



NATURE-BASED INFRASTRUCTURE
GLOBAL RESOURCE CENTRE

Nature-Based Infrastructure for Climate Adaptation and Sustainable Development

Online Training Course by the NBI Global Resource
Centre

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About the NBI Global Resource Centre

The Nature-Based Infrastructure (NBI) Global Resource Centre aims to improve the track record of NBI to deliver infrastructure services and adapt to climate change while delivering other environmental, social, and economic benefits. We provide data, training, and customized valuations of NBI projects, based on the latest innovations in systems thinking and financial modelling.

The Centre is an initiative led by the International Institute for Sustainable Development (IISD), with the financial support of the Global Environment Facility (GEF) and the MAVA Foundation, in partnership with the United Nations Industrial Development Organization (UNIDO).



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1 Course Overview

The world is facing a series of **environmental and social challenges**. Millions of people live without proper sanitation and lack nutritious food and clean drinking water. At the same time, countries are challenged to curb their greenhouse gas emissions and adapt to a changing climate. Responding to these challenges so that people and the planet can thrive requires huge investments. It also requires governments, planners, and investors to rethink past approaches to infrastructure investments.

Historically, decision-makers have prioritized **engineered, grey infrastructure** such as roads, dikes, and water treatment plants. These types of infrastructure are important enablers of development and have given many people access to key services. However, grey infrastructure solutions often have a huge environmental footprint. Their construction, operation, and decommissioning cause massive greenhouse gas emissions, disturb biodiversity, and aggravate challenges elsewhere.

Nature-based infrastructure (NBI), such as sand dunes, wetlands, and forests, also provides infrastructure services, including flood protection and water filtration. At the same time, these natural features bring additional benefits to communities and the environment. Research shows that we should invest more into NBI instead of conventional infrastructure because natural alternatives are more cost-effective and provide greater benefits for sustainable development. However, to embrace the potential of NBI, governments and investors need to better understand its performance.

The **NBI Global Resource Centre** aims to improve the track record of NBI to deliver infrastructure services and adapt to climate change while delivering other environmental, social, and economic benefits. It provides data, training, and customized valuations of NBI projects based on the latest innovations in systems thinking and financial modelling.

The online course was developed by the NBI Global Resource Centre to **help policy-makers, infrastructure planners, and investors understand, assess, and value nature-based infrastructure**. The course familiarizes participants with several tools and modelling approaches for NBI. In particular, participants learn about system dynamics, spatial modelling and financial modelling through a variety of NBI case studies. They also learn to identify risks and opportunities of nature-based infrastructure, in particular in comparison with “built” or “grey” infrastructure.

Participants can complete the course modules at their own pace or sign up for the 5-week guided program, which combines self-paced learning with live sessions. Participants of the 5-week live program receive a **course certificate**. The course is free of charge.



2 Learning Objectives

In this course, participants will learn to:

- Identify nature-based infrastructure (NBI) and its opportunities for climate adaptation and sustainable development.
- Make the case for NBI by explaining its potential economic, environmental, and social benefits.
- Understand the risk profile and the climate resilience benefits of NBI compared to grey infrastructure.
- Explain the basics of systems thinking, system dynamics models, spatial analysis, climate data and financial modelling applied to NBI.
- Appreciate the results of integrated NBI assessments.
- Use case studies of NBI projects as context for their work.

3 Target Group and Prerequisites

The training is open to the public and free of cost.

This course is designed for decision-makers in infrastructure planning, design, construction, maintenance, and finance. The course also targets policy-makers in the area of infrastructure and finance.

Participants do not need specific technical expertise to take this course, but basic knowledge of economics, climate adaptation, sustainable development, and nature-based solutions will help you to fully appreciate the course material.

Proficiency in English is required to follow the course.



4 Learning Methodology and Schedule

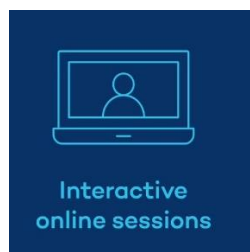
Participants can study the training materials at their own pace or sign up for the 5-week guided program, which combines self-paced learning with live sessions.



Self-paced
materials

The course consists of **five modules**. Each module comprises slide decks for reading and additional learning materials such as videos and reports. The slide decks present the main content of the module. Each module invites participants to dive deeper into the topic through additional materials. This includes exploring websites, reading reports and case studies, and watching video presentations and event recordings.

When studying the materials at their own pace we suggest participants plan for **4 hours per module, or about 20 hours in total**.



Interactive
online sessions

The **live program** combines the self-paced materials with interactive online sessions, spread over five weeks. The live program takes place twice a year and entails 10 Zoom meetings (two per week) with NBI experts and participants from around the world. It gives participants the opportunity to ask questions, exchange experiences with a peer group, and dive deeper into the topics through interactive exercises. Participants of the live program receive a course certificate.

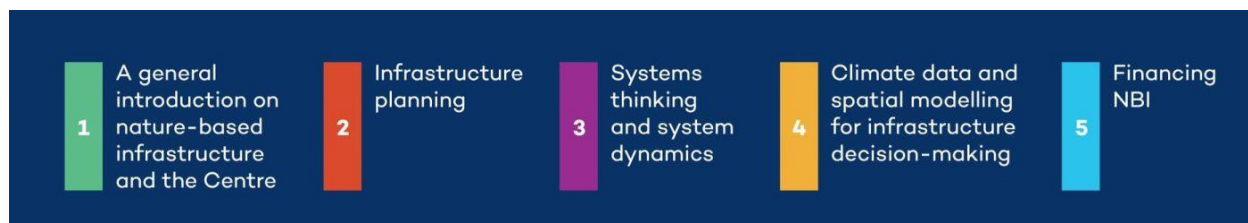
The live program entails **15 hours of live sessions** through Zoom, and we propose that participants spend additional **10 hours** studying the course materials. Participants do not need to join all 10 sessions but are encouraged to catch up through the video recordings.

The next live programs will take place in spring and autumn 2023. If you would like to be informed once the registration opens, please send an email to nbicentre@iisd.org or sign up to the [NBI Newsletter](#).



5 Course Structure and Content

The course content is divided into five modules. The materials are available [here](#) on the NBI Global Resource Centre.



Module 1 introduces the course content and the concept of NBI



Module 1 gives an introduction of the concept of NBI and explains its importance for climate adaptation.

Block 1 provides an introduction to the course. It covers the following content:

- Course topic, target group, and learning objectives
- Learning methods and practicalities
- Overview of the course modules
- Background of the NBI Global Resource Centre and the team delivering the course

Block 2 introduces the concept of NBI and its role in climate adaptation. It covers the following content:

- Definition of NBI with diverse examples
- NBI as a provider of ecosystem services
- Summary of other concepts related to NBI, such as nature-based solutions
- Analyzing climate risks for infrastructure and identifying opportunities for NBI
- Infrastructure investment needs and potential savings from NBI



Module 2 explores how to integrate NBI into infrastructure planning



Module 2 describes guiding principles and tools for planning sustainable and nature-based infrastructure. It also explains how integrated cost benefit analysis supports infrastructure decision-making and introduces the Sustainable Asset Valuation (SAVi) methodology.

Block 1 deals with sustainable infrastructure and international guidelines. It covers the following content:

- Definitions, challenges, and opportunities for sustainable infrastructure
- Guidelines for sustainable infrastructure, with a focus on the United Nations Environment Programme's 10 guiding principles for sustainable infrastructure
- Relevant tools, instruments, and standards for NBI, including the International Union for Conservation of Nature's Global Standard for Nature-based Solutions, the SITES Rating System for Sustainable Land Design and Development, and the RELi rating system for resilient design and construction.

Block 2 explains integrated economic valuations as a tool for infrastructure investments. It covers the following content:

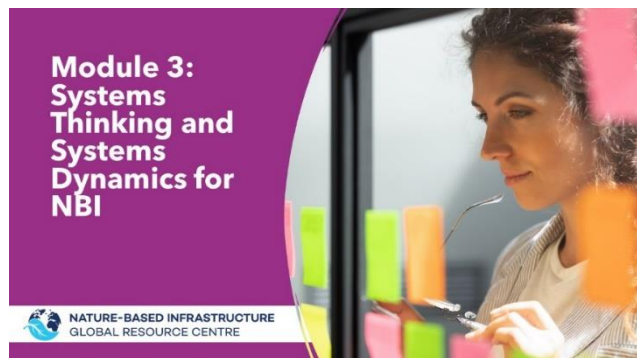
- Valuations in infrastructure decision making
- IISD's Sustainable Asset Valuation (SAVi) methodology
- Simulation, valuation, and customization as key elements of SAVi

Block 3 presents a practice example of a SAVi assessment for peatland restoration in Indonesia. It covers the following content:

- Project description and context
- SAVi assessment using system dynamics and project finance modelling
- Conclusions and opportunities for using the results



Module 3 introduces systems thinking and system dynamics modelling



Module 3 explains the basics of systems thinking and system dynamics modelling and how these methods help understand the outcomes of infrastructure investments. It describes how to quantify the social, economic, and environmental performance indicators of NBI using a systems model.

Block 1 familiarizes participants with systems thinking and system dynamics. It covers the following content:

- How a systemic approach supports infrastructure decision making
- Introduction to systems thinking
- Introduction to system dynamics modelling

Block 2 explains the application of a systems approach to assessments of NBI. It covers the following content:

- Creating, interpreting and using causal loop diagrams
- Quantification of the social, economic, and environmental NBI performance indicators using a systems model
- Use of the results of systems modelling to create societal cost benefit analyses of infrastructure projects

Block 3 presents the results of a systemic assessment for wastewater management in South Africa. The practice example covers the following content:

- Challenges and infrastructure options for water management in Hartenbos, South Africa
- Creating a causal loop diagram for the project
- System dynamics modelling
- Integrated cost benefit analysis and financial assessment



Module 4 explains the role of climate data and spatial analysis for NBI



Module 4 describes how climate parameters influence infrastructure and what this means for climate resilience. It also explains the basics of spatial analysis and how it can be used to map and quantify ecosystem services.

Block 1 describes the use of climate data in infrastructure valuations. It covers the following content:

- Climate scenarios and sources of climate data
- Influence of climate parameters on infrastructure
- Climate indicators for assessing the climate resilience of infrastructure
- Practice example: The integration of Copernicus Climate Data in a SAVi assessment of stormwater infrastructure in South Africa

Block 2 describes the fundamentals of spatial analysis and how it supports the economic valuation of infrastructure. It covers the following content:

- Introduction to spatial analysis and geographic information systems (GIS)
- Land cover maps as a basis for spatial analysis
- Analyzing ecosystem services with Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) models
- Practice example: The use of spatial models for a SAVi assessment of tree planting in Ethiopia
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Block 3 presents a SAVi assessment of reforestation and water management in the Brantas river basin in Indonesia. It covers the following content:

- Sustainability challenges and NBI opportunities in the project context
- Use of spatial models as part of the assessment
- Integrated cost benefit analysis and financial results under different climate scenarios



Module 5 presents financial models and financing options for NBI



Module 5 explains how to integrate environmental and social externalities into excel-based financial models. It also discusses challenges for financing NBI and explores financing instruments for NBI.

Block 1 is about project finance modelling. It covers the following content:

- Definition of project finance
- Main components of project finance models
- How to integrate environmental and social considerations into financial models
- Financial modelling for NBI
- Practice example: Financial modelling for forest restoration in Indonesia (SAVI assessment)

Block 2 familiarizes participants with the challenges and solutions to finance NBI. It covers the following content:

- Challenges of financing NBI
- Innovation in financing NBI: Solutions and instruments