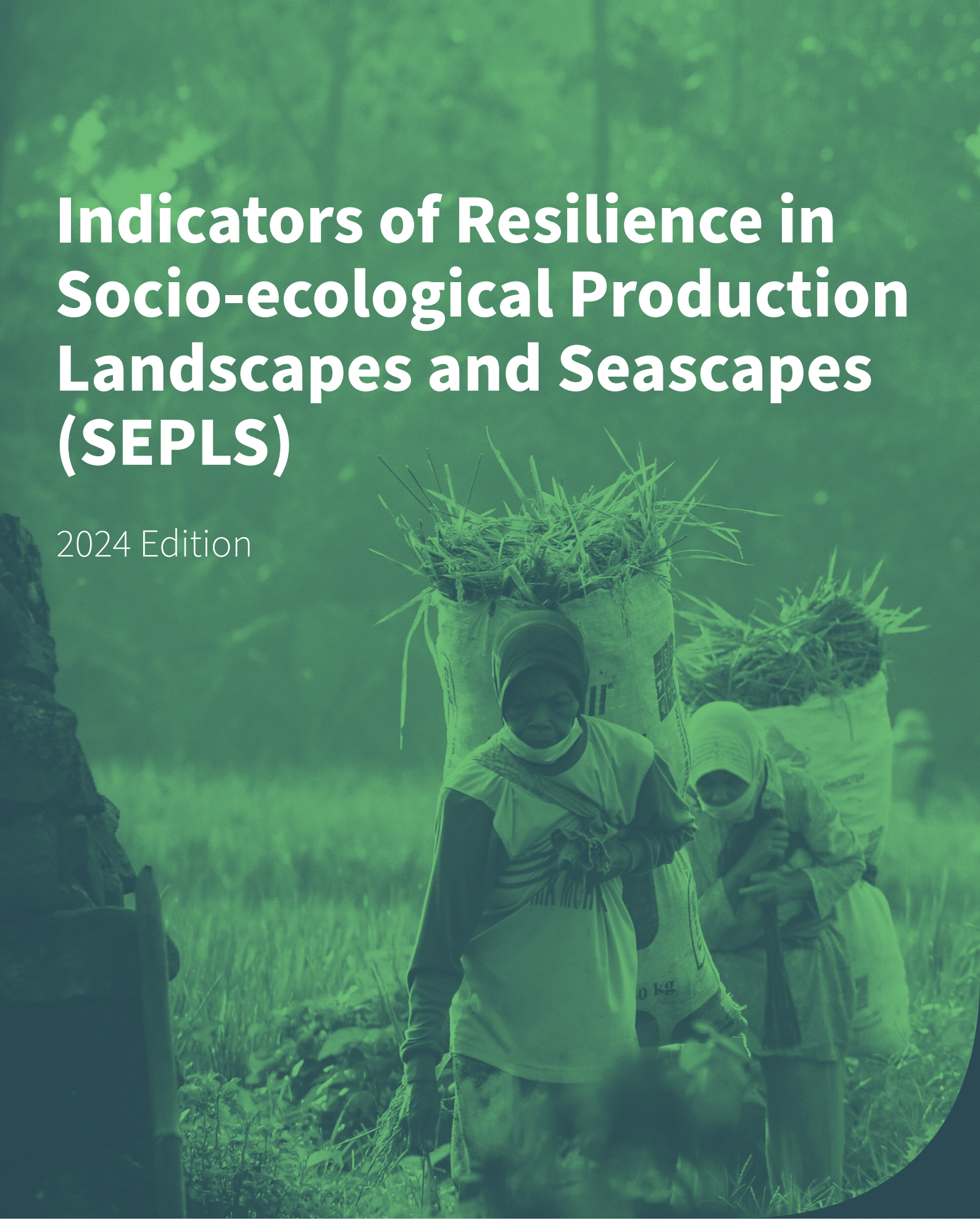
Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (SEPLS)

2024 Edition



UNU IAS

SATOYAMA INITIATIVE

Alliance Bioversity & CIAT

IGES Institute for Global Environmental Strategies

UNDP

Citation

UNU-IAS, Alliance of Bioversity International and CIAT, UNDP GEF-SGP and IGES (2024) Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (SEPLS): 2024 Edition.

Acknowledgements

The Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes were developed in 2012 under the International Partnership for the Satoyama Initiative (IPSI). These indicators were created to help IPSI partners and other communities assess, plan and monitor their progress toward socio-ecological resilience.

The IPSI Secretariat decided to update the indicators after receiving feedback from users who suggested simplifying the language to make them more accessible.

In addition, given recent developments in biodiversity policies, such as the adoption of the Kunming-Montreal Global Biodiversity Framework, it was suggested that more detailed elements be integrated into the indicators without changing their original purpose.

The indicators were revised with input from IPSI members and partners who have extensive experience using them at the community level.

IPSI gratefully acknowledges the support of the Ministry of the Environment, Japan.

List of contributors

Suneetha M. Subramanian (UNU-IAS)
Alexandra Franco Guajardo (UNU-IAS)
Nadia Bergamini (Alliance of Bioversity International and CIAT)
Maurizio Farhan Ferrari (Forest Peoples Programme)
Rissa Edoo (UNDP GEF-SGP)
Terence Hay-Edie (UNDP GEF-SGP)
Yoji Natori (Akita International University)
Guido Guilandi (Associazione Grani Antichi Montespertoli)
Fumiko Nakao (Ministry of the Environment, Japan)
Paulina Karimova (National Dong-Hwa University)
Saxena Krishna Gopal (Jawaharlal Nehru University, School of Environmental Science)
Anil Kumar (M. S. Swaminathan Research Foundation)
Dambar Pun (Back to Nature)
Maiko Nishi (UNU-IAS)
Makiko Yanagiya (former UNU-IAS)
William Dunbar (former Conservation International)

Table of Contents

Foreword

Observing members of the International Partnership for the Satoyama Initiative (IPSI) use the Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (SEPLS) with ease, I have witnessed these indicators become one of the most effective tools for not only measuring but also raising awareness of the concept of resilience in the field of sustainable development.

The unique strength of these indicators, first developed by the Alliance of Bioversity International and CIAT and the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) in 2012, lies in their focus on community perceptions rather than hard, quantifiable metrics. This approach encourages community members to reflect on and discuss their landscape and seascape resilience, fostering a sense of ownership over management processes and potentially leading to more sustainable outcomes.

This version of the indicators is an updated set developed in response to feedback from communities that have used them. The upgrades include language simplification for broader accessibility and integration with new biodiversity policies, such as the Kunming-Montreal Global Biodiversity Framework (GBF). Additionally, the indicators now better align with important frameworks like National Adaptation Plans and Sustainable Development Goals (SDGs).

These enhancements, based on practical insights from extensive field testing, provide clearer guidance and greater usability.

As resilience becomes a central theme in global discussions on biodiversity and sustainability, I am proud to see these resilience indicators positioned for mainstream use. I am confident that they will help communities gain a deeper understanding of their landscape and seascape resilience, leading to enhanced sustainability for the future.

Professor Alfred Oteng-Yeboah
Chair, IPSI Steering Committee
Ghana National Biodiversity Committee

Chapter I: Introduction

The indicators are a tool for engaging local communities in the adaptive management of the landscapes and seascapes in which they live. By using them as analytical tools, communities can increase their capacity to respond to social, economic and environmental pressures and shocks to improve their environmental and economic conditions. This, in turn, can lead to improvements in their environmental and economic conditions, ultimately bolstering the social and ecological resilience of their landscapes and seascapes.

The recommended approach is centred on holding participatory assessment workshops involving discussion and a scoring process for a set of twenty indicators designed to capture communities' perceptions of factors affecting the resilience of their landscapes and seascapes.

The book is divided into two chapters. Chapter I explains the update to the indicators and their purpose, uses and benefits. It also covers three basic concepts: landscapes and seascapes, socioecological production landscapes and seascapes (SEPLS), and resilience.

Chapter II introduces and provides a description of the twenty indicators.

I. Updating the Indicators

The **Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (SEPLS)** were developed in 2012 by Bioversity International, now the Alliance for Bioversity International and CIAT, and the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) to help communities self-assess, plan strategically and monitor their socio-ecological resilience.

Strengthening the resilience of Bhutan's Gamri Watershed through community-led projects. Photo: UNDP Bhutan

Over the past decade, these indicators, also known as the SEPLS Resilience Indicators, have been valuable for identifying areas in need of improvement and measuring the resilience of various landscapes and seascapes. Following their widespread adoption, feedback indicated a need to simplify the indicators for better accessibility and usability at the community level.

In 2024 the indicators were updated, taking into account the following factors:

- **Language simplification:** Simplifying the language of the indicators makes them more accessible to a broader range of communities, enhancing understanding and engagement at the local level.

- **Integration of new biodiversity policies:** With the adoption of the Kunming-Montreal Global Biodiversity Framework (GBF), it became essential to incorporate more nuanced elements. This integration allows the indicators to remain relevant and aligned with contemporary biodiversity policies and frameworks.

- **Relevance to other frameworks:** The updated indicators aim to capture actions pertinent to other important initiatives, including National Adaptation Plans, One Health approaches, and local actions towards the Sustainable Development Goals (SDGs).

- **Community feedback:** The revision process included inputs from IPSI members and partners with extensive experience using the indicators at the community level. The updates reflect practical insights and meet the needs of the communities they are designed to serve.

By addressing these areas, the updated SEPLS Resilience Indicators provide a more effective and user-friendly tool for communities to engage in resilience-building activities, ensuring that they can better navigate and adapt to social, economic, and environmental challenges.

The updates do not intend to aggregate scores across different contexts but rather to catalyze local actions that contribute to resilience.

The SEPLS Resilience Indicators were initially developed in 2012 as a Collaborative Activity under the International Partnership for the Satoyama Initiative (IPSI).

The Satoyama Initiative is a global effort to spread awareness that protecting biodiversity entails the protection of both wild and human-influenced natural environments, such as farmland and secondary forests, which have been managed sustainably over a long time. It is also an effort at thoughtful action towards conserving and using natural resources.

The Satoyama Initiative was collaboratively established by the Ministry of the Environment of Japan (MOEJ) and UNU-IAS at the 10th meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 10) in 2010. From its inception, the Satoyama Initiative has taken a global perspective and sought to consolidate expertise from around the world regarding the sustainable use of resources in socio-ecological production landscapes and seascapes (SEPLS). To this purpose, on 19 October 2010 at CBD COP 10, IPSI was established to promote the activities identified by the Satoyama Initiative.

Fifty-one organizations entered the partnership as founding members. As of 2024, membership had grown to over 300. As an international platform open to organizations dealing with SEPLS, IPSI seeks to foster synergies in the implementation of their respective activities and initiatives on biodiversity conservation and sustainable development. To date, over 60 IPSI Collaborative Activities have been initiated under IPSI. For more information on IPSI, please visit satoyama-initiative.org.

The SEPLS Resilience Indicators were tested in the field by Alliance for Bioversity International and CIAT in Bolivia, Burkina Faso, Cuba, Ethiopia, Fiji, Kenya, Mongolia, Nepal and Uganda, and in selected areas in twenty countries participating in the Community Development and Knowledge Management for the Satoyama Initiative Programme of the United Nations Development Programme (UNDP-COMDEKS). These tests were part of a baseline-assessment and community-consultation process to help measure and understand the resilience of target landscapes and seascapes.

In 2014, the results of these assessments were used to identify suitable community-based activities in each SEPLS to enhance their resilience. Based on these findings, the indicators were revised, and a comprehensive toolkit for measuring resilience was created in 2014 by Alliance for Bioversity International and CIAT, the Institute for Global Environmental Strategies (IGES), the United Nations Development Programme (UNDP), and UNU-IAS as part of an IPSI Collaborative Activity. This toolkit is the Toolkit for the Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes.

II. What is a Landscape and Seascape

These terms refer to more than just physical spaces; they are concepts that encompass multifunctional mosaics of ecosystems or land and sea use that involve multiple stakeholders and interactions between humans and nature. These different elements that make up a landscape or a seascape are interconnected, meaning that they rely on each other to function properly.

Landscape and seascape boundaries can be defined in different ways. Ecological boundaries might be where land meets water or the transition from plains to mountains. Administrative boundaries could be municipal borders or community limits.

Stilt fishers in Sri Lanka. Photo: Daniel Klein via Unsplash

The diversity within a landscape or seascape depends on factors like geography, water systems, soil, vegetation and human influence. For instance, a landscape might include protected areas or sacred areas, crops, human settlements and infrastructure. Similarly, a seascape could feature protected areas, fishing areas, coasts, open oceans and aquaculture sites.

The composition (what is contained) and configuration (how things are arranged) of a landscape or seascape affect its ecological integrity. Ecological integrity refers to how well ecosystems can function naturally. Those with high integrity can support a wide range of species and functions, while degraded ones struggle to do so. Connectivity between different parts of the landscape is crucial for maintaining ecological integrity, whereas barriers can disrupt it. Examples of barriers can include fences or dams (which

are structural disruptions to natural movements) and pollutants, which may harm biodiversity like pollinators and other wildlife.

Ecosystem services, such as food production or flood control, depend on the integrity of the ecosystems. For instance, healthy grasslands can provide various services like erosion control and habitat for diverse species, while degraded ones cannot. Similarly, free-flowing rivers support coastal ecosystems and fish migration, whereas dams disrupt natural processes.

For more information on the concept of landscape approaches, please refer to Using Landscape Approaches in National Biodiversity Strategy and Action Planning.

III. Socio-ecological Production Landscapes and Seascapes

Humans have influenced most of the Earth's ecosystems through production activities such as agriculture, forestry, fisheries, herding and livestock production. While human impacts are often thought of as harmful to the environment, many such human-nature interactions are, in fact, favourable to or synergistic with biodiversity conservation.

Around the world, local communities have been making long-term efforts to adapt to their surrounding environments and continuously enjoy their bounty. They have created unique and sustainable landscapes and seascapes that have provided humans with goods such as food and fuel, and services such as water purification and rich soil, while hosting a diversity of animal and plant species.

These landscapes and seascapes vary widely due to their unique local climatic, geographic, cultural and socio-economic conditions. Yet, they are commonly characterized as dynamic bio-cultural mosaics of habitats and land and sea uses where the interaction between people and the landscape maintains or enhances biodiversity while providing humans with the goods and services needed for their well-being.

Rice Farmers in Ishikawa, Japan. Photo: FAO / Kazem Vafadari

SEPLS have protected biodiversity and provided local communities with ecosystem services around the world for many years. However, with rapidly growing human demands for food and other goods in recent years, as well as changes in socio-economic systems due to industrialization, urbanization and globalization, diverse production areas have been transformed towards more uniform systems requiring intensive use of external inputs such as chemical fertilizers, pesticides and herbicides.

Over time, this has had significant impacts on the associated biodiversity and ecosystems that underpin agricultural production activities. These impacts can be measured in terms of loss of resilience and sustainability in production areas

to an extent that threatens human well-being due to the degradation of natural resources and reductions in ecosystem services.

IV. Resilience in SEPLS

Local communities and the ecosystems they live in may experience pressures and disturbances of different types and degrees, from extreme weather events to market shocks and profound demographic and institutional changes.

Forests, farmlands, lakes and other habitats are affected by fires, storms and droughts, and nearly all landscapes and seascapes are affected to some degree by human-induced pressures such as pollution, soil erosion, deforestation and introduction of invasive species that can lead to ecosystem degradation. Events such as political unrest and economic crises impact human societies, causing changes to the way ecosystem goods and services are used.

During baseline assessment in Niger, stones are used as markers. Photo: UNDP GEF-SGP Niger / Bassirou Dan Magaria.

These disturbances can directly and indirectly affect the livelihoods of local communities, for example through higher input prices, reduced production and lower crop prices. In addition to the impacts from these shocks and short-term disturbances, ecosystems are influenced by relatively gradual but continuous changes in the climate and socio-cultural practices and institutions.

While some changes may cause critical damage to ecosystems and people's livelihoods, SEPLS vary in the degree to which their communities can absorb, resist or recover from these impacts. The ability of SEPLS to absorb or recover —in terms of both ecosystem processes and socio-economic activity— from various pressures and disturbances without lasting damage is what is referred to as "resilience." More generally, resilience refers to the "capacity of a system to deal with change and continue to develop; withstanding shocks and disturbances and using such events to catalyze renewal and innovation."[1] Maintaining resilience in SEPLS is crucial for securing ecosystem services and sustainable production systems for the long term, which will benefit local communities and contribute to global sustainable development objectives.

Strengthening of SEPLS resilience by local communities

The long-term persistence of community-managed SEPLS that employ appropriate management and use of natural resources and biodiversity defines them as resilient systems. Nevertheless, many communities face growing challenges in maintaining these landscapes and the social and ecological processes that sustain them, especially in the face of rapid and often interrelated changes in socio-economic systems, accelerated by increasing climate change and ecosystem

degradation. Communities, as the primary managers of the processes and resources of SEPLS, must reinforce existing management practices and institutions, and innovate in order to adapt to these changes and restore or strengthen the social and ecological resilience of their landscapes and seascapes.

Resilience in SEPLS is a product of ecological, social, cultural and economic systems, dynamically linked to each other in ways that create synergies. Improvements in ecosystem services, for example, may require the adoption of new methods of natural resource management or new types of diversity in crops, animals and associated species. It may also require appropriate local governance mechanisms, including agreed-on rules on resource access, use and exchange, which may be embedded in formal or non-formal institutions. Increased sustainability of agro-ecosystems may require that access and equity issues be addressed, such as support for the role of women in crop selection, production and marketing.

The management of interlocking social and ecological systems requires the capacity to accept and cope with complexity and continuing adaptation. This capacity is associated with rural communities that depend on the wide range of functions, products and services that their landscapes provide. The resilience indicators are designed to contribute to a community's sense of ownership over the planning, implementation, monitoring and evaluation of their production and resource-management practices. Lessons and knowledge generated by these activities can then be used to communicate local visions and strategies for resilient landscapes and productive ecosystems as input into higher-level policies and programmes that affect community livelihoods as well as further conservation and resource-management planning.

V. About the Indicators

Local communities require a more complete understanding of the status and changes in conditions in their landscapes and seascapes in order to strengthen resilience. However, resilience can be difficult to measure precisely because it is complex and multifaceted. Instead of attempting to define an overall measure of resilience for SEPLS, these indicators are designed to encourage discussions on their essential attributes.

The Indicators of Resilience in SEPLS comprise a set of 20 indicators designed to capture different aspects of key systems —ecological, agricultural, cultural and socio-economic. They include both qualitative and quantifiable indicators, but measurement is based on the observations, tallies, perceptions and experiences of the local communities themselves. They are to be used flexibly and can be customized to reflect the circumstances of each particular landscape or seascape and its associated communities.

The spatial scale of SEPLS, in the context of using the indicators, depends on how local community members themselves identify the area they depend on for their survival and livelihood. It generally includes the mosaic of land uses from which communities derive the goods and services on which they depend directly or indirectly and where they directly impact the resource base and regular interactions with the natural biodiversity. A SEPLS may be delineated by administrative boundaries (e.g., a national park or state borders),

[1] *Stockholm Resilience Center (2014) What is Resilience?. https://www.stockholmresilience.org/*

geographic boundaries (e.g., a watershed) or by other factors.

Discussing the results of the indicators scoring exercise in plenary, Khotont district, Mongolia. Photo: Alliance Bioversity International - CIAT / Ronnie Vernooy

The indicators aim to provide communities with a framework for discussion and analysis of socio-ecological processes essential for SEPLS resilience. This relates to critical livelihood and development objectives such as food security, agricultural sustainability, institutional and human development, provision of ecosystem services and conservation of biodiversity, strengthening of community- and landscape-level organizations, and landscape governance for equity and sustainability.

Discussion of the indicators within communities stimulates knowledge-sharing and analysis, which are key factors in creating social capital for landscape governance, planning and management, and fosters community ownership of this process. Periodic use of these indicators enables evaluation of progress towards development and sustainable management objectives and identification of priority actions for local innovation and adaptive management.

The indicators can contribute to local communities and other stakeholders in the following areas:

- **Understanding SEPLS resilience**

The indicators provide an analytical framework for understanding resilience and its status and changes in SEPLS. They are defined and measured in terms that are easy for local communities to understand and use and can be adapted for successive analyses. Users can understand resilience as a multidimensional objective by assessing current conditions and trends in different aspects of SEPLS.

- **Supporting the development and implementation of resilience-strengthening strategies.**

The indicators can help to identify and track social processes, institutions and practices for land-use, conservation and innovation that are part of a resilient system's capacity to adapt and change. Through review and discussion of assessment results, communities can learn what areas and factors to focus on, which may include components of agricultural biodiversity, food security, ecosystem services, livelihood, governance and others.

- **Enhancing communication between stakeholders**

Because they provide a framework with a common set of parameters, the indicators can enhance the exchange of experiences and information within and beyond SEPLS and their communities, for example, between upstream and downstream

communities and among communities in different geographic regions.

- **Empowering communities in decision-making processes and adaptive management**

Using the indicators facilitates continuous discussion and participation within local communities, leading to knowledge of what works and what does not. This kind of adaptive management model promotes a greater sense of ownership among the people living in SEPLS, encouraging them to be active at the policymaking level. Using the indicators as a framework for discussion also helps create consensus on what needs to be done to build or enhance resilience across the landscape and guide decisions and implementation.

VI. Who Can Benefit from Using the Indicators

While the indicators are primarily designed to be used by local communities, they have the potential to be valuable tools for others, such as NGOs, development agencies and policymakers. The indicators may also be helpful for researchers to understand SEPLS and how communities see their landscape or seascape. The role of facilitator may be more important in situations where it is difficult for communities to use the indicators on their own.

The following are some possible benefits for different users.

Local communities:

- Increase common understanding of SEPLS (e.g., conditions and threats to them) among and beyond community members
- Identify priority issues and actions for sustaining SEPLS that benefit livelihoods and well-being, and to evaluate past efforts that community has made
- Contribute to enhancing trust and social capital in communities and resolving conflicts
- Inform policymakers, donors, and relevant stakeholders on the situation of their SEPLS and necessary areas for support in a more efficient manner
- Exchange experiences with communities who have tried the indicators

NGOs and development agencies implementing projects in SEPLS:

- Enhance understanding of resilience from the perspective of local communities
- Promote participatory processes
- Monitor and evaluate project interventions on resilience and biodiversity conservation and identify areas for support
- Communicate with policymakers and donors on the situation of the SEPLS they are working with and necessary areas for support in a more efficient manner

Policymakers and project planners:

- Better understand local conditions from the perspective of local communities
- Improve communication with local communities
- Identify areas that need to be improved and reflect these in policymaking, planning, and other decision-making processes
- Increase coherence across different project sites by applying a common analytical framework and tools

Researchers:

- Enhance multi-dimensional understanding of local conditions from the perspective of local communities
- Deepen the understanding of resilience by examining results from different sites
- Identify research gaps

Assisting the Mongolian herders of Khotont district to understand the indicators.
Photo: Alliance Bioversity International - CIAT / Ronnie Vernooy

Chapter II: The Indicators

I. What the Indicators Measure

The indicators measure elements of SEPLS resilience that are, almost by definition, strongly interrelated. The practices and institutions that they describe can be grouped into five areas:

- **Landscape/seascape diversity and ecosystem integrity**
- **Biodiversity and sustainable management**
- **Knowledge integration and transfer**
- **Livelihoods and well-being**
- **Governance and social equity**

Section II List of Indicators provides more information on each area. **Section III Table of Indicators** provides a short description of how to use the indicators.

II. List of Indicators

LANDSCAPE/SEASCAPE DIVERSITY AND ECOSYSTEM INTEGRITY

Heterogeneous landscapes and seascapes that resemble natural patterns provide greater biodiversity benefits than intensively managed monocultures or marine environments where natural ecosystems like mangroves, seagrass beds or coral reefs have been heavily transformed by extractive practices. Resulting SEPLS are likely to support higher levels of biodiversity and be more resilient to external shocks than more simplified systems.

In the context of climate change, the protection and restoration of watersheds, forests and coastal ecosystems in SEPLS help regulate hydrology and microclimate, thereby providing a buffer against extreme weather events, floods and droughts.

Exercise A: How has the diversity of the landscape/seascape changed over the last 10 years and 50 years? Use both timescales to assess short-term and long-term changes. This can include changes in the ecosystems, vegetation, wildlife, etc.

Refer to **Table 1** in the next page for an example on how to start the assessment.

One helpful way to identify a landscape or seascape and ensure a common understanding of the target area is to have participants draw a map. This map should include natural resources, land uses, landmarks, and other important features such as agricultural lands, water resources, hunting or fishing areas, and buildings. Participatory SEPLS mapping is also an effective way to engage participants in discussion.

1. Landscape/seascape diversity

Indicator Description

1.1. Does the land/seascape have a diverse set (mosaic) of ecosystems?

For example, mountains, wetlands, agricultural lands, lakes, coasts, etc. Score from *High diversity* to *Low*.

This indicator intends to capture the extent to which the mosaic nature of the land/seascape is maintained. This is linked to the understanding that the higher the mosaic nature of a landscape, the more its capacity to be resilient to natural shocks.

Composed map of Datca Bozburun after the mapping exercise Photo: UNDP GEF-SGP Türkiye

Table 1

List current diversity of ecosystems in the area	Diversity of the area 10 years ago	Reasons for change	Diversity of the area 50 years ago	Reasons for change	Score for the current state of diversity

2. Ecological connectivity

2.1. Are different parts of the landscape/seascape managed in ways that allow for the integrity and good functioning of the different ecosystems (for example, connectivity between Protected Areas, other area-based conservation areas, and areas under productive sectors)?

Score from *Very high* to *Very poor.*

Indicator Description

A multifunctional land/seascape oriented towards sustainability allows the easy movement of various life forms and the flow of different ecosystem services (such as, water regulation and pollination). Ease of access for different actors for their needs is essential. Acknowledging that the land/seascapes could be under different governance or management regimes, ensuring connectivity between them for ecological reasons, is crucial.

3. Ecological vulnerability and resilience

3.1. Is the land/seascape prone to any natural calamities or shocks, including those caused by climate change and human activities?

For example, landslides, floods, droughts, etc. Identify the vulnerability and degree of risk from *Very high* to *Very low.*

3.2. Does the land/seascape have the capacity to cope, withstand, or recover from calamities or shocks?

Indicator Description

This indicator will capture the state of vulnerability to natural shocks of the land/seascape and, further, if coping and adaptation mechanisms are in place to overcome such shocks. This will help identify the degree of understanding that the community has regarding the risks they are likely to encounter and how prepared they are to adapt, overcome or recover.

For example, it can cope with flooding through long shorelines, mangrove forests, specific infrastructure, etc. Specify different coping or recovery mechanisms and processes, such as developing land use plans. Score from *Very high capacity* to *Very low capacity*.

Optional Exercise: Identify the vulnerability and degree of risk now, 10 years ago and 50 years ago and identify measures to cope and recover.

BIODIVERSITY AND SUSTAINABLE MANAGEMENT

The health of a landscape or seascape and the ecosystems it supports is reflected in part in the diversity of species living in it and their interactions. It also often forms the physical, cultural and spiritual bases of communities' well-being. Biodiversity contributes to community and landscape/seascape resilience by providing ecosystem services, which are sustained or degraded by the practices and institutions that regulate the use of natural resources.

Agricultural biodiversity includes species used for food, fodder, fibre and fuel, as well as the large number of non-harvested species in the wider landscape that benefit communities through the services they provide, such as pollinators, soil biota and regulators of pests and diseases. Agricultural biodiversity provides material for experimentation, innovation and adaptation.

The genetic diversity found in local crop varieties and animal breeds, expressed in important traits such as drought, cold and saline tolerance and resistance to pests and diseases, helps them adapt to various soil and climate conditions. Loss in diversity of these traits decreases options for risk management and adaptation.

4. Diversity of species with which communities actively interact

This could include species such as crop plants, animal breeds, fish, wild species, etc. For each species group, discuss and include the following separately:

Indicator Description

This indicator seeks to capture the diversity of species being used currently and further assess changes in the short term (last 10 years) and in the longer term (last 50 years) with reasons for changes, if any. Higher diversity implies higher resilience as there is a greater buffer against different types of risks and a healthier interaction between species.

Exercise B - Sustainable use practices:

Are sustainable practices being used to conserve and responsibly use resources?

For example, sustainable harvesting, agroecological farming, rotational fishing, rotational forestry, etc. Report on multiple activities as needed and indicate since when they have been practised.

This exercise is for participants to take stock of sustainable practices they are engaged in with respect to their different SEPLS production activities.

Exercise C - Innovation in sustainable practices:

Are new and innovative practices in production and conservation activities (agriculture, fisheries, forestry, and other practices) pursued to adapt to changing conditions, including climate change and other environmental and economic changes?

Discuss and list.

This exercise will help participants identify and record innovative practices they may have developed or adopted to address changing socio-environmental conditions for sustainability (resource use, input use, means of production, etc.) Both exercises B and C will help assess actions being taken to ensure diversity of biological resources and capacity to manage any risks.

4.1. Has this diversity changed over the last 10 and 50 years? Use both timeframes and provide reasons.

Score from *Improved greatly* to *Degraded*. See **Table 2** as an example of a discussion exercise.

4.2. How easily available are these diverse resources now?

Score from *Easily available* to *Scarce*.

KNOWLEDGE INTEGRATION AND TRANSFER

Communities strengthen their own resilience by experimenting, innovating and learning within and between different knowledge systems, cultures and age groups. Adaptation strategies may be novel or old, but generally build on bio-cultural or traditional knowledge. This knowledge is specific to the locations and cultures of given socio-ecological interactions. It is embodied in resource-use customs, agricultural traditions, local resources, biodiversity and historical events that have shaped their landscapes and seascapes. The maintenance of this knowledge increasingly depends on the ability of elders, parents and younger generations in a community to document and share it.

Photo: UNDP GEF-SGP Türkiye

5. Traditional knowledge promotion and integration

5.1. Are traditional and local knowledge and cultural traditions related to biodiversity (for example, agricultural practices, festivals, labour sharing, etc.) still practiced or integrated into production and management activities?

Score from *Actively practiced* to *Absent*.

Table 2

Species	Current diversity (low, medium, high)	Score for changes from 10 years ago	Reasons for change	Score for change from 50 years ago	Reasons for change

5.2. Are traditional knowledge and practices being documented and practiced to facilitate their transfer to future generations?

Score from *Very high* to *None*.

5.3. How accessible is education, taking into consideration affordability and the integration of experiential learning?

Score from *Conveniently located and affordable education that integrates experiential learning* to *Low access*.

5.4. Are women's knowledge, experiences and skills recognized and respected at the household, community and landscape level?

Score from V*ery high* to *None*.

Indicator Description

This indicator seeks to capture how well local, expert and indigenous knowledge and traditions related to biological resource use, conservation and values are sustained, promoted and actively integrated into SEPLS activities. This also includes ease of access to different sources of knowledge. Explicit acknowledgement and integration of different forms of knowledge ensures the continuance of patronage of cultural wisdom towards sustainable use of resources.

LIVELIHOOD AND WELL-BEING

The resilience of a production landscape or seascape is also dependent on the availability of efficient and functioning infrastructure such as communication, health and education to meet various community needs and aspirations. Livelihood improvement can be directly linked to the options and opportunities of community members to engage in a variety of sustainable income-generating activities developed through peoples' ingenuity and the biodiversity portfolio they have available.

6. Human health and environmental conditions

Report separately on each of the relevant items within each question linked to your context and grade from *Very good* to *Poor*.

6.1. How is the environmental quality (air quality, sanitation, water regulation, waste management, etc.)?

Score from *Very good* to *Poor*.

6.2. How is the quality of human health? This includes nutritional status, physical and mental health parameters and access to health care needs (hospitals, traditional medical experts).

Note: Score separately on the availability and adequacy of local resources for different health and well-being needs. For example, foods and resources to meet food and nutritional security.

Score from *Very good* to *Poor*.

6.3. How is the quality of animal health?

Note: Report separately for different animal groups with whom high interactions are present, from *Very good* to *Poor*.

6.4. How is the quality of human–wildlife interactions?

Score from *Harmonious co-existence* to *Conflicts*.

Indicator Description

For this indicator, different dimensions of health are considered- health of people, which is also dependent on the health of the environment and further, the health of animals. Called One Health, it is a recognition that unless tackled together, having a good quality of life would be challenging. The indicator, therefore, captures the health of these sub-components.

7. Income diversity and sustainability of biodiversity-based livelihoods

Exercise D: Are households engaged in diverse income-generating activities?

If yes, list them. For example, farming, livestock rearing, fishing, forestry, service-oriented activities, etc.

This exercise is to map the range of income generation activities in a SEPLS. This is to facilitate discussions on reducing risks by increasing diversity of economic activities. By diversifying income generation activities, the pressures on the environment could be lessened, and the ability to withstand economic and natural shocks will be enhanced.

7.1. Are households and communities able to move around between different production activities and locations as necessary?

For example, pasture grazing, rotational farming, collection of non-timber products, etc. Specify for each activity and score from *Easily move around* to *Restricted movements*.

Indicator Description

This seeks to capture how fair and just economic transactions in a supply chain of SEPLS products/ services are; the more equitable the system, the more indicative it is of a strong social capital that enables resilience.

7.2. Do livelihoods based on biodiversity follow sustainable and equitable practices?

For example, sustainable harvesting, fair and equitable transactions between different stakeholders (meaning all stakeholders are well acknowledged and get a fair price), ensuring diversity and conservation of resources, etc.

Note: Specify separately for each response. Scores from *Very high* to *None*.

Indicator Description

This also links to the question on ecological connectivity; it seeks to ascertain the ease with which traditional occupations can be followed and is dependent on governance regimes.

GOVERNANCE AND SOCIAL EQUITY

Gender and inequalities, social exclusion and marginalization can hinder the ability of women, indigenous groups and others to strengthen resilience. Women, youth and the elderly hold specific knowledge and skills related to biodiversity. For Indigenous communities, resilience is intrinsically linked with efforts to protect traditional ways of subsistence and cultural heritage. The ability to access ancestral lands and engage in traditional land use and agricultural practices are important conditions for communities to maintain biodiversity and associated traditional knowledge.

Exercise E: Map the different uses of the landscape/seascape and indicate the different governance regimes in each case, whether it is a protected area, co-managed, community-owned, etc. Indicate the current status, 10 years ago, 50 years ago and reasons for change.

See **Table 3** for an exercise example.

8. Rights to resources and social equity

8.1. Does the community have customary or formally recognized rights over land, pastures, waters and natural resources (e.g., ownership, use rights, cultural rights, rights of resources like rivers, etc.)?

Note: Report separately for different types of rights to resources. Score from *Very well established* to *None*.

8.2. Do all members of society in the landscape/seascape (specify across gender, social groups, youth, elderly, etc.) have fair and equitable access to opportunities and resources?

Note: Report separately for different groups. Score from V*ery well established* to *Poor*.

Indicator Description

This indicator is based on the premise that clear rights and responsibilities regarding resource access, use, benefits and related practices empower communities and their members to assert their autonomy and agency to pursue their occupations and ways of life, which is crucial for resilience.

9. Extent of co-management of landscape/seascape

9.1. Is there coordination and communication between and within communities to manage natural resources and ecosystems within the land/seascape?

Focus on self-governance, autonomy and agency
Score from *Very high* to *None*.

9.2. Is there a co-management system (joint management by different stakeholders sharing obligations, responsibilities and rights) for resources, ecosystems and development priorities within the land/seascape?

Score from *Very effective* to *None*.

Indicator Description

This indicator focuses on cooperation between communities in a land/seascape and further explores opportunities for sharing responsibilities and obligations between different actor groups in the landscape.

Photo: UNDP GEF-SGP Costa Rica

Table 3

Land/Sea use	Governance type now	Governance type 10 years ago	Governance type 50 years ago	Remarks, reasons for change or impacts

III. Table of Indicators

How to Use the Indicators

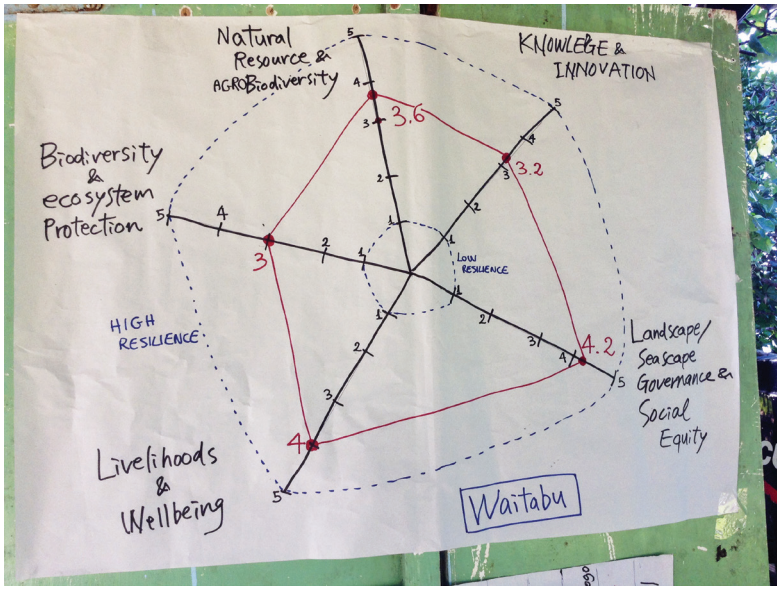
The indicators presented in the table below have been developed to guide the assessment of resilience during assessment workshops participated in by community members and others. Assessment entails assigning a score to each indicator in response to the questions in the table's second column. A score can be assigned to all indicators using either a **3-point scale** (e.g., low—medium—high) or a **5-point scale** (e.g., very high, high, medium or no-change, fair, poor). For consistency, only one scoring pattern should be used for all indicators.

The first column explains the indicators' purpose to facilitate understanding of the questions for scoring and to capture additional information during the group discussion. For example, when talking about the ecosystem diversity in a landscape and seascape it may be useful to refer to a participatory mapping exercise.

Notes can be found in the second column of some of the indicators. These are intended to facilitate answering questions with multiple scores, such as indicators that ask participants to score various elements or assess multiple timelines.

Fore detailed information about the Indicators of Resilience in SEPLS, including case studies and additional resources, please visit the dedicated webpage at the IPSI website: satoyama-initiative.org/featured_activities/indicators-of-resilience/.

UNU-IAS and the IPSI Secretariat welcome feedback based on practical implementation challenges and case studies to improve future editions. Please contact the IPSI Secretariat at **isi@unu.edu**.



Example of radar diagram from a workshop in Fiji. Photo: IGES / Ikuko Matsumoto.

Indicators description	Questions for scoring	Scores
Landscape/Seascape diversity and ecosystem integrity		
Exercise A: How has the diversity of the landscape/seascape changed over the last 10 years and 50 years? Use both timescales to assess short-term and long-term changes. This can include changes in the ecosystems, vegetation, wildlife, etc. Refer to **Table 1** on **page 15** for an example on how to start the assessment.		
1. Landscape/seascape diversity		
This indicator intends to capture the extent to which the mosaic nature of the land/ seascape is maintained. This is linked to the understanding that the higher the mosaic nature of a landscape, the more its capacity to be resilient to natural shocks.	1.1. Does the land/seascape have a diverse set (mosaic) of ecosystems? For example, mountains, wetlands, agricultural lands, lakes, coasts, etc.	Example of scoring with a 5-point scale (5) High diversity (4) Improved to some extent (3) No change rich diversity (2) Poor diversity (1) Low
2. Ecological connectivity		
A multifunctional land/seascape oriented towards sustainability allows the easy movement of various life forms and the flow of different ecosystem services (e.g., water regulation and pollination). Ease of access for different actors for their needs is essential. Acknowledging that the land/seascapes could be under different governance or management regimes, ensuring connectivity between them for ecological reasons is crucial.	2.1. Are different parts of the landscape/seascape managed in ways that allow for the integrity and good functioning of the different ecosystems (for example, connectivity between Protected Areas, other area-based conservation areas, and areas under productive sectors)?	Example of scoring with a 3-point scale (3) Very high (2) Medium (1) Very poor

Indicators description	Questions for scoring	Scores
3. Ecological vulnerability and resilience		
This indicator will capture the state of vulnerability to natural shocks of the land/seascape and, further, if coping and adaptation mechanisms are in place to overcome such shocks. This will help identify the degree of understanding that the community has regarding the risks they are likely to encounter and how prepared they are to adapt, overcome or recover.	3.1 Is the land/seascape prone to any natural calamities or shocks, including those caused by climate change and human activities? For example, landslides, floods, droughts, etc. Identify the vulnerability and degree of risk.	(3) Very high (2) Medium (1) Very poor
	3.2 Does the land/seascape have the capacity to cope, withstand, or recover from calamities or shocks?	(3) Very high capacity (2) Medium (1) Very low capacity
Optional Exercise: Identify the vulnerability and degree of risk now, 10 years ago and 50 years ago and identify measures to cope and recover.		

Indicators description	Questions for scoring	Scores
Biodiversity and sustainable management		
Exercise B – Sustainable use practices: Are sustainable practices being used to conserve and responsibly use resources? For example, sustainable harvesting, agroecological farming, rotational fishing, rotational forestry, etc. Report on multiple activities as needed and indicate since when they have been practised.		
Exercise C – Innovation in sustainable practices: Are new and innovative practices in production and conservation activities (agriculture, fisheries, forestry, and other practices) pursued to adapt to changing conditions, including climate change and other environmental and economic changes? Discuss and list.		
4. Diversity of species with which communities actively interact		
This indicator seeks to capture the diversity of species being used currently and further assess changes in the short term (last 10 years) and in the longer term (last 50 years) with reasons for changes, if any. Higher diversity implies higher resilience as there is a greater buffer against different types of risks and a healthier interaction between species.	4.1. Has this diversity changed over the last 10 and 50 years? Use both timeframes and provide reasons. See **Table 2,** on **page 18**, for an example of a discussion exercise.	(3) Improved greatly (2) Medium (1) Degraded
	4.2. How easily available are these diverse resources now?	(3) Easily available (2) Medium (1) Scarce

Indicators description	Questions for scoring	Scores
Knowledge integration and transfer		
5. Traditional knowledge promotion and integration		
This indicator seeks to capture how well local, expert and indigenous knowledge and traditions related to biological resource use, conservation and values are sustained, promoted and actively integrated into SEPLS activities. This also includes ease of access to different sources of knowledge Explicit acknowledgement and integration of different forms of knowledge ensures continuance of patronage of cultural wisdom towards sustainable use of resources.	5.1. Are traditional and local knowledge and cultural traditions related to biodiversity (for example, agricultural practices, festivals, labour sharing, etc.) still practiced or integrated into production and management activities?	(3) Actively practiced (2) Medium (1) Absent
	5.2. Are traditional knowledge and practices being documented and practiced to facilitate their transfer to future generations?	(3) Very high (2) Medium (1) None
	5.3. How accessible is education, taking into consideration affordability and the integration of experiential learning?	(3) Conveniently located and affordable education that integrates experiential learning (2) Medium (1) Low access
	5.4. Are women's knowledge, experiences and skills recognized and respected at the household, community and landscape level?	(3) Very high (2) Medium (1) None

Indicators description	Questions for scoring	Scores
Livelihood and well-being		
6. Human health and environmental conditions		
For this indicator, different dimensions of health are considered- health of people, which is also dependent on the health of the environment and further, the health of animals. Called One Health, it is a recognition that unless tackled together, having a good quality of life would be challenging. The indicator, therefore, captures the health of these sub-components.	6.1. How is the environmental quality (air quality, sanitation, water regulation, waste management, etc.)?	(3) Very good (2) Medium (1) Poor
	6.2. How is the quality of human health? This includes nutritional status, physical and mental health parameters and access to health care needs (hospitals, traditional medical experts). **Note:** Score separately on the availability and adequacy of local resources for different health and well-being needs. For example, foods and resources to meet food and nutritional security.	(3) Very good (2) Medium (1) None
	6.3. How is the quality of animal health? **Note:** Report separately for different animal groups with whom high interactions are present.	(3) Very good (2) Medium (1) None
	6.4. How is the quality of human–wildlife interactions?	(3) Harmonious co-existence (2) Medium (1) Conflicts

Indicators description	Questions for scoring	Scores
7. Income diversity and sustainability of biodiversity-based livelihoods		
Exercise D: Are households engaged in diverse income generation activities? List them. For example, farming, livestock rearing, fishing, forestry, service-oriented activities, etc.		
This seeks to capture how fair and just economic transactions in a supply chain of SEPLS products/services are; the more equitable the system, the more indicative it is of a strong social capital that enables resilience.	7.1. Are households and communities able to move around between different production activities and locations as necessary? For example, pasture grazing, rotational farming, collection of non-timber products, etc. Specify for each activity.	(3) Easily move around (2) Medium (1) Restricted movements
This also links to the question on ecological connectivity; it seeks to ascertain the ease with which traditional occupations can be followed and is dependent on governance regimes.	7.2. Do livelihoods based on biodiversity follow sustainable and equitable practices? For example, sustainable harvesting, fair and equitable transactions between different stakeholders (meaning all stakeholders are well acknowledged and get a fair price), ensuring diversity and conservation of resources, etc. **Note:** Specify separately for each response.	(3) Very high (2) Medium (1) None

Indicators description	Questions for scoring	Scores
Governance and social equity		
Exercise E: Map the different uses of the landscape/seascape and indicate the different governance regimes in each case, whether it is a protected area, co-managed, community-owned, etc. Indicate the current status, 10 years ago, 50 years ago and reasons for change. Go to **Table 3** on **page 22** as an exercise example.		
8. Rights to resources and social equity		
This indicator is based on the premise that clear rights and responsibilities regarding resource access, use, benefits and related practices empower communities and their members to assert their autonomy and agency to pursue their occupations and ways of life, which is crucial for resilience.	8.1. Does the community have customary or formally recognized rights over land, pastures, waters and natural resources (e.g., ownership, use rights, cultural rights, rights of resources like rivers, etc.)? **Note:** Report separately for different types of rights to resources.	(3) Very well established (2) Medium (1) None
	8.2. Do all members of society in the landscape/seascape (specify across gender, social groups, youth, elderly, etc.) have fair and equitable access to opportunities and resources? **Note:** Report separately for different groups.	(3) Very well established (2) Medium (1) None

Indicators description	Questions for scoring	Scores
9. Extent of co-management of landscape/seascape		
This indicator focuses on cooperation between communities in a land/seascape and further explores opportunities for sharing responsibilities and obligations between different actor groups in the landscape.	9.1. Is there coordination and communication between and within communities to manage natural resources and ecosystems within the land/ seascape? Focus on self-governance, autonomy and agency.	(3) Very high (2) Medium (1) None
	9.2. Is there a co-management system (joint management by different stakeholders sharing obligations, responsibilities and rights) for resources, ecosystems and development priorities within the land/seascape?	(3) Very effective (2) Medium (1) None