Publication Date:
14/11/2023

Methodology:
M001

Version:
V1.0

Contact:
Ecosystem Restoration Standard
25 Rue de Frémicourt
75015 Paris, FRANCE
info@ers.org

GUIDELINES

Reference Ecosystem

SUMMARY

This document provides Developers with guidelines on how to select a Reference Ecosystem that is appropriate in the context of ERS Project Certification. It also sets forward the methodology to assess the ecosystem's state. ERS's approach to assess the state of the Reference Ecosystem is based on SER Australasia's work.

Table of *Contents*

Table of Contents **1**

Reference Ecosystem Selection **2**

DEFINITION 2

GUIDING PRINCIPLES 2

Selection of the Reference Ecosystem 2

METHODOLOGY 4

REFERENCE 6

Reference Ecosystem

Selection

DEFINITION

SER Australasia describes a Reference Ecosystem as an ecosystem that is the target of a restoration project. It represents the non-degraded version of the ecosystem, complete with its flora, fauna (and other biota), functions, processes and successional states that would have existed on the restoration site had degradation, damage or destruction not occurred. ERS adopts this definition of Reference Ecosystem.

The Reference Ecosystem can be an actual site (the Reference Site - a physical area/location) or a conceptual model synthesised from numerous reference sites, field indicators and historical and predictive records, the latter not being adopted by ERS.

ERS's methodologies for CO2 sequestration calculation, and ecological recovery planning and assessment, are based on the usage of Reference Ecosystems, coupled with local, traditional and scientific knowledge.

GUIDING PRINCIPLES

Selection of the Reference Ecosystem

1. The Reference Site must:

    1.1. Be accessible for the Developer to collect reference data to inform the baseline and, when necessary, be validated during the Validation Audit.

1.2. Have not undergone significant anthropogenic disturbance in the last ten years. This will be monitored by ERS using satellite imagery to assess land cover degradation.

2. The Reference Ecosystem must present the following **six key attributes**[1]:

2.1. **Absence of threats:** direct degradation drivers impacting the ecosystem's health, such as over-utilisation, contamination, and invasive species, are minimal or effectively absent.

2.2. **Physical conditions:** the properties required to sustain the ecosystem, such as soils, water, and topography, are present, and their physical and chemical conditions are appropriate.

2.3. **Species composition:** the array and relative proportions of organisms, native species characteristic of the appropriate ecosystem are present, whereas invasive species are minimal or effectively absent.

2.4. **Structural diversity:** the physical organisation of living and non-living elements (e.g. forest layers and food webs), the appropriate diversity of key structural components, including demographic stages, faunal trophic levels, vegetation strata, and spatial diversity, are present.

2.5. **Ecosystem function:** when assessing the roles and processes arising from interactions among living and non-living elements, the appropriate levels of growth and productivity, nutrient cycling, decomposition, habitat, species interactions, and types and disturbance rates are present.

2.6. **External changes:** the flows between sites and the surrounding environments of the ecosystem are appropriately integrated and connected to allow for abiotic and biotic flows and exchanges.

3. These attributes must be used to characterise the Reference Ecosystem, evaluate baseline conditions on the Reference Sites, and provide key indicators for the Project's desired restoration outcomes.

[1] The Reference Ecosystem guiding principles, including the six key attributes, the scoring systems, and the Recovery Wheel were developed by SER Australasia and adapted to ERS's needs by ERS.

METHODOLOGY

To determine the state of the Reference Ecosystem and assess the different attributes, the Field Assessment must be completed at the Reference Site. The assessment is performed using ERS's App.

Following the Field Assessment, an ERS Certification Agent will transfer the data imputed by the Developer into the Ecological Recovery Assessment Tool, resulting in the Recovery Wheel.

The Recovery Wheel is the visualisation tool of the assessment and helps track the progress of restoration efforts by comparing it to the Reference Ecosystem.

Below are the values and conditions adopted by ERS to rate all attributes.

Score/ Attribute	One	Two	Three	Four	Five
Absence of threats	Some direct degradation drivers (e.g. over-harvesting, overgrazing, active contamination) are absent and conservation status secured, but others remain high in number and degree.	Direct degradation drivers (including, e.g. sources of invasive species, absence of appropriate natural disturbances) intermediate in number and degree.	The number of direct degradation drivers is low but some may remain intermediate in degree.	Direct degradation drivers, both external and onsite, are low in number and degree.	Threats from direct degradation drivers are minimal or effectively absent.
Physical conditions	Most physical and chemical properties of the	Physical and chemical properties of	Physical and chemical properties of	Physical and chemical conditions of	Physical and chemical conditions of

	site's substrates and hydrology (e.g. observable soil structure, nutrients, and hydrological conditions) are highly damaged.	substrates and hydrology, remain at poor state but are capable of supporting some biota of reference ecosystem.	substrates and hydrology stabilised and capable of supporting the growth and development of many characteristic native biota.	substrates and hydrology suitable for ongoing growth and recruitment of most characteristic native biota.	substrates and hydrology show evidence they can indefinitely sustain all characteristic species and processes.
Species composition	Some colonising native species are present. Very high levels of non-native invasive or undesirable species.	A small subset of characteristic native species is present. High to moderate levels of non-native invasive or undesirable species.	A subset of key native species is present.	Substantial diversity of characteristic biota is present on the site and representing a wide diversity of species groups. No inhibition by undesirable species.	High diversity of characteristic species across the site; improved potential for colonisation of more species over time.
Structural diversity	One horizontal stratum is present (overstory, understory, herbaceous layer or forest floor) but absence of spatial patterning and trophic complexity.	More than one stratum is present (overstory, understory, herbaceous layer or forest floor) but low levels of spatial patterning and trophic complexity.	Most strata present (overstory, understory, herbaceous layer or forest floor) and intermediate levels of spatial patterning and trophic complexity.	All strata of the reference present (overstory, understory, herbaceous layer and forest floor) and substantial levels of spatial patterning and trophic complexity.	All strata present (overstory, understory, herbaceous layer and forest floor) and high levels of spatial patterning and trophic complexity.

Ecosystem function	Processes and functions (e.g. water and nutrient cycling, habitat provision, appropriate disturbance regimes and resilience) are at a very foundational stage only.	Low numbers and levels of physical and biological processes and functions (including growth, decomposition, and soil processes), are present.	Intermediate numbers and levels of physical and biological processes and functions (including reproduction and dispersal) are present.	Substantial levels of physical and biological processes and functions (including the return of appropriate disturbance regimes) are present.	All functions and processes (including appropriate disturbance regimes) are showing evidence of being sustained.
External exchanges	Positive exchanges and flows with the surrounding environment (e.g. species, genes, water, fire) in place for only very low numbers of species and processes.	Positive exchanges with the surrounding environment are in place for a few characteristic species and processes.	Positive exchanges between the site and the surrounding environment are in place for intermediate levels of characteristic species and processes.	Positive exchanges with the surrounding environment are in place for most characteristic species and processes and are likely to be sustained.	Evidence that exchanges with the surrounding environment are high and likely to be sustained.

Ecosystem Restoration Standard

info@ers.org | www.ers.org