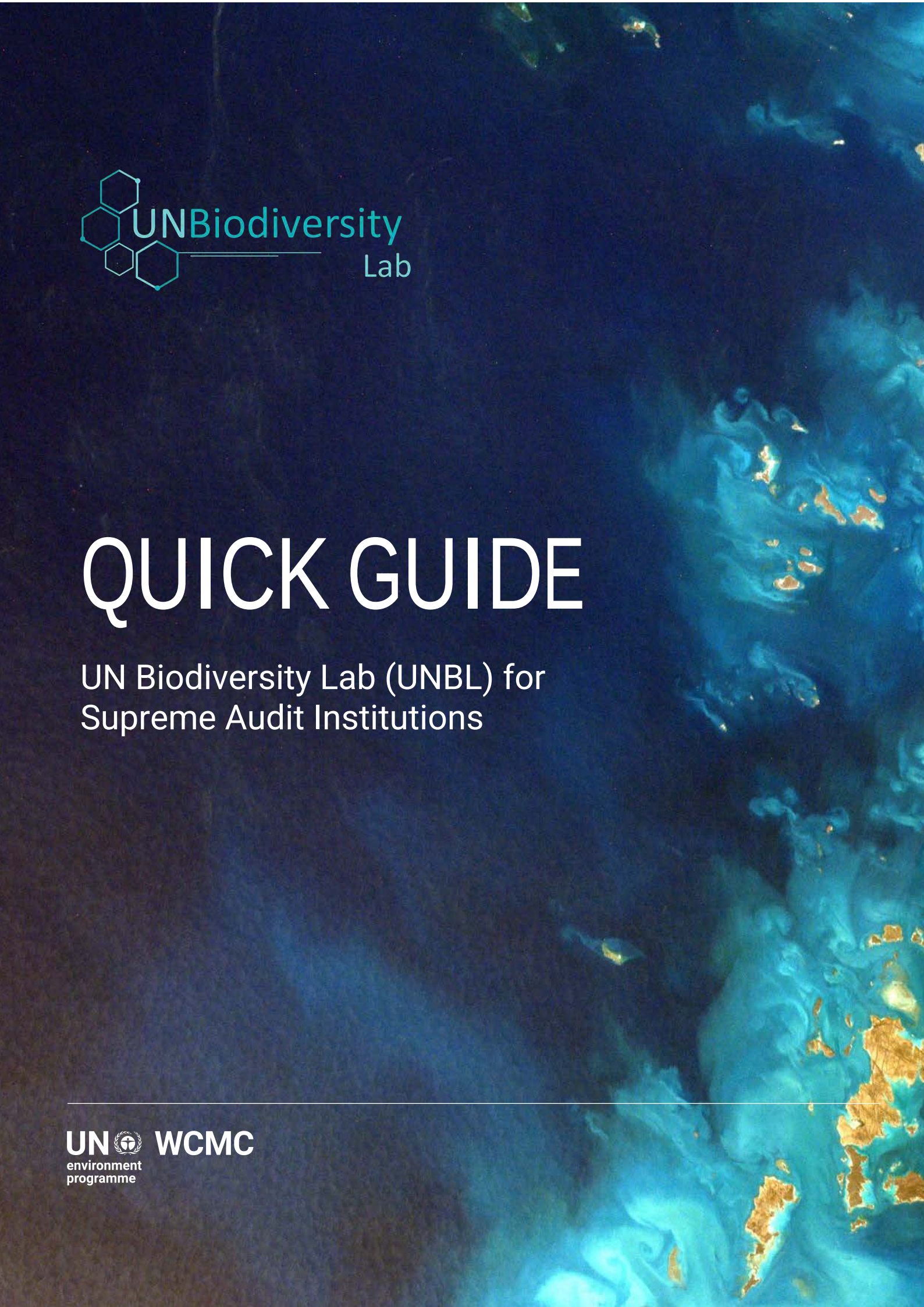

QUICK GUIDE

UN Biodiversity Lab (UNBL) for Supreme Audit Institutions

UN environment programme
WCMC

Quick Guide: UN Biodiversity Lab (UNBL) for Supreme Audit Institutions

Prepared for

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The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the biodiversity expert centre of the United Nations Environment Programme, the world's leading intergovernmental environmental organization. The Centre has been in operation for over 40 years, combining scientific research with practical policy advice.

This initiative was carried out within the scope of the Regional Project Strengthening External Control in the Environmental Area, a partnership of German Cooperation (through GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH), TCU and OLACEFS, with the support of the German Federal Ministry for Economic Cooperation and Development (BMZ).

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Foreword

Dear Readers,

Through the audits, evaluations, studies, and other actions they carry out in compliance with their mandate, the Supreme Audit Institutions (SAIs), as well as subnational audit institutions – depending on the corresponding national context – play an important role in ensuring the proper use of public resources and in constantly improving public policies, making them more effective for the benefit of the quality of life of citizens and sustainable development. In particular, audits on environmental issues have been receiving growing attention as they contribute to the good governance of natural resources, as well as to the conservation of biodiversity and ecosystem services, to the maintenance of human well-being in the long term and to the compliance with international agreements such as the Convention on Biological Diversity (CBD) and the 2030 Agenda for Sustainable Development, among others.

Throughout the entire process inherent to an environmental audit, from the choice of topic and methodological planning, to the collection of evidence and exchange with relevant actors and stakeholders, to the analysis of findings and their disclosure, it is essential that auditors have reliable and up-to-date geospatial environmental data and tools that enable them to explore and manipulate these data.

Among the different online platforms that provide geospatial environmental data, the UN Biodiversity Lab (UNBL) stands out for bringing together, in a centralized manner, a wide range of data from different sources which have passed the quality control of the UN bodies that maintain the platform. This platform also allows users to upload their own data, which can be visualized and analysed in conjunction with the global data already available on UNBL.

This publication, developed as part of a grant agreement between GIZ and the United Nations Environment Programme (UNEP) within the framework of the regional project Strengthening External Control in the Environmental Area, seeks to contribute to the training of auditors from SAIs and subnational audit institutions, as members of the Organization of Latin American and Caribbean Supreme Audit Institutions (OLACEFS), in the use of the UNBL platform in their studies and environmental auditing work. We hope that the use of this new tool will enable these entities to conduct more in-depth and comprehensive geospatial analyses of the most critical environmental issues for sustainable development in the region, thus contributing to compliance with the Multilateral Environmental Agreements and the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030.

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1. Introduction

Considering the role of Supreme Audit Institutions (SAIs) in promoting good governance and transparency in the implementation of public policies, they can play a critical role in the conservation of biodiversity in the jurisdictions in which they operate. To this end, audits carried out by SAIs must have quality data and appropriate supporting tools.

The objective of this Quick Guide is to present the **UN Biodiversity Lab (UNBL) platform as a tool to support external control audits carried out by SAIs in Latin America and the Caribbean (LAC) and globally** on issues of biodiversity conservation and sustainable development. **The targeted audience includes auditors** from SAIs and subnational audit institutions, especially those involved in environmental audits. The content may also be of interest to auditors working in other thematic areas, especially those where there is a relevant territorial component, such as agriculture and infrastructure.

1.1 What is the UN Biodiversity Lab platform?

UNBL's main objective is to provide governments with access to high-quality spatial data on nature and sustainable development. The platform, freely available online for non-commercial use[1], is the result of a partnership between the United Nations Environment Programme (UNEP) and its biodiversity specialist centre, the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), the United Nations Development Programme (UNDP), and the Secretariat of the Convention on Biological Diversity (CBD). These organisations are joined by a range of technical partners[2] and spatial data providers. UNBL seeks to increase the capacity of governments to access and use spatial data to strengthen decision-making processes. This has the potential to provide better understanding and transparency on issues central to Multilateral Environmental Agreements, such as the post-2020 global biodiversity framework of the CBD and the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development.

1.2 The UN Biodiversity Lab platform and the Supreme Audit Institutions

Due to the strong geographic and territorial component, **audits on biodiversity conservation and sustainable development issues particularly benefit from the availability of spatial data**, both in their planning and conduct. As the focus of UNBL is to serve governments, the platform also has the potential to be used by SAIs and subnational audit institutions. Topics that are relevant for governments will certainly also be relevant for institutions responsible for the external control of government action.

The spatial data available in the platform are selected for their quality and relevance to inform decision-making processes on environmental issues. Thus, first and foremost, **UNBL represents a reliable source of global spatial data on biodiversity**. These are data whose quality has been vetted by the UN bodies that maintain UNBL, which recommended their use by governments and other partners. In addition to the global data already available on the platform, UNBL allows users (including SAIs and subnational audit institutions) to use secure workspaces to supplement the database with other national and regional spatial datasets, expanding the potential uses for auditing purposes and enabling data sharing between SAIs and subnational audit institutions in a secure manner.

[1] https://www.unbiodiversitylab.org
[2] Impact Observatory (IO), National Aeronautics and Space Administration of the United States of America (NASA), Microsoft, and the UN International Computing Centre (UNICC).

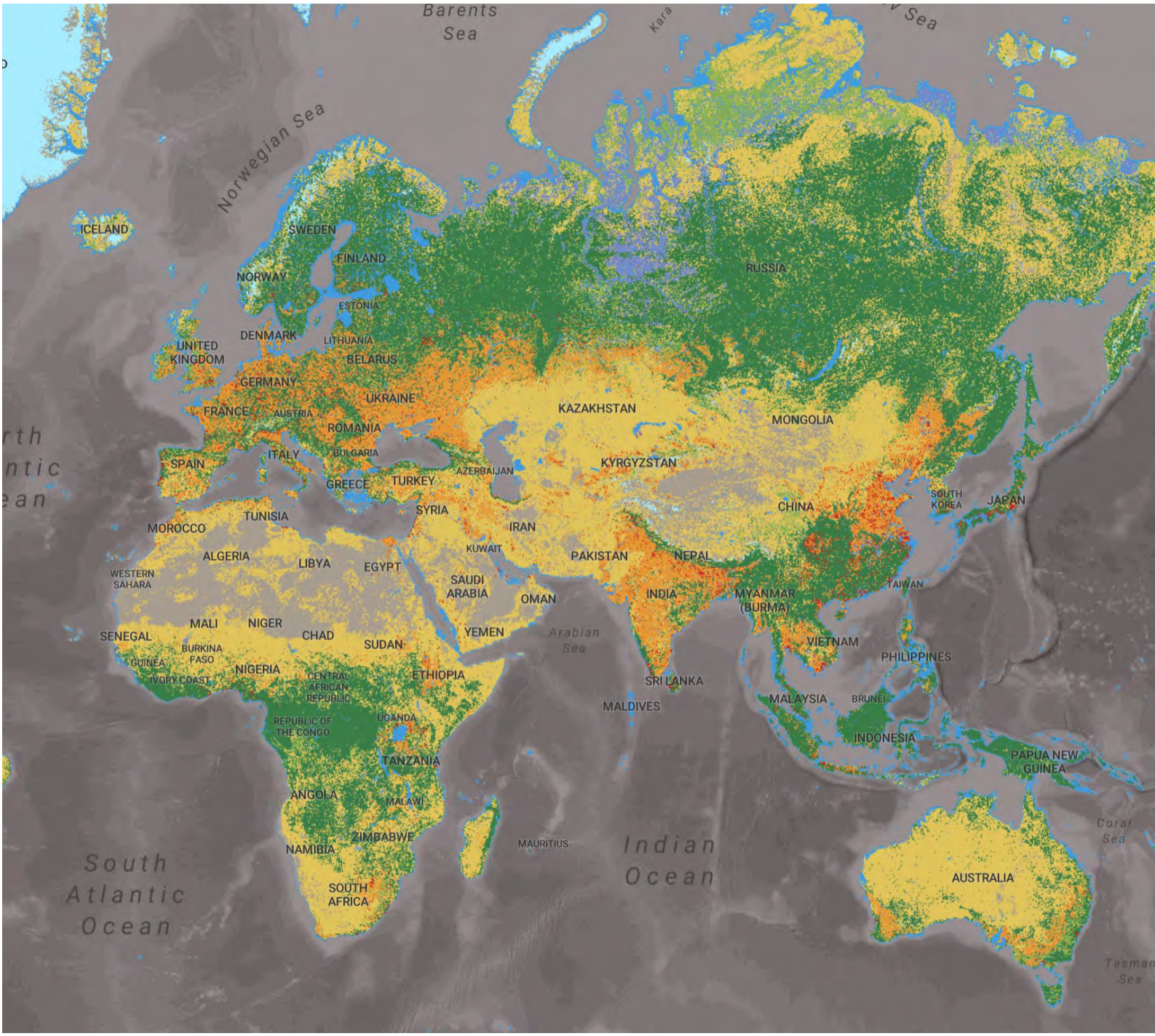

Figure 1. Global map of land use/land cover developed by ESRI in collaboration with Microsoft and Impact Observatory, available on UN Biodiversity Lab.

2. The UNBL public platform

This section presents an **overview of the UNBL public platform**, including information on available data layers and functionalities. At the end of the section, potential uses of the UNBL public platform in the context of audits conducted by SAIs and subnational audit institutions are explored. For more detailed information on the use of the platform, please see the Public Platform User Guide, available from the UNBL website.

2.1 Data layers

A data layer is a visual representation of a geographic dataset in a digital map environment[3]. The data layers hosted by UNBL are some of the best global datasets on biodiversity, ecosystem services, and socioeconomic aspects (see Section 1.1). The careful evaluation of all layers before their inclusion in the platform ensures their quality.

In UNBL, these layers can be visualised globally, or a user can focus on a specific area of interest (see Section 2.2). In total, there are more than 400 data layers available, and more will be added as they become available (current list available here).

The list of layers can be filtered based on categories (e.g. land cover, protected and conserved areas), making it easier to identify those that may be of interest according to the audit topic or the work to be carried out. The themes of these layers largely align with those typically covered by environmental audits in the biodiversity theme (INTOSAI WGEA, 2019): protected areas, endangered species, marine environments and their resources, wetlands, forest resources, among others.

When activating one or more layers, the data are immediately displayed on the map. Layer configuration options are also presented (e.g. selections for transparency and year of interest), as well as an option to obtain detailed information about the layer. When multiple layers are activated, the user can rearrange the overlay order, as shown in Figure 2.

[3] https://support.esri.com/en/other-resources/gis-dictionary/

Figure 2. UN Biodiversity Lab map view with three active data layers: monthly fires (Giglio et al., 2015, from NASA data); tree cover loss (Hansen et al., 2013); and forest cover in 2000 (Hansen et al., 2013).

2.2 Places

In **addition to the general visualisation of data layers, UNBL facilitates their navigation and visualisation in relation to specific areas of interest**. These areas of interest are called "places" in UNBL. On the public platform, the locations currently available include countries and some subnational jurisdictions. In the public platform it is not possible for a user to add other locations than those already available. To add additional locations, the user will need access to a secure UNBL workspace (see Section 3).

To find a location, simply use the search field in the “Places” tab and search for the area of interest. In the public platform, this location will usually be a country. After selecting the location, its boundaries will be plotted on the map and the visualization will be directed to the selected location. Within the “Places” tab, the “Collections” function allows users to create and save sets of locations. Figure 2 shows an example of the use of the “collections” function: Brazil and Bolivia have been added as two places within the “BRA_BOL” collection. This allows the quick navigation and visualisation of layers for the set of places included in the collection.

In addition to the visualisation options described above, the platform includes a function to clip layers to an area of interest directly in UNBL. With this, it is possible to download the clipped layer file (in *GeoTiff* format) for manipulation in geoprocessing software of your preference. Not all layers can be clipped, depending on the terms of use of the dataset, as defined by the dataset provider. See Public Platform User Guide for more details.

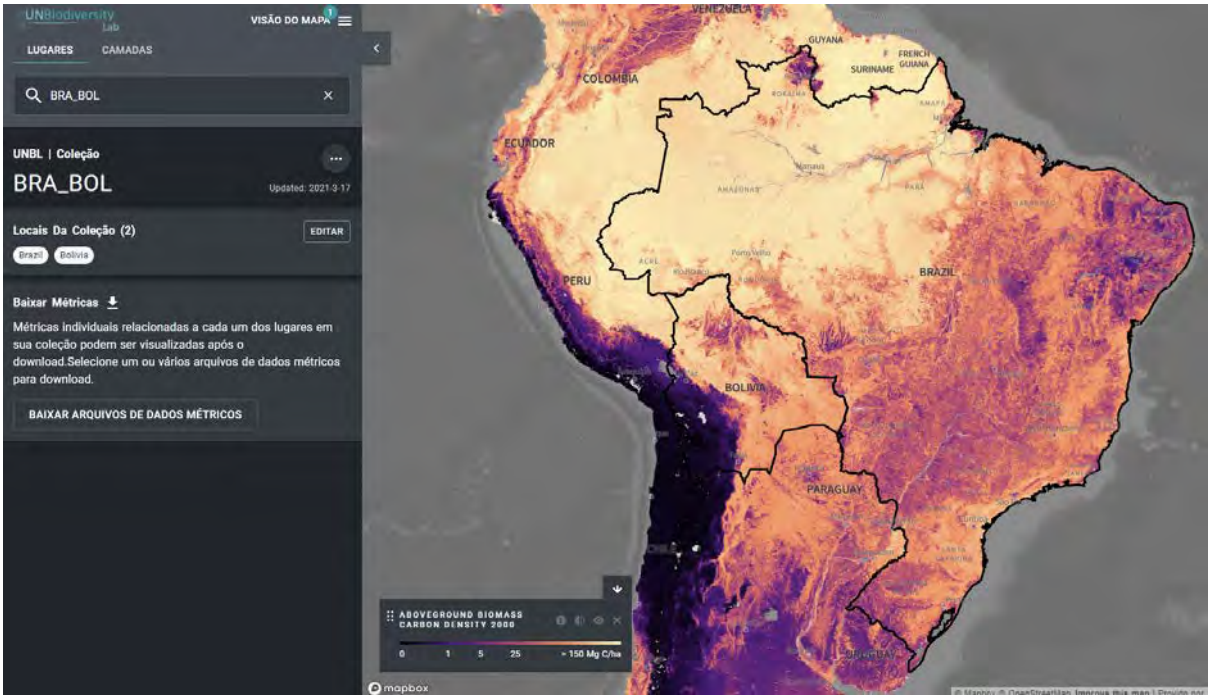

Figure 3. Map view of the aboveground biomass carbon density data layer (Spawn et al., 2020) after selecting an area of interest ("place").

2.3 Dynamic metrics

Selecting a location on the public platform (a country, for example) will automatically display a dashboard with quick views of dynamic metrics, or indicators, for the area of interest. **The dynamic metrics present summaries and charts derived from different layers calculated for the selected location**. Such metrics are dynamic in that they are calculated for each selected site and updated as new data becomes available. They are calculated based on some of the best data layers available on the platform. For example, one of the metrics presents information on a historical series of tree cover loss per year for the selected site.

For now, eight dynamic metrics are available on UNBL, each based on a different global information layer. Other metrics will be added to the platform in the future. Table 1 presents a summary of the available metrics, the data used to calculate each, and their possible uses. Each metric has been tailored to its corresponding data layer. In this way, the graph types vary according to the layer and the metric being presented. Figure 3 presents an example of two available metrics: annual tree cover loss and land cover. In this case, Colombia was selected as the "place" and thus the results presented in the metrics refer to Colombian territory. The metrics provide a quick way to gather impressions on the state of biodiversity in the country and some of the risks related to it. This can be very useful for SAIs and subnational audit institutions in their audits.

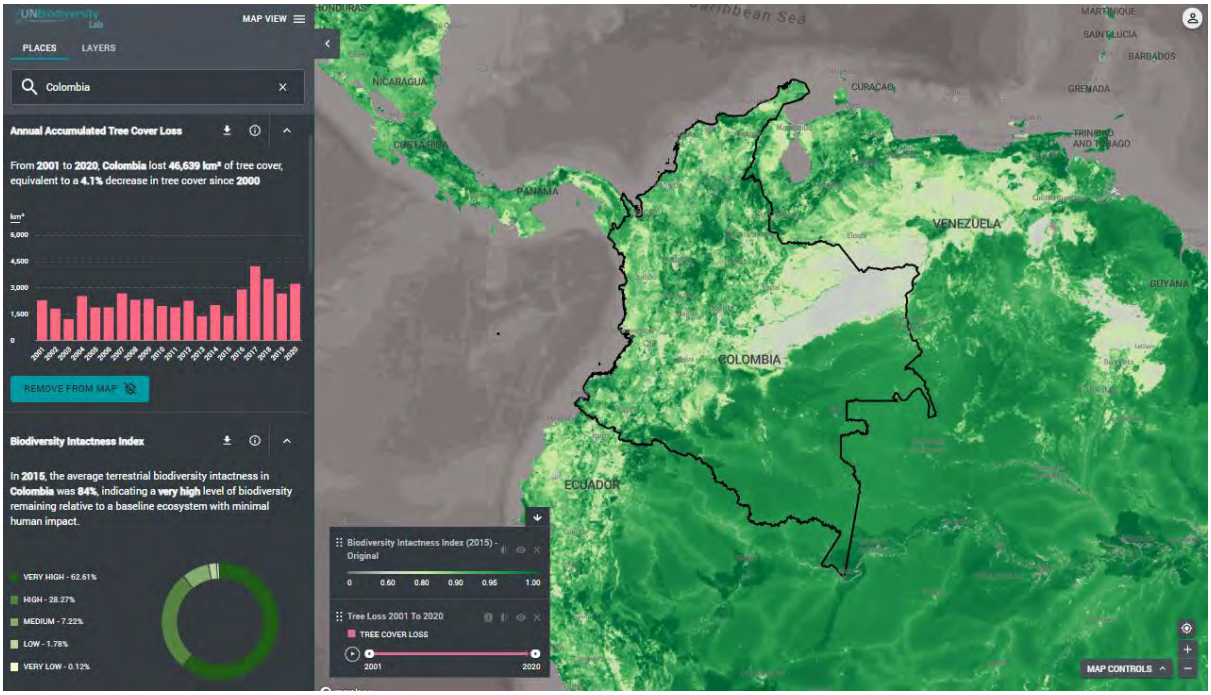

Figure 4. Metrics available for the layers (a) tree cover loss (Hansen et al., 2013), in km^2 per year (top left), and (b) Biodiversity Intactness Index (Newbold et al., 2016), in percentage of the site in each level of intactness (bottom left). In the example, the information refers to Colombia, the country selected as the area of interest.

Table 1. Dynamic metrics currently available in the UN Biodiversity Lab[4].

Layer	Metric	Origin of the data	Potential use
Annual Accumulated Tree Cover Loss	Km^2 of tree cover loss at the site; % change (-/+) since 2000 at the site.	This metric is calculated from the Global Forest Watch Annual Accumulated Tree Cover Loss (Hansen et al., 2013) at 30 metre resolution, from 2001 to 2020.	The information can help monitor when and where deforestation is occurring, and whether it is increasing or decreasing in the area of interest.
Biodiversity Intactness Index	Percentage of the site with very low intactness (0-20%); low intactness (20-40%); medium intactness (40-60%); high intactness (60-80%); and very high intactness (80-100%).	This metric is calculated from the Biodiversity Intactness Index data layer (Newbold et al., 2016) at 1 km resolution, as of 2015.	This information illustrates whether the habitat is becoming more intact or less intact, therefore affecting biodiversity over the area of interest. It can give insight into habitat destruction, fragmentation, or restoration.
Global land cover (ESA)	Percentage of each land cover classification represented within the location.	This metric is derived from the Global Land Cover dataset (ESA, 2017) at 300-meter resolution from 1992 to 2019.	Information can be used to monitor land cover change over time.
Monthly fire activity	Burned area (km^2) within the location; amount of weeks with "unusually high" amount of fire activity.	This metric is derived from NASA MODIS Version 6 Burned Area data product (Giglio et al., 2015) at 500-meter resolution from 2001 to 2020.	Monthly fire data can be analysed to monitor seasonal fire trends, and/or report on increases or decreases in human-made fires.
Protected areas (WDPA)	Km^2 of protected area with location.	This metric is derived from the protected area information provided by national governments to the World Database of Protected	The WDPA is updated monthly and can be used to monitor changes in legally protected areas, or in conjunction with

[4] Adapted from the Public Platform User Guide.

Layer	Metric	Origin of the data	Potential use
		Areas (IUCN & UNEP-WCMC, 2021), updated monthly.	other databases, monitor activities within and around protected areas.
Terrestrial Carbon Density	The sum of stored carbon at the site, averaged per km^2, represented as proportion of biomass carbon and proportion of soil carbon.	This metric is derived from the Terrestrial Carbon Density data layer (Soto-Navarro et al., 2020) at 300-meter resolution, as of 2010.	A time series of this database enables monitoring of carbon stored through nature-based solutions (in biomass and soil).
Human Footprint	Average score at a given location calculated for both 1993 and 2009; difference of above averages.	This metric is derived from the base from the Terrestrial Human Footprint data layer (Williams et al., 2020) for the years 1993 and 2009. Based on the analyses of different types of human pressure on the environment, the Human Footprint serves as a benchmark for human change in natural systems.	The Human Footprint dataset can be used to monitor impacts of development projects and human infrastructure on an area of interest and its surroundings.
Enhanced Vegetation Index (EVI)	Cumulative vegetation productivity at a given site per year.	This metric is derived from the Enhanced Vegetation Index (Didan, 2015) data layer, which measures cumulative vegetation productivity from 2000 to 2019.	EVI can be used to monitor the health of vegetation in an area, as an indicator of various abnormal conditions such as drought or land use change.

2.4 The UNBL public platform and environmental audits

UNBL's public platform can be used in the early stages of an audit, especially in the issue identification and planning stages. It allows for **quick and easy access and exploration of a vast collection of global spatial datasets** related to biodiversity, ecosystem services and sustainability. Thus, this platform has the potential to support the definition of the scope of environmental audits, or the formulation of questions to be answered by the audit.

Auditors with different levels of expertise in geoprocessing can make use of the platform:

- **An auditor with no prior knowledge of geoprocessing** can easily use the platform for the purposes of identifying audit themes, planning, and prioritization. The dynamic metrics and maps cover themes relevant to the implementation of public policies in the environmental area.
- **An auditor with geoprocessing expertise** could go further and use the public platform to access technical data and download the information layers of interest, which can then be manipulated in geoprocessing software of their choice.

Table 2 provides some examples of possible uses of the data layers in the public platform in the context of environmental audits conducted by SAIs and subnational audit institutions.

For institutions completing environmental audits, it is extremely important to go beyond what is available on the UNBL public platform in order to analyse data resulting from an audit, add areas of interest ("places"), and/or use local, national, and regional spatial data. UNBL secure workspaces, explained in the next section, enables users to take this next step.

Table 2. Examples of possible uses of the global databases in the UN Biodiversity Lab platform in the context of external control audits in the environmental area.

Possible subject of the environmental audit	Relevant layers of information and possible use in the audit context
Protected area management effectiveness	The **World Database of Protected Areas (WDPA)** can be viewed in conjunction with other layers that indicate human pressure on these areas. Examples include the **Forest Landscape Integrity Index** (Grantham et al., 2020), which can provide information on the state of the ecosystem, or **NatureMap Human Pressures** (UNEP-WCMC, 2020), which consolidates in a single layer different types of human pressures on nature. These and other combinations allow the auditor to quickly explore potential priority areas for an audit and identify questions to be answered, such as: are human pressures on protected areas being considered in the allocation of resources for their protection and management?
Deforestation Control Policy	UNBL information can be used to identify areas of forest remnants from the *Global Forest Cover* layer (Hansen *et* al., 2013), and other layers can be added to visualise pressures on these areas (such as anthropogenic impact, fragmentation, and tree cover loss layers) as well as their conservation importance (species richness and rarity layers). These and other combinations can support audit prioritisation and the formulation of relevant questions such as: are deforestation control efforts being directed to the most important areas under greatest pressure?

3. UNBL secure workspaces

This section provides an **overview of UNBL's secure workspaces**, including information on how an institution can request a secure workspace, what the different types of users are and how to add your own data. The features unique to secure workspaces will also be explored. The end of this section highlights the potential of secure workspaces to support environmental audits carried out by SAIs and subnational audit institutions. **To access more information about UNBL workspaces and to request your own, please visit the UNBL website.**

3.1 Creation of secure workspaces

Secure workspaces **provide a secure area where users can develop their projects collaboratively, regardless of their level of expertise with Geographic Information Systems (GIS[5])**. SAIs and subnational audit institutions can use these areas to securely add areas of interest and/or national or subnational data layers that are most relevant in the context of planned audits or to support the planning of their future audits. These data are then only available to the set of users specified by the SAIs or subnational audit institutions that own the workspace and protected by UNBL data security.

UNBL workspaces are available to all non-commercial users. To request the creation of a secure workspace, users must fill in a simple form on the UNBL website. As part of the project that gave rise to this guide, a secure workspace was created for the Court of Audit of the Union (TCU), the SAI of Brazil, which are referenced in the examples presented in this section. If interested, other members of the Organization of Latin American and Caribbean Supreme Audit Institutions (OLACEFS) or other non-commercial entities may request the creation of their own secure workspace.

3.2 Administration of secure workspaces

Once created, **secure workspaces can be customised by adding and managing users, as well as places and data layers**. Management options can be accessed by clicking on the Map View option, which will open a panel listing all workspaces to which the user has access (see Figure 5).

[5] "A geographic information system (GIS) is a system that creates, manages, analyzes, and maps all types of data." (https://www.esri.com/en-us/what-is-gis/overview).

Figure 5. Options to enable or disable UNBL workspaces, as well as to access the workspace management pages. These can be accessed by clicking on the Map View option in the UN Biodiversity Lab platform.

In this panel, the user can choose to activate or deactivate the visualisation of assets (locations and layers) of a specific working area. Those with permission to manage the workspace—owner, administrators, and editors—will see the ADMIN button next to the workspace name. This button gives access to the workspace administration page.

Add and manage users

To access a secure workspace, the user must first create an account on the UNBL platform. This is the same account that will allow access to the public platform. If a workspace has been created for an SAI, as in the case of TCU, that SAI will be able to define different user profiles, either to allow users to alter the places and layers, or to allow them to view them. Users can be managed on the administration page. Table 3 summarizes the differences between the four user profile types available in secure workspaces.

Table 3. User profiles of private workspaces in the UN Biodiversity Lab.

Profile	Permissions		
	Add and manage users	Add and manage places and data layers	View places and data layers
Owner	YES (all profiles)	YES	YES
Administrator	YES (editors and viewers)	YES	YES
Editor	NO	YES	YES
Viewer	NO	NO	YES

The "owner" of the secure workspace is set by UNBL administrators when the workspace is created. For details on how to add and manage users, please refer to the "UNBL Workspace User Guide" available on the UNBL platform.

Add new places

Once the workspace has been created and user profiles have been defined, the next step is to add your own places to the platform. A 'place', as explained in section 2.2, refers to an area of interest. In secure workspaces, **these places will only be visible to workspace users defined by the SAI and can represent**

any area of interest for your institution. Examples include subnational jurisdictions (state, municipality, department, etc.), areas affected by a natural disaster, and watersheds, among others.

The decision of which sites to add to the platform will depend on the SAI's use of UNBL. Multiple sites of potential interest can be added if the objective is to select topics or areas for audit. Alternatively, specific sites can be added if the user is in the scoping phase of a specific audit. Figure 6 shows an example of TCU's private workspace, where the Cerrado biome was added as a site.

When adding a site, all UNBL features available on the public platform are also available for the added sites:

1. **quick navigation to the site** from the "places" tab;
2. **dynamic metrics calculated for the site**, with information displayed in the side bar;
3. **cut and download global public information layers to the site**, allowing further analysis in geoprocessing software.

Two important technical issues regarding adding sites to UNBL:

- **file format** – the uploaded file must be in *geoJSON format*. Files in other formats (*shapefile*, for example) can be easily converted to *geoJSON* using geoprocessing programs (QGIS and ARCGIS, for example);
- **file content** - each place should be added individually, i.e. the file uploaded should only include the boundaries of the place of interest. For example, a file containing the boundaries of several subnational jurisdictions will be presented as a single location on the platform, which will not distinguish between each jurisdiction. If the goal is to have each jurisdiction as a distinct location in the platform, each jurisdiction must have its boundaries added in a separate file.

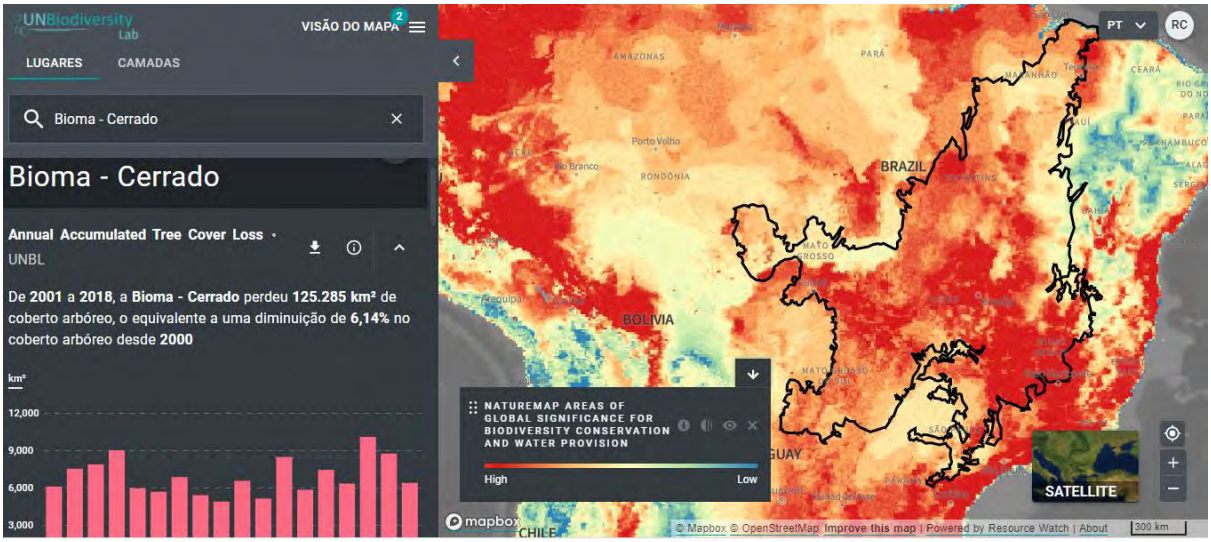

Figure 6. The Cerrado biome in Brazil was added as a place in a private workspace on the UN Biodiversity Lab. The dynamic metrics for the biome are on the left. The map view on the right shows the Nature Map Areas of Global Significance for Biodiversity Conservation and Water Provision (Jung et al, 2020) global dataset.

For step-by-step information on how to add locations to your workspace, please refer to the "UNBL Workspace User Guide" available on the UNBL website.

Adding new layers

Secure workspaces also allow the user to add new data layers to UNBL. This feature expands the options for use of the platform, allowing the inclusion of national or regional datasets, or any other layers that are relevant to the audit or SAI. Data can be added by connecting to an existing repository, or by uploading directly to UNBL for hosting on secure UN servers. In the case of Brazil, for example, it would be possible to add datasets from the National Institute for Space Research (INPE), including official government data on deforestation in the Amazon and Cerrado biomes. Layers of land use information, such as those made freely available by the Mapbiomas initiative, are another example of data that can be added to secure workspaces. These layers can then be viewed together with the global layers and shared with other users of the secure workspace. **These added layers are only available to users of the secure workspace, ensuring data security.**

Adding new layers of information to UNBL is a process that requires basic familiarity with spatial data manipulation and the process of adding these layers to UNBL itself. New layers must be in raster format and hosted on *Google Earth Engine*[6], Carto, or Mapbox to be added to UNBL (ESRI coming soon). The process also involves configuration of layer visualisation, with specification of colours, appearance, and legend. This style configuration follows the *Styled Layer Descriptor* (SLD) standard. The "UNBL Workspace User Guide" describes the steps for adding new layers and also provides examples of the code pattern for SLD language layer style configuration. The layers added to UNBL can be classified as:

- **Simple layer:** a single layer containing all the information. A simple layer does not have a temporal dimension, for example. The *Forest Landscape Integrity Index* layer (Grantham et al., 2020) is an example of a simple layer.
- **Group layer:** these are multi-year or multi-category layers. Layers for each year or category must be added individually, but they can subsequently be grouped for visualisation purposes. For example, the *Biodiversity Intactness Index* layer (Newboldet al., 2016) is a group layer, with the possibility of visualising the data for different years.
- **Animated layer:** a special type of layer that can show accumulation over time. Example: the *Global Forest Cover* layer (Hansen et al., 2013) visualises the accumulation of tree loss over the time. Creating this type of layer requires support from the UNBL team.

Not all users within the SAIs are expected to be skilled in adding new layers. It is suggested that SAIs assign **auditors or other staff who already have prior knowledge in geoprocessing to manage their secure workspaces and assets**. The UNBL support team may also be called upon to assist where needed.

3.3 UNBL secure workspaces and environmental audits

Secure workspaces **expand the uses of UNBL by allowing datasets to be tailored to the priorities of each SAI or specific audit**. This is achieved by allowing local, national, and regional datasets to be added and combined with the already-available global layers. It is expected that in the future it will also be possible to customise metrics in the secure workspaces (e.g., by allowing use of national data instead of global data), thus facilitating analyses and visualisations according to the subject of the audits.

[6] Google Earth Engine is a spatial data analysis tool for non-commercial use free of charge. For more information: https://earthengine.google.com.

The use of UNBL workspaces can be a useful tool for both SAIs that are just starting to use spatial data in audits and for those that are already familiar with GIS. In the latter case, UNBL will not replace the use of geoprocessing software (ArcGIS and QGIS, for example), which will be necessary to carry out more complex analyses. The platform can, however, be a tool to inform which analyses to perform, as well as a source of relevant data.

Secure workspaces also have the potential to **facilitate cooperative and coordinated audits**, i.e. those that involve more than one SAI collaborating to conduct similar or identical audits. In these cases, the platform would enable access to a common spatial database, in addition to the possibility of sharing data between cooperating SAIs.

Finally, UNBL also assists with the **communication of audit results**. The maps generated with the global layers and/or their association with regional or national layers added by SAIs can be used in reports or dissemination materials[7].

[7] See "Public Platform User Guide" for information on how to cite UNBL maps.

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