Framework for Ecosystem Restoration Monitoring (FERM) user guide

About this Guideline

This guidance document provides an overview of how to use the Framework for Ecosystem Restoration Monitoring (FERM). The document covers information about the FERM 's objectives, the context within the United Nations Decade on Ecosystem Restoration, and its role in supporting countries with reporting on areas under restoration for the Kunming-Montreal Global Biodiversity Framework (GBF) Target 2 indicator. Furthermore, it provides step by step instructions on how to use FERM, including the FERM registry, the FERM geospatial platform and the FERM Search engine.

For any questions and comments, please reach out to the FERM support team through this link.

Version: November 2024

Contents

1. BACKGROUND

1.1. UN Decade on Ecosystem Restoration

The UN Decade on Ecosystem Restoration 2021-2030, established in 2019 by the United Nations General Assembly (UNGA) and led by FAO and UNEP, aims to address the urgent need to prevent, halt and reverse the degradation of ecosystems worldwide, benefiting both nature and people. It also plays a vital role in supporting various international objectives, including the Sustainable Development Goals (SDGs), Post-2020 Global Biodiversity Framework (CBD), the Paris Agreement (UNFCCC), the Land Degradation Neutrality targets (UNCCD), and the Bonn Challenge. To facilitate its implementation, the Decade has established five Task Forces within its governance structure, with FAO taking the lead on two: Best Practices and Monitoring.

1.2. UN Decade Task Force on Best Practices

The UN Decade Strategy identified a key limitation of insufficient technical knowledge and capacity in both public and private sectors for planning, implementing, monitoring, and maintaining restoration initiatives. To overcome this barrier and to support the implementation of the UN Decade, a Task Force on Best Practices was established. Comprising 300 members from more than 100 global organizations, this collaborative effort is dedicated to fostering capacity development and knowledge dissemination throughout the Decade and beyond. Its main achievements include the publications on the ten principles for ecosystem restoration and the Standards of practice to guide ecosystem restoration, offering guidance on applying these principles. Additionally, the Task Force conducted a global capacity needs assessment for restoration and prepared a Capacity, Knowledge and Learning Action Plan for the UN Decade. To promote knowledge exchange among practitioners, the Task Force has also developed a Framework for the Dissemination of Good Restoration Practices embedded in the Framework for Ecosystem Restoration Monitoring (FERM) in collaboration with the Task Force on Monitoring.

1.3. UN Decade Task Force on Monitoring

There are persistent barriers in the availability of restoration-related data, information, and indicators that are required for moving ecosystem restoration to scale. Tools, platforms, and data on where and how best to restore ecosystems promise increased efficiency and impact, and governments and stakeholders need to decide where to invest and to be able to monitor progress. However, these tools and data are nascent and are not yet widely available. To overcome these barriers FAO, in consultation with the Task Force on Monitoring, which brings together 400 technical experts from more than 100 organizations, have developed the Framework for Ecosystem Restoration Monitoring (FERM), the official monitoring platform of the United Nations Decade on Ecosystem Restoration to improve data access, transparency, and ensure actions to meet restoration commitments are guided by the best available science. It also supports countries in monitoring and reporting areas under restoration for the Kunming-Montreal Global Biodiversity Framework (GBF) Target 2 (area under restoration).

1.4. Kunming- Montreal Global Biodiversity Framework, Target 2

The Kunming-Montreal Global Biodiversity Framework (GBF) provides a strategic and operational framework to halt and reverse biodiversity loss. Under this Framework, countries have committed to a global restoration target (Target 2) aiming for at least 30 percent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems to be under effective restoration by 2030. It includes qualifiers for effective restoration, which enhances biodiversity, integrity, and connectivity of ecosystems, as well as ecosystem functions and services.

Target 2: "Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity"

As the lead on the Task Forces on Monitoring and Best Practices, FAO has the mandate to support the Secretariat of the CBD and Parties to develop the monitoring and reporting methodology for the Target 2 indicator, area under restoration. FAO has developed the Framework for Ecosystem Restoration Monitoring (FERM) to support countries to collect and compile data on areas under restoration and aims to remove the duplication of effort and ensure alignment between the monitoring of the UN Decade and CBD restoration targets.

1.5. FERM: The Framework for Ecosystem Restoration Monitoring

The FERM, serves as the official monitoring platform for tracking global progress and disseminating good practices for the UN Decade on Ecosystem Restoration and reporting areas under restoration towards Target 2 of the Kunming-Montreal Global Biodiversity Framework. The FERM currently includes a registry of restoration initiatives and their good practices from all ecosystems, a geospatial tool for visualizing restoration data, and a search engine for consulting good practices on ecosystem restoration.

The FERM Registry enables restoration stakeholders and national entities to share information on restoration progress and contributions at different scales. The registry is interoperable with other monitoring platforms, ensuring transparency in reporting and monitoring efforts.

The FERM geospatial platform launched in 2021 and updated in 2022, has been further developed, with increasing functionality built in consultation with the Task Force on Monitoring, member states and other partners, to meet the monitoring and reporting needs of the United Nations Decade on Ecosystem Restoration and the Global Biodiversity Framework. The FERM geospatial platform is interactive and can be used to produce data maps and create compelling restoration impact stories. From remotely sensed geospatial data to statistical time series, the FERM platform enables the analysis of public and private restoration-related data at global, regional, national, and subnational levels.

The FERM Search engine is the result of a collaborative effort by the FAO-led UN Decade Task Forces on Best Practices and Monitoring. This tool brings together good practices from four different collaborating platforms, including Wocat, Panorama Solutions, GoProFor and the FERM Registry. Users can effectively search, filter, and access an extensive array of good restoration practices according to their specific needs.

2. FERM FUNCTIONALITIES

As mentioned in the previous section, the FERM currently includes the following functionalities:

- a registry (REGISTER) of restoration initiatives and their good practices from all ecosystems.
- a geospatial platform (VISUALIZE) for visualize restoration data.
- a search engine (SEARCH) for consulting good practices on ecosystem restoration.
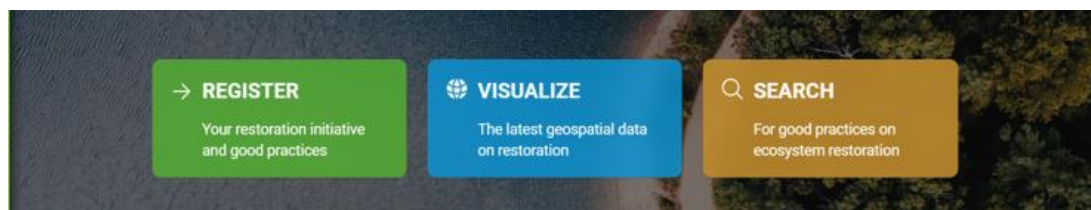
In the next subsections you will find a more detailed explanation of each functionality.

2.1. FERM Registry

The Framework for Ecosystem Restoration Monitoring (FERM) Registry is designed to register ecosystem restoration initiatives and good practices, in the context of the United Nations Decade on Ecosystem Restoration, whilst ensuring interoperability with other restoration monitoring platforms and initiatives.

The FERM Registry is designed to document data from all ecosystem types (terrestrial, aquatic and transitional), providing a comprehensive data entry format.

The FERM registry offers a harmonized and consistent approach for data collection on areas under restoration, based on the methodology for the GBF Target 2 indicator. The FERM registry is designed based on international standards to integrate and be interoperable with other restoration platforms and will enable designated national entities to track and monitor restoration actions for reporting against restoration commitments.

2.1.1. User types and privileges

a) User types

- Super Admins: Super Admins have comprehensive access to the FERM platform, allowing them to manage users, groups, and initiatives. This elevated privilege ensures effective oversight and coordination.
- Group Admins: Groups are the basic unit of organizing users in the FERM Registry. A group is called an institution and can have one or multiple group admins. Group admins are responsible for admitting new users to their institutions and assigning roles and privileges to users. They possess the authority to manage and publish initiatives within their respective groups. When an initiative is submitted for review, the group admin(s) of that institution is (are) required to check the completeness and quality of the submitted initiative and decide whether it can be published or returned for further edits. This role enables them to oversee and edit the content contributed by their group members.
- Editors: Editors can create, edit, and submit initiatives for review and publication. While their scope is limited to the initiatives they create, they play a crucial role in enriching the FERM database. In the future, the FERM Registry will enable multiple editors to work together on one initiative.
- Guest: Guests can visualize the initiative data within their respective groups.
- Visitors: Visitors do not need to sign up. They can browse published data freely, providing them with insights into the diverse range of restoration initiatives.

b) Purpose of Data Usage:

- The data entered in the FERM serves as a comprehensive register of restoration projects and initiatives, fostering collaboration and knowledge exchange among diverse stakeholders.
- By promoting interoperability with other restoration monitoring platforms, the FERM aims to amplify the impact of individual initiatives and facilitate a collective, global approach to ecosystem restoration.
- The primary goal of collecting and sharing data on the FERM platform is to significantly contribute to the global understanding of ecosystem restoration efforts, thereby aiding in the reporting of the United Nations Decade on Ecosystem Restoration and supporting the monitoring of CBD Target 2 for effective monitoring.

The FERM currently does not have a data sharing license, but is considering using CC BY-NC 4.0. To learn more about this license, please refer to Creative Commons website: https://creativecommons.org/licenses/by-nc/4.0/deed.en

Please find below the step-by-step guidance on how to register restoration initiatives, with generic guidance for all ecosystem types, through the FERM Registry.

2.1.2. Restoration Initiatives

Restoration projects, programs, and initiatives at all spatial scales, from individual sites to large landscapes and seascapes, play a vital role in achieving ambitious global goals for sustaining life on Earth. The FERM registry allows for consistent and transparent monitoring, reporting, and sharing information on restoration initiatives and good practices. The information published in the FERM Registry will be used to

officially report on areas under restoration during the United Nations Decade on Ecosystem Restoration and towards the data collection for the Convention on Biological Diversity Post-2020 Global Biodiversity Framework Target 2.

2.1.3. Step by step: how to register initiatives through the FERM Registry?

STEP 1. ACCESS - Access the FERM Registry. Click on '**Register your restoration initiative and good practices**' (**Register** button).

STEP 2. SIGN IN - Request to sign up to the FERM Registry by adding your email and clicking on '**E-mail me a sign-in link**' or **sign in with Google**.

WELCOME TO THE FERM REGISTRY

The Framework for Ecosystem Restoration Monitoring Registry aims to provide a register of ecosystem restoration initiatives and good practices, in the context of the **United Nations Decade on Ecosystem Restoration**, whilst ensuring interoperability with other restoration monitoring platforms and initiatives.

If you already have an account: to login in, enter the email already registered and click to receive the link. When you receive an email from ferm-notifications@fao.org , open it and click "Sign in to FERM Registry" to complete the login. The FERM main page will open on the browser, where you can add a new initiative to the Registry or view other initiatives of the organization that you belong to.

If you do not have an account: to sign in, enter your email and click to receive the link. After receiving by email the confirmation of sign in request, click on the link sent by email "Sign in to FERM Registry" and you will be redirected to a Welcome page (see below); **OR** by confirming your Google email you will be redirected to a Welcome page. Please introduce yourself, typing your name and answering the question.

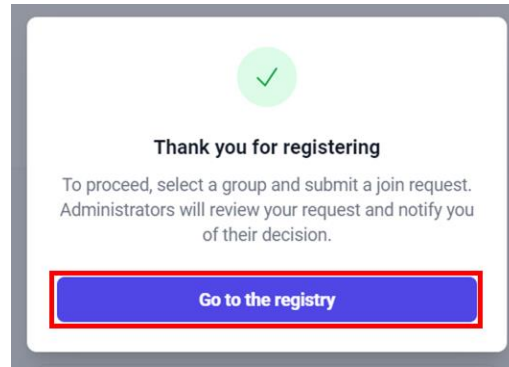After you see a notification message, please click on '**Go to the registry**'.

STEP 3. JOINING OR CREATING AN INSTUTION- In the INITIATIVES main page, please join **OR** request to submit new institution**.**

NOTE: In the FERM, an institution is the grouping for multiple users to access a common workspace, add and edit initiatives, and review initiatives for submission. An institution is an organization/institution or a part of an organization/institution that is registering restoration projects in the FERM. The FERM aims to collect data from institutions that are partnered with the UN Decade on Ecosystem Restoration or national governments. If you are not affiliated with a government institution or a UN Decade partner organization, it is recommended that you share your restoration initiative through Restor, which is working with the FERM team to share non-state actor data with the UN Decade and countries for reporting on Target 2.

If you do not see your institution or organization listed: If you do not see your institution or organization listed, please request to add your institution. By clicking on '**Submit new institution**' you will have to answer a short form. Your response will be sent to the administrators for review and approval.

If you do see your institution or organization listed: If your institution is already in the list, you can click on 'Join', and a notification message will ask you to provide the reasons for joining that institution; your response will be sent to the administrator for review.

NOTE: Please select an institution from the dropdown menu only if you are officially affiliated with it. It's not permitted to request to join an institution to which you don't belong.

INITIATIVES

Restoration projects, programs, and initiatives at all spatial scales, from individual sites to large landscapes and seascapes, play a vital role in achieving ambitious global goals for sustaining life on Earth. The FERM registry allows you to monitor consistently and transparently, report, and share information on restoration initiatives and good practices. The information published in the FERM Registry will be used to officially report on areas under restoration during the United Nations Decade on Ecosystem Restoration and for the Convention on Biological Diversity Post-2020 Global Biodiversity Framework Target 2.

Join an institution

Please select an institution from the dropdown menu **only if you are officially affiliated with it**. It's not permitted to request to join an institution to which you don't belong.

After you make a selection, our administrators will review your request. They may approve or deny it, and you'll be informed of the decision regardless of the outcome.

If approved, you'll be authorized to create new initiatives within the institution you're affiliated with.

In case the institution you belong to isn't listed, you can request its addition. Click on **"Submit new institution"** and provide the necessary details. Administrators will review your submission and inform you of their decision.

Please ensure you accurately represent your affiliations. Misrepresentation may lead to denial of your request and could limit your participation on our platform.

| | Join | Submit new institution |

[Example] If you do see your institution or organization listed.

Join FAO-FLRM

Please provide your reasons for joining | INST. | your response will be sent to the administrator for review.

I am a member of this organization/institution.

Cancel   Join

✓

Request sent

Your request has been sent to the administrator. You will be notified by email once it is processed.

Ok

GEF specific guidance:

To upload an initiative (project or program) financed by the Global Environment Facility (GEF) please join the GEF institution and the GEF reporting line will be activated automatically.

You do not need to be affiliated to GEF, simply manage an initiative financed by this financing mechanism.

[Example] If you do not see your institution or organization listed

NOTE: Your institution request will be directed to the FERM team, who might ask for some additional information to verify that you are affiliated with the institution created. Once your request to create a new institution is accepted, you will become the administrator of the institution within the FERM. Your institution will appear in the list of institutions, and anyone can request to join the institution. The institution admin is responsible for accepting (or rejecting) new users to the institution group. Once a user submits an initiative the institutional admin is responsible for reviewing and verifying the data submitted and can publish the submitted data.

If your request is accepted, you will be notified by email (see example below). Then you can click on the FERM link portal to access the FERM Registry. The sign-up process is successfully concluded.

STEP 4. CREATE NEW INITIATIVE – Log in to the FERM Registry. In the Initiatives main page click on **'Create new initiative'**.
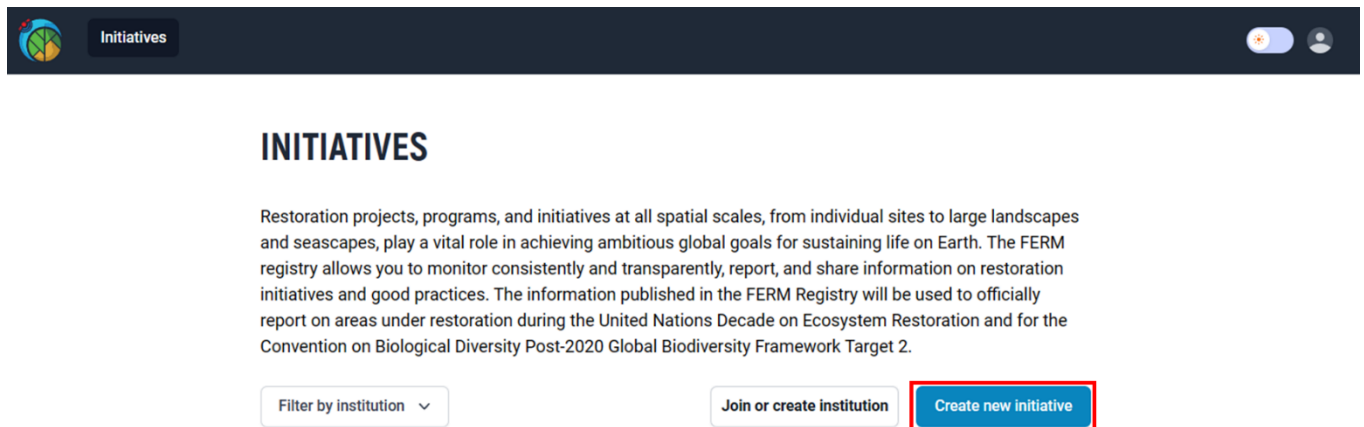
NOTE: You can only create a new initiative if you are part of an institution. If you do not see the button to create a new initiative, follow STEP 3 to join or create an institution.

By clicking on "Create new Initiative," you will be able to view the Terms and Conditions for Adding an Initiative to the FERM Registry. Please take a moment to read through them carefully and then click on "Accept" to proceed.

By selecting 'Accept', you will be directed to the 'Create a new initiative' box (refer below). Please enter the name of the restoration initiative you intend to register. Additionally, select the appropriate reporting line and institution.

NOTE: The reporting line provides two options: FERM and GEF.

The GEF reporting line will be automatically activated if you joined the GEF Institution in FERM and the system will automatically display the GEF registry for restoration projects which is slightly different from the standard FERM survey.

Please select the institution that is overseeing the initiative. Once you have made your selection, please click on 'Create' to be redirected to the initiative form.

STEP 5. REGISTER YOUR INITIATIVE: the Initiative form is structured into three sections and seven tabs, based on the restoration process components outlined in the UN Decade publication on the Standards of practice to guide ecosystem restoration. Below, you will find detailed information regarding the data needed for each tab of the initiative form.

Section 1: Planning & Assessment
Tabs: General, Area & Ecosystems and Characteristics

Section 2: Implementation
Tabs: Activities

Section 3: Monitoring & Reporting
Tabs: Indicators, Monitoring and Preview

NOTE: You can start filling out the form, save it and continue filling it in later by clicking "save and exit". You can move to the next section by clicking "save and next".

STEP 5. SAVE AND EXIT: After completing the registration of the restoration initiative, click "**save and exit**" to return to the Initiatives page. The initiative has now been successfully registered and is visible on the main Initiatives page of the Institution to which the editor is assigned.

NOTE: Saved initiatives are visible in the Institution group by Super Admins, the group Admin and all editors and guests in the group. Saved drafts can be edited by Super admins, group admin and the specific initiative's editor (author/creator).

INITIATIVES

Restoration projects, programs, and initiatives at all spatial scales, from individual sites to large landscapes and seascapes, play a vital role in achieving ambitious global goals for sustaining life on Earth. The FERM registry allows you to monitor consistently and transparently, report, and share information on restoration initiatives and good practices. The information published in the FERM Registry will be used to officially report on areas under restoration during the United Nations Decade on Ecosystem Restoration and for the Convention on Biological Diversity Post-2020 Global Biodiversity Framework Target 2.

| Filter by institution ⌄ | | Join or create institution | Create new initiative |

6 of 6 initiatives

Test

NAME   INSTITUTION

⚙ Draft   Add good practice   📅 Last updated on

2.1.4. Initiative form required information

Reporting line: FERM

2.1.4.1. Section 1: Planning & Assessment

General

In this tab, you can provide basic information about your restoration initiative. The title and a summary of the aims and expected results of the initiative can be provided in the description section. Further information is to be provided, such as when the initiative is expected to start and end, the restoration status, web links or documentation that you find relevant, pictures, responsible organisms and the contact person who can provide further technical details of the restoration initiative.

> **GEF specific guidance:**
>
> There is GEF specific information to be provided in the FERM platform, such as the title (please insert the official GEF project title), the GEF implementing agency, the GEF project symbol, the GEF investment type (project or program) and the GEF cycle as well as focal area for standalone projects and the specific program.

Title	Title of the initiative as stated in the official initiative document
	Promotion of Sustainable Food Systems in India through Transforming Rice-Wheat Systems in Punjab, Haryana, Odisha and CI

GEF implementing agencies
- [ ] African Development Bank
- [ ] Asian Development Bank
- [ ] Brazilian Biodiversity Fund
- [ ] Conservation International
- [ ] Development Bank of Latin America
- [ ] Development Bank of Southern Africa
- [ ] European Bank for Reconstruction and Development
- [x] Food and Agriculture Organization
- [ ] Foreign Economic Cooperation Office
- [ ] GEF Secretariat
- [ ] Inter-American Development Bank
- [ ] International Finance Corporation
- [ ] International Fund for Agricultural Development
- [ ] International Union for Conservation of Nature
- [ ] Ministry of Environmental Protection of China
- [ ] The World Bank
- [ ] United Nations Development Programme
- [ ] United Nations Environment Programme
- [ ] United Nations Industrial Development Organization
- [ ] West African Development Bank
- [ ] World Wildlife Fund - US Chapter

GEF Project Symbol: 10480

GEF investment type: **Project** | Program

GEF cycle: GEF 6 | **GEF 7** | GEF 8

GEF standalone projects (focal areas)
- [x] Land degradation
- [x] Biodiversity
- [x] Climate change
- [ ] Chemicals & waste
- [ ] International waters

Area & Ecosystems:

Identification of geographic areas under ecosystem restoration is essential to keep track of effective restoration, being the main objective of Target 2 of the Kunming-Montreal Global Biodiversity Framework (Target 2). One initiative can implement ecosystem restoration in one or more geographic areas. Activities, indicators, ecosystem characterization and results will be provided for each area. Geographic areas can be identified based on different options:

- Select administrative areas
- Upload polygons/vector
- Draw directly on the platform

Below are the screenshots of the different ways geographic areas can be identified in the Area tab.

Option 1.

Select administrative areas: after clicking the "Add admin area" button, the user is required to enter the name of the restoration Site, enter the size of the Site area in a specific unit and selects the country, region and province. Note that for each area you must select/choose the area's biome.

NOTE: Kindly be aware that clicking on each realm will expand a list of biomes (refer to the example below).

Option 2. Draw polygon: After clicking the "Draw polygon" button, the user is required to enter the Site name and a map window will pop up and the user will be able to delineate a polygon where the restoration Site is located. Once the area is drawn click on the "**Upload**" button that is displayed below. A message will appear asking you to agree to create a new area with a unique identifier, click the button "OK." By uploading the polygon area, this information is added to the restoration initiative record and used to do calculations in the following steps.

To select the biomes automatically, you can use the "**Get biomes in this area**" function. Please note that the Area is calculated automatically after confirmation of the polygon upload.

NOTE: Remember to save the changes using the "Save" button at the bottom of the webpage before the end of the session or the creation of the area will be lost.

Option 3 and 4. Upload polygons/vectors/shapefile: by clicking "Upload shapefile" or "Upload KML/KMZ/GeoJSON" a window will pop up where you can choose a file and upload a shapefile (see specific information in the image below).
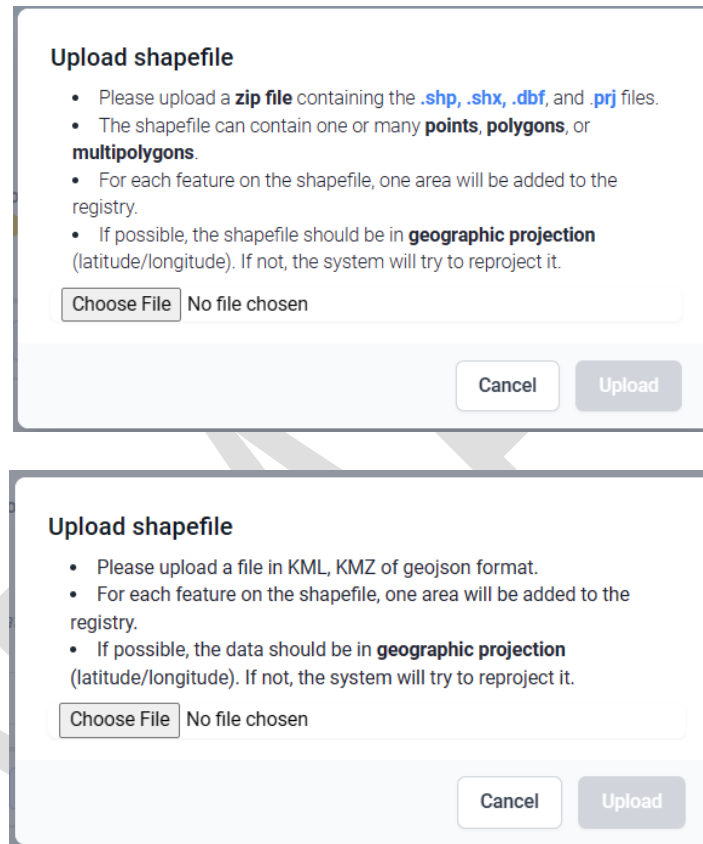
[Ecosystems] In terms of ecosystem classification, the FERM uses the IUCN Global Ecosystem Typology (GET) 2.1 (Keith et al., 2022), which is the recommended system for reporting and disaggregating data for Target 2 under the Kunming-Montreal Global Biodiversity Framework (KM-GBF). The GET is organized into several levels displayed within the FERM platform.

Realms are the five major components of the biosphere that differ fundamentally in ecosystem organization and function: terrestrial, freshwater, marine, subterranean, and atmospheric.

Biomes are components of a realm united by one or a few common major ecological drivers that regulate major ecosystem functions and ecological processes.

Ecosystem functional groups (EFG) are a group of related ecosystems within a biome that share common ecological drivers promoting convergence of ecosystem properties that characterize the group.

In the FERM the list of biomes is provided. Once the ecosystem under restoration has been identified, information can be consulted at: https://global-ecosystems.org/explore to align the ecosystem classification with the GET list of biomes. Please, be aware that the distribution areas of biomes and ecosystem functional groups have been classified as major or minor occurrences. This means that the ecosystem functional group will have a major occurrence where it is very likely to occur, whereas it will be minor where the ecosystem is scattered in patches, or where they occur in substantial areas but only within a segment of a larger region. This resource provides detailed descriptions of biomes and EFGs, which will help to identify the corresponding biome or EFG in the GET that matches the classified ecosystem. At the EFG level, information can be found on ecosystem properties, ecological drivers, and indicative distribution maps showing its presence globally (Figure 1).

Figure 1. Example of the information found at https://global-ecosystems.org/explore for the EFG T4.1-Trophic savannas within the biome T4. Savannas and grasslands. A description of the ecosystem (above), the map of indicative presence of the ecosystem globally (below left), and a chart with the main ecological traits and ecological drivers (below right).

Guidelines and tools for cross-walking existing national ecosystem classifications to the EFGs of the IUCN Global Ecosystem Typology are currently under development, along with cross-walks with other classifications (e.g. IPCC land use categories). Guidance on using the EFGs and related national ecosystems will be integrated into the metadata of target 2 once developed.

Before uploading or delineating the restoration areas in the FERM, it is important to carefully review the data and organize it effectively. This preparation ensures the data submitted is accurate, well-structured, and aligned with the reporting requirements. Consider the following guiding questions to help in the organization of your data:

1. Which ecosystems are under restoration? is it possible to delineate and/or group the areas under different ecosystems? is the initiative composed of a landscape of mixed ecosystems?

2. Is the initiative located within or overlapping with an Indigenous and Traditional Territory (ITT)?

3. Is the initiative located within or overlapping with a Protected Area (PA) or Other Effective Area-based Conservation Measures (OECM)?

4. Are there different restoration activities being implemented in the initiative? Is it possible to locate them within the different areas?

Reflecting on these questions will help you identify key parameters for reporting purposes. These parameters are used to disaggregate data for Indicator 2.1, "Area Under Restoration," into the following categories, by:

● Ecosystem functional group [(Global Ecosystem Typology level 2 and 3)][1]
● Indigenous and Traditional Territories (ITT)
● Protected areas (PA) or other effective area-based conservation measures (OECM)[2]
● Type of restoration activity

These parameters facilitate the filtering of areas under restoration and enable disaggregated reporting, which is essential for assessing progress toward the Kunming-Montreal Global Biodiversity Framework (KM-GBF) targets. Moreover, these parameters are relevant to the indicators across various goals and targets, allowing for a structured alignment and cross-referencing of complementary information.

Detailed step-by-step process for disaggregation in the Area & Ecosystems tab

As described in the previous section, a good organization of the areas is recommended before uploading them into FERM. If the areas can be delineated into the different biomes the initiative is restoring, it is recommended to use an area window for each of the biomes present in the initiative, if it is not possible to delineate them because in the initiative the biomes are mixed, it is recommended to upload all the areas in a single area window. Regardless of the method chosen, a comprehensive list of all biomes overlapping with all the areas will be displayed at the bottom of this section.

If spatially explicit information about an area is provided and represents the entirety of the area under restoration (i.e. points or polygons of the areas are provided, the button "get biomes in this area"

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[1] https://global-ecosystems.org/
[2] https://www.protectedplanet.net/

Get biomes in this area can be used to automatically generate a map overlay to indicate potential biomes that may be under restoration in the area. The user will need to review the automatically selected biomes and ensure that the biomes selected are truly those under restoration. If only tabular data of an area is provided, we kindly ask to select the corresponding ecosystems using biomes of the GET.

In this example (Figure 2), although the potential occurrence of other biomes in the area is shown, the biome under restoration is only -T7.intensive land use biome-. Therefore, the user has to remove irrelevant biomes for the initiative.

Figure 2. From the initial number of biomes potentially present in the area in the above image, the user must select only those under restoration by the initiative (below image)
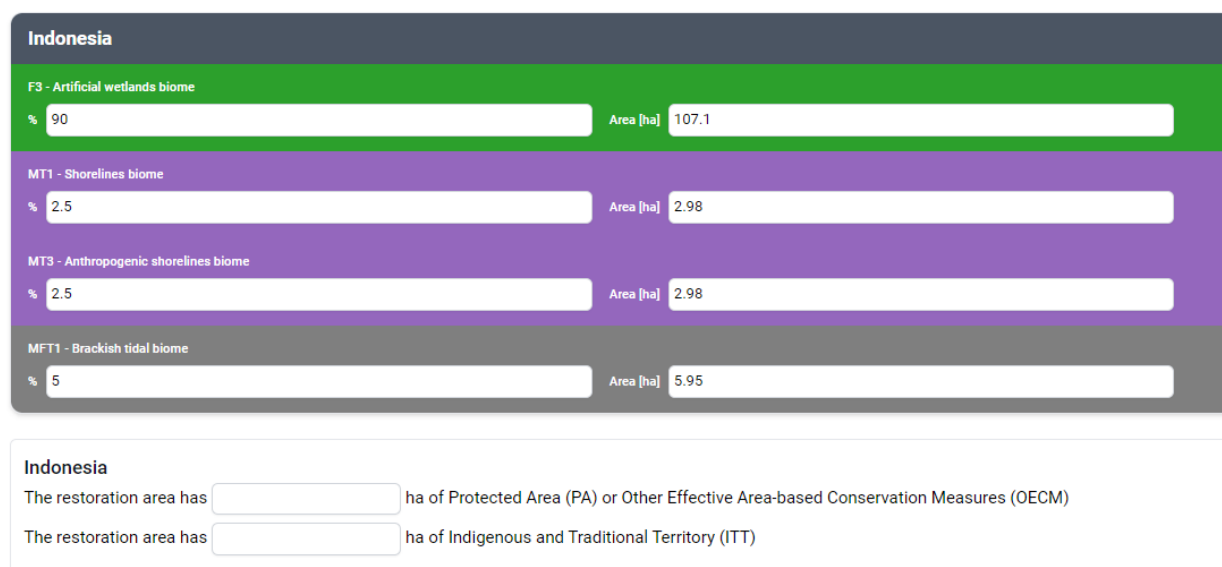
If the areas under restoration span multiple countries, the information must be reflected. Countries are automatically identified based on the uploaded polygons and selected administrative areas, but manual edits are possible.

Once the user has finished uploading all the areas under restoration, at the bottom of this tab, a list of all biomes for the initiative will appear, based on the overlapping of the GET with your uploaded areas. Users must (Figure 3):

● Remove irrelevant biomes
● If multiple biomes are present, estimate the percentage or the area of coverage for each, ensuring the total equals 100%
● Enter the coverage of ITT and/or PA/OECM data as area values or percentages. Unentered values default to 0 ha. The characteristics tab allows the user to automatically detect the overlap between areas under restoration and PA/OECM. See the characteristics section for more details.
● For initiatives covering multiple countries, ensure the values provided per window sum up to 100% of the initiative's total area.
● Calculations for Area and Percentage are automatically done to help the user insert the correct numbers.
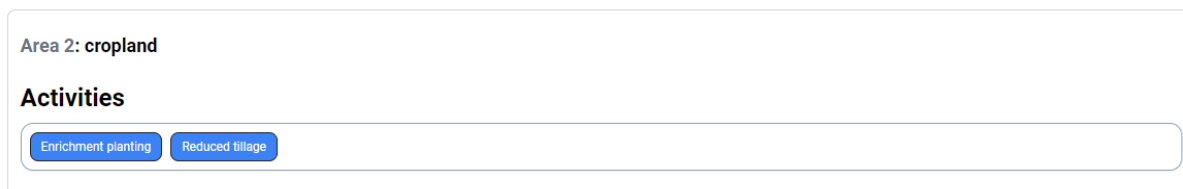
Figure 3. Summary with the list of biomes that will appear at the bottom of the Area & Ecosystems tab. The user must select those biomes under restoration in the initiative and give the percentage or area of all of them. All areas must add up to 100% of the area under restoration.

Disaggregation by restoration activity

In the section 'Activities' of the tab 'Implementation', the user is asked to aggregate the number of restoration activities per area. For each area uploaded in the area & ecosystems tab, the same area will appear in the activities section (figure 4).

Figure 4. Example of restoration activities aggregated to a previusly uploaded area in the Area & Ecosystems tab

GEF specific guidance:

The GEF methodology proposed to report and monitor the achievement of GEF commitments including restoration (in ha of land) in FERM is through a structured three-step process.

Step 1. Land Commitment: In this initial level, users detail the extent of land committed to GEF Indicators 1-5 and LDCF Indicator 2. In a second step the user should define the breakdown of land committed for each Sub-Indicator

Step 2. Restoration and Management Plans: At the second level, comprehensive restoration and management plans are outlined, complete with specific information regarding land designated for restoration or managed under these plans.

Step 3. Geographic Areas: The third level extends to compiling information on geographic areas, which can be expressed as points, polygons, or administrative boundaries.

Information on Geographic Areas (spatially explicit data). The data should have the following [requirements](#) and the feature table to be uploaded the following [structure](#)

DISCLAIMER

Areas can be identified based on different options:
- Select administrative areas ⓘ
- Upload polygons/vector ⓘ
- Draw directly on the platform ⓘ

Total area of land achieved (spatially explicit format) ⓘ   37815.14

Uruguay

Area 1

Site name   Parcelas de Proyecto

Area [Hectares]   37815.14

Characteristics:

This section provides spatial and satellite data through EarthMap (https://ferm.earthmap.org/). EarthMap delivers high-quality, up-to-date satellite imagery and geographic information, enabling you to monitor the restoration progress of your initiatives. It facilitates the tracking of changes in land cover, land degradation, biodiversity, and other key restoration indicators. By integrating this data, the tool enhances your ability to assess progress and make informed decisions, ensuring effective and transparent ecosystem restoration efforts. For more detailed information and example tutorials, please follow: https://help.earthmap.org/

Quick guide

● Select your language in the upper menu 🗚 (English, Spanish, French and Portuguese)

● Add one or more layers to the map by opening the left menu and selecting them ◈ Turn on and off the selected layer by using the button ⬤ you will see the legend appear in the upper right part of the screen
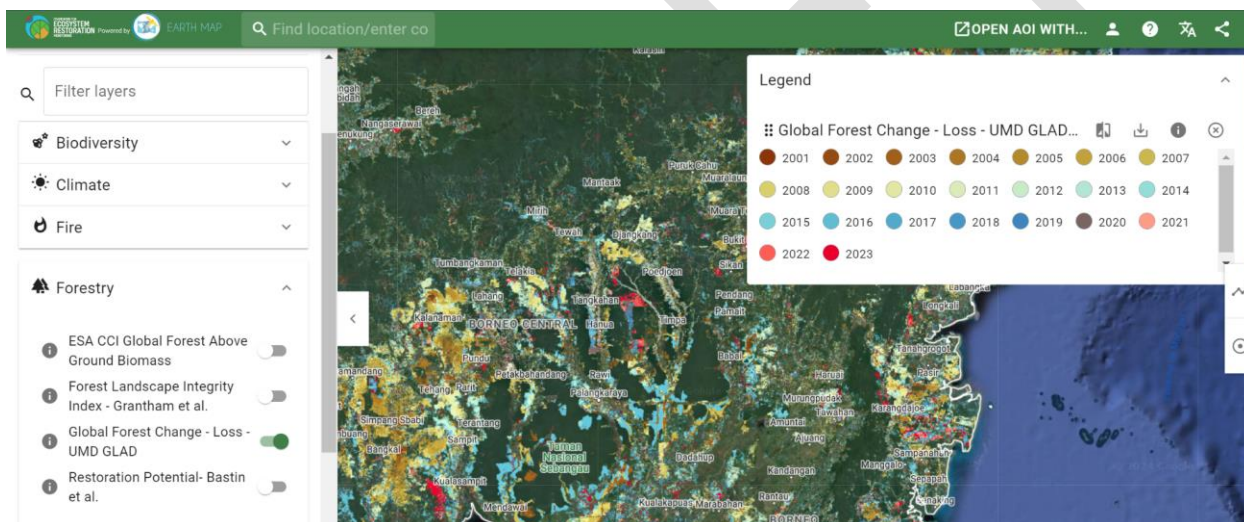
● Adjust layer visibility 🗇 and order through the Legend
● Some layers can be downloaded to your computer in PNG, GeoTIFF or GeoTIFF QGIS style (.qml) using the download button ⬇

● Retrieve information on the layers and legends by clicking the button ⓘ

● Add a slider using the buttons compare layer → and ← click and hold to move the slider and compare the 2 selected images. To close the slider, click on the icon ⊠ in the middle of the screen (see image below).

● To remove the layers, just click on the close button ⊗
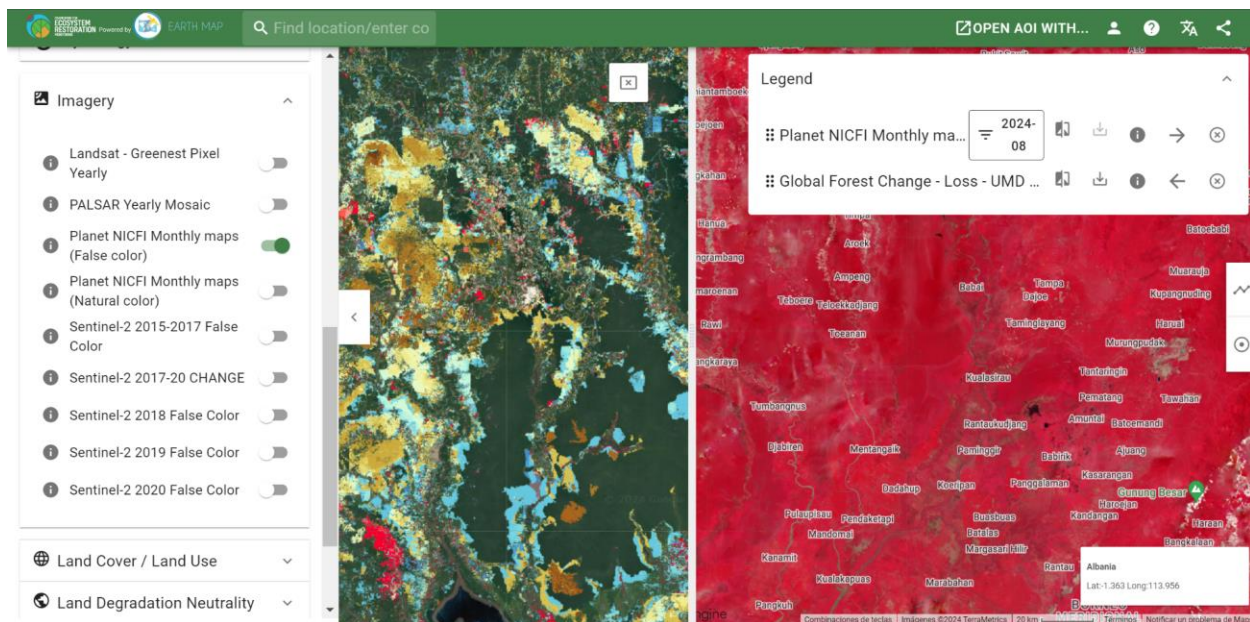
- Refine your analysis by area selecting a boundary [Select a boundary: cropland] in the left drop-down menu and clicking on the polygon of interest in the map
- Multiple areas can be selected by pressing and holding the 'Control' key while clicking on each desired area. This will create a 'batch' of areas which can be analyzed all at the same time with the selected analytic.

- In the right column, you can perform zonal statistics for various datasets [icon]
  Click on your area of interest, select a layer from the drop-down menu, then click on "Process". A time-series plot will appear with the results. You can download the displayed data using the provided button [icon]. Multiple layers can be processed within this section (see image below)
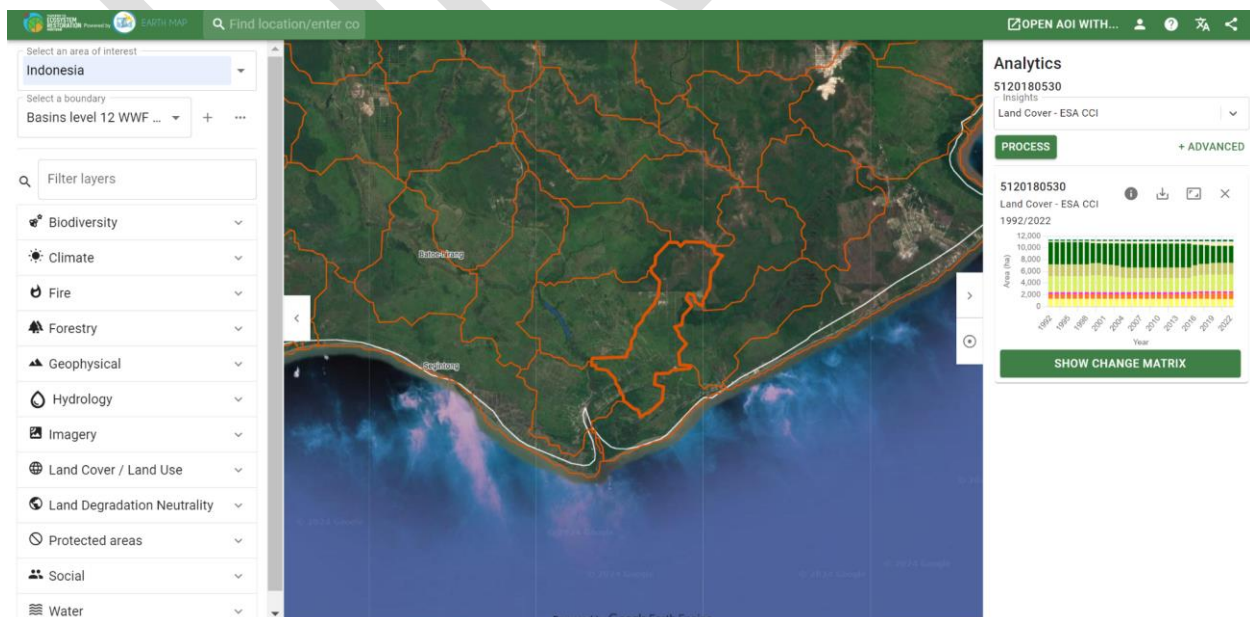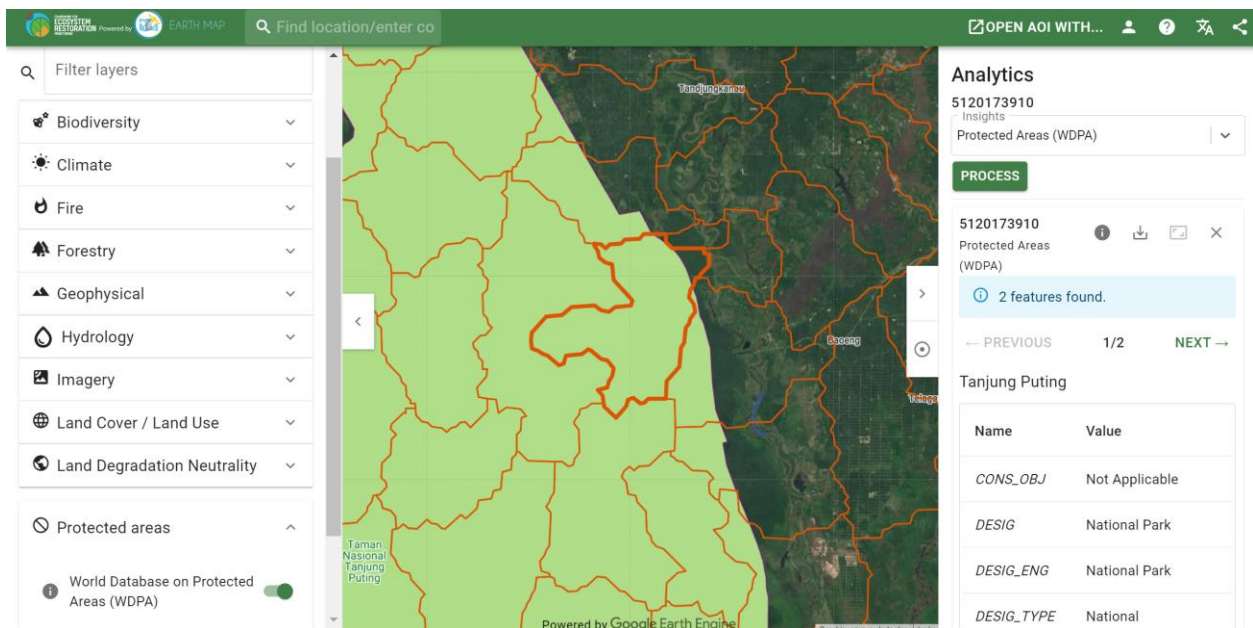
- The analytics menu also allows the user to check for spatial overlap of Protected Areas (PA) or Other Effective Area-based Conservation Measures (OECM), by selecting "Protected Areas (WDPA)" in the analytics menu. All PA and OECM overlapping the restoration area with their characteristics will be displayed in the below menu. The results can be downloaded in csv format (above image).
- Point statistics can be shown by right-clicking on the map

2.1.4.2. Section 2: Implementation

Activities:

Activities describe what is being implemented on the ground in order to achieve restoration objectives. Activities are adapted from the Glossary of restoration interventions of The Economics of Ecosystem Restoration (TEER) initiative (https://www.fao.org/in-action/forest-landscape-restoration-mechanism/our-work/gl/teer/en/). They are divided into two main categories (biophysical and enabling) and secondary categories according to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Assessment Report on Land Degradation and Restoration (https://www.ipbes.net/assessment-reports/ldr). Implementing enabling activities often corresponds to the preparation stage.

NOTE: Please note that selecting each activity will result in an expanded list of more specific activities, and the chosen activities will be displayed in the box at the top (see the example below).

2.1.4.3. Section 3: Monitoring and Reporting

Indicators

Indicators and their corresponding metrics are the way to track the progress of restoration efforts. Initiative-level indicators for monitoring primarily terrestrial restoration efforts are from the publication: "The Road to Restoration" (FAO and WRI, 2019) and are also available through the AURORA tool (https://www.auroramonitoring.org).

If you do not know or have not yet decided which indicators you will need in your restoration initiative, use the AURORA tool and follow the process. In the future you will be able to import the selected indicators from the AURORA tool into the FERM registry.

If you already know the indicators needed to monitor your restoration initiative, please select them from the drop-down list in this section.

If the indicator needed to monitor your initiative is not available in this list, please insert your custom indicator by providing a short name for the indicator and the measurement unit.

The initiative level indicators contribute to SDGs, emphasizing the interconnectedness of restoration efforts with broader sustainable development objectives (FAO and UNEP, 2022).

Area 1
No indicators selected for this area
> **Add project indicators**

By clicking on "Add project indicators" a list of indicators categorized by themes in various colours will be presented (refer to the image below).

Upon selecting each theme, a dropdown list of specific indicators associated with that theme are displayed. Users can choose as many indicators as are applicable to the specific restoration area, and the selected indicators will be displayed at the top of the box (see example below).

Area 1

Products Harvested – Yield – Volume of Food Crops Harvested Per Year (kg/ha) – Increase 🗑

Products Harvested – Yield – Volume of Cash Crops Harvested Per Year (kg/ha) – Increase 🗑

∨ Add project indicators

∨ Food & Products	2 selected
Products Harvested Yield – Volume of Food Crops Harvested Per Year (kg/ha) – Increase	✓
Products Harvested Yield – Volume of Cash Crops Harvested Per Year (kg/ha) – Increase	✓
Products Harvested Yield – Volume of Timber Products Harvested Per Year (kg/ha) – Increase	
Products Harvested Yield – Volume of Woodfuel Harvested Per Year (kg/ha) – Increase	
Products Harvested Yield – Volume of NTFPs Harvested Per Year (kg/ha) – Increase	
Access to Markets Market – Producer's Share of Final Price – Increase	
Access to Markets Market – Share of Roads in Good Condition – Increase	
Access to Markets Market – Rural Road Density (road length/total area) – Maintain	
Access to Markets Market – Distance or Walking Time to Nearest Town – Reduce	
Access to Markets Market – Rural Access Index – Increase	
Access to Markets Market – Number of Producer Groups / Partnerships – Maintain	
Access to Financial Services Finance – Percentage Accessing Financial Services – Increase	
> Climate	0 selected

Monitoring

With robust monitoring, it is possible to track restoration actions, determine their effectiveness, and adopt adaptive management practices to improve the outcomes of the restoration. To facilitate the monitoring, this section allows you to input the metric values corresponding to your chosen indicators on an annual basis. This process can be executed for each of the areas of your restoration initiative.

NOTE: Please note that by clicking on the plus icon (+) you have the option to add as many data entry points as needed for each year (refer to the example below).

Public Page Preview

The preview tab provides a comprehensive summary of the initiative's key features, including the biomes and ecosystems involved, the areas committed to and currently under restoration, the restoration activities undertaken, progress on key indicators, and a selection of spatial datasets useful for monitoring restoration progress, all described in the following paragraphs.

Users can scroll down to review the initiative's details and explore interactive charts that are activated on individual areas. This section also offers a preview of the content that will be visible in the search engine once the initiative is published.

- Comparing committed area versus area under restoration

To evaluate the progress of your initiative, the number of hectares of the area under restoration compared with the total area committed is provided. A global map with the location of all the areas of your initiative is also displayed.

- The progress of the indicators

This section displays several time-series charts, corresponding to the indicators selected. Each chart is presented as a bar plot, illustrating whether the selected indicator is increasing or decreasing over time.
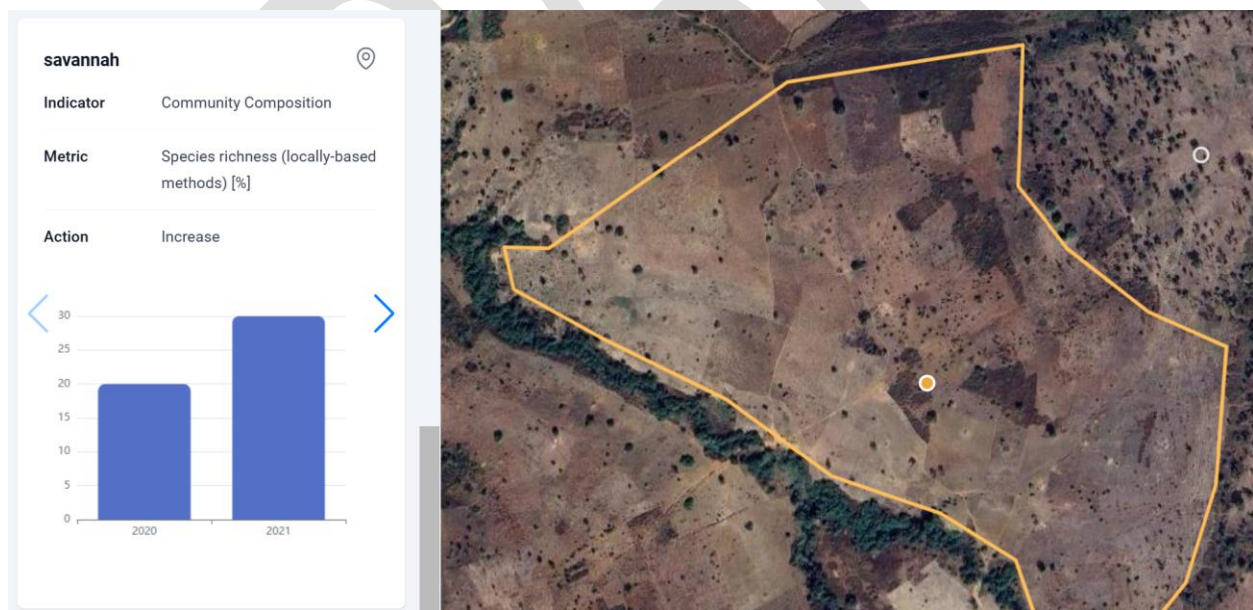
- The progress of selected Satellite Remote Sensing products

By clicking over an individual area of your initiative (labelled with a yellow point), additional time-series charts will pop up. These charts show the evolution of remote sensing datasets that are being monitored in the initiative to help evaluate whether the restoration process initiative is progressing or not. The selected Satellite Remote Sensing (SRS) products in this section, have been widely utilized in studies focused on ecosystem restoration. These products have proven particularly effective for prioritizing areas for global restoration efforts (Strassburg et al., 2020). An analysis of various SRS products supporting all Kunming-Montreal Global Biodiversity Framework (KM-GBF) targets, including Target 2, ranked these datasets among the top seven most frequently used (Timmermans and Kissling, 2023).

In this analysis, these datasets were also linked to the concept of Essential Biodiversity Variables (EBVs), which are defined as "measurements required for study, reporting, and management of biodiversity change" (Pereira et al., 2013). The integration of SRS products with EBVs further complements the efforts of the Group on Earth Observations Biodiversity Observation Network (GEO BON), which plays a leading role in developing EBVs and providing geospatial solutions to support the Kunming-Montreal Global Biodiversity Framework (KM-GBF)

Additionally, these SRS products are vital for calculating the Sustainable Development Goal (SDG) indicator 15.3.1, which serves as a component indicator for KM-GBF Target 2 (Sims et al., 2021).

Many of these datasets provide not only a long historical record of data but also continuous annual updates. This feature allows for the calculation of mean reference values for the period 2011–2020, as established by the Convention on Biological Diversity (CBD) to assess progress toward the goals and targets of the Kunming-Montreal Global Biodiversity Framework (KM-GBF). These reference values serve as a baseline against which data from 2021 onwards can be compared to evaluate restoration progress.

Attribute	Dataset	EBV classification	Sources			Year Availability	Possible to show KM-GBF reference period (2011-2020)
			Strassburg et al.(2020)	Timmermans and Kissling (2023)	Sims et al. (2021)		
Land cover	ESA CCI Land Cover	Live cover fraction	X	X	X	1992-2022	yes
Land cover	Global Forest Change by Year	Live cover fraction, ecosystem distribution		X		2001-2023	yes
Land cover	MODIS land cover type version 6.1	Live cover fraction		X[1]	X	2001-2022	yes
Vegetation productivity	Land Productivity Dynamics LPD Trend - MODIS	Primary productivity, physiology		X			yes[2]
Biodiversity	IUCN Red List (Biodiversity)	Species distributions	X	X[3]		2021-2023	no
Carbon	ESA CCI biomass[4]	Ecosystem distribution	X[5]	X	X	2010-2020	yes

[1] This analysis recommends the use of MODIS (MOD44B), which only focuses on vegetation cover. Version 6.1 is more complete and aligns with FAO LCCS, SEEA, and UNCCD.

[2] Baseline for the indicator 15.3.1 was calculated between 2000-2015. EarthMap offers the possibility to choose any year between 2016 to 2023, being this the last year of a 15-year interval. The user can select any year after 2020 to check the productivity trends.

[3] In Timmermans article, species distribution does not appear in the first 7 ranked datasets but is listed.

[4] This dataset is consistent with the ESA CCI Land cover and provides several years to show monitoring progress

[5] They produced their own maps, but only for actual and potential biomass. Not useful for monitoring
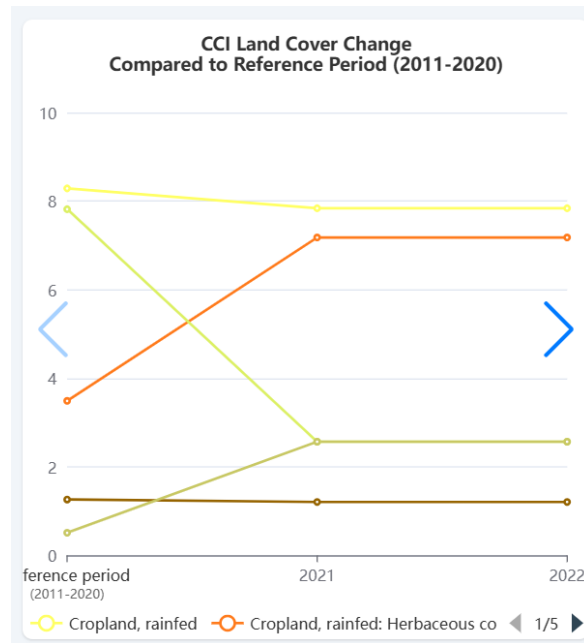
Example of time-series chart describing the changes in land cover using the ESA CCI Land Cover dataset compared with the reference period 2011-2020

GEF specific guidance:

Indicators are selected to monitor project progress. The methodology proposed to report and monitor the achievement of GEF commitments including restoration (in ha of land) in FERM is through GEF Core Indicators. Details on GEF Core Indicators can be found under this link.

Users will need to apply a GEF Core Indicator per area of intervention as defined in the areas tab.

GEF indicators

> 3.4 Area of natural grass and woodlands under restoration

Search

- ∨ 1. Terrestrial protected areas created or under improved management for conservation and sustainable use (hectares)
  - ∨ Component Sub-Indicators
    - ○ 1.1 Terrestrial protected areas newly created
    - ○ 1.2 Terrestrial protected areas under improved management effectiveness
- ∨ 2. Marine protected areas created or under improved management for conservation and sustainable use (hectares)
  - ∨ Component Sub-Indicators
    - ○ 2.1 Marine protected areas newly created
    - ○ 2.2 Marine protected areas under improved management effectiveness
- ∨ 3. Area of land and ecosystems under restoration
  - ∨ Component Sub-Indicators
    - ○ 3.1 Area of land restored (hectares)
    - ○ 3.2 Area of degraded agricultural lands under restoration
    - ○ 3.3 Area of forest and forest land under restoration
    - ● 3.4 Area of natural grass and woodlands under restoration
- ∨ 4. Area of landscapes under improved practices (hectares; excluding protected areas)
  - ∨ Component Sub-Indicators
    - ○ 4.1 Area of landscapes under improved management to benefit biodiversity (qualitative assessment, non-certified)
    - ○ 4.2 Area of landscapes that meet national or international third-party certification and that incorporates biodiversity considerations
    - ○ 4.3 Area of landscapes under sustainable land management in production systems
    - ○ 4.4 Area of High Conservation Value forest loss avoided
- ∨ 5. Area of marine habitat under improved practices to benefit biodiversity (hectares; excluding protected areas)
  - ∨ Contextual Sub-Indicators
    - ○ 5.1 Number of fisheries that meet national or international third-party certification that incorporates biodiversity considerations
    - ○ 5.2 Number of Large Marine Ecosystems with reduced pollution and hypoxia
    - ○ 5.3 Amount of Marine Litter Avoided

GEF reporting line: Please find below an example demonstrating the display of the results tab of GEF project.

RESULTS

In this section you can see a summary of the results of your restoration initiative, such as:
- The progress in the extent of the restoration area
- The proportion of area of each ecosystem under restoration
- The progress of the indicators

125%

● 3.4 Area of natural grass and woodlands under restoration: 37815.14 Ha

Congratulations! Your project has achieved 125% of your total committed land.

125% of this land is under restoration (GEF core indicator 3).

Area of land committed in last project phase	
Target area in last project phase	30251 Ha

Total area of land achieved during project implementation	
Total area of land achieved (tabular format)	30251 Ha
Total area of land achieved (spatially explicit format)	37815.14 Ha

Total area of land achieved per GEF CORE Indicator 1-5	
3.4 Area of natural grass and woodlands under restoration	37815.14 Ha

2.1.5. Additional settings

Actions button   [**Actions** ⌄]
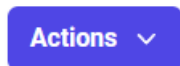
A. **Submission Stage:** when filling out the form, users can click on the "actions" button and access the following options: print, edit, submit for review, add good practice, and delete (refer to the image below).
Data remains editable until the "submit for review" action is chosen, after which the information can no longer be modified.

B. Initiative submitted for review:

The user has the option to submit for review either by clicking the "submit for review" option in the actions button or by selecting the three dots on the right of the initiative listed on the main page. Upon clicking "submit for review," a confirmation message will appear for the user to confirm that the initiative is ready for review (see image below).

INITIATIVES

Restoration projects, programs, and initiatives at all spatial scales, from individual sites to large landscapes and seascapes, play a vital role in achieving ambitious global goals for sustaining life on Earth. The FERM registry allows you to monitor consistently and transparently, report, and share information on restoration initiatives and good practices. The information published in the FERM Registry will be used to officially report on areas under restoration during the United Nations Decade on Ecosystem Restoration and for the Convention on Biological Diversity Post-2020 Global Biodiversity Framework Target 2.

Filter by institution ⌄   Join or create institution   **Create new initiative**

6 of 6 initiatives

TEST

NAME   INSTITUTION   ⋮

⚙ Draft   Add good practice   📅   👁 View

                                                              🖨 Print

                                                              ✎ Edit

                                                              🔍 Submit for review

                                        Guide   Support   ✅ Add Good Practice

                                                              🗑 Delete

Publish Initiative

Are you sure you want to submit the initiative 'TEST' for review? Please note that by proceeding:

1. An email will be sent to your institution administrators for review. They will have the authority to either accept or reject your initiative.

2. You will not be able to make further edits to the initiative once it's submitted for review.

Please review your submission thoroughly to ensure all information is accurate and complete before proceeding. Do you wish to proceed?"

Cancel   **OK**

✓

Initiative Submitted for Review

Your initiative has been submitted for review. An email will be sent to your institution administrators for review. They will have the authority to either accept or reject your initiative.

OK

Once submitted, modifications to the provided initiative form are no longer possible. Users can access the "actions" button and will only find the two following options: Print and Add good practice (refer to the example below).

Additionally, submitting the initiative for review will change the status of your initiative on the main page of the FERM Registry from "Draft" to "Under review" (refer to the example below).

2.1.6. Example: reporting a UN Flagship in FERM

Using the FERM to report the UN Flagship - Building with Nature Indonesia

The initiative, located in Demak, Central Java, has been managed by a Consortium partnering Wetlands International, the Indonesian government and other partners. Ecoshape partners (https://www.ecoshape.org/en/) have developed several full-scale marine infrastructure projects that boost nature, society and economy.

Demak, a low-lying coastal community in Java, has been plagued by erosion, flooding and land loss caused by subsidence and the felling of a nearby protective belt of mangroves.

Rather than replanting mangrove trees, this innovative UN flagship has built fence-like structures with natural materials along the shore to calm waves and trap sediment, creating conditions for mangroves to rebound naturally.

In return for letting mangroves regenerate, farmers have been schooled in sustainable techniques that have increased their shrimp production. With mangroves providing habitat for a host of marine organisms, fishers have also seen their near-shore catches improve.

All available information on this UN flagship initiative has been reported using the FERM Registry. The following sections show the step-by-step process of how this initiative has been documented.

Section 1. Planning and assessment

1.1.General

Description ⓘ	Short description of the initiative

In this section, a general description of the initiative has been provided. Of special interest are the main goals and restoration activities explained in the description. A good and complete description informs about many characteristics that are needed in this section, including the primary aims of the restoration initiative that are important for Target 2 reporting.

Website	Website of the initiative
	https://www.ecoshape.org/en/pilots/building-with-nature-indonesia/

The initiative provides access to a website, with complete information and details about the methods of the initiative, the impact and results of the initiative, partners and access to detailed reports and articles in a resources section.

Starting year	2015

Ending year	2021

Starting and ending years are important parameters, since the reference period of the GBF is 2011-2020, therefore, only restoration areas that are under restoration within this reference period and up to the end of the GBF, 2030, should be counted and reported.

Restoration status ⓘ
- ◯ In preparation
- ◯ In progress
- ⦿ Post-completion monitoring

The restoration status indicates whether a restoration area can be counted towards a reporting period. Since this initiative ended in 2021, the restoration activities have been completed, and efforts are now in place to monitor the results. Therefore, the status is 'Post-completion monitoring.' During this phase, it is important to monitor the area to assess the progress of restoration and prevent degradation from recurring.

Restoration types ⓘ
- ☐ Ecological restoration
- ☑ Rehabilitation

It is important to address the type of restoration in relation to the existing ecosystems. As a useful rule of thumb, if the target ecosystem is natural, the restoration is ecological restoration. If the target ecosystem has been transformed, the restoration is rehabilitation. Therefore, the type of restoration will be rehabilitation to restore the original vegetation coverage in aquaculture ponds that were transformed from original mangrove ecosystems.

Objectives

Please select the primary aim(s) of the restoration initiative. Reference: https://gbf-indicators.org/metadata/headline/2-2

- ☑ Enhance biodiversity
- ☑ Enhance ecosystem functions and services
- ☑ Improve ecological integrity
- ☐ Improve connectivity
- ☐ Other

Please provide additional information on the primary aims of the restoration initiative. ⓘ

The UN flagship has built fence-like structures with natural materials along the shore to calm waves and trap sediment, creating conditions for mangroves to rebound naturally.

The objectives or primary aims of the restoration initiative provide further information about the components of target 2:

*"Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to **enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity**"*

It is important to specify which specific aims the initiative is contributing to, as it does not always cover all of them. This will be important for potentially disaggregating the data by aims. In this initiative, the activities will have an impact on enhancing biodiversity by recovering mangrove vegetation and associated fauna and flora, restoring ecosystem functions and services, increasing food production in the shrimp ponds, and improving ecological integrity by bringing back converted ecosystems.

Tenure statuses ℹ️
- ☐ Communal
- ☑ Government
- ☐ Indigenous and Traditional Territories (ITTs)
- ☐ Jointly owned
- ☐ Private
- ☐ Other
- ☐ Don't know

The land where the initiative is implemented is primarily owned and managed by the Indonesian government, specifically under the jurisdiction of local and national governmental bodies such as the Ministry of Marine Affairs and Fisheries and local regency governments like the Demak Regency. Additionally, local communities play a significant role in managing and utilizing these lands, particularly in coastal and mangrove areas.

- ☑ Goal 6. Ensure availability and sustainable management of water and sanitation for all
- ☐ Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- ☐ Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- ☑ Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- ☐ Goal 10. Reduce inequality within and among countries
- ☑ Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- ☑ Goal 12. Ensure sustainable consumption and production patterns
- ☑ Goal 13. Take urgent action to combat climate change and its impacts
- ☑ Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- ☑ Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems,

The initiative particularly contributes to the above mentioned SDG goals. This information is also important to disaggregate by goal and to evaluate the impact of restoration on these goals.

1.2. Area and ecosystems

Committed area to restore ⓘ `1150` `Hectares ⌄`
  Area   Units

Total area under restoration [Hectares] `119`

The information published in the official UN flagship website (accessed 10/10/2014) (https://www.decadeonrestoration.org/building-nature-indonesia) shows that 119 hectares are under restoration in the initiative, but the overall target is 1,150 hectares.

Area 1

Site name

Demak district

Area [Hectares]

447.43   🖩 Calculate area

IUCN Global Ecosystem Typology 2.0 - Biomes   ☰ Get biomes in this area

Freshwater realm
F3 - Artificial wetlands biome ⊗

Marine-Terrestrial realm
MT1 - Shorelines biome ⊗
MT3 - Anthropogenic shorelines biome ⊗

Marine-Freshwater-Terrestrial realm
MFT1 - Brackish tidal biome ⊗

The initiative encompasses dozens of small areas ranging from 1 to 5 hectares each, totaling 447.43 hectares. Out of these, only 119 hectares (26%) have been put under restoration so far.

After uploading the shapefile with the polygons, the potential presence of biomes from the IUCN Global Ecosystem Typology was retrieved by clicking the 'Get biomes in this area' button, which identifies overlaps between the uploaded areas and the IUCN GET layers. From the initial list of biomes provided, only those validated within the initiative were selected.

The target ecosystems in this area include degraded mangroves, artificial shrimp ponds constructed for aquaculture, and infrastructure built to protect the shoreline. Mapping the local ecosystem classification to the IUCN Global Ecosystem Typology (GET) Biomes requires expert knowledge to ensure that the ecosystem properties and drivers of both classifications are accurately aligned and equivalent.

F3. Artificial wetlands biome
MT1. Shorelines biome
MT3. Anthropogenic shorelines biome
MFT1. Brackish tidal biome

At the bottom of this tab, the share of each biome under restoration is asked within the initiative. The biome that is being restored is mostly the artificial wetlands biome. Whether it is chosen to assign the percentage or the area of the biome covered, the total sum cannot be greater than 100% if it is a percentage or greater than the area under restoration that was previously set.

This initiative does not overlap with any Protected Area (PA) or Indigenous and Traditional Territory (ITT), so no area is collected under these boxes at the bottom of the window.

1.3.Characteristics

EarthMap delivers high-quality, up-to-date satellite imagery and geographic information, enabling the monitoring of the restoration progress of the initiative. A couple of examples below illustrate how the data available in EarthMap can be useful to inform on this progress.

In this first image, using the MODIS land cover type version 6.1 in the analytics menu available on the right, it is possible to track the increase in the MODIS land cover types of Herbaceous wetlands (Light green) and Woody wetlands (Grey) and the decrease of barren land (Yellow) within the duration of the initiative.
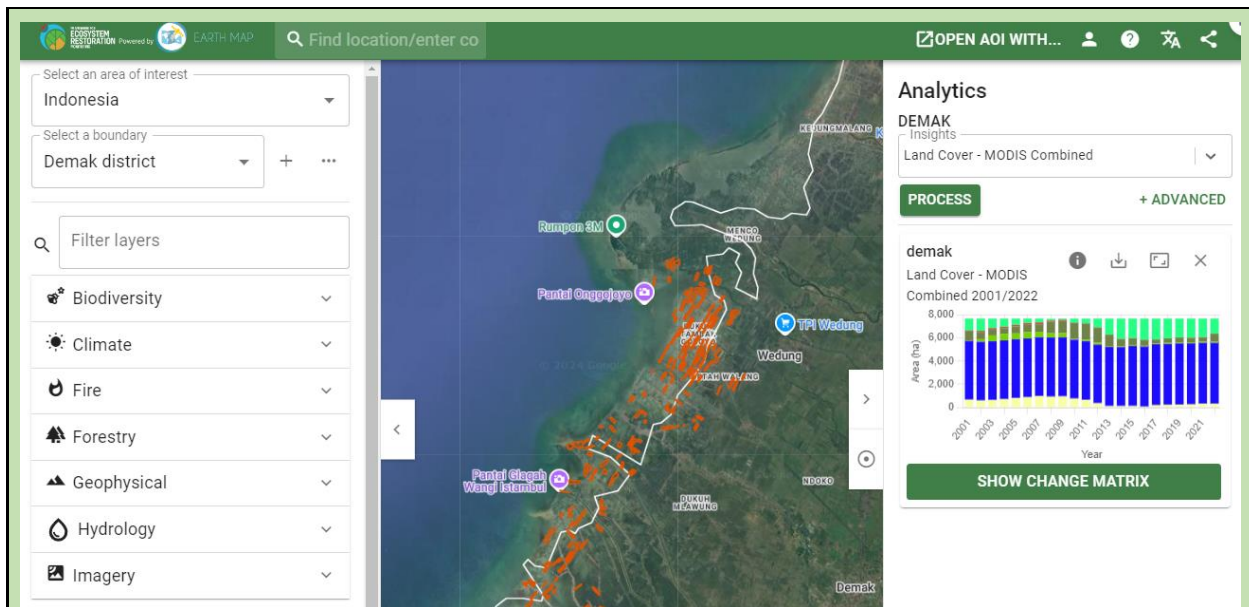
In this second image, the Normalized Difference Vegetation Index (NDVI) derived from Landsat data over the area shows a steady increase over time, reflecting a larger proportion of the area covered by vegetation and a decrease in the area occupied by water. In this case the NDVI index helps to 1. reflect the increased vegetation density, 2.Detect reduced water coverage and 3.Assess the health and vigor of the recovered mangrove vegetation.
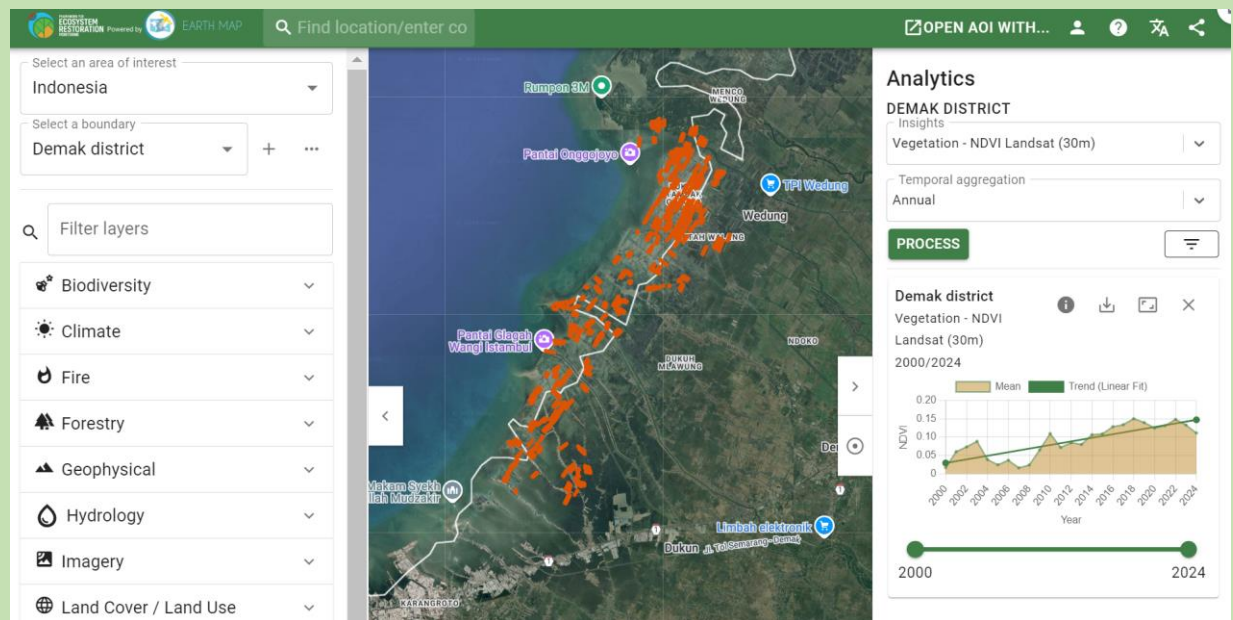
Section 2. Implementation

2.1.Activities

Area 1: **Demak district**

Activities

Agricultural/forestry/fishery/aquacultural management	Assessment of climate change vulnerability and adaptation needs

Assisted natural regeneration   Community consultations   Development of guidance and course materials   Enrichment planting

Establishment of protected areas   Improved fertilizer and agrochemical use efficiency   Incentives for sustainable land-use practices

Increase diversity and vegetative cover in production systems   Integrated crop, livestock and forestry systems

Integrated planning and management   Land-use planning (national, regional, local)

Land/water degradation assessment and mapping   On-site trainings   Participatory natural resource management and governance

Private and community-based conservation   Promotion of indigenous and local knowledge-based traditional use

Promotion of sustainable forest management practices   Restrictions on forest conversion   Training of trainers

Wetland construction or rehabilitation   Zoning

The initiative encompasses a large number of biophysical and enabling activities. These efforts not only aim to restore mangrove vegetation by constructing physical barriers that facilitate sedimentation and provide substrate for mangrove regeneration but also have a significant socio-economic impact on the community. Shrimp farmers are taught better resource management practices, increasing yields while reducing pollution and waste. By approaching the project from multiple angles, these activities contribute to a better overall outcome.

Restoration activities are connected to each area uploaded into the Area & Ecosystems section. In this initiative all activities are implemented over all the polygons provided, but for other initiatives only some activities may be implemented in one area whereas different activities can be implemented in other areas.

Section 3. Monitoring and reporting

3.1.Indicators

To evaluate the restoration progress and impact, the initiative provides several indicators. One of these indicators is collected using the AURORA tool (https://www.auroramonitoring.org/) and measures the project's impact on the local community, particularly the economic benefits arising from the restoration initiative. This indicator is very important, as it is desirable for any initiative that the impact of the restoration activities has a direct economic effect on the community.

Project indicators

Economic Benefits From Restoration — Income — Percentage Income from Restoration Related Activities — Increase 🗑

> Add project indicators

Custom indicators

Number of (inter) national policies and plans that enabled similar solutions — Number of plans — Number 🗑

People that benefit from the impact of the project — Number of people — Number 🗑

Spin-off projects as a result of the implementation of the project — Number of projects — Number 🗑

Species that rely on the restored and protected mangroves — Number of species — Number 🗑

Add custom indicator

The rest of the indicators are not included in the default AURORA list, but FERM allows the user to customize own indicators. Therefore, these indicators have been created based on the impact figures shown in the report:

Building with Nature in Indonesia. Restoring an eroding coastline and inspiring action at scale 2015   - 2021 (report link)

3.2. Monitoring

Area 1: Demak district

Community			

Economic Benefits From Restoration
Income – Percentage Income from Restoration Related Activities – Increase

Year	%	
2015	0	🗑
Year	%	
2021	300	🗑

⊕

Number of (inter) national policies and plans that enabled similar solutions – Number of plans	Year	Number	
	2015	0	🗑
	Year	Number	
	2021	9	🗑
			➕
People that benefit from the impact of the project – Number of people	Year	Number	
	2015	0	🗑
	Year	Number	
	2021	10000	🗑
			➕

The monitoring section allows to track the progress of the selected indicators by entering the year when the indicator was measured and the measured units. In this initiative, for example, the economic benefits of the restoration have increased by 300% since it started in 2015. It has resulted in the creation of 9 similar national and international plans, and around 10,000 people have benefited from its impact.

Indicators, as well as activities, are also associated with the different areas provided, since different indicators may be applied in different areas.

3.3. Public Page Preview

In this section, a summary of different key features of the initiative are provided, including the progress of the area under restoration versus the committed area, biomes/ecosystems, restoration activities and progress of the selected indicators and remote sensing datasets.

Multiple charts are automatically generated by default. When clicking in the yellow dot at the centroid of all areas, time-series charts appear showing the progress of indicators and satellite remote sensing datasets. Clicking on the blue arrows on the left and right side it is possible to browse the different charts.

From these charts, it can be seen the progress of two different types of data. On the left image below, the impact that the initiative had on local people in the area. On the right image, the changes in land cover from the year 2021 onwards, compared with the reference period 2011-2020.

The information summarized in this section will be visible for all users accessing the search engine, once the initiative is published (https://ferm.fao.org/search/initiatives).

2.1.3. Good practices

Sharing good practices for ecosystem restoration through the FERM Registry

To encourage mutual learning and knowledge-sharing among restoration practitioners, good practices (GP) resulting from restoration initiatives must be systematically documented and disseminated. This will be essential to avoid repeating mistakes and to replicate and adapt good practices to other situations with similar goals, strengthening capacities to undertake and scale up effective restoration efforts across all sectors, ecosystems and regions.

To this end, the FAO-led Task Force on Best Practices collaborates with the FAO-led Monitoring Task Force to document good practices from the initiatives registered in the *Framework for Ecosystem Restoration Monitoring* (FERM) Registry.

What is a good practice for ecosystem restoration?

A good practice for ecosystem restoration is an **evidence-based approach, technique or technology** that contributes to achieving one or more objectives of a restoration initiative, maximizing benefits for nature and people across different contexts. **It is usually a component of a restoration initiative that has been applied, tested and replicated in different contexts and therefore, can be easily transferred**

and/or adapted to other initiatives with similar goals. If a practice has been tested **solely in a specific context**, it is considered a **promising practice,** then results need to be proven outside the current situation for replicability and adaptability to different contexts**.**

What are the benefits for people and organizations interested in documenting good restoration practices?

- Learning and reflecting from their own experiences through the documentation process of good restoration practices derived from their initiatives, projects and programmes.
- Getting standardized documentation of their own restoration initiatives and practices.
- Receiving feedback from the review panel, potentially leading to further improvement.
- Being part of a global community of ecosystem restoration practitioners, which will enable sharing good practices, information, knowledge, capacity development opportunities, among others.
- Gaining visibility and recognition among the global restoration community of the UN Decade on Ecosystem Restoration.

1. Considerations before documenting good practices through the FERM Registry

When preparing your submission, please consider the following recommendations and information:

a) Check if your restoration practices **are in compliance** with the **ten criteria below (Figure 2)** derived from the ten principles for ecosystem restoration.
b) If any of the practices is protected by a patent or holds any property rights, **it cannot be considered for the UN Decade.**
c) By submitting a practice, you agree to be contacted by the review panel and to authorize the information to be publicly available and freely used and amended by FAO in order to prepare for publication on the FERM Platform.
d) You are welcome to document **good and promising** practices derived from the restoration initiatives registered in the FERM registry. **Please note that the platform allows for documentation of multiple practices per each initiative registered.**

2. What will happen after your submission?

The good practices submitted will be assessed by a panel of experts based on the ten criteria referred below. Each practice must meet a minimum score for each of the criteria. If endorsed, you will then be contacted if any further information is needed or to confirm that your submission will be featured on the FERM search engine. **Please find in the __Appendix__ the questions from the assessment sheet used by the review panel when evaluating good practices submitted through the FERM Registry.**

3. What will happen if your good practice submission is not accepted?

Your submission will not be accepted if: i) it does not meet the minimum score for any of the criteria above, or ii) the information is inconsistent or incomplete. For both cases, you will be notified accordingly and receive feedback from the review panel so that you can refine and re-submit.

Assessment criteria

1. **Contributes to the achievement of the Sustainable Development Goals (SDGs).** The practice contributes to the achievement of at least one of the 17 Sustainable Development Goals (SDGs), especially SDGs 3, 13, 14 and 15.

2. **Participatory and inclusive.** The practice has fostered meaningful and inclusive involvement of stakeholders and right-holders, particularly from under-represented and often marginalized groups (e.g., local communities, Indigenous Peoples, ethnic minorities, women, youth, LGBTIQ+ people, etc.).

3. **Belongs to a restorative activity.** The practice belongs to one or several restoration activities that are part of the continuum of ecosystem restoration. In addition, it is technically and/or socially feasible to allow for replication or adaptation.

4. **Provides several benefits to nature and people.** The practice has resulted in positive impacts for nature and people (e.g., by improving biodiversity, ecosystem health and integrity, human well-being, sustainable production of goods and services, climate change mitigation, etc.). In addition, the practice has supported and assisted natural recovery processes, without causing further degradation of ecosystems and livelihoods.

5. **Addresses causes of ecosystem degradation.** The practice has identified and reduced direct and/or indirect causes of ecosystem degradation.

6. **Integrates different types of knowledge.** Through its implementation, the practice integrated Indigenous Peoples' traditional knowledge, local, practical, scientific, and/or other types of knowledge.

7. **Contributes to ecological, cultural and socio-economic objectives of the restoration initiative.** The practice has effectively contributed to the progress of one or several ecological and/or cultural and/or socio-economic objectives from the restoration initiative.

8. **Implemented in different contexts.** The practice has been applied, tested and replicated in different contexts and therefore, can be easily transferred and/or adapted to other initiatives with similar goals.

9. **Properly validated.** The practice has been evaluated, from a technical and methodological point of view, to demonstrate that it has achieved its measurable objectives. In addition, beneficiaries of the practice have also validated its positive impacts, and lessons learned have been integrated.

10. **Replicable and adaptable.** Key factors, constraints and lessons learned are clearly identified and described to allow for replication and adaptation of the practice to similar objectives in different situations.

Figure 2. Ten assessment criteria to evaluate good restoration practices submitted through the FERM Registry.

How to document good practices through the FERM Registry?

STEP 1 (GP) – REGISTER AN INITIATIVE: The first step to document a good practice is to register an initiative, please follow the steps 1-5 on how to register an initiative through the FERM Registry (p. 08 to 16 of this document). After registering an initiative, please continue to follow the steps below.

STEP 2 (GP) – ADD GOOD PRACTICE (S): After completing the registration of the restoration initiative, in the Initiatives main page, click the **'Add good practice'** button, either located on the blue icon or by selecting the three dots on the right.

STEP 3 (GP) – CONSENT NOTE AND GUIDELINES: Before starting to complete the good practice form, please read the **consent note**. Ensure you check the corresponding box and familiarize yourself with the details regarding what is a good restoration practice, submission guidelines, and assessment criteria.

Additionally, please be aware that the consent note only appears the first time you document a practice, however you can always view it by clicking on the guidelines button. You can access the good practices guidelines at any point during the completion of the good practice form by clicking on the '**guidelines**' button located at the top right of the page.

STEP 4 (GP) – DOCUMENT YOUR GOOD PRACTICE: Document your good practice through a standardized form consisting of **five sections** (Objectives and context; Methodology; Key factors, Constraints and Lessons Learned; Benefits and Validation; and Additional Resources). You can find detailed information on the information required for each section in the next segment of this document.

NOTE: You can start filling out the form, save it and continue filling it in later by clicking "save and exit". You can move to the next section by clicking "save and next".

STEP 5 (GP) – SUBMIT FOR REVIEW: After you have finalized completing the good practices form, please click on "**save and exit**". When you click again in your good practice(s) saved, please click on "**Submit for review**" (see images below). Please note that after submitting for review you will not be able to edit the information provided anymore.

STEP 6 (GP) – DOCUMENT MULTIPLE PRACTICES: If you want to document more than one practice, repeat steps 2,3,4 and 5, adding a new practice to your registered initiative. You can also visualize how many practices were already added to your initiative and edit them before submission, if necessary.

Good practice form required information

The good practice form was developed collaboratively by a working group of the Best Practice Task Force. The form's logic and structure are based on the Ten Principles for Ecosystem Restoration, which have been adapted to the practice level and transformed into criteria for assessing good restoration practices.

1. Objectives and Context: In this section, you are required to provide basic information about the good practice derived from your restoration initiative. It is comprised of 10 questions (5 are multiple choice):

1.1 Title
1.2 Objectives
1.3 Objectives additional information
1.4 Areas
1.5 Ecosystems
1.6 Ecosystems additional information
1.7 Context
1.8 Activities
1.9 Degradation Drivers
1.10 Degradation Drivers additional information

2. Methodology: In this section, you are required to provide information about how the good practice was implemented. It is comprised of 9 questions (4 are multiple choice):

2.1 Description (of the practice)
2.2 Steps for implementation
2.3 Stakeholder engagement
2.4 Stakeholder's additional information
2.5 Types of knowledge (included in the practice)
2.6 Participatory approaches
2.7 Scale (of implementation)
2.8 Replicability
2.9 Replicability additional information

3. Key Factors, Constraints and Lessons Learned: In this section, you are required to provide information about the key factors that need to be in place for the successful implementation of the practice, also provide information on constraints and lessons learned. It is comprised of 4 questions (1 is multiple choice):

3.1 Key factors
3.2 Key factors additional information
3.3 Constraints (Challenges and or/risks in applying the practice)
3.4 Lessons learned/Recommendations

4. Benefits and Validation: In this section, you are required to provide information about the positive and negative impacts after implementing the practice and provide information on the validation process. It is comprised of 4 questions (1 is multiple choice):

4.1 Positive impacts
4.2 Positive impacts additional information
4.3 Negative impacts
4.4 Validation

5. Additional resources: In this section, you are required to provide additional resources related to the implementation, impacts and validation of the good practice. It is comprised of 4 questions:

5.1 Links
5.2 Additional information on costs and benefits

5.3 Additional comments
5.4 Please upload a picture of the practice

2.2. FERM Geospatial Platform

The FERM geospatial platform is built on FAO's corporate Hand-In-Hand geospatial architecture. FERM's foundational, and restoration-relevant, geospatial data is sourced from FAO technical divisions responsible for Soil, Land, Water, Climate, Fisheries, Crops, and Forestry and public catalogues.

Additionally, in collaboration with the Task Force for Monitoring, and with ecosystem and domain oversight from Terrestrial and Aquatic Sub-Task Forces, and the Socio-Economic Sub-Task Force, restoration-relevant geospatial data will be sourced and added over the coming months and years.

Continuous improvement will support a science-based restoration movement through transparent and fit-for-purpose monitoring in support to the United Nations Decade on Ecosystem Restoration. The FERM geospatial platform provides accessible and transparent information for restoration practitioners across all UN Decade's types of ecosystem restoration: grasslands, shrub lands and savannahs, peatlands, mountains, farmlands, oceans and coasts, freshwaters, forests, drylands, and urban areas, in an easy-to-use interface.

The UN Decade's Global Flagships are hosted on the FERM platform and users can find more information of the restoration activities and actions in the Flagships Initiatives. Users can interrogate and interact with key geospatial information related to the biophysical, and the socio-economic dimension for their ecosystem of interest.

The FERM geospatial platform also has functionality for uploading national and sub-national data, enabling integration of geospatial data locally, nationally, regionally, and globally. The platform includes functionality for creating compelling restoration impact stories, based on user specific geospatial data for a defined area of interest. For the more advanced user, it also includes an integration with FAO's geospatial processing platform, SEPAL (https://openforis.org/tools/sepal/).
The platform also allows restoration stakeholders and national entities to share their information on restoration progress at different scales through the FERM Registry, which will be interoperable with other restoration monitoring platforms, enabling transparency in restoration monitoring and reporting.

The FERM geospatial platform is divided into eight main categories – Indicators, Initiatives, Biophysical data, Socio-economic data, Practices, Tools, Boundaries and Basemaps and My Data. Each category has various datasets for monitoring ecosystem restoration including reported data on SDG indicators, key geospatial datasets, links to documents and tools for restoration monitoring and information on restoration projects worldwide. Users can upload their own data into the FERM into their private workspace through the 'My Data' category or publicly share data on their restoration project through the FERM registry.

The Monitoring Task Force has identified 20 headline indicators based on SDGs (Sustainable Development Goals) relevant to restoration as global indicators for reporting Decade's progress (FAO and UNEP, 2022). The 20 headline indicators are built on existing SDG and Multilateral Environmental Agreement indicators and existing country and global data collection mechanisms. To avoid extra reporting burdens, the UN Decade is not establishing formal country monitoring and reporting. Instead, it builds on existing data reporting systems within relevant international commitments, conventions, and plans.

A key component of the Decades reporting structure will be the restoration-relevant headline indicator — 2.2. Area under restoration — under target 2 of the Kunming-Montreal Global Biodiversity Framework. It will be integrated into a new FERM dashboard as soon as data is available.

Additional frameworks, such as the GRO (Global Restoration Observatory) network's Restoration Project Information Sharing Framework, are linked in the FERM to include data related to the project level indicators.
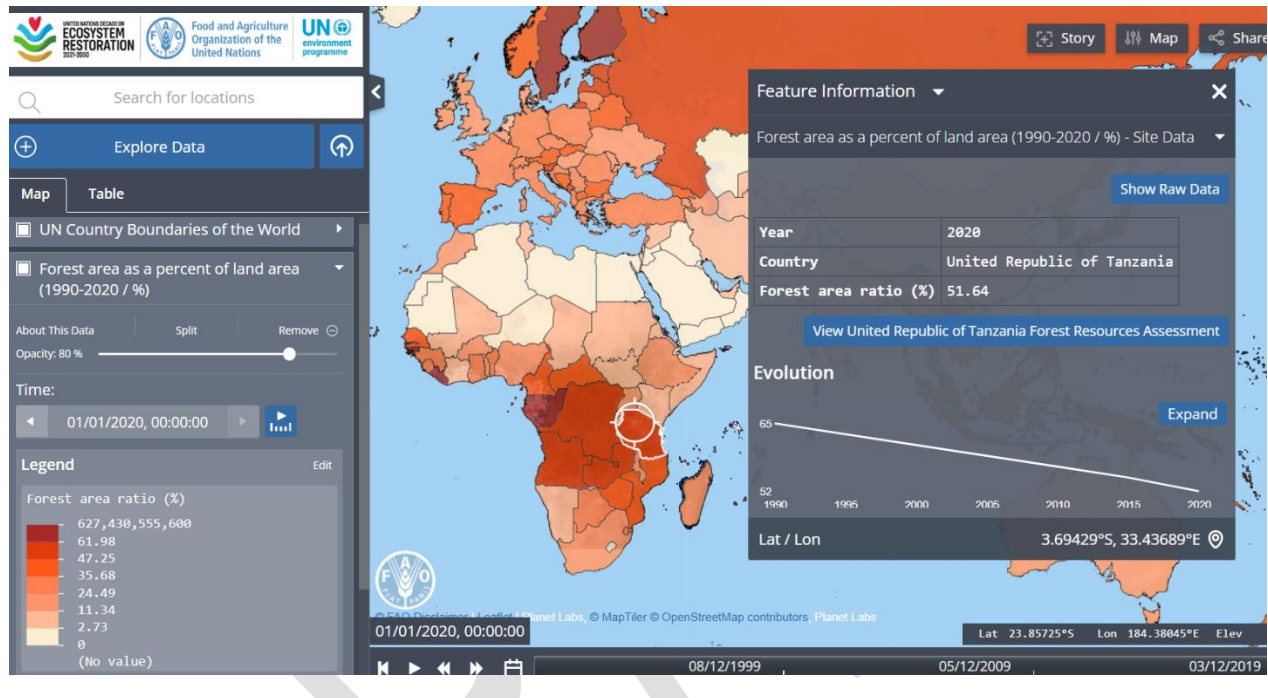
The FERM geospatial platform hosts the UN Decade Global Flagships, which are accessible through the Initiatives tab. Geospatial data for each of the 10 flagships can be visualized and analyzed against other relevant geospatial data on restoration. The FERM geospatial platform is interactive and can be used to produce data maps and create compelling restoration impact stories. From remotely sensed geospatial data to statistical time series, the FERM platform enables the analysis of public and private restoration-related data at global, regional, national, and subnational levels.

The platform enables restoration stakeholders to compare key data layers and visualize changes in ecosystem components over time. This can be done using temporal datasets and by selecting the date range, clicking 'play.' Data layers can be compared side-by-side using the slider function to split your screen and visualize and compare data layers of interest. These functionalities allow the user to examine how a defined Area of Interest (AOI) changes over time.

At any point during the analysis, the user can save or print their geospatial analysis, or preferably, use the "share" function to generate a unique URL to save and share your restoration story with the restoration community. The ability to create impact stories around restoration actions provides a powerful communication tool for practitioners to demonstrate results on the ground, highlight best practices and attract further investment and political will.

A key FERM functionality is for users to add their own custom data set, while working in private FERM workspaces, particularly governments and sub-national entities are encouraged to include and analyze national and sub-national geospatial data for increased accuracy and enhanced spatial resolution as well as interoperability between monitoring and reporting.

2.2.1. Exploring FERM geospatial data

Click on "Explore Data" to access geospatial data. The geospatial layers are organized under eight tabs at the top of the popped-up window. In addition to these data layers, users can upload and visualize their own data in My Data tab. Explore each tab to read the description of each geospatial data layer and select those of interest to be added to the background.
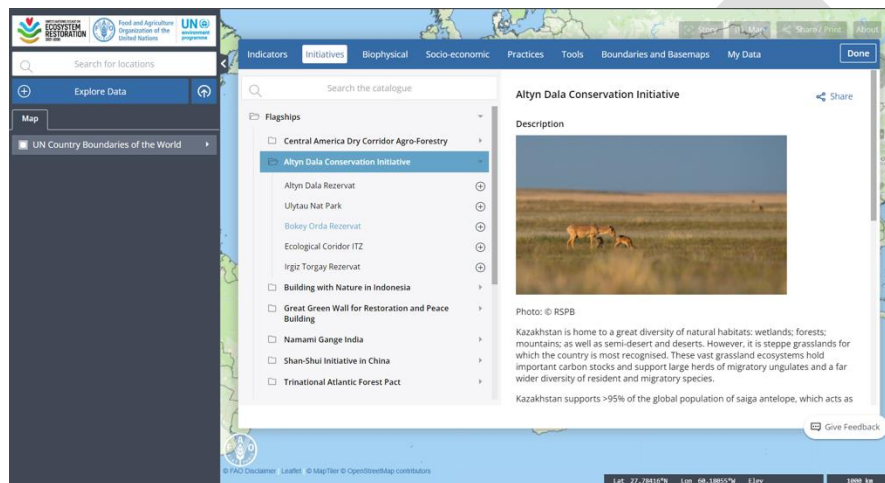
Applying dataset

If you wish to visualize your selected dataset on the map, you will need to click on the plus sign or the **Add to the Map** button on the top right corner of the preview.
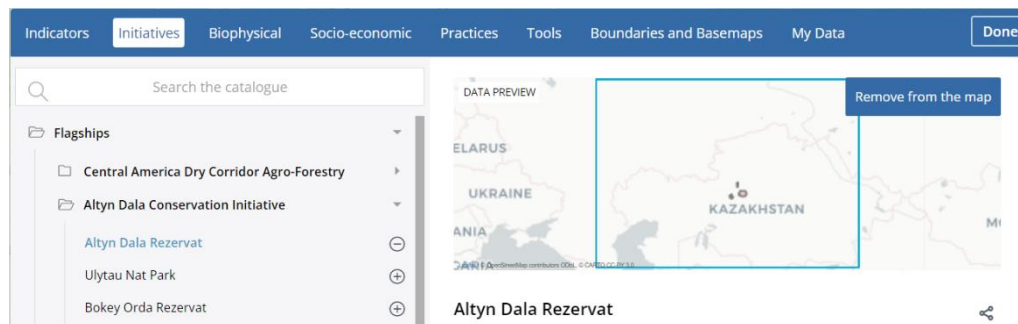
In the Initiatives tab, select geospatial information from any of the 10 Global Flagships

Viewing dataset

Once your added **data** is reflected on the map, you can easily customize your search by applying different parameters to suit your needs, such as:

1. **Map View** - change from 2D to 3D Terrain, modify the type of overlay, apply image optimization, and regulate Raster Map Quality.

2. **Workbench with Legends** – helps you refine your search criteria for the added datasets by adjusting the **opacity of the colors, selecting the timeframe, changing the variables,** among others.
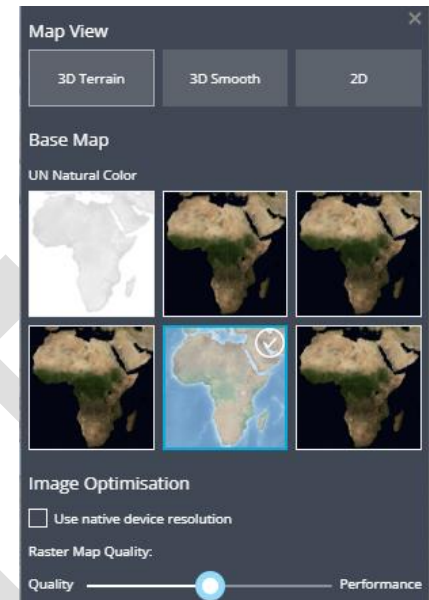
Feature adjustment

The slider allows you to see the changing dynamics over time for the selected data set. It can be displayed either by clicking the **Play** button at the bottom of the map – to see the chronological change, moving the **slider** manually, or by setting a fixed timeframe on the left panel.

Comparing datasets

Users can use the 'Split' function to compare datasets. After adding two or more datasets to the map, you will be able to see a comparison between the datasets visualized in the map:

1. **Split** - click on this button after adding your to-be compared datasets
2. Click on a data set to select **right or left,** to set the comparison
3. **Cursor** - move the cursor to the right and left to visualize the comparison.

ADDING CUSTOM DATA
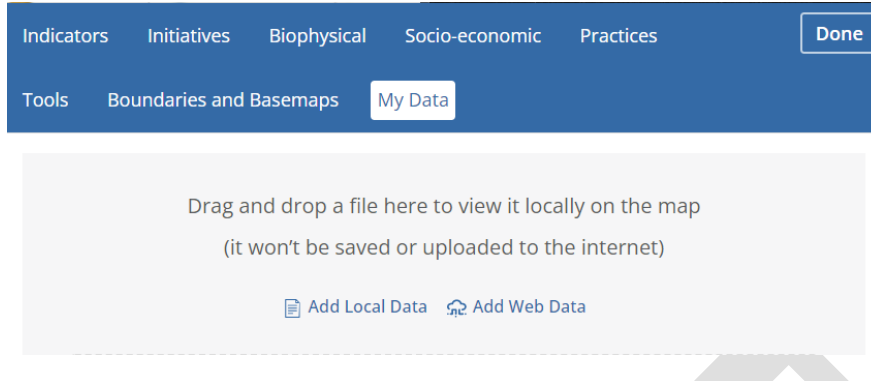
With the use of Database of Global Administrative Areas (GADM) for sub-national boundaries, FERM integrates publicly available national data. To add data privately, click:

1) Explore Data > 2) My Data > 3) Upload your data using preferred method and

format:

CUSTOM DATA

Adding custom data, such as national and sub-national datasets at different admin levels helps you view more localized information. This will ensure the accuracy of information and help generate solid national and sub-national reports.

VIEWING CUSTOM DATA

Adding the **Custom Data set to the Map (1)** will **Feature Information (2)** and provide comprehensive data for analysis both on national and sub-national levels. Only the user will be able to view and analyze their own uploaded data in completely private workspaces.

Add impact story

The 'Story' functionality allows you to create interactive stories within the map, and then create and share:

1. Select **Story** once the data set is reflected into the Map
2. Click **Capture Scene** on a selected area of interest
3. Type in the corresponding **Title** and **Description** to your story, and then click on the **Save** button
4. After saving the **Story**, click on the **Play Story** button
5. You should then be able to see your **created data-map story** and **share it online or print it.**
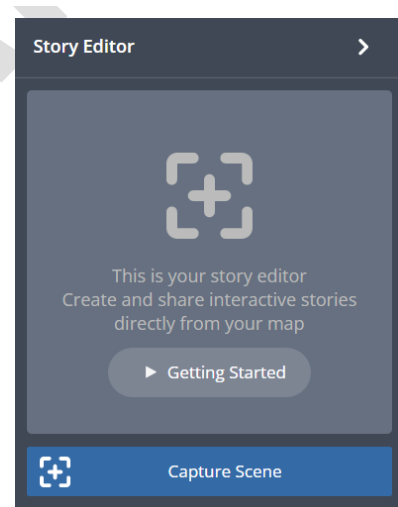
2.2.2. Foundational geospatial data

The **"Indicators" tab** includes information on indicators at two scales:

1. ***UN Decade Headline Indicators.*** These are global indicators for reporting Decade progress. Information on the FERM reporting structure for the UN Decade on Ecosystem Restoration, identifying how ecosystem restoration is contributing to achieving the Sustainable Development Goals. The 20 headline indicators are built on existing SDG and Multilateral Environmental Agreement indicators and existing country and global data collection mechanisms. To support global reporting on restoration progress, the FERM platform provides data on these indicators,

pulling the latest reported statistics from the SDG API and underlying datasets (found in the Biophysical and Socio-Economics tabs), such as the World Database on Protected Areas, used for reporting on SDG indicators 14.5.1 and 15.1.2. The status of headline indicators can be added to the map and then visualized by country for the latest data available. If data is available for several years, a plot will show the trend throughout time. Additionally, linkages to tools to define custom analyses to monitor ecosystem restoration progress (found in the Tools tab), such as the SDG 15.4.2 application in SEPAL to monitor the Mountain Green Cover Index, help better track and report on restoration. The platform provides the time series of the headline indicators for all countries that officially report data.

2. ***GRO Indicators.*** These are project indicators for monitoring restoration interventions. Indicators for monitoring project level restoration activities are being discussed among key members of the Task Force for Monitoring, through a process initiated by Climate Focus, the Society for Ecological Restoration (SER), in partnership with the Global Restoration Observatory (GRO) network and the Task Force on Monitoring. The aim is to formalize a standard set of sector-wide project indicators for tracking progress and trends in ecosystem restoration actions. A set of common indicators can enable communication among disparate databases, meta-analyses, and feed into tracking of the progress of the UN Decade.

The "Initiatives" tab shares data on where restoration is happening through regional initiatives taking part in the UN Decade Flagships, project level data reporting through the FERM registry and linkages to other restoration platforms such as Restor and IUCN's Restoration Barometer. The 10 Global Flagships of the UN Decade span 23 countries and include the following initiatives:

- Central America Dry Corridor Agro-Forestry
- Altyn Dala Conservation Initiative
- Building with Nature in Indonesia
- Great Green Wall for Restoration and Peace Building
- Namami Gange India
- Shan-Shui Initiative in China
- Tri-national Atlantic Forest Pact
- SIDS (Small Island Developing States) Ecosystem Restoration Flagship
- Restoration of Coastal and Marine Ecosystems Abu Dhabi
- Multi-country Flagship on Ecosystem Restoration in Mountain Regions

The "Biophysical" tab hosts an array of geospatial data, sourced from FAO technical divisions responsible for Soil, Land, Water, Climate, Fisheries, Crops, and Forestry, as well as from available public catalogues. Full details of any layer on the FERM can be found on the platform. Some highlights of geospatial data available on the platform is described below (more data are being added to the platform progressively):

- Global land cover information at 10-meter resolution (*Vegetation*).
- Geospatial data on hydrological basins, rivers, irrigation, and dams (*Water*)
- FAO's Global Soil Organic Carbon Map (GSOC) the first global soil organic carbon map ever produced through a consultative and participatory process involving member countries (*Soils*).
- Global Ecological Zones (second edition) used for The Global Forest Resources Assessment (FRA) reporting (*Climate*)
- Elevation Models (*Terrain*)

The "Socio-economic" tab identifies data and publications that represent the crucial intersection of people and nature in restoration monitoring. This tab will continue to be populated in consultation with the sub-task force on Socioeconomics

The "Practices" tab highlights geospatial information relevant to good and promising ecosystem restoration practices from the Task Force for Best Practices.

The "Tools" tab shared tools that can be used for customs analyses for monitoring ecosystem restoration. Key tools have been identified and the list of tools is growing as technology evolves and momentum in the restoration community amasses. Tools presently included in the FERM include:

- SEPAL : (System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring) is an open-source platform that enables global users to comprehend land cover dynamics efficiently using Earth observation data, without requiring coding expertise.

- Earth Map: Earth Map, an open-source tool, allows users to explore geography, satellite imagery, and diverse information layers easily, enabling visualization and analysis of global datasets without the need for prior knowledge of remote sensing or Geographical Information Systems (GIS)

- Climate Crop and Water Requirements Tool:

  The Crop Water Requirement Tool (CropWat-online) is a tool to explore spatial weather data and use that data to run a crop-water-requirement model called CROPWAT. It gives information on meteorology, reference-evapotranspiration, soil-saturation and crop-water-requirements under different climatic conditions, different soil types and different crop related variables, such as the sowing and the harvesting date.

- Se.plan: A component of UN FAO's SEPAL tool, facilitates forest restoration planning decisions by utilizing cloud-based supercomputing and Google Earth Engine datasets. It identifies optimal restoration locations concerning restoration costs, considering biophysical and socioeconomic constraints imposed by users to define allowable restoration areas.

- Peatland restoration monitoring:

  The FAO 2021 technical document, Practical guidance for peatland monitoring in Indonesia (available in English and Bahasa Indonesian provides an overview of the importance of peatland monitoring by evaluating changes in soil moisture. The document uses examples from Indonesia and discusses the relevance of peatland monitoring for National Monitoring Systems. It describes different SEPAL tools to illustrate how peatlands can be monitored in Indonesia and discusses knowledge gaps while offering recommendations to practitioners and developers to improve methodologies for peatland monitoring.

- Collect Earth and Collect Earth Online: Collect Earth is a tool that facilitates data collection using Google Earth, Bing Maps, and Google Earth Engine. Its capabilities include the analysis of high-resolution satellite imagery for diverse purposes. Complementing this, Collect Earth Online is a free, open-source system for viewing and interpreting high-resolution satellite imagery, allowing users to efficiently gather current environmental information and track changes over time.

- Satellite time series:

Research on algorithms for detecting land use change, degradation of ecosystems, and restoration is abundant and growing. Time-series analysis is instrumental for restoration monitoring in a variety of ecosystems and can be used to develop consistent baselines for monitoring. The SEPAL platform provides simplified access to time series analysis using SAR data from the European Space Agency's (ESA) Sentinel 1 satellite and the Japan Aerospace Exploration Agency (JAXA) ALOS-PALSAR satellites, as well as optical data from NASA's Landsat satellites, ESA's Sentinel 2 satellites and high-resolution data from Planet Labs. Time- series algorithms such as Breaks For Additive Season and Trend (BFAST) (Verbesselt et. al 2010), Continuous Change Detection and Classification (CCDC) (Zhu & Woodcock 2014), PYthon Sentinel-1 soil-Moisture Mapping Toolbox (PYSMM) (Greifeneder et al., 2021), Satellite Monitoring for Forest Management (SMFM) Biota, and SAR amplitude time series analysis (Flores-Anderson et al. 2019) are made available in SEPAL through simple user interfaces for ecosystem monitoring.

- AURORA: (Assessment, Understanding and Reporting Of Restoration Actions). A web application designed to facilitate the establishment of monitoring systems for restoration projects, developed through a collaboration between the World Resources Institute (WRI) and the Food and Agriculture Organization of the United Nations (FAO)

- FL-WES: The tool that provides decision support for the monitoring of forest-water interactions based on different contexts and situations

- ABC-Map: A geospatial app that holistically assesses the environmental impact of National Policies and Plans and investments in the AFOLU sector.

The "Boundaries and Basemaps" tab includes background geospatial data, such as country boundaries and satellite data. High resolution monthly cloud free image mosaics from Planet Labs covering 64 tropical countries are available thanks to Norway's International Climate & Forests Initiative.

2.2.3. Advanced functionality

The FERM platform is also integrated with FAO's geospatial processing platform, SEPAL, and allows on the fly composite/mosaic creation for more advanced users – drawing on the historical archive of Landsat imagery, the frequency of the Sentinel-2 imagery and of the cloud-penetrating abilities of Sentinel-1. SEPAL provides data visualization and analytical possibilities within the FERM. For any area of interest on the planet's surface and for any time-period of interest, users can create customized, best-pixel, Landsat or Sentinel image composites, on-the-fly. Satellite imagery from 40 years ago can be viewed alongside the latest acquisitions to visualize the impacts of restorative actions. This can be combined with ecosystem-specific geospatial data available in the FERM such as for terrain, climate, soil, water, vegetation, socioeconomics, and management.

1. Select or create an Area of Interest (AOI)
2. Click on 'Explore Data'
3. Click on 'Tools'
4. Click on 'SEPAL' and 'Add to the Map'
5. A SEPAL theme will appear in the map layers
6. Click on the area of interest (AOI) in the map
7. Click on the SEPAL label in the pop-up box
8. You will be presented with options to create an optical or radar mosaic/composite
9. Select the AOI from the dropdown menu
10. Select the date (or date range) for which you want to make an image

11. Select the sources of imagery (Landsat or Sentinel-2 for Optical, Sentinel-1 for radar)
12. Select composite options (or just take the default)
13. Select color bands (or just take the default)
14. Click 'GO'

To explore the full functionality of SEPAL join the 15,000 users already using the platform and sign up

2.3. FERM Search Engine

The FERM common search engine is the result of a collaborative effort by the FAO-led Best Practices and Monitoring Task Forces of the UN Decade, combining the need to share and promote good practices and the need to transparently track progress of our collective restoration efforts. The common SEARCH engine brings together good practices on ecosystem restoration documented by four collaborating platforms: the FERM Registry, LIFE GoProFor, Panorama Solutions and WOCAT. Users can effectively search, filter, and access an extensive array of good restoration practices according to their specific needs. Users can search for good practices through two modalities:

- An open browser, by typing key words.
- Refined filters including degradation drivers, ecosystem, region, source and language (upcoming).

You can explore and learn from over 1500 good practices on ecosystem restoration currently available through the FERM common search engine. To access this tool, simply click on the "SEARCH" button on the FERM main page or follow this link.
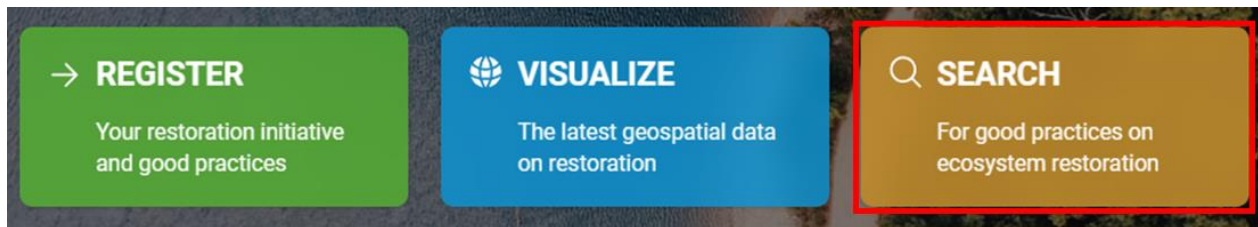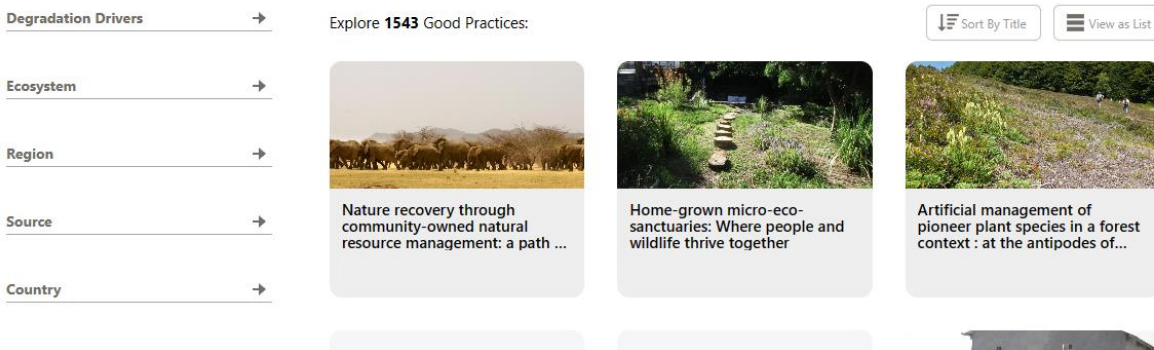
2.3.1. FERM good practices visualization page

The FERM Registry documents good practices, which, upon approval through the review process, will be showcased on the FERM search engine. To easily locate these endorsed practices, use the search engine and filter results by selecting the source as "FERM".
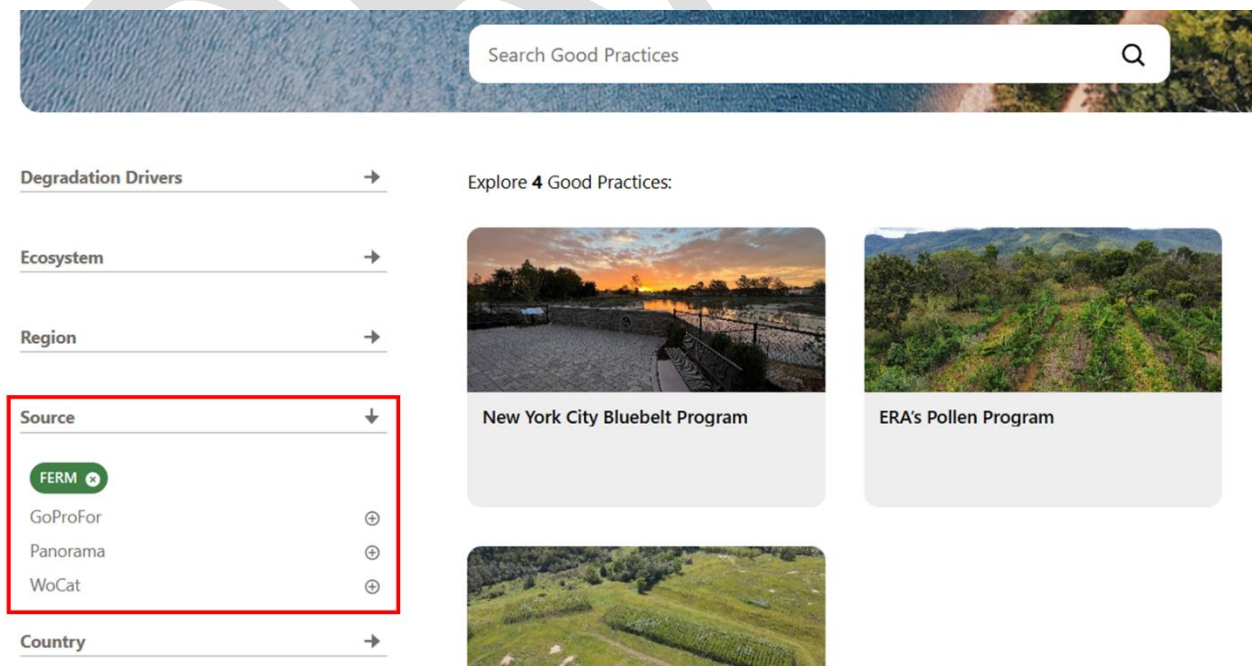
Selecting a practice triggers the display of its corresponding card. Clicking on "**View Full Practice**" redirects you to the FERM good practice visualization page, providing access to comprehensive information about the selected practice.

3.   NEXT STEPS

Supporting national restoration monitoring and reporting

At the national level, state-of-the-art tools and data will be curated and deployed to countries through the FERM platform, building on and respecting national systems, capacity, and institutional arrangements. The FERM builds on, and complements, existing international, regional, and national reporting processes, their goals, targets, criteria, and indicators.
The FERM registry also offers an official entry point for those countries that do not have their own system to monitor and report on the Kunming-Montreal GBF target 2 - Area under restoration - indicator. This functionality is currently under development.

Integration and interoperability with other monitoring tools and platforms

Integration and interoperability of monitoring tools and platforms can enhance and simplify the user experience of restoration practitioners. For instance, FERM will integrate projects and data of the Global Environmental Facility (GEF) into the UN Decade Monitoring Framework. FERM has established and proposed a methodology to report and monitor the achievement of FAO GEF projects commitments including restoration (in ha of land). That way it is providing FAO-GEF staff and all relevant stakeholders the chance to effectively display the progress of committed versus achieved land under restoration, along with clear results such as the percentage of project achievement. Presenting a single technical solution to both needs reduces duplication of effort and ensures that geospatial data is interoperable between platforms.

Through the Monitoring Task Force, a survey on monitoring tools and platforms revealed an ecosystem of over 150 tools, useful for restoration monitoring practitioners at various scales. In the future, under the mandate of the Task Force, discussions with tool and platform developers will explore integration and/or linkages to the FERM platform. The vision of the Task Force and of the FERM is to support a data ecosystem founded on data integration and interoperability, with linkages/integration with other tools and platforms. This shared vision for restoration monitoring is critical to a coherent UN Decade to capitalize on increased public and private restoration commitments, and to capitalize on advances in global monitoring solutions and transformational technologies to enhance delivery of restoration action on the ground.

FERM Dashboard

A dashboard will be a new element incorporated into the FERM. It will provide information about data compiled on ecosystem restoration, progress towards commitments, disaggregation of areas under restoration by ecosystem, initiatives and good practices displayed spatially with geospatial data, interactive maps to visualize data, and links to national databases. All these parameters will be displayed at the global and the national level.

Other developments

The Monitoring Task Force is calling for special attention to further develop monitoring approaches to ecosystems, which currently lack or require enhanced monitoring approaches for their large-scale monitoring. These include marine and freshwater ecosystems. From a socio-economic perspective, there

is still important work to be done and incorporated into restoration monitoring approaches. The Task Force encourages further development of crowd-sourced monitoring approaches that could also be integrated into the FERM platform. The Task Force also recognizes the importance of geospatial information for restoration planning as a complement to monitoring efforts. Selected countries are piloting the use of the se.plan restoration decision support planning tool for this purpose.

Resources:
Visit the UN Decade website: UN Decade on Restoration
Explore the UN Decade Task Force: UN Decade Task Force
UN Decade Task Force on Best Practices: Task Force on Best Practices
UN Decade Monitoring Webpage: Monitoring Webpage
UN Decade Task Force on Monitoring leaflet: Task Force on Monitoring Leaflet
For updates on CBD Target 2, visit: CBD Target 2
UN Decade restoration strategy: Restoration Strategy
Global indicators for monitoring ecosystem restoration: Global Indicators
More information on The UN Decade on Ecosystem Restoration Monitoring: UN Decade Monitoring
Explore the FERM Registry, Geospatial platform and Search engine: FERM

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Appendix

1. Good practice assessment sheet questions

Objectives, context and methodology: Implementation of the practice

Question 1	Are the practice implementation activities clearly described, logical, and technically and socially feasible allowing for replication or adaptation? (total score of 10)
Assessment criteria to be evaluated in this question	**Belongs to a restorative activity.** The practice belongs to one or several restoration activities that are part of the continuum of ecosystem restoration. In addition, it is technically and socially feasible to allow for replication or adaptation. **[Principle 3]**
Questions to be analyzed in the submission form	**Good practice form:** 1. Objectives and context (section), 2.1 Description, 2.2 Steps for implementation
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The steps for implementation are logical, **detailed and well-described**, and technically and socially feasible, allowing for replication or adaptation.
High (8-9)	The steps for implementation are logical, **well-described** and technically and socially feasible, allowing for replication or adaptation.
Medium (6-7)	The steps for implementation are logical and technically and socially feasible **but the level of detail could be improved.**
Low (1-5)	The steps for implementation **are unclear/too general** with insufficient information to allow replication or adaptation and/or the practice is not technically/socially feasible/appropriate with concerns regarding the species used (e.g., non-native, invasive) or negative impacts on biodiversity and local people.

Methodology: Stakeholders' engagement

Question 2	Does the practice have fostered meaningful and inclusive participation from different stakeholders, right-holders, and particularly under-represented groups? (total score of 10)
Assessment criteria to be evaluated in this question	**Participatory and inclusive.** The practice has fostered meaningful and inclusive involvement of stakeholders and right-holders, particularly from under-represented and often marginalized groups (e.g., local communities, Indigenous Peoples, women, youth etc.) **[Principle 2]**

Questions to be analyzed in the submission form	**Good practice form:** 2.3 Stakeholder engagement, 2.4 Stakeholder's engagement additional information, 2.5 Types of knowledge, 2.6 Participatory approaches
Note for reviewer	Under-represented groups: e.g., local communities, Indigenous peoples, ethnic minorities, women, youth and LGBTIQ+ people

| **Please see the scoring guide below to help you evaluate this criterion.** ||

Very high (10)	The practice has fostered meaningful and inclusive participation from different stakeholders, right-holders and **at least one under-represented group.**
High (8-9)	The practice has fostered meaningful and inclusive participation from different stakeholders and right holders.
Medium (6-7)	The practice has fostered participation from different stakeholders and/or right-holders and under-represented groups, **but the way in which the process has been meaningful and inclusive needs more details.**
Low (1-5)	The description of how the practice has fostered meaningful participation from different stakeholders and/or right-holders and under-represented groups **is unclear and weak.**

Methodology: Knowledge integration

Question 3	**Does the practice include different types of knowledge in a meaningful way?** **(total score of 10)**
Assessment criteria to be evaluated in this question	**Integrates different types of knowledge.** Through its implementation, the practice has integrated Indigenous People's traditional knowledge, local, practical, scientific, and/or other types of knowledge. **[Principle 6]**
Questions to be analyzed in the submission form	**Good practice form:** 2.3 Stakeholder engagement, 2.4 Stakeholder's engagement additional information, 2.5 Types of knowledge, 2.6 Participatory approaches
Note for reviewer	The incorporation of Indigenous Peoples' traditional knowledge should comply with the right of free, prior, and informed consent.

| **Please see the scoring guide below to help you evaluate this criterion.** ||

Very high (10)	The practice has meaningfully integrated **two or more** types of knowledge, including **Indigenous Peoples' traditional knowledge and/or local knowledge.** If Indigenous Peoples' traditional knowledge has been integrated, compliance with the right of Free, Prior and Informed Consent is well explained.
High (8-9)	The practice has meaningfully integrated **at least one** type of knowledge. If Indigenous Peoples' traditional knowledge has been integrated, compliance with the right of Free, Prior and Informed Consent is explained.
Medium (6-7)	The practice has integrated one or more types of knowledge, **but the way in which the process has been meaningful needs more details.** If Indigenous Peoples' traditional knowledge has been integrated, compliance with the right of Free, Prior and Informed Consent is explained.
Low (1-5)	The description of how the practice has meaningfully integrated different types of knowledge **is unclear and weak.** If Indigenous Peoples' traditional knowledge has been integrated, compliance with the right of Free, Prior and Informed Consent **is not well explained.**

Methodology: Replicability in different contexts

Question 4	**Has the practice been tested and replicated in different contexts?** **(total score of 10)**
Assessment criteria to be evaluated in this question	**Implemented in different contexts.** The practice has been tested and replicated in different contexts and therefore, can be easily transferred and/or adapted to other initiatives with similar goals. **[Principle 8]**
Questions to be analyzed in the submission form	**Good practice form:** 2.7 Scale, 2.8 Replicability, 2.9 Replicability additional information
Note for reviewer	Different contexts (e.g., geographic location, type of ecosystem, different socio-economic groups involved, different locations within a region, etc.)
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The practice has been tested and replicated in **different contexts and scales** and therefore, can be easily transferred and/or adapted to other initiatives with similar goals. **[Good practice]**

High (8-9)	The practice has been tested and replicated only **in the same context and scale**, but it is **currently being proven** for replicability and adaptability to different contexts. **[Promising practice]**
Medium (6-7)	The practice has been tested and replicated only in the same context and scale, **it needs to be proven** for replicability and adaptability to different contexts. **[Promising practice]**
Low (1-5)	The practice **has not been tested** so it cannot be transferred and/or adapted to other initiatives.

Key success factors, constraints and lessons learned

Question 5	Are the key success factors, constraints and lessons learned coherent and adequately described allowing for further replication and adaptation? (total score of 10)
Assessment criteria to be evaluated in this question	**Replicable and adaptable.** Key factors, constraints and lessons learned are clearly identified and described to allow for replication and adaptation of the practice to similar objectives in different situations. **[Principle 10]**
Questions to be analyzed in the submission form	**Good practice form:** 3.1 Key factors, 3.2 Key factors additional information, 3.3 Constraints, 3.4 Lessons learned/Recommendations
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The key success factors, constraints and lessons learned **are coherent, detailed and well-described** allowing for replication or adaptation.
High (8-9)	The key success factors, constraints and lessons learned are **coherent and well-described** allowing for replication or adaptation.
Medium (6-7)	The key success factors, constraints and lessons learned are generally **described**, level of detail could be improved to allow for replication and adaptation.
Low (1-5)	The key success factors, constraints and lessons learned **are incoherent and not adequately described.**

Benefits

Question 6	Has the practice resulted in positive impacts for nature and people and supported recovery processes without causing further degradation of ecosystems and livelihoods? (total score of 10)
Assessment criteria to be evaluated in this question	**Provides several benefits to nature and people.** The practice has resulted in positive impacts for nature and people (e.g., by improving biodiversity, ecosystem health and integrity, human well-being, sustainable production of goods and services, climate change mitigation, etc.). In addition, the practice has supported and assisted natural recovery processes, without causing further degradation of ecosystems and livelihoods. **[Principle 4]** **Addresses causes of ecosystem degradation.** The practice has identified and reduced direct and/or indirect causes of ecosystem degradation. **[Principle 5]**
Questions to be analyzed in the submission form	**Good practice form:** 1.9 Drivers, 1.10 Drivers additional information, 4.1 Positive impacts, 4.2 Positive impacts additional information, 4.3 Negative impacts
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The practice has resulted in clear positive ecological **AND** socio-economic/cultural impacts **(including quantitative data) and moderate negative impacts without causing further degradation of ecosystems and livelihoods.**
High (8-9)	The practice has resulted in clear positive ecological **OR** socio-economic/cultural impacts **(including quantitative data) and moderate negative impacts without causing further degradation of ecosystems and livelihoods.**
Medium (6-7)	The practice has resulted in positive ecological **and/or** socio-economic/cultural impacts for nature and people, with **moderate negative impacts without causing further degradation of ecosystems and livelihoods. However, the level of detail could be improved by including more quantitative data.**
Low (1-5)	The proponent does not provide a good description of the positive impacts and is not including quantitative data AND/OR **the negative impacts are high with the risk to cause further degradation of ecosystems and livelihoods.**

Drivers of ecosystem degradation

Question 7	Has the practice identified and reduced direct and/or indirect drivers of ecosystem degradation? (total score of 10)
Assessment criteria to be evaluated in this question	**Addresses causes of ecosystem degradation.** The practice has identified and reduced direct and/or indirect causes of ecosystem degradation. **[Principle 5]**

Questions to be analyzed in the submission form	**Good practice form:** 1.8 Activities, 1.9 Drivers, 1.10 Drivers additional information, 4.1 Positive impacts, 4.2 Positive impacts additional information, 4.3 Negative impacts
Note for reviewer	For more info on direct and indirect drivers of degradation, see IPBES 2018 (Land degradation and restoration) - Chapter 3, p.143, 144 and 145 https://ipbes.net/assessment-reports/ldr
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The practice has identified and reduced **more than one** direct and/or indirect driver of ecosystem degradation.
High (8-9)	The practice has identified and reduced **one** direct **or** indirect driver of ecosystem degradation.
Medium (6-7)	The practice has identified and reduced **one or more** direct or indirect drivers of ecosystem degradation **to some extent.**
Low (1-5)	The way in which the practice has **identified and reduced** any direct or indirect driver of ecosystem degradation is **unclear/not well described.**

Evaluation of the practice

Question 8	**Has the practice been properly evaluated to demonstrate that it has achieved its objectives? Have the beneficiaries of the practice validated its outcomes?** (total score of 10)
Assessment criteria to be evaluated in this question	**Properly validated.** The practice has been properly evaluated, from a technical and methodological point of view, to demonstrate that it has achieved its measurable objectives. In addition, beneficiaries of the practice have also validated its positive impacts, and lessons learned have been integrated. **[Principle 9]**
Questions to be analyzed in the submission form	**Good practice form:** 4.4 Validation, 5.1 Links
Note for reviewer	Please check out the additional resources for evidence on validating a good practice. E.g., research papers, beneficiary testimonials and videos.
Please see the scoring guide below to help you evaluate this criterion.	

Very high (10)	The practice has been **properly evaluated** (e.g., through meta-analysis, expert review, and cost-efficiency analysis) from a technical and methodological point of view to demonstrate that it has achieved its measurable objectives. The **beneficiaries of the practice have validated its impacts,** and **lessons learned have been integrated.**
High (8-9)	The practice has been **properly evaluated** (e.g., meta-analysis, expert review, cost-efficiency analysis) from a technical and methodological point of view to demonstrate that it has achieved its measurable objectives and the **beneficiaries of the practice have validated its impacts.**
Medium (6-7)	The practice has been evaluated (e.g., meta-analysis, expert review, cost-efficiency analysis) from a technical and methodological point of view to demonstrate that it has achieved its measurable objectives, **but the beneficiaries of the practice have not validated its impacts.**
Low (1-5)	The practice **has not developed any evaluation process yet OR the description provided is insufficient.**

Contribution to objectives of the restoration initiative

Question 9	**Does the practice contribute to the progress of one or more ecological and/or cultural and/or socio-economic objectives of the restoration initiative?** **(total score of 10)**
Assessment criteria to be evaluated in this question	**Contributes to the progress of ecological, cultural and socio-economic objectives of the restoration initiative.** The practice has effectively contributed to the progress of one or more ecological and/or cultural and/or socio-economic objectives from the restoration initiative. **[Principle 7]** **Contributes to the achievement of the Sustainable Development Goals (SDGs).** The practice contributes to the achievement of at least one of the 17 Sustainable Development Goals (SDGs), especially SDGs 3, 13, 14 and 15. **[Principle 1]**
Questions to be analyzed in the submission form	**Initiative form:** Description and SDGs indicators **Good practice form:** Overview of the complete form
Please see the scoring guide below to help you evaluate this criterion.	
Very high (10)	The practice contributed to the progress of **more than one** ecological **and** socio-economic/cultural objective of the restoration initiative, and **at least two** of the following SDGs: 3, 13, 14 and 15. **The methodology (e.g., practice description, steps for implementation, participatory approaches) and positive impacts are well aligned with the objectives selected.**

High (8-9)	The practice contributed to the progress of **one or more** ecological **or** socio-economic/cultural objectives of the restoration initiative, and **at least one** of the following SDGs: 3, 13, 14 and 15. **The methodology (e.g., practice description, steps for implementation, participatory approaches) and positive impacts are well aligned with the objectives selected.**
Medium (6-7)	The practice contributed to the achievement of **one or more** ecological/socio-economic/cultural objectives of the restoration initiative, and **at least one** of the following SDGs: 3, 13, 14 and 15. **However, the methodology and positive impacts are not totally coherent.**
Low (1-5)	The practice **does not contribute/there is no clear** link to the objectives of the restoration initiative and does not include any of the following SDGs: 3, 13, 14 and 15.