of global data layers (available for select layers only).
- Run the ELSA analysis.
- Save resulting ELSA maps in their UNBL workspace and/or download resulting ELSA maps to their local computer.

What the ELSA tool on UNBL cannot be used to accomplish

Users with a UNBL workspace will not be able to use the ELSA tool to:

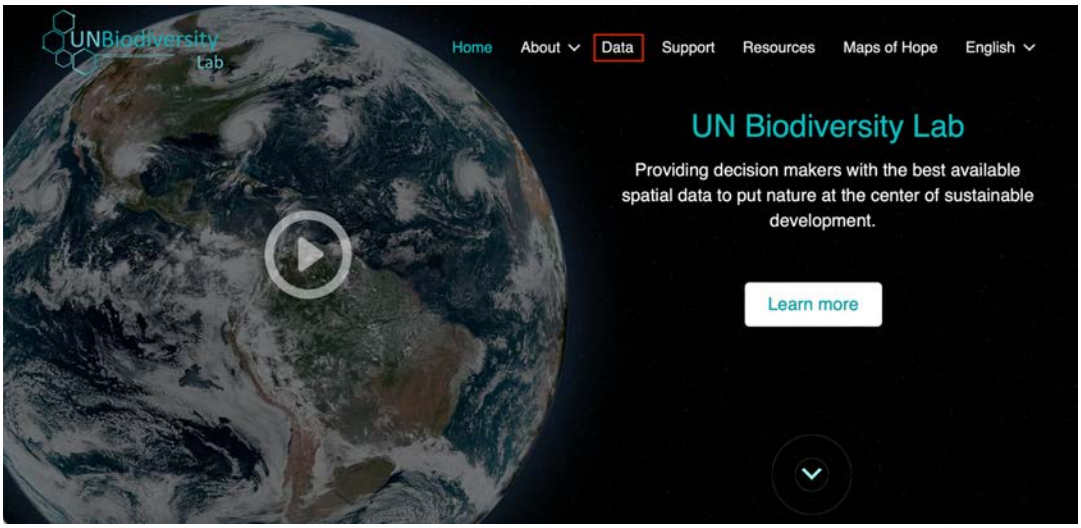
- Create customized ELSA maps for countries other than Colombia, Costa Rica, and South Africa.
- Add additional data layers for inclusion in the model either as planning features or as zoning constraints.
- Directly replace global layers with national layers.
- Add additional lock-in features.

This chapter takes users through all the steps needed to refine the rapid ELSA analysis for a given country.

2.2. Register on UNBL and Request a UNBL Workspace

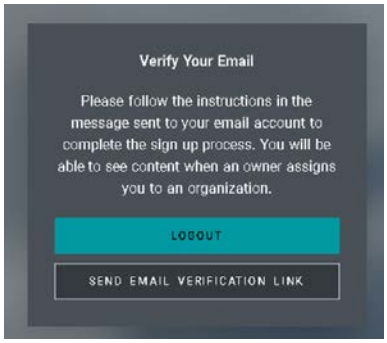
To register on UNBL and request a secure UNBL workspace, please take the following steps.

1. Click the 'data' page of the UN Biodiversity Lab website, then select the 'launch' button to access the data app.



2. Once this has loaded, select the account icon in the top right-hand corner and choose ‘sign up’. Enter your email, name, country, and institution (optional), and set your password to sign up.

3. You will receive an email within a few minutes. Follow the instructions in this email to then follow the email to verify your account.



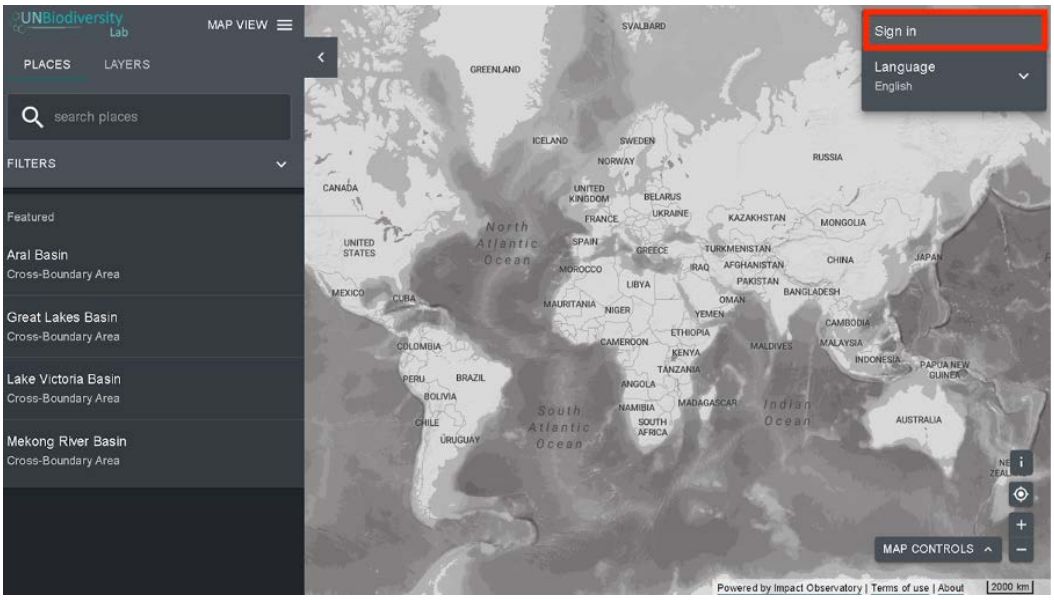
4. Once your account is verified, you can log-in using your email address and password each time you access the platform.

5. To request a UNBL workspace, Fill in the request form available on the UNBL workspaces page. The UNBL support team will review your application and set up the workspace for you once approved. *Note: UNBL workspaces are only available for non-commercial users.*

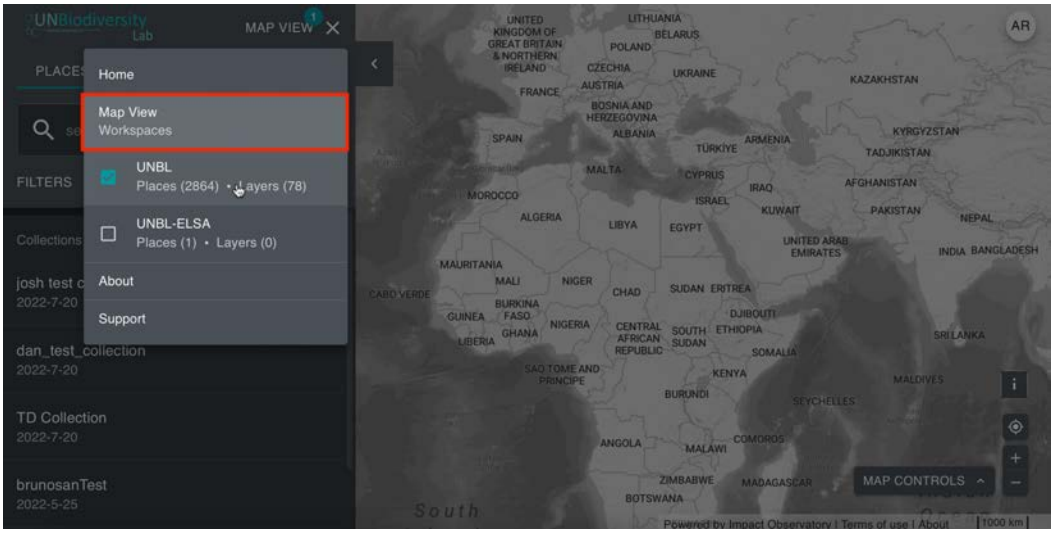
2.3. Navigate to the ELSA Tool in Your UNBL Workspace

Once you have successfully been granted access to your UNBL workspace, please follow these steps to access the interface:

1. Log in to your account.



2. Click the MAP VIEW dropdown menu at the top left of the page. This will display the workspaces you belong to. Click the checkbox for your workspace.



3. After activating your workspace, your initial view will be the PLACES tab. Click on LAYERS in the left panel. You will see a tab called ELSA Maps.

4. Click on CREATE NEW MAP to start a new rapid ELSA analysis.

2.4. Select Country for the Rapid ELSA Analysis

Once you have accessed your workspace, you have the option to view and modify the ELSA map for any of the available countries.

1. Select a country from the list available. The proof-of-concept rapid ELSA analysis is currently available for Colombia, Costa Rica, and South Africa. Once you select the country of interest, you will be able to see a first iteration rapid ELSA map for the country that was created using global data and default parameters.

2. Click on “MODIFY ELSA MAP to refine the analysis for the selected country.

2.5. Review Input Layers

Before modifying parameters to refine the ELSA analysis, take a moment to review the input data layers. *Note:* Data selection and processing were undertaken to reflect national level conditions. The full data list and descriptions of each layer can be found in Annex 3.

1. Click on VIEW INPUT LAYERS to preview the datasets used for the rapid ELSA analysis in your country. In this tab, you will be able to view data used in three ways in the analysis:

a. *Planning features:* Planning features are the 23 data layers initially used to map the 10 priority global policy targets that guide the ELSA analysis. Each planning feature is categorized to show which of the 10 global priority targets it is associated with.

b. *Zones:* The zone layers are the initial input into the rapid ELSA analysis about where it is potentially possible to implement protection, restoration, management, and urban greening. These zones are intended to exclude areas that are clearly not suitable for an action, but do not constitute a true evaluation of an action's feasibility within a planning unit or region.

c. *Protected Areas:* The rapid ELSA analysis offers the option to include all existing protected areas within the final ELSA map.

2. For each data layer in the list, you will see up to three icons.

a.  Click this icon to preview the layer on the map. Click again to switch off. You can activate data layers individually or activate several at the same time.

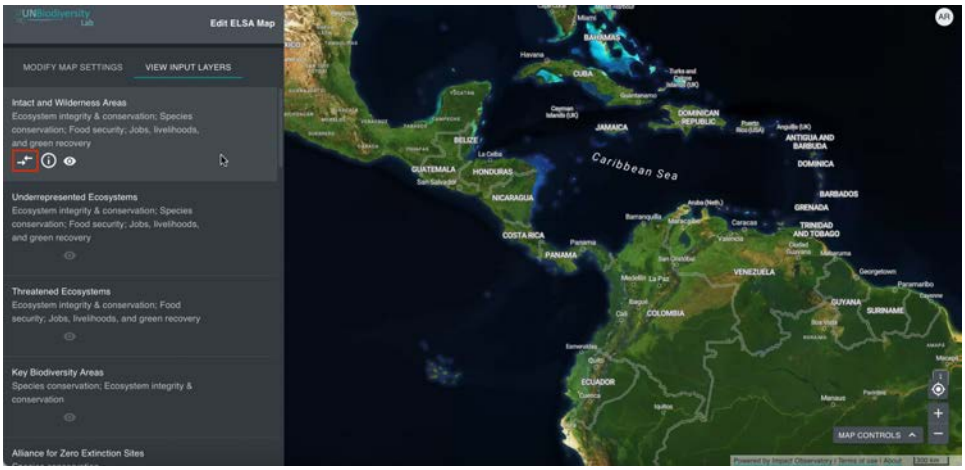
b.  Click on this icon to access information and metadata for the layer.

c.  The ELSA tool on UNBL enables countries to replace select global data layers with national data to strengthen the analysis. **The presence of this icon indicates that the layer is eligible to be replaced with national data.**

2.6. Request National Data Swaps

The rapid ELSA analysis enables you to request national data layers be used in place of specific global data layers. To determine if you would like to request any national data be added:

1. Click on the VIEW INPUT LAYERS tab to see which layers are eligible to be replaced with national data. Remember, all eligible data layers are marked with the following icon: 
2. Review the national data swap-in instructions and fill in the data submission form. For any questions or assistance needed, please email support@unbiodiversitylab.org.
3. The UNBL team will contact you as soon as the requested layer has been added to your ELSA data stack on UNBL.



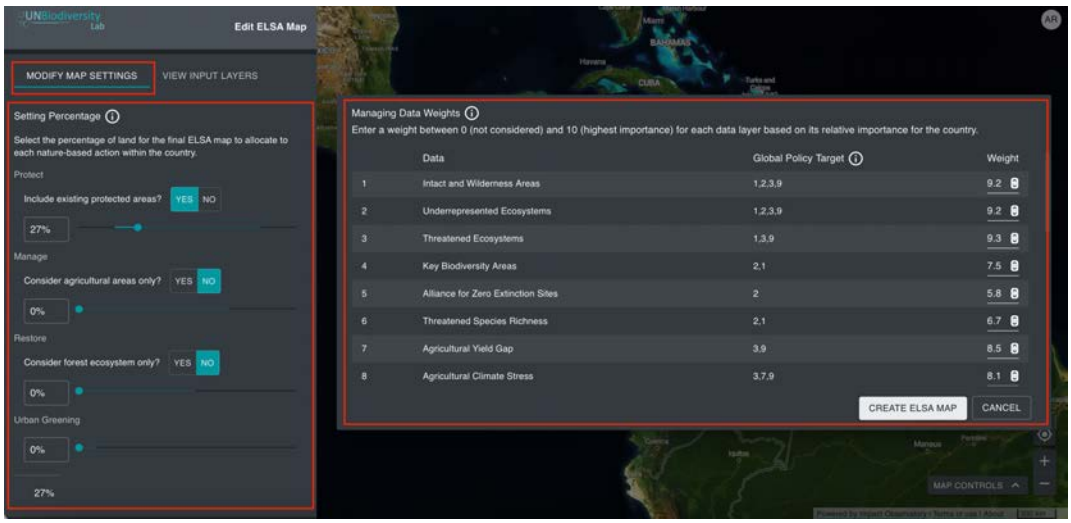
2.7. Modify Map Settings

The ELSA tool enables users to customize key parameters to develop a refined national version of the ELSA map. To customize these parameters, click on MODIFY MAP SETTINGS.

The resulting screen shows the various parameters that be adjusted, including:

- 2.7.1: The percentages (area-based targets) allocated to each nature-based action zone (protect, restore, manage, and urban greening).
- 2.7.2: The ability to include (lock-in) all existing protected areas in the ELSA map.
- 2.7.3: Criteria that define where each nature-based action can be implemented based on national context.
- 2.7.4: The weights for each input planning feature based on its relative importance and accuracy for the country.

We will walk through each of these one by one.



2.7.1. Setting percentages for area-based targets

This part of the ELSA tool on UNBL enables users to set area-based targets for protection, restoration, management, and urban greening. The targets can also be understood as the percentage of terrestrial area that can be allocated to each nature-based action within the country.

The default values for each action are derived from globally agreed targets, with 30% for protect, 15% for manage, 20% for restore, and 0.5% for urban greening (Figure 4).

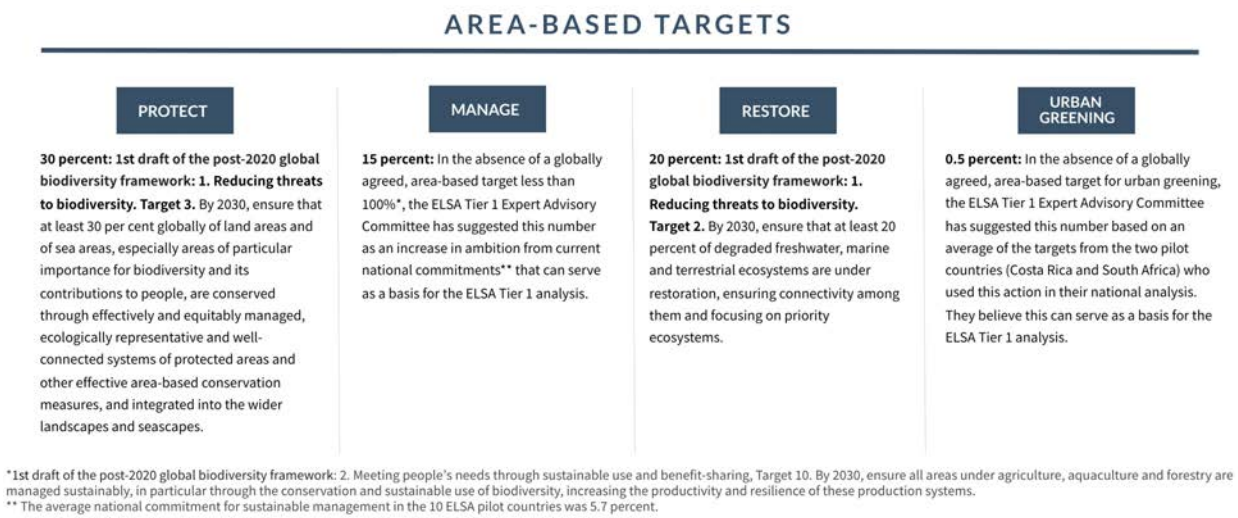


Figure 4: Area Based Targets.

Users can adjust these targets based on national policy targets and planning. For instance, if the national target for protection is actually 35%, this can be used to generate an ELSA map that reflects national targets. To do this:

- Change each % slider to reflect existing national area-based targets for protection, management, restoration, and urban greening. Note that the sliders will only provide you with options that will lead to a successful ELSA analysis. In the case of protection, management, and restoration, the options the % sliders provide will depend on your responses to the questions around customizing the zones (see 2.7.2 and 2.7.3). In addition, the total value of % across the four actions, documented at the bottom of the panel, should not exceed 100%. If you exceed 100%, this number will turn red, alerting you to the need to refine your percentage selection.

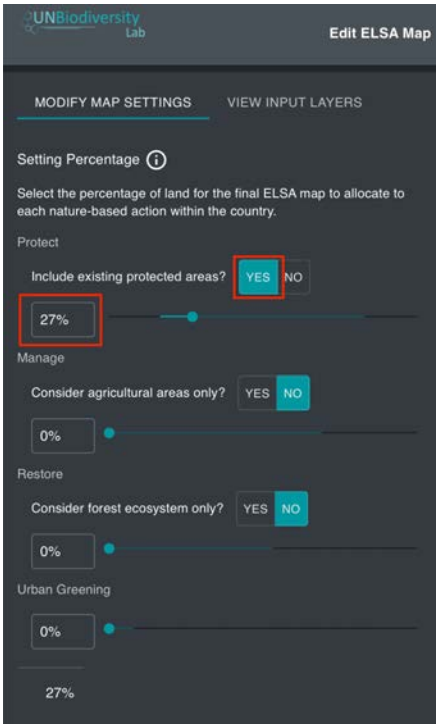
2.7.2. Include (lock in) protected areas?

The lock-in function ensures that specific areas are included in the ELSA map. In the ELSA tool on UNBL, users have an option to lock in existing protected areas. This is one of several ways that users can customize the criteria that define each nature-based action for their country. It is the most severe because it forces the inclusion of existing protected areas in the resulting ELSA map.

- Select "Yes" to lock-in protected areas in the final ELSA map. This setting will force the analysis to include existing protected areas within the 'protect' action. In addition to showing existing protected areas, the resulting map will also show where new protected areas should be placed. This functionality is built on the notion that an existing network of protected areas should and can be built upon or enhanced. *If you select yes, the lowest available % for the protect slider will be equal to the country's current protected area coverage, calculated from the World Database on Protected Areas.*

- Select "No", to enable the ELSA algorithm to choose the best areas in the country for protection based on the 10 global priority targets. If you select this option, the ELSA algorithm will not consider existing protected areas as an influential factor for its land optimization. The result map will independently indicate where action should be taken to protect natural ecosystems, that may or may not include the existing protected areas system. *If you select no, the lowest available % will be 0.*

  Note: The World Database on Protected Areas (WDPA) is used to map protected areas. Users are able to submit their national protected areas data to use in place of the WDPA if preferred (see 2.6).



2.7.3 Customize the criteria for zones that define where each nature-based action can be implemented based on national context

In the rapid ELSA analysis, zones are used to map where it is potentially possible to implement each nature-based action based on broad definitions of each. The zones are intended to exclude areas that are clearly not suitable for an action, but do not constitute a true evaluation of an action's feasibility within a planning unit or region.

In the ELSA tool on UNBL, users have the option to customize the **sustainable management** and **restoration** zones. Unlike the lock-in for protected areas, this does not require that certain areas be included in the final map. However, it provides the ability to customize the options considered by the ELSA optimization based on national context.

Consider manage within existing agricultural areas only?

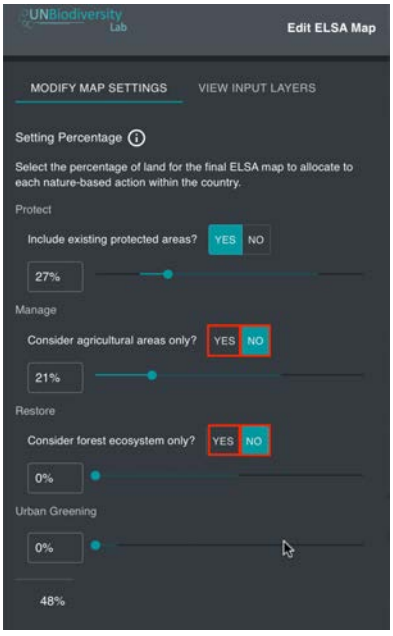
This setting enables users to customize the analysis based on national approaches to sustainable management.

- Select "Yes" if the country defines sustainable management as only relevant for agricultural areas. This will restrict the territory that the ELSA optimization considers for management to agricultural areas.
- Select "No" if the country defines sustainable management as relevant across all ecosystem types.

Consider restore within forest ecosystems only?

This setting enables users to customize the analysis based on national approaches to restoration.

- Select "Yes" if the country defines restoration as only relevant for forest ecosystems. This will restrict the territory that the ELSA optimization considers for restoration to forest ecosystems.
- Select "No" if the country defines restoration as relevant across all ecosystem types.



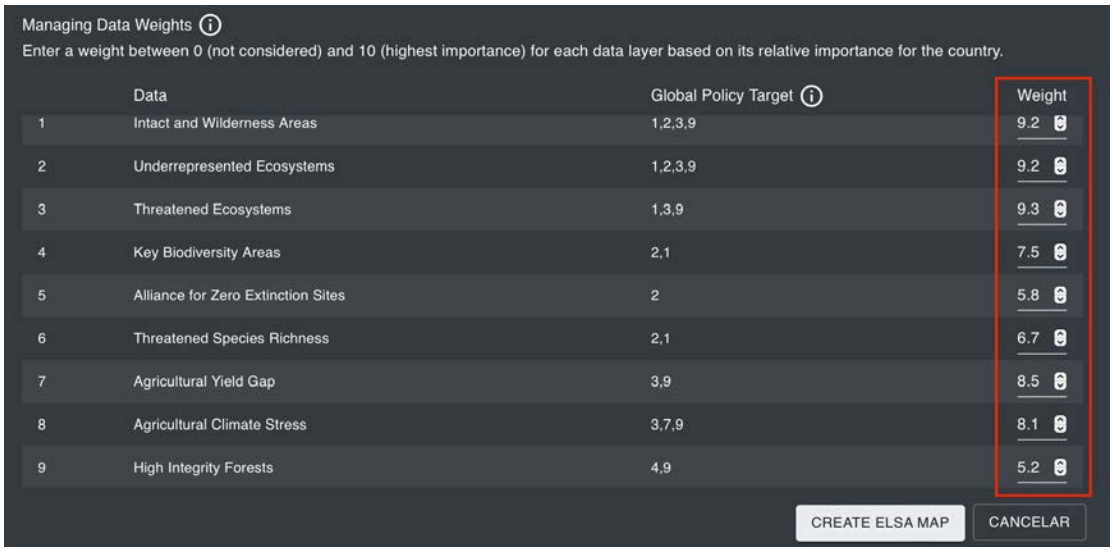
2.7.4 Managing Data Weights

The planning features used in the rapid ELSA analysis serve as 'proxies' to map the 10 global priority targets. Each planning feature may correspond to one or multiple priority global policy targets, indicated in the second-to-right column. The ELSA analysis will ultimately seek to optimize outcomes across all planning features.

Each of the planning features are assigned a default weight in the ELSA tool, which can be adjusted by the user based on: (1) relative importance of the layer and (2) confidence in the data layer for the country. For instance, threatened and underrepresented ecosystems are more important for reaching national targets than protecting Key Biodiversity Areas, users should assign the threatened and underrepresented ecosystems layers a higher weight in the ELSA tool.

To manage the data weights:

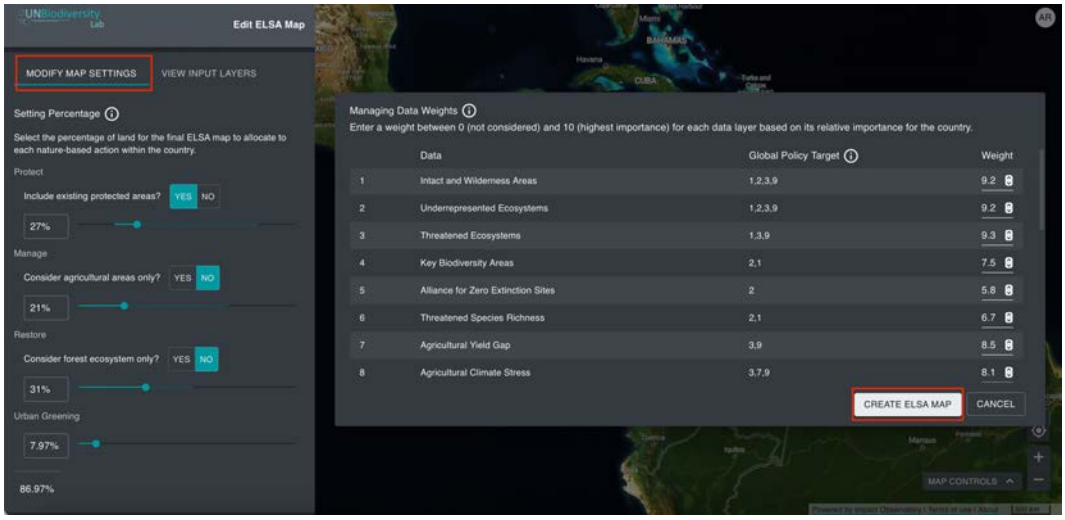
1. Enter a weight for each planning feature using a number scale from 0-10, where:
    - 0 – not important / do not consider
    - 2.0 – low importance and/or confidence
    - 5.0 – average importance and/or confidence
    - 10.0 – highest importance and/or confidence



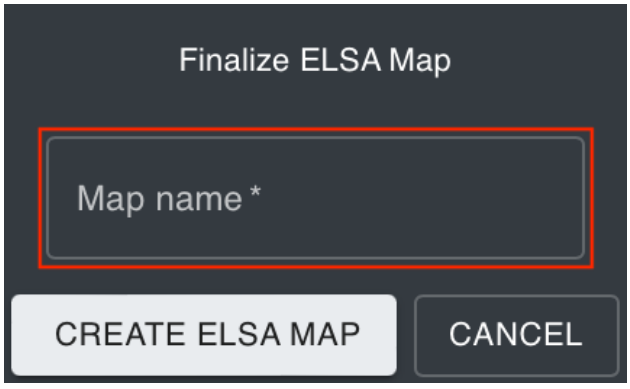
2.8. Create Your ELSA MAP

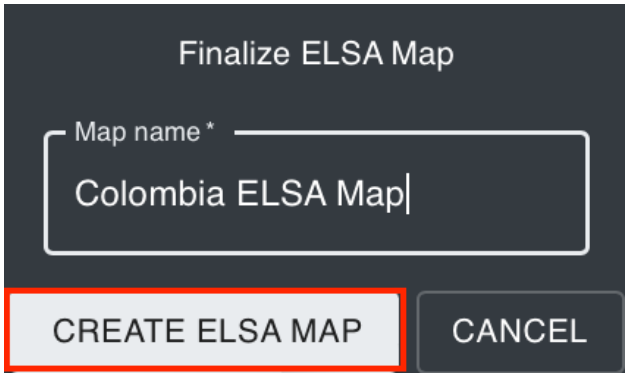
Once you are satisfied with the parameters set for the nature-based actions and planning features, you will be ready to run the ELSA optimization analysis to make the ELSA map.

1. Click on CREATE ELSA MAP.



2. Enter a name for your ELSA map and click on CREATE ELSA MAP.





3. You will see a message in the Layers tab explaining that your map is being created. The ELSA analysis will typically take 3-5 minutes. However, if the country is large, it may take significantly longer.

4. Once the optimization has finished, you will see your completed ELSA map in the left-hand panel

2.9. View ELSA Maps

Once the optimization has completed, you will be able to view 2 maps for your country based on the results of the ELSA analysis.

- **The ELSA heat map.** This heat map shows the intersection of all planning features and their weights to indicatively show areas of importance for the 10 priority global policy targets.

- **The ELSA action map.** This shows the optimal spatial locations where action should be taken for protection, management, restoration, and urban greening to best contribute to the achievement of the 10 priority global policy targets.

To visualize the ELSA maps:

1. Click on the LAYERS tab.
2. Click on your new ELSA map in the ELSA Maps box. The ELSA action map will load as the default map.

3. To view the ELSA heat map, click on the drop-down arrow in the legend. If you cannot see the data, make sure you have the map centered over the country corresponding to the selected ELSA map using the Map Controls.

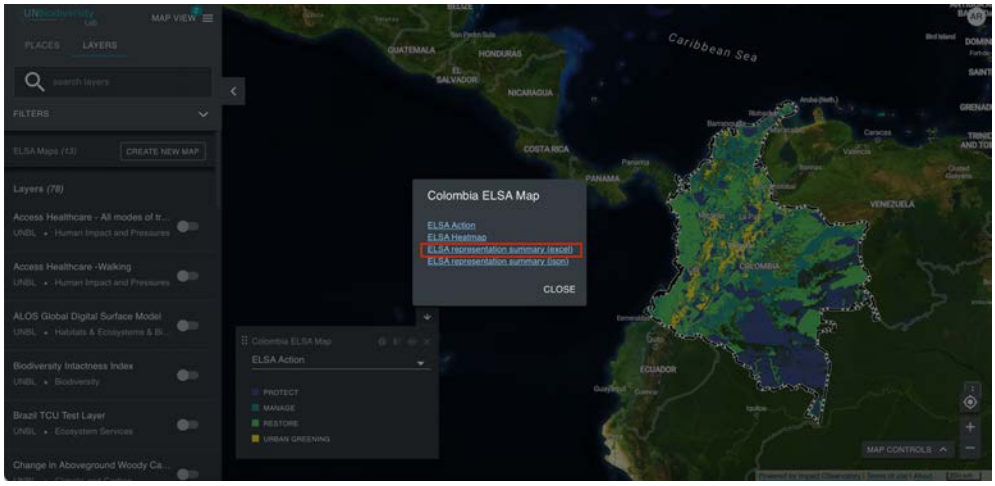
2.10. Analyze Synergies and Tradeoffs

The ELSA map shows the optimal spatial locations where action should be taken for protection, management, restoration, and urban greening to best contribute to achieving the 10 priority global targets. Because each of these targets is mapped by one or more planning features, and not all planning features are located in the same areas, even the best optimization will lead to trade-offs that national stakeholders must consider. The results table enables users to do this by measuring the outcome for each planning feature with a 'representation' score.

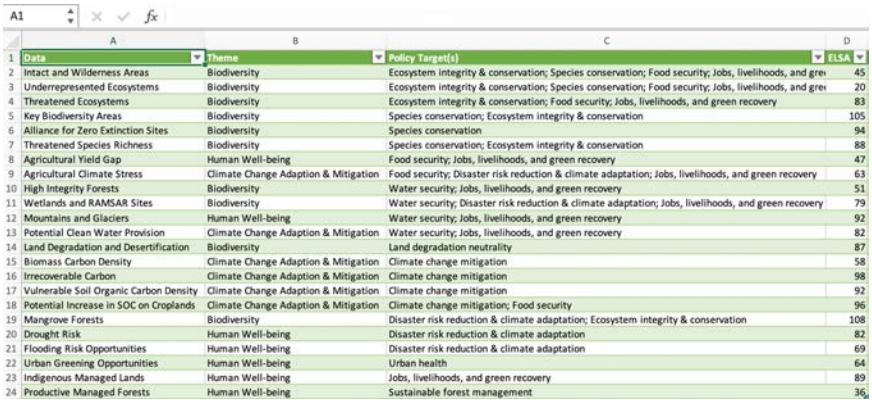
After each iteration of the analysis, a new version of this summary results table will be available. Users can view and download the results and assess whether the weights used for each planning feature have led to an acceptable representation.

To review the results:

1. Click on the LAYERS tab.
2. Click on your new ELSA map in the ELSA Maps box.
3. Click on the information button in the legend, then click on 'download summary table'. This will download an excel file of the results.



4. Review the results table. The ELSA representation score is available in column D of the excel. For planning features with low representation, users may wish to increase the weights to ensure the ELSA map better represents these features. Even after increasing weights, some features may remain with low representation due to factors such as the zone constraints preventing ELSA actions in areas where these features occur.



Data	Theme	Policy Target(s)	ELSA
Intact and Wilderness Areas	Biodiversity	Ecosystem integrity & conservation; Species conservation; Food security; Jobs, livelihoods, and gre	45
Underrepresented Ecosystems	Biodiversity	Ecosystem integrity & conservation; Species conservation; Food security; Jobs, livelihoods, and gre	20
Threatened Ecosystems	Biodiversity	Ecosystem integrity & conservation; Food security; Jobs, livelihoods, and green recovery	83
Key Biodiversity Areas	Biodiversity	Species conservation; Ecosystem integrity & conservation	105
Alliance for Zero Extinction Sites	Biodiversity	Species conservation	94
Threatened Species Richness	Biodiversity	Species conservation; Ecosystem integrity & conservation	88
Agricultural Yield Gap	Human Well-being	Food security; Jobs, livelihoods, and green recovery	47
Agricultural Climate Stress	Climate Change Adaption & Mitigation	Food security; Disaster risk reduction & climate adaptation; Jobs, livelihoods, and green recovery	63
High Integrity Forests	Biodiversity	Water security; Jobs, livelihoods, and green recovery	51
Wetlands and RAMSAR Sites	Biodiversity	Water security; Disaster risk reduction & climate adaptation; Jobs, livelihoods, and green recovery	79
Mountains and Glaciers	Human Well-being	Water security; Jobs, livelihoods, and green recovery	92
Potential Clean Water Provision	Climate Change Adaption & Mitigation	Water security; Jobs, livelihoods, and green recovery	82
Land Degradation and Desertification	Biodiversity	Land degradation neutrality	87
Biomass Carbon Density	Climate Change Adaption & Mitigation	Climate change mitigation	58
Irrecoverable Carbon	Climate Change Adaption & Mitigation	Climate change mitigation	98
Vulnerable Soil Organic Carbon Density	Climate Change Adaption & Mitigation	Climate change mitigation	92
Potential Increase in SOC on Croplands	Climate Change Adaption & Mitigation	Climate change mitigation; Food security	96
Mangrove Forests	Biodiversity	Disaster risk reduction & climate adaptation; Ecosystem integrity & conservation	108
Drought Risk	Human Well-being	Disaster risk reduction & climate adaptation	82
Flooding Risk Opportunities	Human Well-being	Disaster risk reduction & climate adaptation	69
Urban Greening Opportunities	Human Well-being	Urban health	64
Indigenous Managed Lands	Human Well-being	Jobs, livelihoods, and green recovery	89
Productive Managed Forests	Human Well-being	Sustainable forest management	36

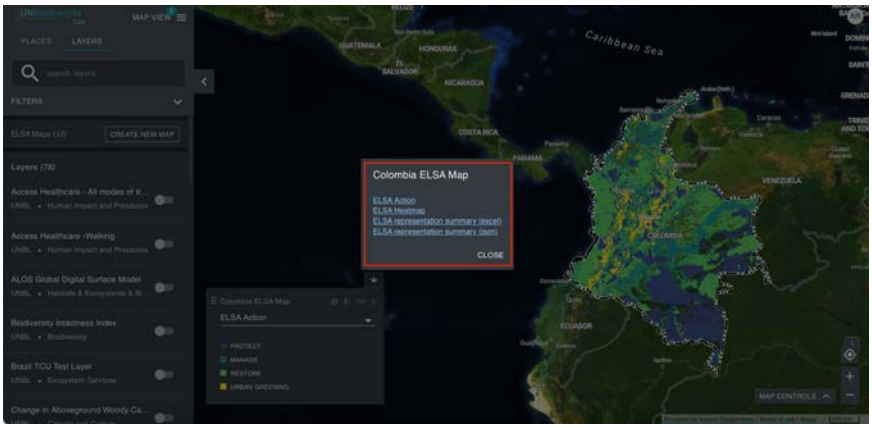
Figure 5: Download Summary Table.

2.11. Download Results

After running the optimization, users can download the 2 maps and the results table based on the results of the ELSA analysis. These can be used for communication and implementation purposes.

To download:

1. Click on the LAYERS tab. Click on your new ELSA map in the ELSA Maps box.
2. Click on the information button in the legend, then click on ELSA Action and/or ELSA Heatmap to download the maps as GeoTIFFs. Click on ELSA representation summary to download as an Excel or json.



3. When using the ELSA map in a formal report or publication, please use the following citation: UNDP. 2022. Essential Life Support Areas (ELSA) [Country]. Created at: www.unbiodiversitylab.org on Day Month Year.

2.12. Further Support

For further support, please contact support@unbiodiversitylab.org. We are happy to respond to your questions and requests.

Annex 1. Quick Resources on ELSA

Introduction to ELSA

- ELSA trailer: This 4-minute introductory video explains the basics of mapping ELSAs and tours the world to explore how different countries are applying the ELSA process.
- Learning for Nature: ELSA community of practice.
- Mapping Hope: Introduction to see mapping ELSAs and country case studies.

Science of ELSA

- Training on Systematic Conservation Planning: This session offered by PacMARA introduces the fundamentals of the science behind ELSA, Systematic Conservation Planning.
- Training on prioritizr: This session offered by Richard Schuster, Carleton University, shows the details of the prioritizr R code that runs the ELSA analysis. Further information is available from the prioritizr website and the prioritizr workshop manual.

Annex 2. Key Terms Used in the ELSA Tool on UNBL

Term	Definition
Area-based target	The maximum land area (expressed as % of total country land area) that can be allocated to a 'zone'.
Planning feature	An element of biodiversity or ecosystem service selected as a focus for conservation planning or action. The feature layer describes the spatial distribution of the element. In the ELSA process, each of the 10 global priority targets may correspond to one or more planning features depending on its complexity.
Decision support software	A computer-based application that uses information on possible actions and constraints on these actions in order to aid the process of decision-making in pursuit of a stated objective. For the rapid ELSA analysis, prioritizr is used as the decision support software.

Term	Definition
Geographic Information System (GIS)	A computer-based system consisting of hardware and software required for the capture, storage, management, analysis and presentation of geographic (spatial) data. UNBL uses GIS software to present spatial data to users. No GIS expertise is required to use it.
Constraint	A rule that must be met during the optimization as it creates a network of zones. The primary constraints are that the area-based targets (land area dedicated to each ELSA action) must not be exceeded, and that each zone can only occur within specified planning units (e.g., protection zone may only be possible in planning units that are not agricultural or urban land covers)
Maximum coverage problem	The objective of the maximal coverage problem in systematic conservation planning is to maximize protection of features subject to the constraint that the resources expended do not exceed a fixed cost. The rapid ELSA analysis uses a maximum coverage problem formulation.
Minimum set problem	The objective of the minimum-set problem in systematic conservation planning is to minimize resources expended, subject to the constraint that all features meet their conservation target. The minimum set problem is not applicable for the rapid ELSA analysis.
Planning Units	Planning units are the building blocks of a reserve system. A study area is divided into planning units that are smaller geographic parcels of regular or irregular shapes. Examples include squares, hexagons, cadastral parcels and hydrological units. The rapid ELSA analysis uses the following Coordinate Reference System and pixel size for its planning units: • Coordinate Reference System: Mollweide projection customized per country. • Resolution or pixel size: Costa Rica-250m, Colombia-1200m, South Africa-1000m. The general rule used to define planning unit size in the rapid ELSA analysis is: country land and inland water area (km2), divided by 800,000 and rounded to the nearest fifty (250m, 500m, 1,000m, etc).

Term	Definition
Representation	In Systematic Conservation Planning, a representative system captures a full range of planning features (species, ecosystems, and ecosystem services) occurring within the planning region, not just iconic species. In the rapid ELSA analysis, representation is used to measure how well the ELSA map captures or represents the planning features. The representation score is documented in the summary results table.
Systematic conservation planning (SCP)	Formal method for identifying potential areas for conservation management that will most efficiently achieve a specific set of objectives, commonly some minimum representation of biodiversity. The process involves a clear and structured approach to priority setting, and is now the standard for both terrestrial and marine conservation. The effectiveness of systematic conservation planning stems from its ability to make the best use of limited fiscal resources towards achieving conservation goals and do so in a manner that is defensible, accountable, and transparently recognises the requirements of different resource users. SCP is the science behind the rapid ELSA analysis.
User interface	The means by which people interact with a particular software application. A Graphical User Interface (GUI) presents information in a user-friendly way using graphics, menus and icons. UN Biodiversity Lab provides a GUI for users to directly run the rapid ELSA analysis.
Weights	Weights enable users to set relative priorities based on importance of planning feature and confidence in the data. Values typically range for '0' (no importance) to '10' (extremely high importance and/or confidence)

Term	Definition
Zones/Actions	A land use zone, equivalent to a nature-based action, that serves to improve specific planning features. Zones are determined by constraints that define where an action absolutely can or cannot occur. For example, these hard constraints limit protection to intact areas (e.g., low human footprint values), protection/restoration to areas that are moderately impacted by human activity, but not fully human dominated (e.g., low to mid human footprint values), and urban greening to areas highly impacted by human activity (e.g., high human footprint values) In the rapid ELSA analysis there are four zones: protect, restore, manage, and urban greening.

Annex 3. Data Layers Used in the Rapid ELSA Analysis on UNBL

Group	Name	Layer Description	Original data used	Citation
Features	Intact and Wilderness Areas	The layer represents the contribution of each cell to ecoregion intactness, a measure of a cell's condition and its connectivity to adjacent cells of good condition. Use directly as a continuous measure of intactness / wilderness quality.	Ecoregions intactness (Beyer et al., 2020)	Beyer, H. L., Venter, O., Grantham, H. S., & Watson, J. E. (2020). Substantial losses in ecoregion intactness highlight urgency of globally coordinated action. Conservation Letters, 13(2), e12692.

Group	Name	Layer Description	Original data used	Citation
Features	Underrepresented Ecosystems	The layer is composite with the world's terrestrial ecosystems and WDPA. If the coverage of protected areas within a certain ecosystem is under 30%, this ecosystem is considered as underrepresented in this layer. The value assigned to a given planning unit is the percentage of unprotected areas within the ecosystems.	World Terrestrial Ecosystems (Sayrer et al., 2020) The World Database on Protected Areas (WDPA) (UNEP-WCMC and IUCN, 2021)	Sayre, R., Karagulle, D., Frye, C., Boucher, T., Wolff, N.H., Breyer, S., Wright, D., Martin, M., Butler, K., Van Graafeiland, K., Touval, J., Sotomayor, L., McGowan, J., Game, E.T., Possingham, H., 2020. An assessment of the representation of ecosystems in global protected areas using new maps of World Climate Regions and World Ecosystems. Global Ecology and Conservation 21, e00860. https://doi.org/10.1016/j.gecco.2019.e00860 UNEP-WCMC and IUCN (2022), Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], April 2022, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.
Features	Threatened Ecosystems	For country, calculate ecosystem threat status as the proportion of that ecosystem that has an intactness value less than the median for all planning units within the country.	World Terrestrial Ecosystems (Sayrer et al., 2020) Ecoregions intactness (Beyer et al., 2020)	Sayre, R., Karagulle, D., Frye, C., Boucher, T., Wolff, N.H., Breyer, S., Wright, D., Martin, M., Butler, K., Van Graafeiland, K., Touval, J., Sotomayor, L., McGowan, J., Game, E.T., Possingham, H., 2020. An assessment of the representation of ecosystems in global protected areas using new maps of World Climate Regions and World Ecosystems. Global Ecology and Conservation 21, e00860. https://doi.org/10.1016/j.gecco.2019.e00860

Group	Name	Layer Description	Original data used	Citation
				Beyer, H. L., Venter, O., Grantham, H. S., & Watson, J. E. (2020). Substantial losses in ecoregion intactness highlight urgency of globally coordinated action. Conservation Letters, 13(2), e12692.
Features	Key Biodiversity Areas	Key Biodiversity Areas are sites that contribute significantly to the global persistence of biodiversity in terrestrial, freshwater and marine ecosystems. Sites qualify as global KBAs if they meet one or more of 11 globally agreed upon criteria, including: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. We only include KBAs that have been identified at the international level and exclude Alliance for Zero Extinction (AZE) sites, which are included as a separate standalone layer in ELSA. Please visit the World Database of Key Biodiversity Areas website (https://www.keybiodiversityareas.org/).	World Database of Key Biodiversity Areas (BirdLife International, 2022)	BirdLife International (2021). World Database of Key Biodiversity Areas. Managed by BirdLife International on behalf of the KBA Partnership: BirdLife International, International Union for the Conservation of Nature, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Re:Wild, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, Wildlife Conservation Society and World Wildlife Fund. March 2021 Version. Available at http://www.keybiodiversityareas.org.

Group	Name	Layer Description	Original data used	Citation
Features	Alliance for Zero Extinction Sites	The Alliance for Zero Extinction (AZE) is a joint initiative of biodiversity conservation organizations from around the world working to prevent extinctions by promoting the identification and ensuring the safeguard and effective conservation of key sites that are the last remaining refugees of one or more Endangered or Critically Endangered species. AZE sites are included in the global Key Biodiversity Areas (KBA) database, but we include them in ELSA as a standalone conservation feature. See: https://zeroextinction.org.	World Database of Key Biodiversity Areas (BirdLife International, 2022)	BirdLife International (2021). World Database of Key Biodiversity Areas. Managed by BirdLife International on behalf of the KBA Partnership: BirdLife International, International Union for the Conservation of Nature, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Re:Wild, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, Wildlife Conservation Society and World Wildlife Fund. March 2021 Version. Available at http://www.keybiodiversityareas.org.
Features	Threatened Species Richness	This layer represents the number of species of threatened amphibians, birds, mammals, reptiles and plant taxa whose distribution distribution overlaps in each planning unit.	NatureMap Threatened species richness (UNEP-WCMC, 2020)	UNEP-WCMC (2020) Threatened species richness. Derived from Areas of Habitat maps created from data from the IUCN Red List, BirdLife International, the Global Assessment of Reptile Distributions (GARD), the Botanical Information and Ecology Network (BIEN) database and additional vascular plant species ranges were created from point data from the IUCN Red List, Botanic Gardens Conservation International (BGCI), the Global Biodiversity Information Facility (GBIF) and iNaturalist. Cambridge, UK.

Group	Name	Layer Description	Original data used	Citation
Features	Agricultural Yield Gap	Average yield gaps for maize, wheat and rice, measured as the percentage gap of the observed yield to the attainable yield circa the year 2000. Identify areas for increasing food production.	Attainable yield achieved 2000 (Mueller et al., 2012)	Mueller, N., Gerber, J., Johnston, M. et al. Closing yield gaps through nutrient and water management. Nature 490, 254–257 (2012). https://doi.org/10.1038/nature11420
Features	Agricultural Climate Stress	Predicted change in general agricultural suitability between 1981–2010 and 2071–2100, considering rainfed conditions and irrigation on currently irrigated areas. In this layer, only negative changes in agricultural suitability was included, which are areas projected to experience a decrease in agricultural suitability. The increasing value in planning units identifies increasing loss of agricultural suitability.	Crop Suitability Change (Zabel et al., 2014)	Zabel F., Putzenlechner B., Mauser W. (2014): Global agricultural land resources – a high resolution suitability evaluation and its perspectives until 2100 under climate change conditions. Online available: PLOS ONE. DOI: 10.1371/journal.pone.0107522

Group	Name	Layer Description	Original data used	Citation
Features	High Integrity Forests	Identify structurally complex forests with low human pressure that are likely to be most valuable for biodiversity and ecosystem services, including water security. Average FSII and FLII data where both available, for places not covered by FSII, directly use FLII.	Forest Structural Integrity Index (Hansen et al., 2019) Forest Landscape Integrity Index (Grantham et al., 2020)	Hansen, A., Barnett, K., Jantz, P. et al. Global humid tropics forest structural condition and forest structural integrity maps. Sci Data 6, 232 (2019). https://doi.org/10.1038/s41597-019-0214-3 Grantham, H.S., Duncan, A., Evans, T.D. et al. Anthropogenic modification of forests means only 40% of remaining forests have high ecosystem integrity. Nat Commun 11, 5978 (2020). https://doi.org/10.1038/s41467-020-19493-3
Features	Wetlands and RAMSAR Sites	The distribution of wetland that covers the tropics and subtropics, and wetlands of international importance (Ramsar). Only Ramsar sites identified by a polygon are used. When Ramsar polygons are available, wetlands given a value of 0.5, Ramsar sites a value of 1, as these are recognized as internationally important wetlands. Otherwise use wetland only.	Global Wetlands: Tropical and Subtropical Wetlands Distribution (Gumbricht et al., 2017) Ramsar sites (Ramsar Convention on Wetlands, 1971)	Gumbricht, T., Roman-Cuesta, R.M., Verchot, L., Herold, M., Wittmann, F., Householder, E., Herold, N., Murdiyarso, D., 2017. An expert system model for mapping tropical wetlands and peatlands reveals South America as the largest contributor. Global Change Biology 23, 3581–3599. https://doi.org/10.1111/gcb.13689 Wetlands International/Ramsar (2022). Ramsar Sites Information Service. Wetlands International and Ramsar Convention Secretariat. http://ramsar.wetlands.org

Group	Name	Layer Description	Original data used	Citation
Features	Mountains and Glaciers	The distribution of mountains and glaciers. Combined with 0.5 weight accordingly.	Global Mountain Explorer K3 (Karagulle et al., 2017) Randolph Glacier Inventory 6.0 (RGI Consortium, 2017	Karagulle, D., C. Frye, R. Sayre, S. Breyer, P. Aniello, R. Vaughan, and D. Wright. 2017. Modeling global Hammond landform regions from 250-m elevation data. Transactions in GIS, DOI: 10.1111/tgis.12265 RGI Consortium (2017). Randolph Glacier Inventory – A Dataset of Global Glacier Outlines: Version 6.0: Technical Report, Global Land Ice Measurements from Space, Colorado, USA. Digital Media. DOI: https://doi.org/10.7265/N5-RGI-60
Features	Potential Clean Water Provision	This dataset shows the total potential supply of clean water available to users in m. Water quantity in each pixel is calculated as the water balance (rainfall minus actual evapotranspiration) cumulated downstream. See Mulligan et al. (2013) for a description of the global water balance dataset. Potential water provisioning services for each cell are first calculated as the volume of clean water available from upstream. The volume of water is calculated as the downstream cumulated water balance based on (rainfall+fog+snowmelt)-actual evapotranspiration. All analyses were carried out using the WaterWorld (Mulligan 2013) and Co$ting Nature (Mulligan et al. 2010)	Potential Clean Water Provision (Mulligan et al., 2019)	Mulligan, M. (2019) Potential Clean Water Provision. Model results from the Costingnature version 3 policy support system (non commercial-use). http://www.policysupport.org/costingnature [prepared by user mark.mulligan_kcl.ac.uk]Wetlands International/Ramsar (2022). Ramsar Sites Information Service. Wetlands International and Ramsar Convention Secretariat. http://ramsar.wetlands.org

Group	Name	Layer Description	Original data used	Citation
Features	Land Degradation and Desertification	The World Atlas on Desertification (WAD3) builds on a systematic framework of providing a convergence of reliable, global evidence of human environment interactions to identify local or regional areas of concern where land degradation processes may be underway. Concerns can be validated or dismissed only by evaluating them within local biophysical, social, economic and political contexts. Local context provides an understanding of causes and consequences of degradation, but also offers guidance for efforts to control or reverse it. ELSA uses the summary, convergence of evidence layer from WAD.	World Atlas of Desertification (WAD) - Convergence of Evidence (Cherlet et al., 2018)	Cherlet, M., Hutchinson, C., Reynolds, J., Hill, J., Sommer, S., von Maltitz, G. (eds.), World Atlas of Desertification, Publication Office of the European Union, Luxembourg, 2018. doi:10.2760/06292
Features	Live Biomass Carbon Density	This layer provides a spatially explicit estimation of above- and below-ground terrestrial live biomass carbon density. The original map was produced by combining the most reliable publicly-available datasets on biomass carbon.	NatureMap - Live Biomass Carbon Density (García-Rangel et al., in prep)	García-Rangel, S. et al. (In prep) Global distribution of natural carbon stocks potentially vulnerable to land use changes
Features	Irrecoverable Carbon	Irrecoverable carbon refers to the vast stores of carbon in nature that are vulnerable to release due to human activity and - if lost - could not be restored by 2050, when the world must reach net-zero emissions to avoid the worst impacts of climate change. This layer shows the combined mass of	Irrecoverable carbon (Noon et al., 2021)	Noon, M.L., Goldstein, A., Ledezma, J.C. et al. Mapping the irrecoverable carbon in Earth's ecosystems. Nat Sustain (2021). https://doi.org/10.1038/s41893-021-00803-6

Group	Name	Layer Description	Original data used	Citation
		irrecoverable carbon (in tonnes per hectare) from both biomass and soil.		
Features	Vulnerable Soil Organic Carbon Density	This layer shows soil organic carbon stocks that could be potentially vulnerable to human impact by 2050.	NatureMap - Vulnerable Soil Organic Carbon Density (García-Rangel et al., in prep)	García-Rangel, S. et al. (In prep) Global distribution of natural carbon stocks potentially vulnerable to land use changes.
Features	Potential Increase in SOC on Croplands	This layer provides an estimate of the potential increase in soil organic carbon within the top 30 cm of soil in croplands after 20 years, following implementation of better land management practices under a high sequestration scenario. The per pixel values here take into consideration the percent of each pixel which is classified as cropland (from the GLC-Share/GLC-02 dataset), and values have been converted to total tonnes of carbon.	Increase in SOC on Croplands After 20 Years – high scenario (Zomer et al., 2017)	Zomer, R.J., Bossio, D.A., Sommer, R., Verchot, L.V., 2017. Global Sequestration Potential of Increased Organic Carbon in Cropland Soils. Scientific Reports 7, 15554. https://doi.org/10.1038/s41598-017-15794-8
Features	Mangrove Forests	The global data on distribution of mangrove in the year 2016.	Global Mangrove Watch - Mangrove Forests 2016 (Bunting et al., 2018)	Bunting P., Rosenqvist A., Lucas R., Rebelo L-M., Hilarides L., Thomas N., Hardy A., Itoh T., Shimada M. and Finlayson C.M. (2018). The Global Mangrove Watch – a New 2010 Global Baseline of Mangrove Extent. Remote Sensing 10(10): 1669. doi: 10.3390/rs1010669.

Group	Name	Layer Description	Original data used	Citation
Features	Drought Risk	Drought risk is assessed for the period 2000–2014 and is based on the product of three independent determinants: hazard, exposure and vulnerability.	Global map of drought hazard (Carrão et al., 2016)	Carrão, H., Naumann, G., Barbosa, P., 2016. Mapping global patterns of drought risk: An empirical framework based on sub-national estimates of hazard, exposure and vulnerability. Global Environmental Change 39, 108–124. https://doi.org/10.1016/j.gloenvcha.2016.04.012
Features	Flooding Risk Opportunities	Flood risk opportunities layer which FRO = Average Flood Risk of planning units in watershed, divided by NDVI value.	Proportion of population exposed to floods (Tellman et al., 2021) MODIS/TERRA NDVI 2022-01-01-16 Global BasinATLAS	Tellman, B., Sullivan, J.A., Kuhn, C., Kettner, A.J., Doyle, C.S., Brakenridge, G.R., Erickson, T.A., Slayback, D.A., 2021 Satellite imaging reveals increased proportion of population exposed to floods. Nature 596, 80–86. https://doi.org/10.1038/s41586-021-03695-w Didan, K. (2015). MOD13Q1 MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. Accessed 2020-12-07 from https://doi.org/10.5067/MODIS/MOD13Q1.006 Linke, S., Lehner, B., Ouellet Dallaire, C., Ariwi, J., Grill, G., Anand, M., Beames, P., Burchard-Levine, V., Maxwell, S., Moidu, H., Tan, F., Thieme, M. (2019). Global hydro-environmental sub-basin and river reach characteristics at high spatial resolution. Scientific Data 6: 283. doi: https://doi.org/10.1038/s41597-019-0300-6

Group	Name	Layer Description	Original data used	Citation
Features	Urban Greening Opportunities	Urban areas with low NDVI and exposure to extreme heat. Layer is composite with MODIS-NDVI data, urban exposure to extreme heat, and urban area from ESRI 10m land cover data. The value in each urban planning unit is calculated as reversed value of ndvi + heat index /2, then rescaled to a range of 0-1.	10m Annual Land Use Land Cover 2020 MODIS/TERRA NDVI 2022 Wet bulb globe temperature (WBGT)	Karra, K., et al. 2021. "Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707. Didan, K. (2015). MOD13Q1 MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. Accessed 2020-12-07 from https://doi.org/10.5067/MODIS/MOD13Q1.006 Tuholske, C., Caylor, K., Funk, C., Verdin, A., Sweeney, S., Grace, K., Peterson, P., Evans, T., 2021. Global urban population exposure to extreme heat. Proceedings of the National Academy of Sciences 118, e2024792118. https://doi.org/10.1073/pnas.2024792118
Features	Indigenous Managed Lands	LandMark community level data provides sub-national information at the scale of distinct indigenous or community lands	LandMark Indigenous and community lands (LandMark, 2017)	LandMark. 2017. LandMark: The Global Platform of Indigenous and Community Lands. Available at: http://www.landmarkmap.org/

Group	Name	Layer Description	Original data used	Citation
Features	Productive Managed Forests	Map of managed forests, intersected with Net Primary Productivity data (annual average 2021) to identify productive managed forests.	NatureMap - Human Impact on Forests (Lesiv et al., 2020) Net Primary Production (NPP) MODIS (Running et al., 2019)	Lesiv, M., Schepaschenko, D., Buchhorn, M., See, L., Duerauer, M., Georgieva, I., … Blyshchyk, I. (2020). Methodology for generating a global forest management layer. Zenodo. http://doi.org/10.5281/zenodo.3933966 Running, S., Zhao, M. (2019). MOD17A3HGF MODIS/Terra Net Primary Production Gap-Filled Yearly L4 Global 500 m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. Accessed 2021-01-25 from https://doi.org/10.5067/MODIS/MOD17A3HGF.006
Lock-in	Protected Areas	The World Database on Protected Areas (WDPA) is the most up-to-date and complete source of information on protected areas, updated monthly with submissions from governments, non-governmental organizations, landowners, and communities.	The World Database on Protected Areas (WDPA) (UNEP-WCMC and IUCN, 2021)	UNEP-WCMC and IUCN (2022), Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], April 2022, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.
Zones	Human Footprint Index 2013	The global terrestrial Human Footprint map for the year 2013. The Human Footprint map shown here indicates human pressure scores ranging from 0 - 50, representing five classes of human pressure, each encompassing an equal proportion (~20%) of the planet.	Global terrestrial Human Footprint map (Williams et al., 2020)	Williams, B.A., et al. 2020. Change in Terrestrial Human Footprint Drives Continued Loss of Intact Ecosystems. One Earth 3, 371–382. https://doi.org/10.1016/j.oneear.2020.08.009

Group	Name	Layer Description	Original data used	Citation
Zones	Managed Forests	Managed forest from the Global Forest Certification Map, including managed forest, intact certified and certified forest categories.	Global Forest Certification Map (Kraxner et al., 2017)	Kraxner, F., Schepaschenko, D., Fuss, S., Lunnan, A., Kindermann, G., Aoki, K., ... & See, L. (2017). Mapping certified forests for sustainable management-A global tool for information improvement through participatory and collaborative mapping. Forest Policy and Economics, 83, 10-18. https://doi.org/10.1016/j.forpol.2017.04.014
Zones	Agriculture Areas	Crop land cover form the ESRI 10m Land Use Land Cover data	10m Annual Land Use Land Cover 2020	Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.
Zones	Urban Areas	Built area form the ESRI 10m Land Use Land Cover data	10m Annual Land Use Land Cover 2020	Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.
Zones-restrictions	Protect Zone	Analyse HFP distribution within protected areas, set protect threshold using the HFP that excludes the 5% most modified area of existing protected areas, exclude all agriculture and urban	Global terrestrial Human Footprint map 10m Annual Land Use Land Cover	Williams, B.A., et al. 2020. Change in Terrestrial Human Footprint Drives Continued Loss of Intact Ecosystems. One Earth 3, 371–382. https://doi.org/10.1016/j.oneear.2020.08.009 Karra, K., et al. 2021. "Global Land Use/Land

Group	Name	Layer Description	Original data used	Citation
				Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.
Zones-restrictions	Manage Zone	Hard constraint using HFP, exclude 20% most modified and 20% least modified area of the country (retaining all middle 60%), and include all managed forests from global certification map and all agricultural areas, exclude urban areas	Global terrestrial Human Footprint map 10m Annual Land Use Land Cover Global Forest Certification Map	Williams, B.A., et al. 2020. Change in Terrestrial Human Footprint Drives Continued Loss of Intact Ecosystems. One Earth 3, 371–382. https://doi.org/10.1016/j.oneear.2020.08.009 Karra, K., et al. 2021. "Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707. Kraxner, F., Schepaschenko, D., Fuss, S., Lunnan, A., Kindermann, G., Aoki, K., ... & See, L. (2017). Mapping certified forests for sustainable management-A global tool for information improvement through participatory and collaborative mapping. Forest Policy and Economics, 83, 10-18. https://doi.org/10.1016/j.forpol.2017.04.014

Group	Name	Layer Description	Original data used	Citation
Zones-restrictions	Manage Zone (Agricultural Areas Only)	In the case where a country chooses to restrict the definition of management to agricultural areas only, the map of agriculture will be used as the hard constraint.	10m Annual Land Use Land Cover	Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.
Zones-restrictions	Restore Zone	Hard constraint using HFP, exclude 20% most modified and 20% least modified area of the country, exclude urban and agriculture	Global terrestrial Human Footprint map 10m Annual Land Use Land Cover	Williams, B.A., et al. 2020. Change in Terrestrial Human Footprint Drives Continued Loss of Intact Ecosystems. One Earth 3, 371–382. https://doi.org/10.1016/j.oneear.2020.08.009 Karra, K., et al. 2021. "Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.
Zones-restrictions	Restore Zone (Forested Areas Only)	In the case where a country chooses to define restoration as only for forest cover, the hard constraint would be areas that are ecologically forest, but without current forest cover.	NatureMap Potential Natural Vegetation 10m Annual Land Use Land Cover	Hengl, Tomislav, Jung, Martin, & Visconti, Piero. (2020). Potential distribution of land cover classes (Potential Natural Vegetation) at 250 m spatial resolution (v0.1) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.3631254 Karra, K., et al. 2021. "Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.

Group	Name	Layer Description	Original data used	Citation
Zones-restrictions	Urban Areas	Build-up areas from the 10m land cover map	10m Annual Land Use Land Cover	Global Land Use/Land Cover with Sentinel 2 and Deep Learning," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, 4704–4707.

Convening Partners

The UNBL convening partners work in dynamic partnership to ensure all stakeholders can generate insights from spatial data to take action for nature and sustainable development.

Technical Partners

The UNBL technical partners ensure our platform uses state of the art technology and infrastructure to ensure anyone can discover, access, and use data.

Data Providers

In addition to the logos shown above, we gratefully acknowledge the following data providers: European Space Agency(ESA)/European Space Agency Climate Change Initiative (ESA CCI), ESRI, Food and Agriculture Organization of the UnitedNations (FAO), Global Wind Atlas, NASA Oak Ridge National Laboratory (ORNL) Socioeconomic Data and Applications Center(SEDAC), United Nations Educational, Scientific and Cultural Organization (UNESCO) and World Bank.

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