Restoration Project Information Sharing Framework

A resource for coordinated monitoring and reporting on ecosystem restoration

V1.0

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A resource for coordinated monitoring and reporting on ecosystem restoration

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Climate Focus
Society for Ecological Restoration

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Contributors

Organizational logos indicate a contribution to this process was made by individuals from these organizations, and does not indicate endorsement by the organization itself.

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Introduction

In 2021, The Society for Ecological Restoration (SER) and Climate Focus, in partnership with the Global Restoration Observatory (GRO) network, and in coordination with the UN Decade on Ecosystem Restoration Monitoring Task Force and many other collaborators, led a process to formalize a sector-wide Restoration Project Information Sharing Framework ("Framework").

The Framework was developed to track progress and trends in ecosystem restoration and includes a series of information variables such as monitoring indicators and project descriptors that can be shared among the many platforms and databases that collect, aggregate, evaluate, and provide access to data on ecosystem restoration.

The Framework was developed to track progress and trends in ecosystem restoration.

The Framework provides a wide slate of shared variables from which organizations and project managers may adopt relevant and appropriate content for their individual monitoring protocols, reporting systems, databases, and platforms. Through the use of these shared variables, the Framework facilitates the collection of project information across the restoration monitoring data universe. Acknowledging that it would be impossible to identify one set of shared variables that would be relevant and applicable in all divergent social and ecological contexts, the uptake of all shared variables by any one user is neither expected nor recommended.

The Framework represents the collective thinking of more than 80 individuals from 55 organizations representing 27 countries on six continents—most of whom are actively engaged in implementing, monitoring, or researching restoration (Appendix A). The result of this global process is a set of 61 headline, core, and secondary monitoring indicators organized under the 10 Principles of Ecosystem Restoration to Guide the 2021-2030 UN Decade ("UN Decade Principles"), along with 32 project descriptors (metadata, project, and site variables) used to document general project information (Appendix C).

Background

This document outlines the process and timeline (Fig. 1) for developing the Framework and provides notes for use by practitioners, researchers, funders, and other interested parties. The Framework is intended to be iterative, adapting to user experiences and developments in the broad field of ecosystem restoration in future versions.

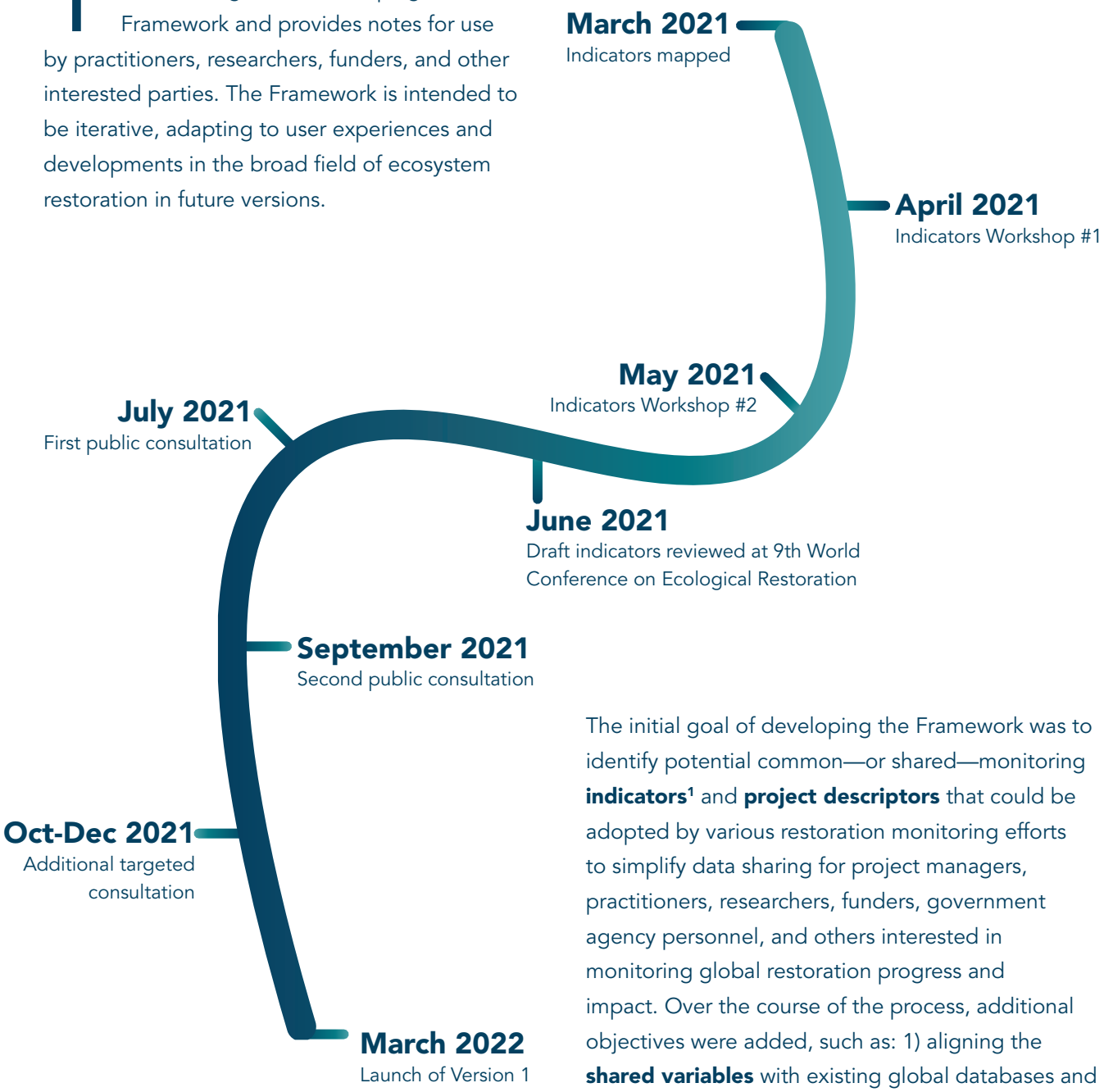

Figure 1. Timeline of process.

[1] Terms in bold are defined in the Glossary

The initial goal of developing the Framework was to identify potential common—or shared—monitoring **indicators**[1] and **project descriptors** that could be adopted by various restoration monitoring efforts to simplify data sharing for project managers, practitioners, researchers, funders, government agency personnel, and others interested in monitoring global restoration progress and impact. Over the course of the process, additional objectives were added, such as: 1) aligning the **shared variables** with existing global databases and platforms under development; and 2) integrating the proposed monitoring indicators into a framework such as the UN Decade Principles.

This project builds on objectives of the GRO network to 1) convene restoration experts and practitioners to coordinate restoration monitoring tools and approaches, share knowledge, and facilitate increased data sharing; 2) promote the development of science-based, open-access data to increase transparency, ambition, and effectiveness of restoration; and 3) fill gaps identified by the restoration community. The idea of developing a shared monitoring and reporting framework arose organically to address the proliferation of restoration platforms and initiatives that collect or facilitate the sharing of restoration information from the project to national levels (Fig. 2) as well as the proliferation of monitoring indicators and other variables that track progress. In addition, the project is intended to provide external support for and validation of UN Decade monitoring efforts, which operate primarily at the global and country level. The development of the Framework and shared monitoring indicators was supported by a grant from Google.org.

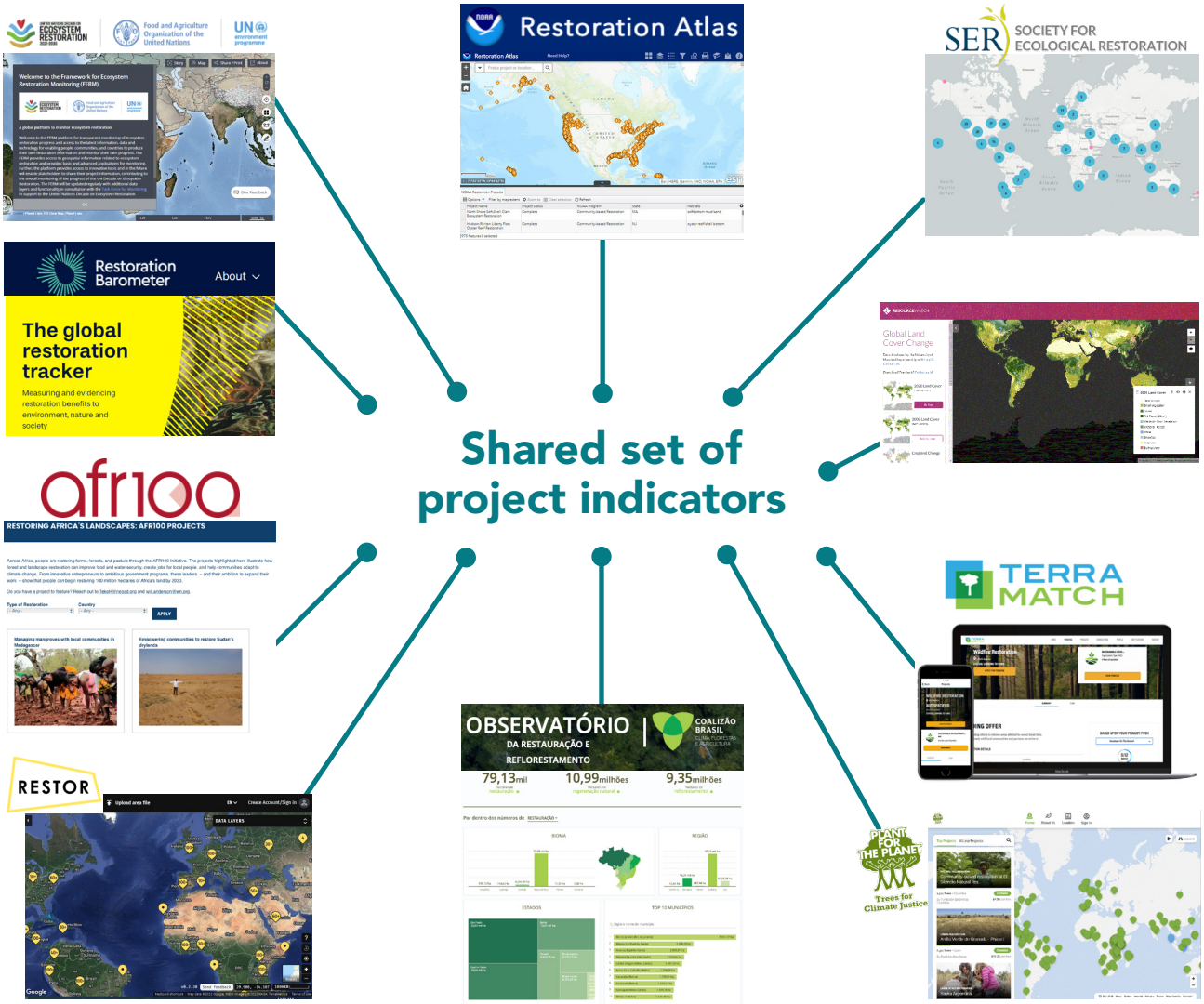

Figure 2. Examples of online restoration platforms identified by GRO (note that this is not an exclusive set).

The Framework successfully fills a gap in the ecosystem restoration monitoring space by organizing bottom-up (i.e. detailed project level) information to better align with and contribute to top-down (i.e. global, country, and subnational levels) monitoring frameworks. It also connects shared monitoring indicators directly to the UN Decade Principles, effectively nesting them in the global context. Ultimately, the Framework is intended to reduce duplication of effort, increase data sharing and aggregation, and contribute to an improved understanding of restoration outcomes and limitations.

Version 1.0 of the Framework includes 17 **headline indicators**, together with 44 additional **core** and **secondary indicators**.

This tightly balances the need for a small, manageable number of headline indicators with the desire for more detailed variables to enable deeper level analysis into project outcomes when possible.

17

headline indicators

44

core and secondary indicators

Process

Scoping of the Framework

The United Nations Decade on Ecosystem Restoration (UN Decade) defines ecosystem restoration as "the process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity. Ecosystem restoration encompasses a wide continuum of practices, depending on local conditions and societal choice." The Official Strategy of the UN Decade states that "Such activities include, for example, enhancing organic carbbon in agricultural soils, increasing fish stocks in overfished zones, remediating polluted sites, restoring ecological processes, restoring biodiversity and conserving fauna and flora that can assist in the restoration process."

This broad scope of restoration activities generally aligns with the activities described as restorative in the Restorative Continuum in SER's International Principles and Standards for the Practice of Ecological Restoration (Gann *et al.* 2019; Fig. 3), which were referenced by the Decade strategy.

At the onset, the conceptual scope of the Framework was defined to include a broad suite of activities consistent with the UN Decade and the SER Restorative Continuum. While the Framework is designed to be generally applicable across any ecosystem, additional variables will likely be needed for specific biomes, ecosystems, and projects.

Acknowledging that each type of restoration project has unique monitoring requirements, the Framework is designed to be used like a menu. No one organization or restoration project is expected to use all shared variables. However, one potential future step is to group minimum sets of shared variables according to context, increasing uptake and usefulness of the Framework.

"Ecosystem restoration encompasses a wide continuum of activities that contribute to protecting intact ecosystems and repairing degraded ecosystems."

Official Strategy of the UN Decade on Ecosystem Restoration

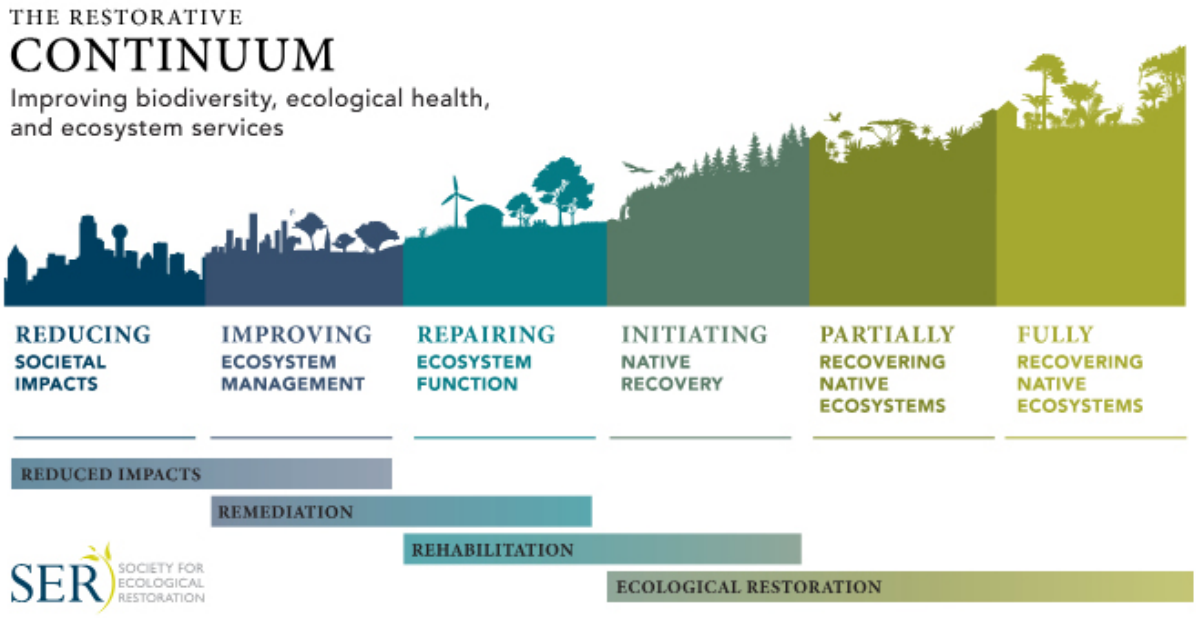

Figure 3. The Restorative Continuum, outlining the breadth of restorative activities generally included in the concept of ecosystem restoration as defined by the UN Decade.

Variable Source Mapping and Review

The project reviewed and mapped existing variables from international frameworks, existing and new databases, published literature, existing and proposed certification and standardization processes, and monitoring tools (Fig. 4; see Appendix B for a representative list of sources reviewed). In total, more than 50 sources were reviewed - some as part of an initial mapping and others at the recommendation of project participants (see next section). The reviewed sources contributed a wide array of information ultimately included in the Framework.

More than 50 databases, frameworks, standards and tools were reviewed.

Consultations and Other Project Development

To capture and incorporate the expertise and recommendations of the restoration community, a wide variety of consultative activities (workshops, knowledge cafés, surveys, peer review processes, and bilateral discussions) were conducted from April 2021 through February 2022.

The first engagements were a series of two virtual workshops led by SER in April and May 2021. The workshops included 44 ecosystem restoration experts and stakeholders (see Appendix A for participant list) with representation from 27 organizations and agencies in North America, South America, Europe, Africa, and Asia. Both workshops included managers, researchers, and practitioners from a wide variety of entities, including UN and other global organizations, local, regional, and global nonprofits, and academia. Practitioners at both the global and local levels were specifically recruited for the second workshop to ensure that the Framework would function at both the practical and analytical levels. The first workshop included more people working on forests and forest landscapes, whereas participants in the second had expertise in a wider array of ecosystems.

In the first workshop, participants discussed both process and impact indicators at the global and the sector/biome levels (e.g. forests). Participants reviewed and provided feedback on the list of databases and variable classifications previously mapped. Participants also brainstormed general criteria for shared indicators and a list of prospective shared indicators. Workshop participants recommended considering whether the indicators would sit within a framework of principles, goals, or other criteria (the UN Decade Principles were not released until September 2021).

Using the outcomes of the first workshop, the organizers conducted additional research, analysis, and synthesis to identify potential process and impact indicators, and organized the recommendations from the first workshop into two hierarchical levels (global and sector/biome) for further discussion and prioritization at the second workshop. As part of this process, the organizers also collected indicator ideas from The Economics of Ecological Restoration (TEER), the Framework on Ecosystem Restoration ("FERM" a working list of 4500+ indicators identified by FAO), and other sources, and compared them to the draft indicators generated by the first workshop.

This work resulted in a draft list of 135 global process indicators and 97 global impact indicators (232 total indicators). Organizers also developed a preliminary recommendation of response types (e.g., multiple-choice, write-in) for each indicator.

During the second workshop, participants reviewed and commented on the draft list of 232 global indicators, including suggesting new indicators to fill gaps. The workshop included a prioritization process that resulted in a list of 86 process and 64 impact indicator recommendations. Key recommendations from the second workshop included:

1. aiming to keep the number of indicators as low as possible (recommendations ranged from 10-100) while still having the benefit of shared indicators;

2. where possible and appropriate, matching or aligning indicators and other variables with those in existing frameworks (e.g. TEER, FERM)—recognizing that some indicators may need to be newly created or modified to address gaps or improve methods.

Throughout the process, the organizing team continued to advance the process by consolidating similar or overlapping indicators and prioritizing those indicators that received the most support from workshop participants and subsequent reviewers. The team also produced a draft of potential shared project descriptors (metadata, project, and site variables) for review. Consultations and engagement included:

- **A series of discussions** with FAO representatives of the UN Decade Monitoring Task Force to increase consistency of final products across the field (June—December 2021)
- **Two knowledge cafés** at SER's virtual 9th World Conference on Ecological Restoration in which participants were provided with an overview of the project to date followed by the opportunity to give direct input on variables and other indicators and other variables, priorities, and scale (June 2021)
- **A global survey** asking the GRO network and SER 2021 knowledge café participants to rank and comment on 68 potential process indicators, 55 potential impact indicators, and 38 potential project descriptors (June-July 2021)
- **Synthesis**, consolidation, and prioritization of feedback resulted in 45 potential process indicators, 43 potential impact indicators, and 31 potential project descriptors ranked as core or secondary, together with proposed database structure and minimum recommended data responses (July-August 2021)
- **A targeted survey** to the GRO network, workshop participants, and other reviewers inviting comments on a model data collection platform with the 119 potential shared variables (88 indicators and 31 project descriptors) and a proposed classification of variables into core and secondary. This resulted in 923 comments on 117 variables (September 2021)
- **Dedicated meetings** and communication with GRO Network partners and other collaborators, including submission of the proposed Framework to the GRO network for final review (October 2021—February 2022)
- **Finalization of Version 1** of the Framework, including selection of 17 headline indicators nested within the UN Decade Principles, 26 core indicators, 19 secondary indicators, and 32 project descriptors, together with suggested database and data submittal structures (January 2022—February 2022)

Outcomes

In order to clarify the purpose and relevance of the headline, core, and secondary indicators, the full recommended list was prioritized and organized under the UN Decade Principles. Table 1 provides an overview of the 10 UN Decade Principles and corresponding 17 headline indicators. Appendix C links the headline, core, and secondary indicators to the UN Decade Principles and sample project goals. Appendix D provides a list of the additional project descriptors (metadata registration, project registration, and site detail variables).

The project descriptors are not nested under the UN Decade Principles, but generally align with the FERM system, which is managed by FAO and the UN Decade on Ecosystem Restoration Monitoring Task Force. The supplemental Restoration Project Information Sharing Framework – guide and shared variables spreadsheet contains all variable names, descriptions, links to global data standards and other references, minimum data reporting recommendations, notes for database managers, recommended or suggested sub-variables, metrics, and additional information.

Table 1

List of UN Decade Principles with corresponding headline indicators

UN Decade Principles	Headline indicator
PRINCIPLE 1: Ecosystem restoration contributes to the UN sustainable development goals and the goals of the Rio Conventions.	**Contributions to global commitments** Officially recognized contribution to national or regional commitments.
	Extent of restoration Extent of area undergoing restoration. Also aligns with Principle 4.
PRINCIPLE 2: Ecosystem restoration promotes inclusive and participatory governance, social fairness and equity from the start and throughout the process and outcomes.	**Stakeholders engaged** Types and diversity of stakeholders engaged.
	Stakeholder engagement activities Types of stakeholder engagement activities implemented. Also aligns with Principle 8.
PRINCIPLE 3: Ecosystem restoration includes a continuum of restorative activities.	**Categories of ecosystem restoration activities and approaches utilized** Major categories of restoration activities used in the restoration project or program (i.e., reducing societal impacts, remediation, rehabilitation, ecological restoration, other). A sub-indicator tracking categories or approaches to rehabilitation and ecological restoration is recommended for those projects.

UN Decade Principles	Headline indicator
PRINCIPLE 4: Ecosystem restoration aims to achieve the highest level of recovery for biodiversity, ecosystem health and integrity, and human well-being.	**Biodiversity target status** Changes in biodiversity status from pre-project baseline toward project targets, accounting for leakage.
	Ecosystem integrity Change in ecosystem integrity status from pre-project baseline toward measurable project goals, accounting for leakage.
	Social-economic benefits Change in delivery and sustainability of social-economic benefits from restoration from pre-project baseline toward measurable project goals, accounting for leakage. Also aligns with Principle 7.
	Carbon sequestration Estimated change in sequestered aboveground carbon, soil organic carbon, and blue carbon equivalents from pre-project baseline toward measurable project goals, accounting for leakage. Also aligns with Principle 7.
PRINCIPLE 5: Ecosystem restoration addresses the direct and indirect causes of ecosystem degradation.	**Degradation causes** Trends in ecosystem degradation causes (or drivers) from pre-project baseline toward measurable project goals.
PRINCIPLE 6: Ecosystem restoration incorporates all types of knowledge and promotes their exchange and integration throughout the process.	**Knowledge and experience** Capacity and diversity of technical expertise and experience applied to restoration project.
	Capacity building, skills, and knowledge development Change in levels of capacity, skills, and knowledge from pre-project baseline toward measurable project goals, including those needed for planning, implementation, and monitoring. Also aligns with Principle 8.
PRINCIPLE 7: Ecosystem restoration is based on well-defined short-, medium- and long-term ecological, cultural and socio-economic objectives and goals.	**Goals and objectives** Specific, relevant, and measurable goals and objectives, and timeline are included in restoration plan and used to measure effectiveness (e.g. following SMART criteria).
PRINCIPLE 8: Ecosystem restoration is tailored to the local ecological, cultural and socio-economic contexts, while considering the larger landscape or seascape.	**Landscape/seascape scale planning** Landscape or seascape scale considerations that align with local project planning.
PRINCIPLE 9: Ecosystem restoration includes monitoring, evaluation and adaptive management throughout and beyond the lifetime of the project or programme.	**Monitoring effectiveness** Elements of effective monitoring included in the plan and implemented.
	Adaptive management Key lessons learned, adaptive management processes, and mid-course corrections taken to address unforeseen challenges and improve outcomes. Also aligns with Principle 6.
PRINCIPLE 10: Ecosystem restoration is enabled by policies and measures that promote its long-term progress, fostering replication and scaling-up.	**Enabling governance conditions** Changes in enabling governance policies, mechanisms, and institutional conditions at the national and subnational levels from pre-project baseline toward measurable project goals.

Conclusion

While some of the contributors to the Framework argued for a relatively small number of possible shared indicators (e.g., 10), others wanted the shared indicators and other variables to capture additional detail to enable more precise measurement, evaluation, assessment, and potentially to increase the capability to conduct more project-level meta-analyses. The final Framework, thus, addresses both globally relevant fields (like extent of area undergoing restoration) as well as detailed ecological, social, and economic information relevant for each unique project.

SER and Climate Focus are pleased to have achieved the following key accomplishments with the production of Version 1.0 of the Restoration Project Information Sharing Framework:

In 2022, Climate Focus and SER will work with GRO partners and other interested parties to promote uptake of as many of the shared variables as possible into existing restoration databases and those under development.

Climate Focus and SER will also explore opportunities for further work, such as highlighting case studies demonstrating how the use of integrated and shared data can improve restoration delivery and linking the indicators to the UN 2030 Sustainable Development Goals. The Framework is a living tool that is intended to adapt and change as the field of restoration evolves.

- Connecting shared headline, core, and secondary indicators to the UN Decade Principles;
- Providing balance to connect the aggregation and reporting of country outputs (top-down type variables) with indicators and project descriptions useful to monitoring, evaluating, and improving restoration projects on the ground (bottom-up type variables); and
- Creating a flexible structure that allows organizations and restoration practitioners to quickly prioritize the variables that are most relevant to their projects, while providing the detail needed to allow for the potential integration of data collection, storage, and sharing systems).

Glossary

Indicator
A specific, observable, and measurable variable that can be used to show the changes or progress towards the attainment of a goal. (FAO FERM)

Indicator, Core
An indicator that is highly recommended to be included in monitoring and reporting systems, whenever possible.

Indicator, Headline
An indicator that is highly recommended to be included in monitoring and reporting systems, and that provides simple and clear information to decision-makers and the public about progress in ecosystem restoration, key factors determining ecosystem integrity, and whether restoration is moving society towards environmental sustainability. (Adapted from European Environment Agency)

Indicator, Secondary
An indicator that may be more applicable to specialized kinds of ecosystem restoration, or to add value to core or headline indicators.

Project Descriptor
A variable intended to identify the source of information, specific project details, or site information with which an individual project or program is associated. Project descriptor information may be static, or may change over time (e.g., an increase in project size, decrease in budget, change in project key contact).

Shared Variable
A feature of a data system that allows data on one system to be shared with another. In data management, at minimum a shared variable generally has an agreed name and data type.

Variable
A named unit of data that is assigned a value. If the value is modified, the name does not change. Some variables are mutable, meaning their values can change, while other variables are immutable, meaning their value, once assigned, cannot be deleted or altered (e.g., a unique record ID). All indicators and project descriptors are considered to be variables. (Modified from Computer Hope).

Appendix A: Participation

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Appendix B: Sample list of indicator sources

Variable Source	Database type
African Forest Landscape Restoration Initiative (AFR100)	Multilateral framework
Restoration Barometer	Multilateral framework
Framework for Ecosystem Restoration Monitoring (FERM)	Multilateral framework
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Indicators	Multilateral framework
Post-2020 Global Biodiversity Framework	Multilateral framework
UNCCD Progress Indicators for Strategic Objectives 1, 2, and 3	Multilateral framework
Sustainability Index for Landscape Restoration	Multilateral framework
The Economics of Ecosystem Restoration (TEER)	Multilateral framework
Funding Ecosystem Restoration in Europe	Project Database
Global FLR CO2 Removals Database	Project/country database
Restor	Project Database
Santa Barbara Restoration Project Database (SBRPD)	Project Database
SER Restoration Resource Center Database	Project Database
TerraMatch	Project Database
The Nature Conservancy's Coastal Restoration & Natural Infrastructure Project Database	Project Database
WOCAT Global Database on Sustainable Land Management (SLM)	Project Database
Costantini et al. (2016). Soil indicators to assess the effectiveness of restoration strategies in dryland ecosystems.	Report or Academic paper
Gatica-Saavedra et al. (2017). Ecological indicators for assessing ecological success of forest restoration: a world review.	Report or Academic paper
Mazón et al. (2021). Engagement increases people willingness to sustain restored areas beyond financial incentives.	Report or Academic paper
Muñoz-Rojas (2018). Soil quality indicators: critical tools in ecosystem restoration.	Report or Academic paper
NYDF Assessment Partners (2019). Protecting and Restoring Forests: A Story of Large Commitments yet Limited Progress. New York Declaration on Forests Five-Year Assessment Report.	Report or Academic paper
Romijn et al. (2019). Land restoration in Latin America and the Caribbean: an overview of recent, ongoing and planned restoration initiatives and their potential for climate change mitigation.	Report or Academic paper
Sewell et al. (2020). Technical Note on Methodology for the Global Restoration Commitments Database.	Report or Academic paper
Ecosystem Restoration Field Verification Standard V2.0	Standard/ Guidelines
ITTO Guidelines for Forest Landscape Restoration in the tropics	Standard/ Guidelines
IUCN Business and Biodiversity Programme (2017). IUCN Review Protocol for Biodiversity Net Gain: A guide for undertaking independent reviews of progress towards a net gain for biodiversity.	Standard/ Guidelines
Keenleyside et al. (2012). Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices.	Standard/ Guidelines
LandScale	Standard/ Guidelines
SER (2019). International Principles & Standards for the Practice of Ecological Restoration, 2nd Edition.	Standard/ Guidelines
Verra Climate, Community, & Biodiversity Standards (CCB)	Standard/ Guidelines
FAO & WRI (2019). The Road to Restoration	Tool
Land Degradation Surveillance Framework (LDSF)	Tool
Nature Map Explorer	Tool/Global Map
Restoration Opportunities Assessment Methodology (ROAM)	Tool
WRI Restoration Diagnostic Assessment Tool	Tool

Appendix C: Table of UN Decade Principles and corresponding goals, headline, core, and secondary indicators produced for the Framework.

See Restoration Project Sharing Framework – guide and shared variables spreadsheet for complete details for each indicator.

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 1: Ecosystem restoration contributes to the UN sustainable development goals and the goals of the Rio Conventions.	Ensure that ecosystem restoration contributes to global goals for sustaining healthy and biodiverse life on Earth.	**Contributions to global commitments (H)** Officially recognized contribution to national or regional commitments.	**Official acknowledgements** Certifications or verifications project has achieved (e.g. Forestry Stewardship Council, VERRA) that contribute to the SDGs or other global goals.
	Contribute to the implementation of ecosystem restoration at the largest scales that can be achieved.	**Extent of restoration (H)** Extent of area undergoing restoration. *Also aligns with Principle 4.*	
PRINCIPLE 2: Ecosystem restoration promotes inclusive and participatory governance, social fairness and equity from the start and throughout the process and outcomes.	Ensure inclusive and participatory governance.	**Stakeholders engaged (H)** Types and diversity of stakeholders engaged.	**Stakeholder awareness** Change in stakeholder and community awareness of value of restoration from pre-project baseline.
		Stakeholder engagement activities (H) Types of stakeholder engagement activities implemented. *Also aligns with Principle 8.*	
		Stakeholder engagement (C) Change in stakeholder and community engagement in restoration from pre-project baseline.	
		Representation in project governance (C) Underrepresented groups represented within project decision-making structure.	
	Protect rights and increase benefits.	**Elements of Free, Prior and Informed Consent (FPIC) incorporated into the project (C)** Whether stakeholder FPIC was practiced during the planning stages, including in relation to land tenure and land rights, and rights to project benefits.	
	Utilize appropriate planning tools and guidance to maximize project success.	**Technical planning tools (C)** Primary technical guidance used in restoration planning (e.g. FAO, IUCN, SER).	**Project review process** Review process carried out during the project planning or design phase.

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 3: Ecosystem restoration includes a continuum of restorative activities.	Foster a wide range of restorative activities, singly or collectively, which aim to protect and repair degraded ecosystems across the social-ecological continuum.	**Categories of ecosystem restoration activities and approaches utilized (H)** Major categories of restoration activities used in the restoration project or program (i.e., reducing societal impacts, remediation, rehabilitation, ecological restoration, other). A sub-indicator tracking categories or approaches to rehabilitation and ecological restoration is recommended for those projects.	**Species used in project** Species used in project, including plants, animals, fungi, lichens. Sub-indicators tracking origin of material used (genetic stock if known) and size and maturity of material used are also recommended.
		Restoration activities implemented (C) Types of project activities implemented (i.e., interventions, treatments). Sub-indicators tracking activities regarding vegetation cover or marine structures, invasive species, and soil and water are suggested.	
	Provide aftercare and maintenance to optimize ecosystem recovery.	**Aftercare and maintenance (C)** Types of aftercare or maintenance for seeds/plants/biota that are or were provided. A sub-indicator is recommended to track the length of time aftercare or maintenance for seeds/plants/biota is provided or planned. A sub-indicator tracking costs is suggested.	
	Maximize survival of translocated biota	**Survival (C)** Percent survival of installed/seeded plants or other translocated biota from pre-project baseline toward measurable project goals. A sub-indicator could track growth or reproduction of translocated biota.	
PRINCIPLE 4: Ecosystem restoration aims to achieve the highest level of recovery for biodiversity, ecosystem health and integrity, and human well-being.	Increase integrity, area, number, or viability of biodiversity targets identified by project goals within the focal restoration area.	**Biodiversity target status (H)** Changes in biodiversity target status from pre-project baseline toward measurable project goals, accounting for leakage.	
	Achieve the highest level of ecological recovery possible within the focal restoration area, given project and program-level goals.	**Ecosystem integrity (H)** Change in ecosystem integrity status from pre-project baseline toward measurable project goals, accounting for leakage. This is a composite indicator - see Core and Secondary indicators below and to the right.	**Ecosystem recovery** Recovery progress from pre-project baseline toward an agreed reference model.
		Native species richness (C) Change in richness of desirable native species from pre-project baseline toward measurable project goals.	**Presence of contaminants** Change in presence of contaminants, pollutants, or excess nutrients, from pre-project baseline toward measurable projects goals.

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 4 (continued): Ecosystem restoration aims to achieve the highest level of recovery for biodiversity, ecosystem health and integrity, and human well-being.		**Native species abundance (C)** Changes in native species abundance or relative abundance from pre-project baseline toward measurable project goals.	**Human-wildlife conflict** Change in number of human-wildlife conflicts affecting indicator species from pre-project baseline toward measurable project goals.
		Invasive species (C) Change in invasive species abundance or relative abundance from pre-project baseline toward measurable project goals. Also aligns with Principle 5.	**Reproduction and dispersal mechanisms** Changes in beneficial reproduction and dispersal from pre-project baseline toward measurable project goals.
		Beneficial connectivity of native ecosystems (C) Changes in beneficial connectivity between native ecosystems from pre-project baseline toward measurable project goals.	**Ecosystem productivity** Changes in ecosystem productivity, whether natural or anthropogenic, from pre-project baseline toward measurable project goals.
			Disturbance regimes Reestablishment of characteristic ecological disturbance regimes (e.g. periodic flooding or fire, grazing).
	Achieve and sustain the greatest net gain possible for ecosystem goods and services and human health and wellbeing within the focal restoration area, given project and program-level goals.	**Social-economic benefits (H)** Change in delivery and sustainability of social-economic benefits from restoration from pre-project baseline toward measurable project goals, accounting for leakage. This is a composite indicator - see Core and Secondary indicators below and to the right. *Also aligns with Principle 7.*	**Restoration-based livelihoods** Change in local community restoration-based livelihoods, including employment, from a pre-project baseline toward measurable project goals.
		Food, water, fuel security (C) Changes in food, water, fuel security from pre-project baseline toward measurable project goals.	**Other financial benefits** Financial benefits from restoration other than employment from pre-project baseline toward measurable project goals.
		Other social benefits (C) Changes in other social benefits from pre-project baseline toward measurable project goals.	**Security and self-sufficiency** Changes in owner or other occupant capacity for security and self-sufficiency from pre-project baseline toward measurable project goals.
		Duration of social-economic benefits (C) Timeframe during which benefits are expected to be produced or available.	

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 4 (continued): Ecosystem restoration aims to achieve the highest level of recovery for biodiversity, ecosystem health and integrity, and human well-being.	Achieve and sustain the greatest net gain possible for climate change mitigation and risk reduction within the focal restoration area, given project and program-level goals.	**Carbon sequestration (H)** Estimated change in sequestered aboveground carbon, soil organic carbon, and blue carbon equivalents from pre-project baseline toward measurable project goals, accounting for leakage. *Also aligns with Principle 7.*	
		Climate change adaptation/ disaster risk reduction (C) Contributions to climate change mitigation and disaster risk reduction.	
	Restore land cover to maximize benefits to nature and people.	**Land cover or marine structured habitat (C)** Changes in land cover or marine structured habitat from pre-project baseline toward measurable project goals.	
PRINCIPLE 5: Ecosystem restoration addresses the direct and indirect causes of ecosystem degradation.	Identify and eliminate or greatly reduce indirect and direct causes of degradation to the extent practicable. Maximize	**Degradation causes (H)** Trends in ecosystem degradation causes (or drivers) from pre-project baseline toward measurable project goals.	**Causes of degradation not addressed by project** Direct and indirect causes (or drivers) of ecosystem degradation not addressed by the restoration project.
		Causes of degradation addressed by project (C) Direct and indirect causes (or drivers) of ecosystem degradation addressed by the restoration project, including reducing risk.	**Degradation processes** Trends in ecosystem degradation processes from pre-project baseline toward measurable project goals.
PRINCIPLE 6: Ecosystem restoration incorporates all types of knowledge and promotes their exchange and integration throughout the process.	Ensure appropriate knowledge and technical capacity is integrated and employed, including local and indigenous knowledge.	**Knowledge and experience (H)** Capacity and diversity of technical expertise and experience applied to restoration project.	
	Increase knowledge and technical capacity among specific actors and stakeholders.	**Capacity building, skills, and knowledge development (H)** Change in levels of capacity, skills, and knowledge from pre-project baseline toward measurable project goals, including those needed for planning, implementation, and monitoring. *Also aligns with Principle 8.*	
PRINCIPLE 7: Ecosystem restoration is based on well-defined short-, medium- and long-term ecological, cultural and socio-economic objectives and goals.	Define and align short, medium, and long-term ecological and social-economic goals and objectives.	**Goals and objectives (H)** Specific, relevant, and measurable goals and objectives, and timeline are included in restoration plan and used to measure effectiveness (e.g., following SMART criteria).	**Reference model** If and how a reference model was constructed.
		Baseline assessment (C) Components of project baseline assessed.	

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 8: Ecosystem restoration is tailored to the local ecological, cultural and socio-economic contexts, while considering the larger landscape or seascape.	Increase beneficial exchanges with ecological, cultural, and social-economic systems operating at the landscape or seascape scale.	**Landscape/seascape scale planning (H)** Landscape or seascape scale considerations that align with local project planning.	
		Impacts at landscape/seascape scale (C) Changes in exchanges with external ecological, cultural, and social-economic systems, from pre-project baseline toward measurable project goals.	
PRINCIPLE 9: Ecosystem restoration includes monitoring, evaluation and adaptive management throughout and beyond the lifetime of the project or programme.	Ensure appropriate monitoring of environmental and social conditions throughout and beyond the lifetime of the project.	**Monitoring effectiveness (H)** Elements of effective monitoring included in the plan and implemented.	**Monitoring funding** Main sources of monitoring funding.
		Adaptive management (H) Key lessons learned, adaptive management processes, and mid-course corrections taken, to address unforeseen challenges and improve outcomes. *Also aligns with Principle 6.*	**Restoration evidence** Publication of project monitoring results in scientific literature, technical reports, educational documents, and media aimed at the public, in both print and video formats.
		Monitoring duration (C) Intended or completed monitoring duration (e.g., less than one year, 1-3 years, 3-5 years).	
		Monitoring frequency (C) How often monitoring is or was performed.	
		Monitoring responsibility (C) Identification of those responsible for monitoring.	
		Monitoring methods (C) Monitoring method categories employed.	
		Data sharing (C) How monitoring data are shared.	

UN Decade Principles	Sample Project Goals	Headline (H) and Core (C) Indicators	Secondary Indicators
PRINCIPLE 10: Ecosystem restoration is enabled by policies and measures that promote its long-term progress, fostering replication and scaling-up.	Ensure an enabling policy environment at both the short term and long term.	**Enabling governance conditions (H)** Changes in enabling governance policies, mechanisms, and institutional conditions at the national and subnational levels from pre-project baseline toward measurable project goals.	**Stakeholders and governance change** Participation of stakeholders in creation of ecosystem restoration policies and rules.
		Long-term resourcing and support (C) Long-term funding or other resourcing strategies to maintain or manage the restoration process or restored ecosystem into the future and prevent further degradation.	

Note: Headline indicators that align with other principles are noted as such, but core and secondary indicators have not yet been evaluated for alignment with other principles. The 'sample project goals' column is included for reference, to illustrate how indicators can be aligned with possible goals.

Appendix D: Recommended Project Descriptors

Section Name	Project Name	Priority	Description
Metadata registration	Project ID	Core	Unique record ID generated by each database collecting project information.
Metadata registration	Individual name	Core	Name of the person submitting the project information.
Metadata registration	Email	Core	Email address of individual submitting the information.
Metadata registration	Name of organization, agency, or institution	Core	Name of the organization, agency, or institution of the person submitting the information.
Metadata registration	Organization, agency, or institution role	Core	Role of the organization, agency, or institution submitting the information, using IATI Standard.
Metadata registration	Date of information submittal	Core	Date of creation of a unique data record.
Metadata registration	Data version	Core	Choice of original submittal or update.
Metadata registration	Public access to data	Core	Is the data open access?
Metadata registration	Project information languages	Secondary	Language(s) of project information.
Metadata registration	Acceptance of conditions	Secondary	Whether the respondent accepts the condition of submitting the data submittal.
Project Registration	Title of project or program	Core	Main title of the project or program for which information is being entered.
Project Registration	Project or program hierarchy	Core	Whether the project or program is/was part of a larger planning unit.
Project Registration	Name of lead entity	Core	Name of organization with primary responsibility for the project or program.
Project Registration	Lead entity type	Core	Category of project lead entity.
Project Registration	Partner organization(s)	Core	Primary collaborating organizations.
Project Registration	Description of project	Core	Executive summary of project.
Project Registration	State of progress	Core	Categorization of project progress at time of submittal.
Project Registration	Project start date	Core	Date when project activities started.
Project Registration	Project end date or estimated end date	Core	Date when project activities finished or are projected to finish.
Project Registration	Total budgeted expenses	Core	Total financial expenditures planned or expended.
Project Registration	Main source of funds	Secondary	Main sources of funding for the project.
Project Registration	Project motivation	Core	The motivation for the project, which may be different from the goals and objectives.
Site Details	Country name	Core	Country of implementation of the project or program.
Site Details	Subnational region (level 1)	Core	Province/state.
Site Details	Site name or names	Core	Specific place name if it exists.
Site Details	Spatial extent of project or program	Core	Coordinate of project location(s) or polygon(s) of restoration area.
Site Details	Ecoregion	Secondary	Terrestrial or marine ecoregion.
Site Details	Historical Biome / Ecosystem Functional Group	Secondary	Pre-degradation biome / ecosystem functional group using IUCN Global Ecosystem Typology 2.0.
Site Details	Overlap with area of conservation concern	Secondary	Overlap with protected areas, biodiversity hotspots, or red listed ecosystems.
Site Details	Regional land tenure	Secondary	Primary regional land tenure or ownership types in the surrounding landscape.
Site Details	Land tenure of the project site	Secondary	Land tenure of project site or area.
Site Details	Unplanned disturbances or events	Core	Unplanned disturbances or events during implementation at or in the vicinity of the project site.

Restoration Project Information Sharing Framework

CLIMATE FOCUS

SER SOCIETY FOR ECOLOGICAL RESTORATION

UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030