

A Summary of Definitions, Guidelines, and Tools on Ecosystem-Based Approaches for Watershed Management

January 2024

STAP SCIENTIFIC AND TECHNICAL
ADVISORY PANEL
*An independent group of scientists that advises
the Global Environment Facility*



A summary of definitions, guidelines, and tools on ecosystem-based approaches for watershed management

Table of Contents

- 1. Introduction..... 1
- 2. Definitions and guidelines on ecosystem-based approaches 1
 - 2.1. Definitions of ecosystem-based approaches 2
 - 2.2. Examples of guidelines for implementing ecosystem-based approaches 7
 - 2.3. STAP guidance to support implementation of ecosystem-based approaches 10
- Closing remarks 12
- Appendix A 13
- Endnotes 16

1. Introduction

In June 2023, the Independent Evaluation Office (IEO) of the Global Environment Facility (GEF) released a strategic country cluster evaluation of the Lower Mekong River Basin ecosystem. This noted that GEF investments provided added value and were closely aligned with national priorities to reduce the vulnerability of rural communities, but it also found that projects “lacked guidelines for applying conceptual management tools such as ecosystem-based adaptation (EbA), ecosystem-based management (EbM), and failed to provide appropriate indicators to measure their effectiveness.”¹

The IEO recommended that “The Scientific and Technical Advisory Panel (STAP), in consultation with the GEF, should provide technical advice on internationally agreed-upon definitions and guidelines for implementation of ecosystem-based conceptual approaches and management tools (e.g., ecosystem-based adaptation, ecosystem-based management, nature-based solutions, ridge to river basin) to support consistent understanding and implementation on the ground.” The GEF Council took note of the IEO’s recommendations and endorsed the GEF Secretariat’s management response to address them.

STAP has prepared this paper, in consultation with the GEF Secretariat, to provide advice on definitions, guidelines, and available tools on EbA and EbM.

2. Definitions and guidelines on ecosystem-based approaches

The IEO’s recommendation requested that the paper cover technical advice on (1) definitions of ecosystem-based conceptual approaches and (2) guidelines for implementing ecosystem-based approaches and management tools for watershed management. Section 2.1 presents definitions of

various ecosystem-based approaches, and Section 2.2 presents brief descriptions of existing guidelines and tools for implementing ecosystem-based approaches that could be consulted in designing GEF projects. Section 2.3 offers examples of additional STAP guidance that could be used to support the design and implementation of ecosystem-based approaches.

2.1. Definitions of ecosystem-based approaches

Two elements guided the selection of the terms and definitions for ecosystem-based approaches. First, the definitions are aligned with the Convention on Biological Diversity (CBD) definition of “ecosystem approach” (2004): “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.”² Second, the definitions recognized work by the United Nations Environment Programme (UNEP), conducted in 2022, to harmonize the CBD’s definition of an ecosystem approach with the UNEP’s definition of nature-based solutions.³ The definitions below are congruent, with UNEP’s definition of nature-based solutions “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.”⁴

Ecosystems comprise the economic value or services, e.g. air and water purification, cultural enrichment, and carbon sequestration, provided by natural capital that benefits human beings. Hence, decisions on how ecosystems and their services are managed are intertwined with impacts on natural capital and human well-being. Knowledge, tools, and practices exemplifying this relationship are important for integrating natural capital and ecosystem management into decision-making by governments, businesses, and communities.

To select the definitions, STAP used literature databases and search engines to access scientific publications and grey literature (e.g. Google Scholar, Science Direct) for terms that refer to ecosystem-based approaches, including nature-based processes that explicitly aim to enhance climate mitigation, strengthen adaptation to climate change, improve land and water resource management, avoid negative trade-offs,⁵ and improve human well-being. These definitions are in Table 1. Several of them (e.g. for nature-based solutions) have been agreed at international environment-related forums. Others, such as for integrated water resource management, integrated coastal (zone) management, and “Source to Sea”, have been defined by technical and scientific groups and practitioners.

Table 1: A glossary of ecosystem-based approaches

Ecosystem-based approach	Overview and definitions <i>(Definitions paraphrased from original source)</i>	Source
Drought-smart land management	<p>Overview: Drought-smart land management is a system of land practices that aim to increase water supply where needed, such as in crop root systems, or to reduce water demand, for example, through the use of drought-resistant crops. Drought-smart land management measures contribute to drought risk mitigation, biodiversity conservation, soil carbon sequestration, and drought resilience.</p> <p>Definition: Interventions that improve the soil’s capacity to accept, retain, release, and transmit water and that increase plants’ water-use efficiency.</p>	Reichhuber, 2019 ⁶
Ecosystem-based adaptation	<p>Overview: Ecosystem-based adaptation seeks to achieve conservation and sustainable management of resources to decrease vulnerability to climate change.</p> <p>Definition: A nature-based solution that harnesses biodiversity and ecosystem services to reduce vulnerability and build resilience to climate change.</p> <p>Definition: The use of ecosystem management activities to increase the resilience, and reduce the vulnerability, of people and ecosystems to climate change.</p>	IUCN, 2017 ⁷ IPCC, 2022; ⁸ Kumar et al., 2019 ⁹
Ecosystem-based disaster risk reduction	<p>Overview: Ecosystem-based disaster risk reduction focuses on the conservation and restoration of ecosystems to address disaster risk and contribute to resilience.</p> <p>Definition: The sustainable management, conservation, and restoration of ecosystems to reduce disaster risk, for sustainable and resilient development.</p>	Renaud et al., 2016 ¹⁰
Ecosystem-based management	<p>Overview: Ecosystem-based management considers a specific ecosystem – and its various components and the interactions between them – when designing and implementing activities. This approach integrates the ecological, economic, and social attributes of a system. Ecosystem-based management focuses on long-term sustainability. The goal of ecosystem-based management is to maintain or restore the health and resilience of ecosystems, while also meeting human needs and societal goals.</p> <p>Definition: A strategy for the integrated management of land, water, and living resources that promotes their conservation and sustainable use in an equitable way.</p>	Laurila-Pant et al., 2015; ¹¹ Delacámara et al., 2020; ¹² Christensen et al., 1996; ¹³ IPBES, 2019 ¹⁴ CBD, 2004 ¹⁵

	<p>Definition: A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. It recognizes that human beings, with their cultural diversity, are an integral component of many ecosystems.</p>	<p>IPBES, 2019;¹⁶ O’Higgins et al., 2020¹⁷</p>
<p>Integrated coastal management</p>	<p>Overview: Integrated watershed management, integrated water resource management, integrated coastal management, and integrated coastal zone management are interdisciplinary approaches that emphasize the links between water and land resources to strengthen watershed and coastal resilience to climate change and to other environmental and social stressors and drivers.</p> <p>Definition: An interdisciplinary management approach to strengthen coastal resilience to the impacts of climate change and other environmental and social stressors. It focuses on maintaining or enhancing ecosystems and natural resources. An integrated coastal management process is developed and supported by broad stakeholder consensus.</p>	<p>Knecht, 1997¹⁸</p>
<p>Integrated coastal zone management</p>	<p>Overview: <i>See integrated coastal management.</i></p> <p>Definition: A dynamic, multidisciplinary, and iterative process to promote sustainable management of coastal zones. Integrated coastal zone management relies on the participation and cooperation of all stakeholders to assess and achieve societal goals. It seeks, over the long term, to balance environmental, economic, social, cultural, and recreational objectives.</p>	<p>Thia-Eng, 1993¹⁹</p>
<p>Integrated land-use planning</p>	<p>Overview: Integrated land-use planning is a spatially explicit approach²⁰ to balancing the economic, social, and environmental attributes of land management. This approach integrates different land uses while minimizing trade-offs between environmental, social, and economic objectives. In doing so, integrated land-use planning identifies a combination of land uses that can meet stakeholders’ needs while safeguarding resources for the future.</p> <p>Definition: An approach to balance the economic, social, and cultural opportunities provided by land to maintain and enhance ecosystem services provided by land-based natural capital.</p>	<p>Verburg et al., 2022²¹</p> <p>Verburg et al., 2022²²</p>
<p>Integrated watershed management</p>	<p>Overview: <i>See integrated coastal management.</i></p> <p>Definition: An adaptive, integrated, and multidisciplinary systems approach to management to preserve productivity and ecosystem integrity for water, soils, plants, and animals within a watershed,</p>	<p>Wang et al., 2016²³</p>

	thereby protecting and restoring ecosystem services for environmental, social, and economic benefit.	
Integrated water resource management	<p>Overview: See <i>integrated watershed management</i>.</p> <p>Definition: A process to promote coordination and management of water and land to maximize economic and social benefits without compromising the sustainability of ecosystems.</p>	<p>IPCC, 2022;²⁴ Kumar et al., 2019;²⁵ UNEP, n.d.²⁶</p>
Land degradation neutrality	<p>Overview: Land degradation neutrality aims to counterbalance unavoidable or expected losses of natural capital with interventions to achieve equivalent gains within the same land type. This process seeks to minimize negative trade-offs in relation to land and between other natural resources.</p> <p>Definition: Where the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems.</p>	<p>Orr et al., 2017²⁷</p>
Marine spatial planning	<p>Overview: Marine spatial planning is a framework that brings together multiple users across communities, government, and industries to sustainably manage marine resources. Marine spatial planning organizes the use of the ocean, i.e. the interactions between the marine environment and different sectoral uses, such as aquaculture, shipping, tourism, marine mining, and renewable energy.</p> <p>Definition: A public process to analyze and allocate the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives agreed through a political process.</p> <p>Definition: A framework to improve decision-making in the use of marine resources and space. It is based on principles of the ecosystem approach and ecosystem-based management.</p>	<p>Ehler and Douvere, 2009²⁸</p> <p>CBD and STAP, 2012²⁹</p>
Nature-based solutions	<p>Overview: Nature-based solutions are actions that reduce the impacts of climate change, restore and improve ecosystem services, and/or provide biodiversity benefits in a wide range of ecosystems and socioeconomic contexts. These solutions are rooted in a people–nature, place-based framing, which fosters a co-design of ecosystem-based management.</p> <p>Definition: Actions to protect, sustainably manage, and restore natural or modified ecosystems and to address societal challenges (e.g. climate change, food and water security, natural disasters)</p>	<p>Opperman et al., 2021³⁰</p> <p>Cohen-Shacham et al., 2016³¹ & 2019³²</p>

	<p>effectively and adaptively, while simultaneously providing benefits for human well-being and biodiversity.</p> <p>Definition: Actions to protect, conserve, restore, sustainably use, and manage natural or modified terrestrial, freshwater, coastal, and marine ecosystems and to address social, economic, and environmental challenges effectively and adaptively, while providing benefits for human well-being, ecosystem services, ecosystem resilience, and biodiversity.</p>	<p>UNEP, 2022³³</p>
<p>Resilient watershed management</p>	<p>Overview: Resilient watershed management is a participatory approach to identify a landscape’s risks, hazards, and vulnerabilities and to develop a management plan. The landscape can include a watershed, several watersheds, a portion of a watershed, or a basin. The approach involves assessment of hazards, identification of high-risk locations, preparation of risk-based watershed management plans, and participatory implementation of the risk-based watershed management plan.</p> <p>Definition: A management approach to strengthen the sustainable provision of ecosystem services provided by the watershed, while reducing existing disaster and climate risks and preventing new ones from emerging.</p>	<p>FAO, 2023³⁴</p>
<p>Source to Sea or Ridge to Reef</p>	<p>Overview: Ridge-to-Reef or Source-to-Sea are coastal and marine approaches to target environmental degradation in a watershed. These approaches emphasize the interconnections between terrestrial, freshwater, and marine ecosystems, as well as the socioeconomic characteristics influencing the watershed system.</p> <p>Definition: An integrated approach that considers the entire social, ecological, and economic system of a watershed, from the land area drained by a river system to the coastal area, including the open ocean. It emphasizes the interconnectedness of terrestrial, freshwater, and marine ecosystems and to address environmental and resource management challenges.</p>	<p>Granit et al., 2017³⁵ Northwest Pacific Action Plan, n.d.³⁶</p>
<p>Sustainable land management</p>	<p>Overview: Sustainable land management is based on the premise that the interactions between land and water resources, climate, and human activities determine the productivity and sustainability of a land-use system. Managing soil and water sustainably is integral to improving and maintaining ecosystem functions and services and, therefore, the long-term productivity and functionality of the land.</p> <p>Definition: The stewardship and use of land resources, including soils, water, animals, and plants, to meet changing human needs,</p>	<p>IPCC, 2019³⁷</p>

	<p>while ensuring the long-term productive potential of these resources and the maintenance of their environmental functions.</p> <p>Definition: The use of land resources, including soils, water, animals, and plants, to produce goods to meet human needs, while ensuring the long-term productive potential of these resources and the maintenance of their environmental functions.</p>	<p>FAO, n.d.³⁸ WOCAT, n.d.³⁹</p>
Sustainable ocean planning	<p>Overview: Sustainable ocean planning integrates marine spatial planning in a broad framework for ocean governance. Sustainable ocean planning targets marine and coastal areas under national jurisdiction. The process considers the links between national marine or coastal jurisdictions and the adjoining watersheds.</p> <p>Definition: An approach that guides public and private sector decision makers on how to sustainably manage a nation’s ocean area under national jurisdiction, to achieve lasting economic and social development while protecting the marine environment.</p>	<p>Ocean Panel, 2021⁴⁰</p>

2.2. Examples of guidelines for implementing ecosystem-based approaches

Table 2 presents a **non-exhaustive** compilation of guidelines for implementing the ecosystem-based concepts and approaches described in Table 1. These guidelines have been prepared by technical organizations (e.g. IUCN), scientific bodies (e.g. IPCC), multilateral environmental agreements (e.g. CBD, UNCCD), United Nations agencies (e.g. UNEP, UNDP, FAO) or partnerships between these organizations or groups of experts.⁴¹

When designing projects involving ecosystems-based approaches, examples of guidelines that project developers could start with to gain a broad understanding of how to develop and implement the approach include *“Ecosystem-based management: Moving from concept to practice”*, *“Guidance for using the IUCN Global Standard for Nature-based solutions, 1st ed.”*, and *“Implementing the source to sea approach: a guide for practitioners”*.

Table 2: Non-exhaustive compilation of guidelines for implementing ecosystem-based approaches

Guidance	Description <i>(Paraphrased from original source)</i>
<p>Drought-smart land management: <u>The land–drought nexus</u></p>	<p>This report by the UNCCD Science–Policy Interface⁴² introduces the concept of drought-smart land management as an ecosystem-based approach for climate change adaptation and disaster risk reduction. More precisely, drought-smart land management is described as relying on maintaining a diversity of species and intact ecosystem functions to manage climate and disaster risks and impacts. The report provides a synthesis of the effectiveness and co-benefits of drought-smart land management and summarizes enabling policies and tools that could help upscale these practices.</p>

<p>Ecosystem-based adaptation: <u>Guidelines for integrating ecosystem-based adaptation into national adaptation plans</u></p>	<p>These UNEP guidelines⁴³ outline how to coordinate actions across sectors and scales to implement ecosystem-based adaptation. This includes key principles that should underpin the integration of ecosystem-based adaptation into national adaptation plans. These principles include the importance of involving local communities, ensuring the conservation of biodiversity, and promoting sustainable development. The guidelines also suggest how to conduct assessments of ecosystems and their vulnerabilities to climate change, as well as how to identify ecosystem-based adaptation options. Methods are provided on how to monitor the effectiveness of ecosystem-based adaptation interventions and evaluate their impact on climate resilience, biodiversity conservation, and socioeconomic factors.</p>
<p>Ecosystem-based adaptation: <u>Exploring program theory to enhance monitoring and evaluation in ecosystem-based adaptation projects</u></p>	<p>This paper by McKinnon and Hole⁴⁴ describes the application of a theory of change for ecosystem-based adaptation interventions, including how to identify indicators on ecosystem-based adaptation along the causal pathways. Indicator selection, using the theory of change, for monitoring and evaluating ecosystem-based adaptation can be valuable in data-poor environments. Two case studies are provided to highlight project design elements using a theory of change process.</p>
<p>Ecosystem-based management: <u>Ecosystem-based management: Moving from concept to practice</u></p>	<p>This book by Delacámara et al.⁴⁵ introduces concepts on ecosystem-based management and provides details of related tools and techniques which can be applied in a broad range of aquatic ecosystems, including the tropical Mekong Delta.</p>
<p>Integrated coastal management: <u>Guidelines for integrated management of coastal and marine areas</u></p>	<p>These UNEP guidelines⁴⁶ offer support for integrated coastal management strategies at the national level. The guidelines are based on the experience of countries bordering the Mediterranean Basin but are adaptable to local conditions. The guidelines are intended to be used by national policymakers, project developers, and managers working on integrated coastal and marine area management.</p>
<p>Integrated coastal zone management and marine spatial planning: <u>Marine spatial planning and integrated coastal zone management approaches to support the achievement of Sustainable Development Goal targets 14.1 and 14.2</u></p>	<p>These UNEP guidelines⁴⁷ provide approaches for marine spatial planning and integrated coastal zone management to support the Sustainable Development Goals and targets on marine and coastal ecosystems. Case studies show how the conceptual framework proposed in the guidelines can be applied.</p>
<p>Integrated water resource management: <u>Water interactions for consideration in NDC</u></p>	<p>This document by UNDP and the Stockholm International Water Institute⁴⁸ offers checklists on how to enhance water–climate interactions in a country’s climate action plan or its nationally determined contribution under the Paris Agreement. The checklists can help project developers identify interventions where improved</p>

<u>enhancement and implementation</u>	water and land management may be needed to make climate mitigation and adaptation more successful. The checklists are organized by sector, such as energy and industry, agriculture and livestock, forestry and land use, and ecosystems and biodiversity.
Land degradation neutrality: <u>LDN implementation tools</u>	This UNCCD website ⁴⁹ offers a suite of Earth observation tools, methodologies, and good practice guidance on designing and implementing land degradation neutrality.
Land degradation neutrality: <u>The contribution of integrated land use planning and integrated landscape management to implementing land degradation neutrality</u>	This report by the UNCCD's Science–Policy Interface ⁵⁰ provides an analytical overview of common tools and approaches to support integrated land-use planning. The report identifies entry points for embedding land degradation neutrality actions into planning systems at different scales (i.e. national, watershed, or local).
Land degradation neutrality: <u>Scientific conceptual framework for land degradation neutrality</u>	This framework, prepared by the UNCCD's Science–Policy Interface, ⁵¹ provides a scientific foundation for understanding, implementing, and monitoring land degradation neutrality. It was designed to create a bridge between the vision and the practical implementation of land degradation neutrality, by defining it in operational terms. The framework includes links to ecosystem-based management, which can contribute to achieving land degradation neutrality by helping to restore and enhance ecosystems and improve land productivity.
Marine spatial planning: <u>International guide on marine/maritime spatial planning</u>	This guide by UNESCO and the European Commission ⁵² provides support to project teams in developing and implementing marine spatial planning in different regions. Guidance is offered on how to capture knowledge and learning about the ecosystem-based management of marine resources.
Marine spatial planning: <u>Marine spatial planning in the context of the Convention on Biological Diversity</u>	The report by the CBD Secretariat and STAP ⁵³ provides an overview of the theory and practice for implementing marine spatial planning, while addressing the well-being of communities who live in coastal, estuary, and other nearshore environments or who depend on the blue economy. The report synthesizes lessons learned about marine spatial planning and summarizes relevant marine spatial planning tools and criteria for success at various scales.
Nature-based solutions: <u>Guidance for using the IUCN Global Standard for Nature-based Solutions, 1st ed.</u>	The IUCN Global Standard for Nature-based Solutions provides a framework for the planning, implementation, and verification of nature-based solutions to address environmental and societal challenges. The report cited here ⁵⁴ is aimed at governments, organizations, and communities to help them develop and implement nature-based solutions to combat global issues like climate change, habitat degradation, and natural resource management.
Resilient watershed management: <u>Building resilience into watersheds</u>	This sourcebook by FAO ⁵⁵ provides advice on how to incorporate disaster risk reduction and resilience building into the watershed management process. It includes steps for developing, implementing, monitoring, and evaluating a resilient watershed

	management plan. Generic recommendations are offered to remind users that the elements presented in the sourcebook will need to be tailored and adapted to local circumstances. Recommended reading and materials are suggested at the end of each chapter for users interested in further information.
Ridge to Reef: <u>Regional guidelines for the application of Ridge to Reef spatial prioritization and planning procedures</u>	These guidelines by the Pacific Community ⁵⁶ are designed to address environmental and land-use issues in diverse landscapes, from mountainous or upland areas (the “ridge”) down to coastal and marine ecosystems (the “reef”). The guidelines focus on spatial prioritization, which involves identifying and designating priority areas within the landscape for targeted conservation, restoration, and sustainable development, and considering ecological, social, and economic factors.
Source to Sea: <u>Implementing the Source-to-Sea approach</u>	Building on the conceptual framework first developed by the Action Platform for Source-to-Sea Management and STAP, this guide by the Stockholm International Water Institute ⁵⁷ presents practical steps for the design and implementation of projects that can improve the management of land, freshwater, delta, estuary, coast, nearshore, and ocean environments.
Sustainable ocean planning: <u>100% sustainable ocean management</u>	Sustainable ocean planning is a framework for ocean-related governance to guide decision makers and stakeholders on how to manage maritime areas sustainably under national jurisdiction. This document, written by the High-Level Panel for a Sustainable Ocean Economy, ⁵⁸ describes the components of a sustainable ocean plan and offers a checklist for the plan’s implementation. Options for financing are described, with case studies highlighting sustainable plans.
Watershed management: <u>Watershed management in action</u>	This report by FAO ⁵⁹ reviews the lessons learned from 12 FAO watershed management projects. The review identifies a sequence of steps for watershed management projects to respond to global challenges of water supply, land restoration, climate change adaptation, disaster risk management, and hunger.

2.3. STAP guidance to support implementation of ecosystem-based approaches

Table 3 sets out guidance that STAP has provided on how to design projects which apply ecosystem-based approaches described in Table 1. Project developers can use STAP’s *Theory of Change Primer* (Table 3 and Figure 1 in Appendix A), as an entry point to think about what ecosystem-based approaches (e.g. source to sea, ecosystem-based adaptation, land degradation neutrality, integrated watershed management, or a combination of concepts from Table 1), guidelines and tools (Table 2) would be appropriate to achieve the desired project goals. Some of the guidelines and tools in Table 2 include indicators that could help track progress towards achieving key outcomes and outputs.

Project designers are encouraged to start with a tool from Table 2, and then proceed to STAP’s guidance in Table 3 to complete the development of ecosystem-based activities. For example, a project designer

in need of developing activities that connect land and coastal ecosystems, might start with a Source to Sea approach (Table 2). The project designer could then follow up with STAP’s *Theory of Change Primer* (Table 3) and the *Enabling element of good project design* (Table 3) to complement a Source to Sea analysis.

Table 3: STAP guidance supporting ecosystem-based approaches

Guidance	Description
<p>Enabling elements: <u>Enabling elements of good project design</u></p>	<p>This STAP advisory paper⁶⁰ highlights eight enabling elements of good project and program design and illustrates how adopting them will increase the likelihood of delivering durable outcomes and contribute to transformational change. The elements are applicable to all projects and programs, including those applying an ecosystem-based approach. The eight elements are (1) apply systems thinking and theory of change, (2) engage the right stakeholders, (3) pursue integrated outcomes, (4) foster intentional behavioral change, (5) invest in purposeful innovation, (6) scale for systems transformation, (7) ensure robustness to future change, and (8) support learning with knowledge management.</p>
<p>Future narratives: <u>Exploratory future narratives primer</u></p>	<p>STAP’s primer⁶¹ provides a synthesis of how to use simple narratives of the future in designing projects and programs to achieve resilient and durable outcomes. It highlights the importance of considering all drivers of change, such as population, conflict, climate change, and migration, and how they could unfold in the future, when designing projects. Doing this for ecosystem-based projects and programs can provide insights into how drivers affecting an ecosystem and its services could unfold in future and inform the choice of interventions that will be robust to plausible futures.</p>
<p>Nature-based solutions: <u>Nature-based solutions and the GEF</u></p>	<p>This STAP advisory paper⁶² reviews recent literature and project experience on nature-based solutions and identifies challenges in designing and implementing nature-based solution projects. It also offers guidance on how to address these challenges, emphasizing the importance of applying STAP’s enabling elements for good project design, to ensure that nature-based solutions generate environmental and socioeconomic benefits, while managing negative trade-offs.</p>
<p>Natural capital: <u>Report on natural capital approaches</u></p>	<p>This study, commissioned by STAP, by the Stanford Natural Capital Project,⁶³ reviews recent experience in implementing natural capital approaches. Natural capital encompasses ecosystems, and the services they provide, such as fertile soils and clean water. The report suggests various techniques and methodologies on natural capital assessments and accounting, with key principles for their successful application.</p>
<p>Source to Sea: <u>A conceptual framework for governing and managing key flows in a Source-to-Sea continuum</u></p>	<p>This STAP⁶⁴ conceptual framework highlights the provision of ecosystem services along the Source-to-Sea continuum, emphasizing the benefits that ecosystems offer to both human societies and the environment. The document also offers elements to guide a systems-based analysis theory of change for Source-to-Sea projects.</p>

<p>Theory of change: <u>Theory of change primer</u></p>	<p>This STAP primer⁶⁵ explains the importance of developing a theory of change, describes when to develop one, and provides a concise guide on how to build a good theory of change in GEF project design. The primer encourages analysis of the social–ecological system of concern to understand the problem and goals and to inform the logic of the causal pathways. The systems analysis can help in understanding interactions between the social, economic, and environmental dimensions of a project, applying an ecosystem-based approach.</p>
---	--

Closing remarks

There are many definitions and guidelines associated with ecosystem-based approaches. The terms and guidelines highlighted throughout this document offer a starting point. This short compilation presents a snapshot of ecosystem-based approaches in support of nature-based solutions to assist the GEF in tackling global challenges and delivering multiple environmental and social benefits in watersheds. Appendix A offers a way to think about ecosystem-based approaches in designing projects.

Appendix A

Table 4 illustrates the links between ecosystem-based concepts and guidelines (Tables 1 and 2) and a theory of change process (Figure 1), and it suggests some questions that can be asked during the key steps of developing a theory of change.

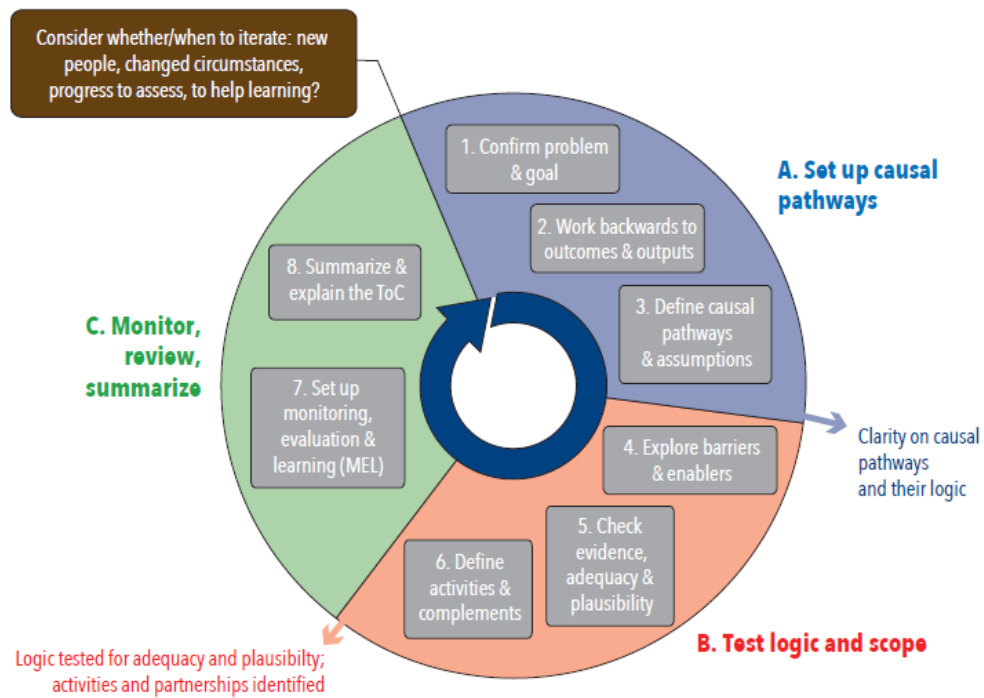


Figure 1: Key phases and steps of a theory of change for the GEF. Source: Stafford Smith, 2020.⁶⁶

Table 4: Links between ecosystem-based concepts and guidelines and a theory of change process

Theory of change step	Example questions to ask	Examples of concepts and guidelines that could be applied (from Tables 1 & 2)
Step 1: Confirm goal	<ul style="list-style-type: none"> • What is the project goal in relation to global environmental benefits? • Which stakeholders need to be engaged? • What is the social context relevant to the project, or intervention? (Consider stakeholders' values, power dynamics, gender, and different types of knowledge.) 	<p>Concepts and guidelines focused on the interactions and trade-offs between sectors (e.g. biodiversity, climate change, land, water, chemicals and waste management); scales (e.g. watershed, community, land unit); stakeholder engagement and governance (e.g. diverse perspectives and decision-making roles); and social and economic aspects relevant to the project context(e.g. cultural norms, gender)).</p>
Step 2: Work backward to outcomes and outputs	<ul style="list-style-type: none"> • While engaging stakeholders, revisit the project goal and ask, what are the necessary and sufficient outcomes, outputs, and activities to deliver the goal? • How and why will the desired change occur? 	<p>Concepts and guidelines focused on integration and social aspects, with an emphasis on stakeholder perspectives and local knowledge.</p>
Step 3: Define causal pathways and assumptions	<ul style="list-style-type: none"> • Drawing from stakeholders' values, visions, and narratives, describe what changes are needed to achieve system resilience. (Consider what intentional options for change may be necessary for resilience and transformation.) • What long-term drivers of change risk undermining the durability of global environmental benefits? (Consider how changes in population growth, climate change, and market fluctuations will affect the project.) • What is the causal logic between goal, outcomes, output, and activities? What are the assumptions underpinning key outcomes and outputs? 	<p>Concepts and guidelines with an emphasis on integration across sectors and scales (e.g. upper catchment, wetland, coastal), theory of change, multi-stakeholder engagement, polycentric governance, and future planning.</p>
Steps 4&5: Identify barriers and enablers (as well as risks and opportunities);	<ul style="list-style-type: none"> • What are the barriers and enablers for achieving outcomes and outputs? What do stakeholders value (in the targeted system), and what are the barriers in delivering these outcomes and outputs? 	<p>Concepts and guidelines that help create impact or logic pathways between goals, outcomes, outputs, and activities; help assess plausible futures to define the risks and opportunities in achieving the pathways and goal; and help identify knowledge gaps (assumptions).</p>

challenge assumptions	<ul style="list-style-type: none"> • What evidence exists, or is needed, to validate assumptions? 	
Step 6: Define activities	<ul style="list-style-type: none"> • What activities are necessary to achieve the project goal? • Who are the key stakeholders necessary to achieve the goal? 	Concepts and guidelines that help create impact or logic pathways.
Step 7: Set up monitoring and learning	<ul style="list-style-type: none"> • What needs to be monitored, and what are the indicators? • Who will do the monitoring? • How will monitoring be done? 	Approaches, guidelines, and tools that define baselines and activities; monitor and assess change; and embed learning and key feedback across sectors and scales. Examples include tools on land and spatial planning, systems analysis, and stakeholder decision-making.
Source: Based on Stafford Smith, 2020. ⁶⁷		

Endnotes

- ¹ GEF IEO (2023). “Strategic country cluster evaluation of the Lower Mekong River Basin ecosystem”. Independent Evaluation Office of the Global Environment Facility, Washington, DC. https://www.thegef.org/sites/default/files/documents/2023-06/EN_GEFIEO_Strategic_Country_Cluster_Evaluation_LMRB_May%20FINAL_Rev01.pdf.
- ² CBD (2004). “Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its seventh meeting”. Convention on Biological Diversity. <https://www.cbd.int/doc/decisions/cop-07/cop-07-dec-11-en.pdf>.
- ³ UNEP (n.d.) “Intergovernmental consultations on nature-based solutions”. United Nations Environment Programme, Nairobi. <https://www.unep.org/about-un-environment/intergovernmental-consultations-nbs>.
- ⁴ Ibid.
- ⁵ Trade-offs occur when pursuing one option entails giving up the opportunity to choose a different one. These choices can have negative or positive implications.
- ⁶ Reichhuber, A. et al. (2019). *The Land-Drought Nexus*. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/reports/land-drought-nexus-enhancing-role-land-based-interventions-drought-mitigation-and>.
- ⁷ IUCN (2017). “Ecosystem-based adaptation.” Issues Brief. International Union for Conservation of Nature, Gland, Switzerland. https://www.iucn.org/sites/default/files/2022-07/ecosystem-based_adaptation_issues_brief_final.pdf.
- ⁸ IPCC (2022). “Annex II: Glossary”. In *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Cambridge University Press, Cambridge.
- ⁹ Kumar, M.D., Batchelor, C., and James, A.J. (2019). “Operationalizing IWRM concepts at the basin level: From theory to practice”. In *Current Directions in Water Scarcity Research*, Vol. 1. Elsevier.
- ¹⁰ Renaud, F.G., Sudmeier-Rieux, K., Estrella, M., and Nehren, U. (eds.) (2016). *Ecosystem-based Disaster Risk Reduction and Adaptation in Practice*, Vol. 42. Springer, Cham. <https://portals.iucn.org/library/node/46820>.
- ¹¹ Laurila-Pant, M., Lehtikoinen, A., Uusitalo, L., and Venesjärvi, R. (2015). “How to value biodiversity in environmental management?” *Ecological Indicators* 55:1–11. <https://doi.org/10.1016/j.ecolind.2015.02.034>.
- ¹² Delacámara, G., O’Higgins, T.G., Lago, M., and Langhans, S. (2020). “Ecosystem-based management: moving from concept to practice”. In *Ecosystem-based Management, Ecosystem Services and Aquatic Biodiversity*. Springer International Publishing, Cham.
- ¹³ Christensen, N.L., et al. (1996). “The report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management”. *Ecological Applications* 6(3):665–691. <https://doi.org/10.2307/2269460>.
- ¹⁴ IPBES (2019). “Glossary”. In *Global Assessment Report on Biodiversity and Ecosystem Services*. Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services, Bonn. <https://doi.org/10.5281/zenodo.5657079>.
- ¹⁵ CBD (2004). “Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its seventh meeting”. Convention on Biological Diversity. <https://www.cbd.int/doc/decisions/cop-07/cop-07-dec-11-en.pdf>.
- ¹⁶ IPBES (2019). “Glossary”. In *Global Assessment Report on Biodiversity and Ecosystem Services*. Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services, Bonn. <https://doi.org/10.5281/zenodo.5657079>.
- ¹⁷ O’Higgins, T.G., DeWitt, T.H., and Lago, M. (2020). “Using the concepts and tools of social ecological systems and ecosystem services to advance the practice of ecosystem-based management”. In *Ecosystem-based Management, Ecosystem Services and Aquatic Biodiversity*. Springer, Cham. https://doi.org/10.1007/978-3-030-45843-0_1.
- ¹⁸ Knecht, R.W. (1997). “Integrated coastal zone management for developing maritime countries”. In *Coastal Zone Management Imperative for Maritime Developing Nations*. Springer Netherlands, Dordrecht.

-
- ¹⁹ Thia-Eng, C. (1993). "Essential elements of integrated coastal zone management". *Ocean & Coastal Management* 21(1–3). [https://doi.org/10.1016/0964-5691\(93\)90021-P](https://doi.org/10.1016/0964-5691(93)90021-P).
- ²⁰ Spatially explicit approaches are used to understand and analyse social, economic, and environmental phenomena in a spatial or geographic context. The approach focuses on observing, analysing, and interpreting data or information related to a specific location or place.
- ²¹ Verburg, P.H., et al. (2022). *The Contribution of Integrated Land Use Planning and Integrated Landscape Management to Implementing Land Degradation Neutrality: Entry Points and Support Tools*. United Nations Convention to Combat Desertification, Bonn.
- ²² Ibid.
- ²³ Wang, G., Mang, S., Cai, H., Liu, S., Zhang, Z., Wang, L., and Innes, J.L. (2016). "Integrated watershed management: evolution, development and emerging trends". *Journal of Forestry Research* 27:967–994. <https://doi.org/10.1007/s11676-016-0293-3>.
- ²⁴ IPCC (2022). "Annex II: Glossary". In *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Cambridge University Press, Cambridge.
- ²⁵ Kumar, M.D., Batchelor, C., and James, A.J. (2019). "Operationalizing IWRM concepts at the basin level: From theory to practice". In *Current Directions in Water Scarcity Research*, Vol. 1. Elsevier.
- ²⁶ UNEP (n.d.). "What is integrated water resources management?" United Nations Environment Programme. <https://www.unep.org/explore-topics/disasters-conflicts/where-we-work/sudan/what-integrated-water-resources-management>.
- ²⁷ Orr, B.J., et al. (2017). *Scientific Conceptual Framework for Land Degradation Neutrality*. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/reports/scientific-conceptual-framework-land-degradation-neutrality-report-science-policy>.
- ²⁸ Ehler, C., and Douvère, F. (2009). *Marine Spatial Planning: A Step-by-Step Approach Toward Ecosystem-Based Management*. Intergovernmental Oceanographic Commission, Paris.
- ²⁹ CBD (Secretariat) and STAP (2012). *Marine Spatial Planning in the Context of the Convention on Biological Diversity: A Study Carried Out in Response to CBD COP 10 Decision X/29*. CBD Technical Series No. 68. Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel to the Global Environment Facility.
- ³⁰ Opperman, J., Oyare, E., Baleta, H., Fahrbach, S., and Camargo, R. (2021). *Waterways to Resilience: Nature-based Solutions for Adaptation in Africa*. WWF-International, Gland, Switzerland. https://wwfint.awsassets.panda.org/downloads/wwf_report_waterways_to_resilience_f_web.pdf.
- ³¹ Cohen-Shacham, E., Walters, G., Janzen, C., and Maginnis, S. (eds.) (2016). *Nature-based Solutions to Address Global Societal Challenges*. International Union for Conservation of Nature, Gland, Switzerland. <https://portals.iucn.org/library/sites/library/files/documents/2016-036.pdf>.
- ³² Cohen-Shacham, E., et al. (2019). "Core principles for successfully implementing and upscaling nature-based solutions". *Environmental Science & Policy* 98:20–29.
- ³³ UNEP (n.d.) "Intergovernmental consultations on nature-based solutions". United Nations Environment Programme, Nairobi. <https://www.unep.org/about-un-environment/intergovernmental-consultations-nbs>.
- ³⁴ FAO (2023). *Building Resilience into Watersheds*. Food and Agriculture Organization of the United Nations, Rome. <https://doi.org/10.4060/cc3258en>.
- ³⁵ Granit, J., Liss Lymer, B., Olsen, S., Tengberg, A., Nömmann, S., and Clausen, T.J. (2017). *A Conceptual Framework for Governing and Managing Key Flows in a Source-to-Sea Continuum*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC. https://www.stapgef.org/sites/default/files/2021-02/S2S%20conceptual%20framework_web%20version.pdf.

-
- ³⁶ Northwest Pacific Action Plan (n.d.). “Integrated coastal and river basin management”. United Nations Environment Programme. <https://www.unep.org/nowpap/what-we-do/integrated-coastal-and-river-basin-management>.
- ³⁷ IPCC (2019). “Annex I: Glossary”. In *Climate Change and Land*. Cambridge University Press, Cambridge. <https://doi.org/10.1017/9781009157988.010>.
- ³⁸ FAO (n.d.). “Sustainable land management”. Food and Agriculture Organization of the United Nations, Rome. <https://www.fao.org/3/a-i4593e.pdf>.
- ³⁹ WOCAT (n.d.). “SLM”. World Overview of Conservation Approaches and Technologies. <https://www.wocat.net/en/slm>.
- ⁴⁰ Ocean Panel (2021). *100% Sustainable Ocean Management: An Introduction to Sustainable Ocean Plans*. High Level Panel for a Sustainable Ocean Economy. https://oceanpanel.org/wp-content/uploads/2022/06/21_REP_Ocean-SOP_v10.pdf.
- ⁴¹ The abbreviations in this paragraph stand for the following: IUCN – International Union for the Conservation of Nature; IPCC – Intergovernmental Panel on Climate Change; CBD – Convention on Biological Diversity; UNCCD – United Nations Convention to Combat Desertification; UNEP – United Nations Environment Programme; UNDP – United Nations Development Programme; FAO – Food and Agriculture Organization of the United Nations.
- ⁴² Reichhuber, A. et al. (2019). *The Land–Drought Nexus*. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/reports/land-drought-nexus-enhancing-role-land-based-interventions-drought-mitigation-and>.
- ⁴³ UNEP (2021). *Guidelines for Integrating Ecosystem-based Adaptation into National Adaptation Plans: Supplement to the UNFCCC NAP Technical Guidelines*. United Nations Environment Programme, Nairobi. <https://wedocs.unep.org/20.500.11822/36703>.
- ⁴⁴ McKinnon, M.C., and Hole, D.G. (2015). “Exploring program theory to enhance monitoring and evaluation in ecosystem-based adaptation projects”. *New Directions for Evaluation* 2015(147):49-60. <https://doi.org/10.1002/ev.20130>.
- ⁴⁵ Delacámara, G., O’Higgins, T.G., Lago, M., and Langhans, S. (2020). “Ecosystem-based management: moving from concept to practice”. In *Ecosystem-based Management, Ecosystem Services and Aquatic Biodiversity*. Springer International Publishing, Cham.
- ⁴⁶ UNEP (1995). “Guidelines for integrated management of coastal and marine areas: with special reference to the Mediterranean Basin”. UNEP Regional Seas Reports and Studies No. 161. United Nations Environment Programme, Nairobi.
- ⁴⁷ UNEP (2018). “Marine spatial planning and integrated coastal zone management approaches to support the achievement of Sustainable Development Goal Targets 14.1 and 14.2: conceptual guidelines”. UNEP Regional Seas Reports and Studies No. 207. United Nations Environment Programme, Nairobi. https://resources.unep-wcmc.org/products/WCMC_RT408.
- ⁴⁸ UNDP–SIWI Water Governance Facility (2020). *Water Interactions for Consideration in NDC Enhancement and Implementation*. Stockholm International Water Institute, Stockholm.
- ⁴⁹ UNCCD (n.d.). “LDN implementation tools.” United Nations Convention to Combat Desertification. <https://www.unccd.int/land-and-life/land-degradation-neutrality/tools-and-resources-ldn-implementation>.
- ⁵⁰ Verburg, P.H., et al. (2022). *The Contribution of Integrated Land Use Planning and Integrated Landscape Management to Implementing Land Degradation Neutrality: Entry Points and Support Tools*. United Nations Convention to Combat Desertification, Bonn.
- ⁵¹ Orr, B.J., et al. (2017). *Scientific Conceptual Framework for Land Degradation Neutrality*. United Nations Convention to Combat Desertification, Bonn. <https://www.unccd.int/resources/reports/scientific-conceptual-framework-land-degradation-neutrality-report-science-policy>.
- ⁵² UNESCO-IOC and European Commission (2021). *MSPglobal: International Guide on Marine/Maritime Spatial Planning*. IOC Manuals and Guides No. 89. UNESCO, Paris. <https://unesdoc.unesco.org/ark:/48223/pf0000379196>.

-
- ⁵³ CBD (Secretariat) and STAP (2012). *Marine Spatial Planning in the Context of the Convention on Biological Diversity: A Study Carried Out in Response to CBD COP 10 Decision X/29*. CBD Technical Series No. 68. Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel to the Global Environment Facility.
- ⁵⁴ IUCN (2020). *Guidance for Using the IUCN Global Standard for Nature-based Solutions*, 1st ed. International Union for Conservation of Nature, Gland, Switzerland.
- ⁵⁵ FAO (2023). *Building Resilience into Watersheds: A Sourcebook*. Food and Agriculture Organization of the United Nations, Rome. <https://doi.org/10.4060/cc3258en>.
- ⁵⁶ Pacific Community (2021). *Regional Guidelines for the Application of Ridge to Reef Spatial Prioritization and Planning Procedures*. Pacific Community, Suva, Fiji.
- ⁵⁷ Mathews, R.E., Tengberg, A., Sjödin, J., & Liss-Lymer, B. (2019). *Implementing the Source-to-Sea Approach: A Guide for Practitioners*. Stockholm International Water Institute, Stockholm.
- ⁵⁸ Ocean Panel (2021). *100% Sustainable Ocean Management: An Introduction to Sustainable Ocean Plans*. High Level Panel for a Sustainable Ocean Economy. https://oceanpanel.org/wp-content/uploads/2022/06/21_REP_Ocean-SOP_v10.pdf.
- ⁵⁹ FAO (2017). *Watershed Management in Action: Lessons Learned from FAO Field Projects*. Food and Agriculture Organization of the United Nations, Rome.
- ⁶⁰ Stafford Smith, M., Ali, S., Carr, E.R., Donaldson, J., Metternicht, G., Ratner, B.D., and Bierbaum, R. (2021). *Enabling Elements of Good Project Design: A Synthesis of STAP Guidance for GEF Project Investment*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC. <https://stapgef.org/index.php/resources/advisory-documents/enabling-elements-good-project-design-synthesis-stap-guidance-gef>.
- ⁶¹ Stafford Smith, M., Leonard, S., and Carr, E. (2023). *Exploratory Future Narratives Primer*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC. <https://stapgef.org/index.php/resources/advisory-documents/simple-future-narratives-brief-and-primer>.
- ⁶² Bierbaum, R. (2020). *Nature-based Solutions and the GEF*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC. <https://stapgef.org/resources/advisory-documents/nature-based-solutions-and-gef>.
- ⁶³ Ruckelshaus, M., Guerry A., Mandle, L., Vogl, A., and Nathan, N. (2022). *Report on Natural Capital Approaches*. Natural Capital Project, Stanford University. <https://stapgef.org/resources/policy-briefs/natural-capital-approaches-lessons-learned>.
- ⁶⁴ Granit, J., Liss Lymer, B., Olsen, S., Tengberg, A., Nömmann, S., and Clausen, T.J. (2017). *A Conceptual Framework for Governing and Managing Key Flows in a Source-to-Sea Continuum*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC. https://www.stapgef.org/sites/default/files/2021-02/S2S%20conceptual%20framework_web%20version.pdf.
- ⁶⁵ Stafford Smith, M. (2020). *Theory of Change Primer*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC.
- ⁶⁶ Stafford Smith, M. (2020). *Theory of Change Primer*. Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC.
- ⁶⁷ Ibid.