Ministry of Agriculture & Livestock Development

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Alliance Bioversity & CIAT

CGIAR

ICAT Initiative for Climate Action Transparency

A NATURE-BASED SOLUTIONS TRAINING GUIDE

Strengthening Capacity for Implementation, and Monitoring and Evaluation in Kenya



Initiative for Climate Action Transparency - ICAT

A NATURE-BASED SOLUTIONS TRAINING GUIDE:
Strengthening Capacity for Implementation, and Monitoring and Evaluation in Kenya

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PREPARED UNDER

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Purpose of this training guide

This training guide was developed to strengthen capacity for the implementation, monitoring, evaluation, and reporting of Nature-based Solutions (NbS) in Kenya's agricultural and biodiversity landscapes. It responds to the growing need for practical guidance that supports stakeholders at different levels to understand NbS concepts, apply monitoring frameworks, and generate credible evidence for climate, biodiversity, and restoration reporting.

The guide is grounded in experiences from Kenya's biodiversity and climate-vulnerable landscapes, particularly the Chyulu Hills landscape, where NbS interventions are being implemented across complex agricultural, rangeland, forest, and conservation systems. As such, the guide is designed not only for the Kenyan context, but also for application in similar landscapes within Kenya and across the region that share characteristics such as dryland and semi-arid ecosystems, mixed livelihood systems, climate vulnerability, ecosystem degradation, and community-based natural resource management approaches.

The guide provides foundational context designed for non-technical and community-level stakeholders who require a practical introduction to NbS. The target audience includes community members, farmer groups, community-based organisations, community forest associations, water resource users associations, local leaders, extension officers, civil society organisations, and county-level practitioners involved in awareness raising, implementation, and local governance of NbS interventions. The guide also provides practical application of monitoring, evaluation, learning and reporting for NbS. The target audience includes national and county government technical officers, climate change units, monitoring and evaluation specialists, extension officers, research institutions, development partners, non-governmental organisations (NGOs), field enumerators, and data management teams responsible for supporting evidence generation, transparency, and reporting.

Training resource overview

The guide is organised into four modules, progressing from foundational concepts to practical application.



MODULE 1
NbS in the context of agriculture

Introduces NbS concepts, principles, and practices, with a focus on their role in addressing land degradation, climate change, and food system challenges in Kenya.



MODULE 2
Policy and institutional landscape for NbS

Examines the global, national, and county-level policy and institutional frameworks shaping NbS implementation, including governance, coordination, and financing considerations.



MODULE 3
Monitoring and evaluation for NbS

Provides an overview of monitoring and evaluation (M&E) concepts, frameworks, and indicators, and introduces Kenya's NbS M&E Framework, including its development process.



MODULE 4 - Functionality of the NbS M&E Framework

Module 4 A
Translating framework indicators

Guides users on how to interpret indicators into practical field-level questions, designing data collection questions to get community level information.

Module 4 B
The NbS M&E Reporting Tool

Focuses on the practical application of the NbS M&E Framework through a digital reporting tool, enabling data collation, analysis, and reporting of NbS interventions.

Acronyms and abbreviations

ASAL	Arid and Semi-Arid Land
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resource Management
CBO	Community-Based Organisation
CCAP	Climate Change Action Plan
CCCU	County Climate Change Unit
CCD	Climate Change Directorate
CFA	Community Forest Association
CIDP	County Integrated Development Plan
CSA	Climate-Smart Agriculture
DRR	Disaster Risk Reduction
EbA	Ecosystem-based Adaptation
FMNR	Farmer-Managed Natural Regeneration
FOLAREP	Forest and Landscape Restoration Implementation Plan
GHG	Greenhouse Gas
ICRAF	World Agroforestry Centre
IPCC	Intergovernmental Panel on Climate Change
ISFM	Integrated Soil Fertility Management
ITK	Indigenous Technical Knowledge
IUCN	International Union for Conservation of Nature
KCSAIF	Kenya Climate-Smart Agriculture Implementation Framework
KCSAS	Kenya Climate-Smart Agriculture Strategy
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
M&E	Monitoring and Evaluation
MoALD	Ministry of Agriculture and Livestock Development
MoECCF	Ministry of Environment, Climate Change and Forestry
MRV	Measuring, Reporting and Verification
NAP	National Adaptation Plan
NbS	Nature-based Solutions
NBSAP	National Biodiversity Strategy and Action Plan
NCCAP	National Climate Change Action Plan
NCCC	National Climate Change Council
NDC	Nationally Determined Contribution
NEMA	National Environment Management Authority
NGO	Non-Governmental Organisation
PES	Payments for Ecosystem Services
SDG	Sustainable Development Goal
SLM	Sustainable Land Management
TNC	The Nature Conservancy
TWENDE	Towards Ending Drought Emergencies
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WRUA	Water Resource Users Association
WWF	World Wide Fund for Nature

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MODULE 01

NbS in the context of agriculture



Purpose of this module

This module introduces the concept of NbS and their application in the context of agricultural systems, with a focus on Kenya. It aims to build foundational understanding of how NbS can address land degradation, climate change, and food production challenges while improving livelihoods.



Learning objectives

By the end of this module, participants will be able to:

- Understand the core concepts, principles, and functions of NbS in agricultural landscapes.
- Identify the major drivers of ecosystem degradation and explain how NbS interventions respond to these challenges.
- Identify key NbS practices in Kenya and their role in addressing land degradation, climate change, and food system challenges.
- Recognise critical considerations for designing effective, context-specific NbS interventions.

Background

Land and natural resource degradation is one of the most pressing environmental challenges globally and in Kenya. It is characterised by the decline in land productivity, forest and water resources, ecosystem function, and ecosystem services, driven by:

- Deforestation
- Overgrazing
- Unsustainable agricultural practices
- Mining activities
- Infrastructural development
- Climate change pressures

Globally, over 25% of land is degraded, affecting billions of people. In Kenya, this challenge is particularly acute in arid and semi-arid lands (ASALs), where declining soil fertility, water scarcity, and climate variability threaten livelihoods and food security.

Degraded landscapes are less productive, store less carbon, and are more vulnerable to droughts and floods. Addressing these challenges requires approaches that restore ecosystems while supporting human well-being, this is where NbS play a critical role.

What are NbS?

NbS are defined by the International Union for Conservation of Nature (IUCN) as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits". (IUCN, 2016)

NbS work by mimicking natural processes to improve ecosystem functioning.

NbS encompass many different types of ecosystem-based approaches for addressing societal challenges while delivering benefits for both people and nature. These complementary approaches include restoration interventions, which focus on rehabilitating degraded ecosystems; protection approaches, which conserve intact ecosystems to maintain their functions; and sustainable management approaches, which ensure that landscapes such as agricultural systems continue to provide goods and services over time. It also includes issue-specific approaches, such as ecosystem-based adaptation (EbA) or disaster risk reduction (DRR), and infrastructure-related approaches, where natural or hybrid systems (e.g. green and blue infrastructure) are used alongside or instead of built infrastructure.

These approaches are applied to address key societal challenges, including climate change mitigation and adaptation, food and water security, DRR, and human health. As illustrated in the IUCN conceptual framework, NbS should generate multiple, simultaneous outcomes - enhancing human well-being through improved livelihoods, resilience, and resource security, while also delivering biodiversity benefits by conserving, restoring, and sustainably managing ecosystems.



Figure 1. Nature-based solutions conceptual framework (Source: IUCN, 2020)

Key elements of an NbS intervention:

- Addresses a societal challenge (e.g. climate change, food security)
- Uses nature and/or ecosystem services
- Delivers benefits for both people and biodiversity
- Is sustainable and resilient over the long term
- Can be measured and monitored

Drivers of ecosystem degradation

NbS respond to the underlying drivers of ecosystem degradation that threaten agricultural productivity, ecosystem health, and community resilience. In agricultural landscapes, ecosystem degradation is driven by a range of interconnected environmental, climatic, and human-induced pressures, categorised as below.



Unsustainable agricultural practices

Unsustainable land management practices contribute to declining soil fertility, erosion, biodiversity loss, and reduced productivity.

Examples include intensive monocropping, overgrazing, inappropriate tillage practices, excessive use of synthetic inputs, and cultivation of poorly adapted crop varieties and livestock breeds.



Encroachment of protected and ecologically sensitive ecosystems

Unsustainable land conversion and resource extraction threaten forests, wetlands, rangelands, and wildlife habitats. Examples include deforestation and illegal resource extraction, encroachment into wetlands and riparian areas, illegal grazing in protected areas, mining activities and pollution, and destruction of wildlife corridors.



Increased climate change impacts and risks

Climate variability and extreme weather events place increasing pressure on ecosystems and livelihoods. Examples include droughts and erratic rainfall, flooding and landslides, rising temperatures, and water scarcity.

NbS response pathways

NbS interventions address these degradation drivers through four interconnected outcome areas that support ecosystem restoration, resilience, and sustainable livelihoods.



Adoption of sustainable agricultural practices

NbS promote sustainable farming systems such as agroforestry and farmer-managed natural regeneration (FMNR), conservation agriculture, integrated soil fertility management (ISFM), and sustainable grazing systems that restore ecosystem functions while maintaining agricultural productivity.

This leads to improved soil health and fertility, reduced land degradation, and increased and more stable agricultural productivity.



Enhanced resilience of communities to climate shocks

NbS strengthen the ability of communities and ecosystems to cope with climate variability and extreme weather events.

This leads to improved water availability and regulation, reduced vulnerability to droughts and floods, and increased adaptive capacity of communities and farming systems.



Restored and sustained protected ecosystems

NbS support the restoration and long-term protection of forests, wetlands, rangelands, and other critical ecosystems. This leads to restored biodiversity and habitats, increased carbon sequestration, and improved ecosystem service delivery.



Enhanced community governance and capacity

Effective NbS implementation requires strong governance systems, community participation, and institutional capacity.

This leads to improved natural resource governance, increased community ownership and participation, and greater sustainability of NbS interventions.

NbS in agricultural landscapes

NbS work by mimicking natural processes and build on land restoration and integrated water–land management approaches to enhance vegetation cover, improve water availability and quality, and strengthen agricultural productivity. They encompass actions to conserve, restore, and rehabilitate natural ecosystems, as well as to enhance or reintroduce natural processes within managed agricultural landscapes.

In practice, many production-oriented approaches harness the complementary functions of trees, crops, and livestock to sustain agricultural production while reducing environmental impacts, an approach reflected in regenerative and conservation agriculture. Within agricultural systems, NbS improve soil health and moisture retention, increase carbon sequestration in soils and biomass, enhance downstream water quality, and conserve biodiversity, ultimately contributing to more sustainable and resilient agricultural value chains. Many agroecological and climate-smart agriculture (CSA) practices align closely with the NbS framework, as they integrate productivity, resilience, and environmental sustainability.

Despite these opportunities, current food production systems often contribute to land degradation, declining soil health, water resource depletion, and biodiversity loss across multiple scales, undermining the long-term sustainability of agriculture. In response to these interconnected challenges, there is growing recognition of the need for transformative approaches to agri-food systems. NbS provide a practical and adaptable pathway for such transformation, offering context-specific solutions that address environmental, social, and economic objectives simultaneously, while acknowledging that no single intervention can address all challenges.

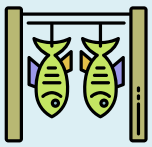
Agriculture and food systems are responsible for:



60% of global biodiversity loss on land



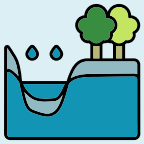
24% of the global greenhouse gas emissions



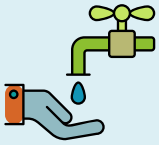
61% of the depletion of commercial fish



33% of degraded soils



20% overexploitation of the world's aquifers



70% of global freshwater withdrawals are for agriculture



A **60%** increase in **global food production** is needed to feed a future population of 9 billion people. At the same time **>800 million people are hungry today**.

Figure 2. Unsustainable food production and consumption practices are major contributors to environmental degradation and the intensification of climate change (Sources: UNEP and IRP, 2025; UNESCO, 2024)

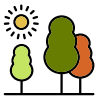
What are the benefits of NbS in agriculture?

- Increase soil organic matter and nutrient cycling
- Improve yield stability and reduce input costs
- Enhance climate resilience and carbon storage
- Support pollinators, wild foods, and dietary diversity
- Reduce erosion, flooding, and sediment runoff



NbS solutions in agriculture

This section gives examples of NbS solutions applied in agricultural landscapes, their NbS mechanisms and agricultural and environmental outcomes.



Agroforestry

Agroforestry integrates trees with crops and/or livestock within a single production system. Trees are deliberately selected and managed to foster beneficial interactions with both crops and animals.

Examples of agroforestry application:

- Alley cropping with legumes
- Silvopasture (trees, pasture and livestock)
- Fruit tree-crop systems
- Boundary planting and windbreaks

NbS mechanisms of agroforestry:

- Tree roots stabilise soils and reduce erosion
- Leaf litter and root turnover increase soil organic matter
- Trees regulate microclimate (shade, wind reduction, humidity)
- Nitrogen-fixing species enhance soil fertility
- Tree cover improves water infiltration and reduces runoff

Agricultural and environmental outcomes:

- Improved yield stability under climate stress (heat, drought)
- Reduced fertilizer and irrigation needs
- Diversified farm outputs (food, fodder, fuelwood, timber, medicines)
- Enhanced carbon sequestration and biodiversity habitat



Farmer-managed natural regeneration (FMNR)

A technical practice or approach used to support local communities to restore their natural environment, normally used as an early restoration intervention. In other areas, it can be appropriately included under agroforestry practices within the NbS context because it integrates and manages naturally regenerating trees and shrubs within farming systems alongside crops and/or livestock, which aligns with the core principles of agroforestry.

Examples of FMNR application:

- Species identification of trees and shrubs to be regenerated
- Thinning shoots from tree stumps
- Managing pruned stumps and shrubs
- Use of stems and shrubs for fodder or firewood

Agricultural and environmental outcomes:

- Improved soil fertility
- Increased crop yields
- Availability of animal fodder



Conservation agriculture

Conservation agriculture is based on three principles:

- Minimal soil disturbance
- Permanent soil cover
- Diversified crop rotations

Examples of conservation agriculture application:

- No-till or reduced tillage
- Cover crops (legumes, grasses)
- Residue retention and mulching

NbS mechanisms of conservation agriculture:

- Reduced tillage preserves soil structure and soil organisms
- Cover crops and mulch protect soil from erosion and moisture loss
- Crop rotations disrupt pest cycles and enhance nutrient cycling
- Soil organic carbon increases through reduced disturbance

Agricultural and environmental outcomes:

- Improved water retention and drought resilience
- Reduced erosion and sediment loss
- Lower production costs over time
- Stabilised or increased yields in rain-fed and stress-prone systems



Integrated soil fertility management (ISFM)

ISFM integrates organic inputs, mineral fertilizers, improved seed, and good agronomic practices tailored to local soil conditions.

Examples of ISFM application:

- Legume rotation and green manure
- Fertilizer micro-dosing
- Compost-fertilizer blends

NbS mechanisms of integrated soil fertility management:

- Incorporation of compost, manure, and crop residues improves soil structure, fertility, and moisture retention
- Use of nitrogen-fixing plants and soil biota naturally enhances nutrient availability
- Mulching and cover crops protect soil, reduces erosion, and maintains soil moisture
- Combining organic and inorganic inputs in a balanced way optimises soil fertility and sustains productivity over time

Agricultural and environmental outcomes:

- Enhanced nutrient availability supports higher and more stable productivity
- Increased soil organic matter, structure, and microbial activity
- Soils hold moisture more effectively, improving drought resilience
- Lower erosion and improved soil stability
- Reduced nutrient losses and improved input efficiency
- Decreased reliance on synthetic inputs and reduced runoff and pollution



Aquatic and coastal NbS

Restoration and protection of wetlands, floodplains, mangroves and river systems, supporting food production systems linked to agriculture and fisheries.

Examples of aquatic and coastal NbS application:

- Revegetation of wetlands/mangroves with native species
- Riparian buffer restoration
- Restoring natural hydrology (water flow and storage)

NbS mechanisms of wetland/mangrove/floodplain restoration:

- Wetlands regulate water flows and purify water
- Mangroves and floodplains store carbon and buffer storms
- Healthy aquatic systems sustain fisheries and aquaculture
- Nutrient cycling supports adjacent agricultural lands

Agricultural and environmental outcomes:

- Stable fish and aquatic food supplies
- Reduced flood damage
- Enhanced climate resilience of coastal communities
- Improved water quality for irrigation and livestock



Landscape approaches

Landscape approaches align NbS practices across farms, forests, water bodies, and settlements to strengthen ecological connectivity and enhance ecosystem services.

Examples of landscape scale/ecological intensification application:

- Buffer strips along rivers
- Catchment restoration
- Mosaic landscapes combining production and conservation

NbS mechanisms of landscape scale/ecological intensification:

- Riparian buffers filter sediments and nutrients
- Habitat corridors support biodiversity movement
- Coordinated land use reduces flood and erosion risks
- Watershed restoration improves downstream water quality

Agricultural and environmental outcomes:

- Reduced disaster risk (flooding, landslides)
- Improved water availability for irrigation
- Enhanced pollination and pest regulation

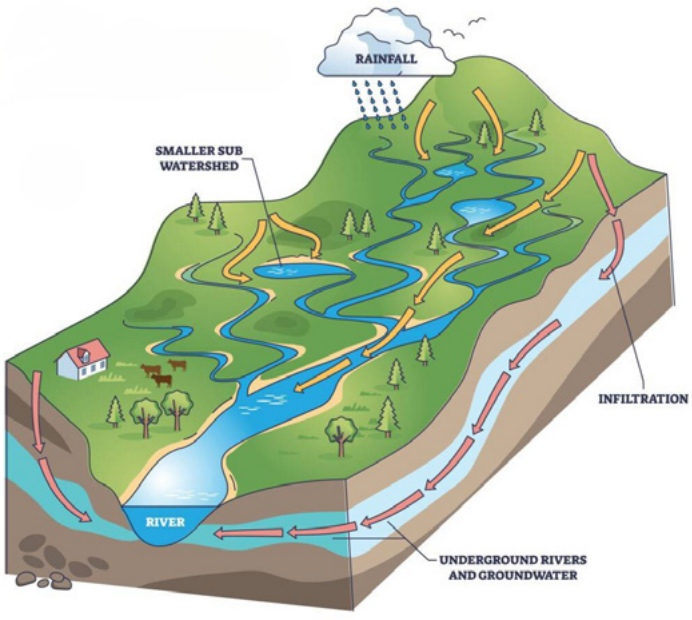


Figure 3. A watershed (Source: TWF, 2026)



Climate mitigation potential of various NbS practices

Estimates indicate that NbS could deliver up to 37% of the mitigation required by 2030 to meet the targets of the Paris Agreement. This can be achieved through a range of actions for example:

- Planting trees increases carbon sequestration.
- Restoring native forests along riverbanks can both reduce landslide risks and act as carbon sinks.
- CSA enables farmers to increase carbon storage in soils while maintaining productivity.
- Reducing deforestation, such as through incentives for farmers to conserve forests, helps preserve ecosystem services, including carbon sequestration, clean water provision, and reduced downstream sedimentation.

NbS also play a critical role in climate adaptation by strengthening the resilience of landscapes and communities. They offer a cost-effective approach to addressing climate change while simultaneously tackling biodiversity loss and land degradation, enabling multiple challenges to be addressed at once.

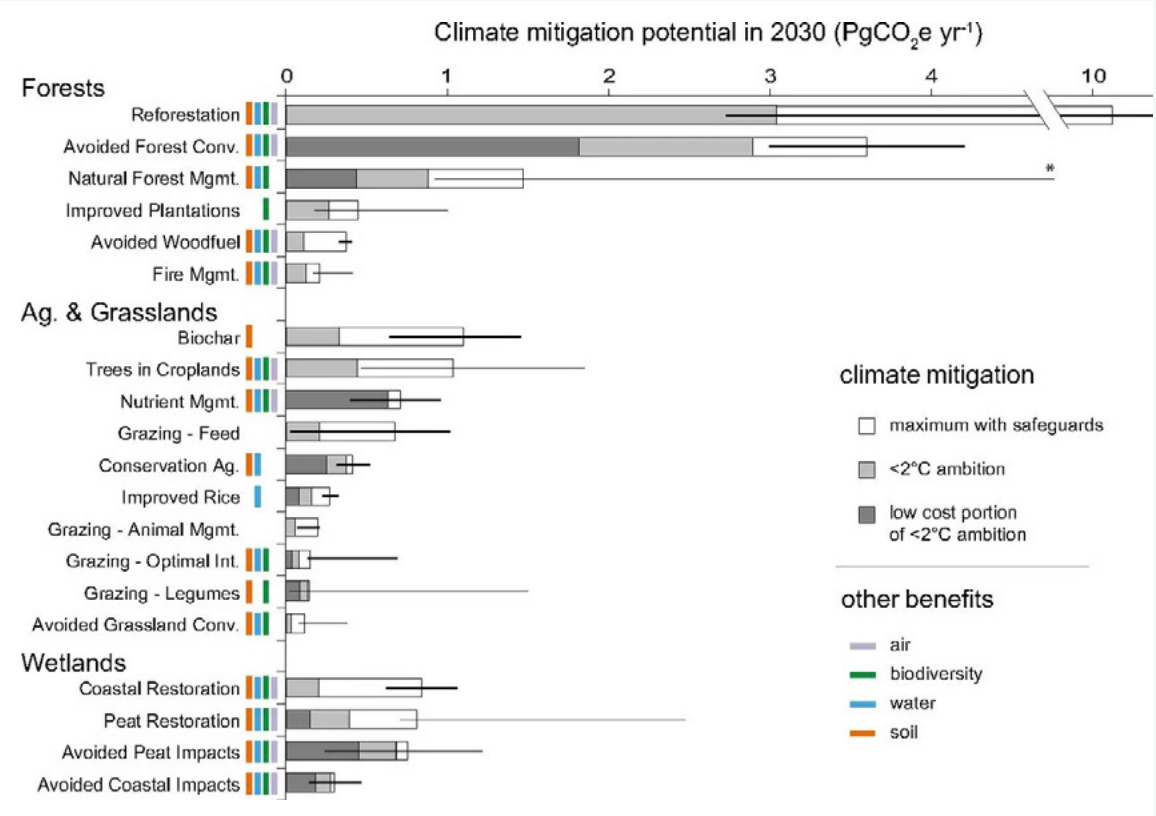


Figure 4. Climate mitigation potential of various nature-based solutions (Source: Griscom et al., 2017)

Criteria to consider when designing an effective NbS project

If poorly designed or implemented, NbS can risk harming biodiversity and undermining the essential ecosystem services we rely on, such as clean water and food production. For instance, a tree-planting project focused on a single non-native species may degrade soil quality, reduce biodiversity, and make the forest difficult or costly to sustain over time.

Similarly, efforts to restore mangroves for storm protection may fail if upstream and downstream dynamics such as reduced freshwater flows, sediment loss, pollution, or coastal development pressures, are not adequately considered. Inadequate consideration of water use can also result in restored ecosystems placing excessive pressure on local water resources and communities. More broadly, neglecting social and economic factors has meant that some NbS initiatives, while successful as pilots, have not been sustainable beyond the lifespan of the project. In such cases, NbS may also lead to maladaptation, where interventions intended to reduce climate or environmental risks inadvertently increase vulnerability, lock in unsustainable practices, or shift risks to other ecosystems or communities.

NbS are inherently complex and require careful consideration across all stages of project development. The three core phases, planning, implementation, delivery and monitoring, evaluation, and learning (MEL), should be thoughtfully designed, taking into account several key factors:

- NbS rely on evolving ecosystem processes, which introduce uncertainty. Project design and implementation must therefore accommodate changing conditions over time.
- NbS involve a wide range of stakeholders, requiring early and sustained consultation, with particular emphasis on the stewardship and active engagement of beneficiary and impacted communities.
- There are often several viable approaches, making optimisation an important part of the process.
- NbS generate a range of co-benefits beyond the primary objective, requiring approaches that capture their full value.
- Ongoing learning and flexibility are essential, as projects may need to be adjusted in response to changing conditions.
- Monitoring and feedback are critical final steps, ensuring that project performance reflects the dynamic nature of NbS and supports continuous adaptation.

Effective NbS requires:

- Strong understanding of ecosystem functions
- Multi- and transdisciplinary approaches combining science and local knowledge
- Early and continuous stakeholder involvement
- Sustainable financing mechanisms
- Robust monitoring, evaluation, and learning systems

Case: NbS in practice – TWENDE, Kenya

The TWENDE "Towards Ending Drought Emergencies: Ecosystem Based Adaptation in Kenya's Arid and Semi-Arid Rangelands" project is a flagship example of NbS applied in Kenya's ASALs. The initiative focuses on strengthening climate resilience by restoring degraded rangelands and improving ecosystem governance, directly addressing the growing impacts of drought on livelihoods and the national economy.

Kenya's ASALs cover a large proportion of the country and support millions of people, many of whom depend on livestock for their livelihoods. However, these landscapes are increasingly affected by land degradation, weakened natural resource governance, and more frequent and severe droughts. These pressures reduce productivity, increase conflict over resources, and heighten vulnerability to climate shocks.



Approach

TWENDE applies an EbA approach, a core form of NbS, by working with natural systems to restore ecological function while supporting livelihoods. Key interventions include:

- Restoration of degraded rangelands through improved vegetation cover and soil health.
- Strengthening landscape-level planning and governance systems.
- Enhancing water resource management in critical dry season grazing areas.
- Supporting climate informed decision-making and ecosystem management.

These interventions aim to restore natural processes such as water cycling, vegetation regeneration, and soil recovery, while reinforcing CBNRM systems.



Scale and impact

The project is implemented across multiple counties and landscapes, with the ambition to:

- Restore or protect approximately 500,000 hectares of rangeland.
- Benefit over 600,000 people in pastoral and agro-pastoral communities.



Outcomes and learning

Insights from key stakeholders at the TWENDE workshop in 2025 highlighted the importance of:

- Integrating scientific data with local and Indigenous Knowledge.
- Strengthening institutional coordination across national and county levels.
- Building capacity for monitoring, learning, and adaptive management.
- Ensuring community ownership and participation in restoration efforts.



Activity

Reflect on what you have learned by considering the following questions:

- What are the main drivers of land and natural resource degradation in your area?
- Which NbS practices are already being implemented locally?
- What benefits could NbS provide to farmers, ecosystems, and communities?
- What important considerations should be taken into account when designing and implementing NbS interventions?



Technical resources

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MODULE 02

Policy and institutional landscape for NbS



Purpose of this module

This module aims to build a clear understanding of the policy, institutional, and regulatory environment shaping the design, implementation, and scaling of NbS in Kenya. It explores how global commitments are translated into national and county-level frameworks. It also highlights the roles of key institutions, and the role of communities in governance, and emphasises the importance of monitoring, evaluation, learning and reporting systems in ensuring coordination, accountability, and evidence-based decision-making.



Learning objectives

By the end of this module, participants will be able to:

- Understand how global, national, and county-level policy frameworks shape the implementation and scaling of NbS in Kenya.
- Identify the roles and coordination of key institutions involved in NbS governance and delivery.
- Recognise key enabling factors, challenges, and opportunities for strengthening NbS integration and scaling.

Why NbS is a policy concern

As covered in module 1, NbS are actions to protect, conserve, restore, and sustainably use ecosystems in order to address key societal challenges, including climate change and food security. They are essential for conserving biodiversity, regulating climate, and contributing to the achievement of the Sustainable Development Goals (SDGs). NbS also play a critical role in supporting climate adaptation by reducing vulnerability to shocks such as droughts and floods. However, without clear legal mandates and strong policy coherence, NbS efforts often remain fragmented and project-based, limiting their potential to deliver systemic and long-term impact.

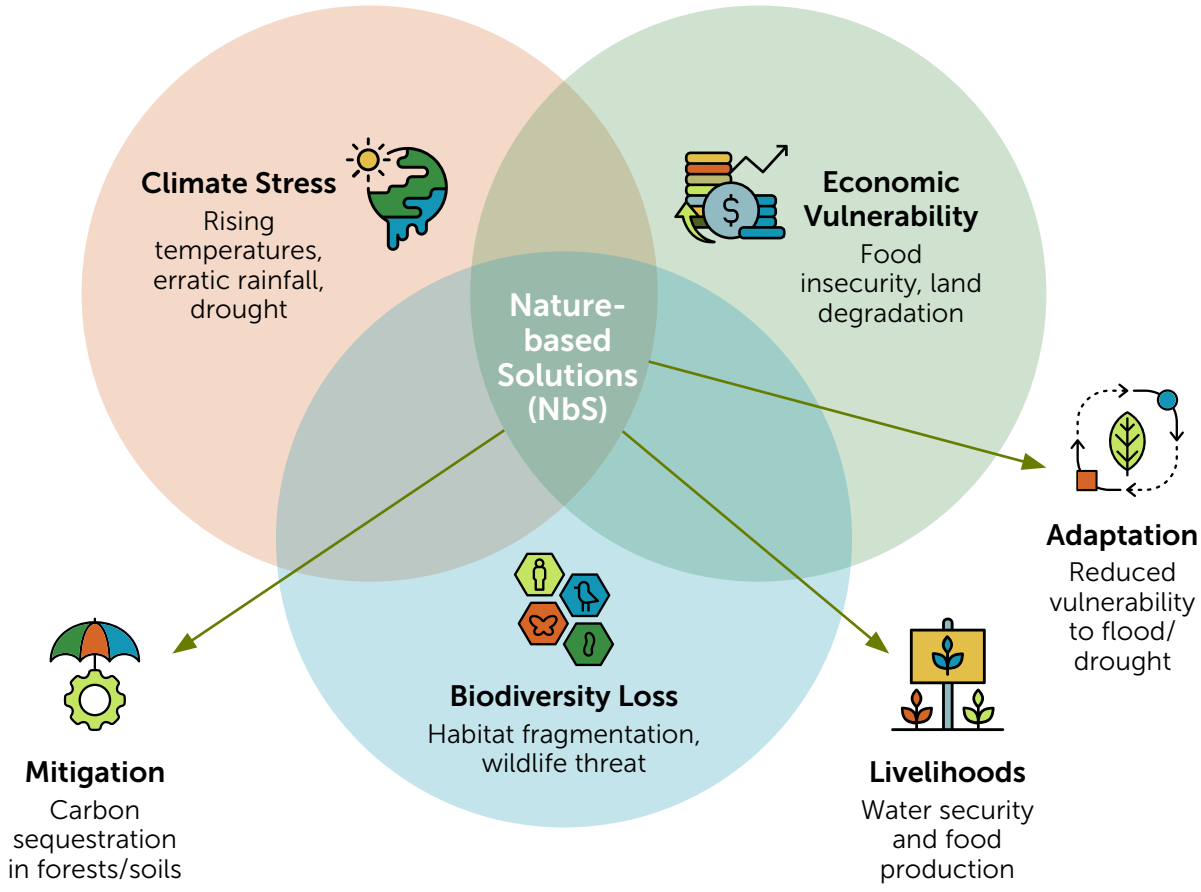


Figure 5. Nature-based solutions address the triple planetary crisis (Source: Authors)

An effective enabling environment for scaling NbS requires several interconnected elements:

- Policy coherence is essential to align sectors such as agriculture, water, and forestry and to avoid conflicting incentives.
- Strong institutional coordination is needed to clarify roles and responsibilities across ministries and different levels of government.
- Mobilising both public and private finance, including mechanisms such as the Green Climate Fund (GCF) and payments for ecosystem services (PES), is also critical.
- Secure land tenure and effective governance arrangements help ensure that communities have the rights and incentives for long-term stewardship.
- Building capacity, alongside robust M&E systems, is necessary to support effective implementation and generate evidence for adaptive management and accountability.

Kenya's global commitments

International frameworks

The United Nations Framework Convention on Climate Change (UNFCCC) has played a central role in advancing global efforts on NbS. Under the Paris Agreement, Article 5 specifically encourages countries to conserve and enhance carbon sinks, particularly forests, as part of their climate mitigation and adaptation strategies. In the lead-up to the 26th Conference of the Parties (COP26), countries were further encouraged to integrate NbS into their Nationally Determined Contributions (NDCs). As a result, more than two-thirds of countries that are party to the Paris Agreement have now incorporated NbS-related actions into their NDCs, reflecting their growing importance in global climate policy.

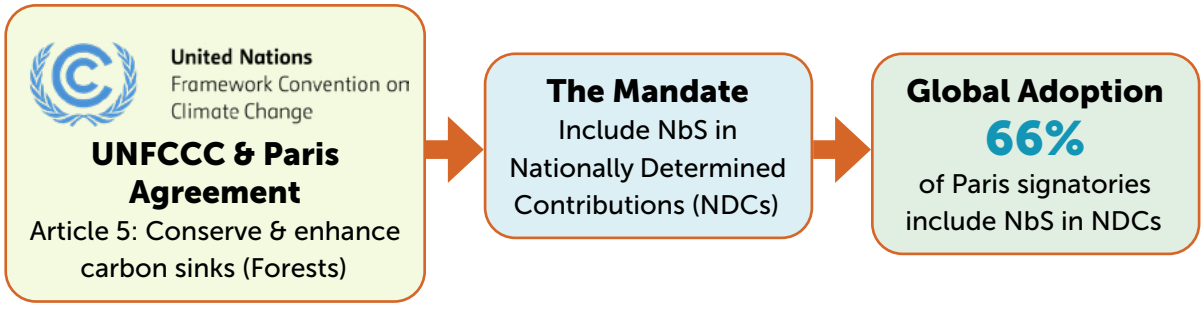


Figure 6. Positioning nature-based solutions within the global climate policy framework (Source: Authors)



Rio Convention Strategies

Global policy frameworks under the Rio Conventions strongly support the application of NbS. The Kunming-Montreal Global Biodiversity Framework (KM-GBF), adopted under the Convention on Biological Diversity (CBD) in December 2022, represents a global commitment to halt and reverse biodiversity loss by 2030 and promotes the use of NbS to restore ecosystems and strengthen climate resilience. Similarly, the United Nations Convention to Combat Desertification (UNCCD) advocates for the integration of NbS to address desertification, land degradation, and drought. In parallel, the Sendai Framework for Disaster Risk Reduction (2015-2030) recognises ecosystem-based approaches as effective tools for reducing disaster risk and enhancing resilience.

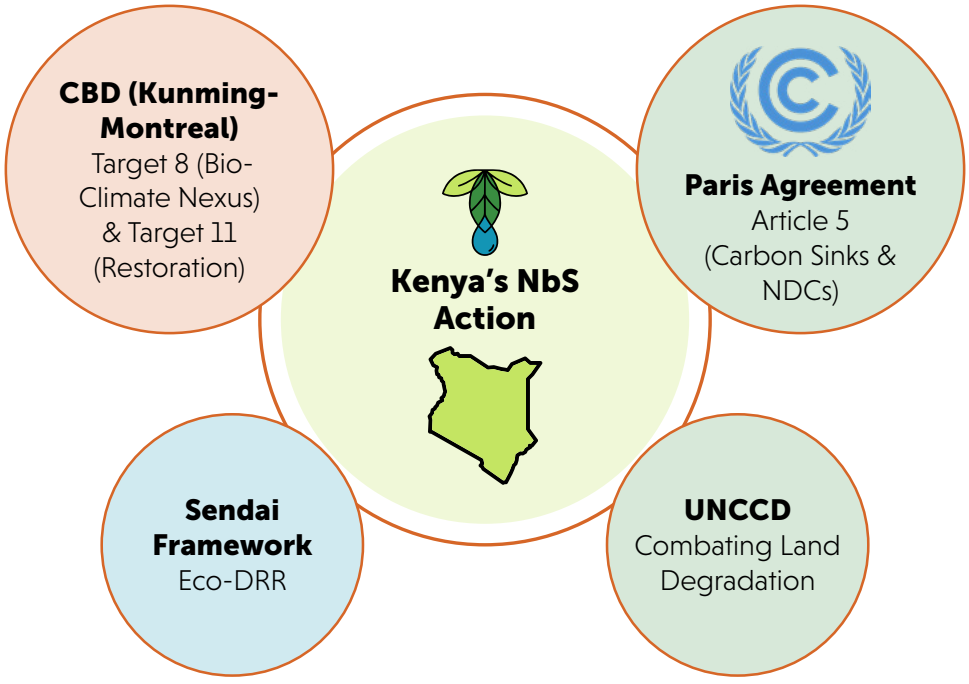


Figure 7. Kenya's nature-based solutions action aligns with global commitments (Source: Authors)

Translating global policy in Kenya

Kenya has made significant progress in translating global commitments on NbS into national policy and institutional frameworks. The country's governance architecture is anchored in the Climate Change Act (2016), amended in 2023, which provides the legal basis for coordinated climate action. The Act mandates the establishment of the National Climate Change Council (NCCC) for strategic oversight, the Climate Change Directorate (CCD) for coordination, monitoring, reporting and verification (MRV), and Climate Change Units (CCUs) to support mainstreaming across sectors and county governments. The 2023 amendment further strengthens provisions for carbon markets and benefit sharing. In this context, Kenya launched its National Carbon Registry in February 2026, creating a centralised, digital and transparent system to track, verify and manage carbon projects and credits generated within the country.



National policies and strategies that integrate NbS

KENYA VISION 2030

The overarching goal of Kenya Vision 2030 is to transform Kenya into a globally competitive and prosperous nation by 2030, with a focus on sustainable development. The agricultural sector in Vision 2030 promotes NbS through its focus on green agriculture and SLM practices. It includes reforestation and afforestation programmes, such as the Kenya Forest Service's (KFS) efforts to restore degraded lands through agroforestry and the promotion of sustainable timber and non-timber forest products. Vision 2030 also supports community-based land restoration initiatives that leverage natural solutions to improve productivity, land health, and local livelihoods.

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP, 2019-2030)

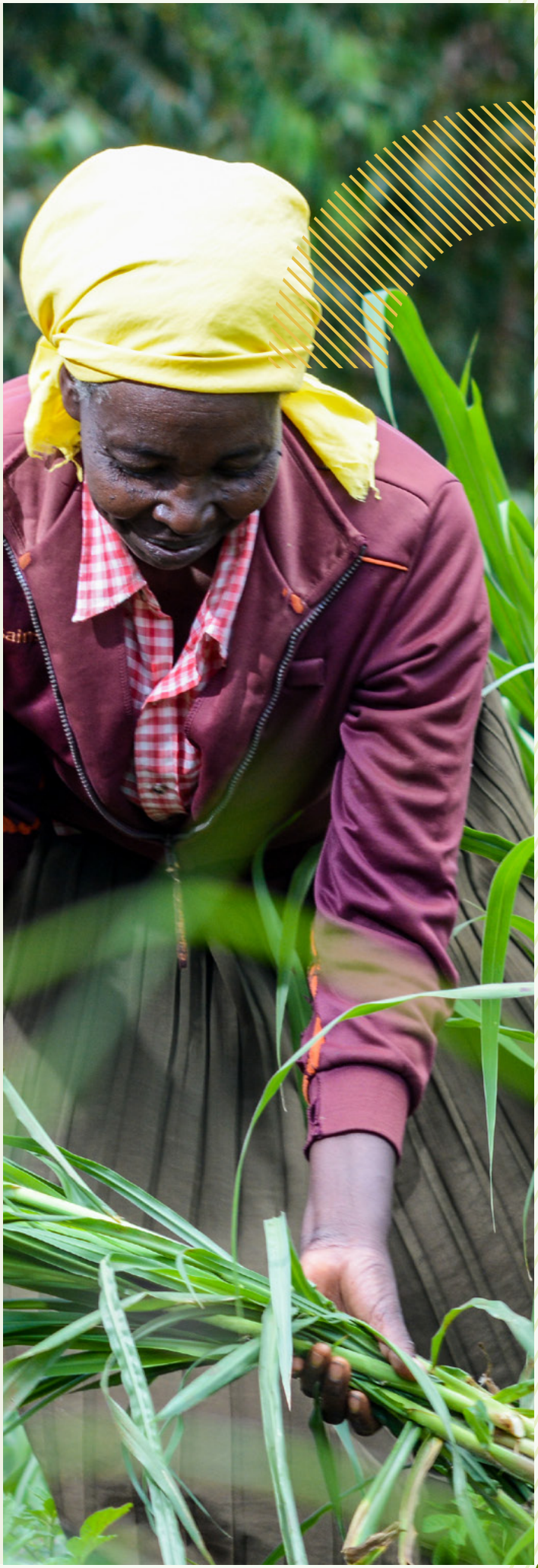
The NBSAP (2019–2030) aligns with international biodiversity commitments under the CBD and serves as the country's biodiversity blueprint, with a strong emphasis on ecosystem restoration and sustainable management. It targets the restoration of at least 30% of degraded ecosystems and achieving a minimum of 10% tree and vegetation cover, contributing to climate mitigation and combating desertification. The NBSAP also promotes the sustainable management of landscapes, including agriculture, aquaculture, river systems, wetlands, drylands, mountains, and forests, while aiming to reduce pollution and its impacts on ecosystem function, biodiversity and human well-being. It further prioritises increasing awareness and climate adaptation and mitigation actions by 50% across all sectors in the country.

The NBSAP aims for restored and safeguarded ecosystems that contribute to health, livelihoods and well-being. This is to be achieved through the involvement of local communities across all protected areas (Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs)), conservancies, and wildlife in sustainable livelihoods improvement programmes, as well as income generating activities. It further promotes the active engagement of local communities in biodiversity conservation, education, advocacy, monitoring and reporting. These efforts are supported by improved systems for monitoring, reporting, information sharing and resource mobilisation to meet national and international commitments.

NATIONAL CLIMATE CHANGE ACTION PLAN (NCCAP, 2023-2027)

The NCCAP (2023–2027) outlines priority actions that closely align with NbS principles, with the overarching goal of addressing climate change impacts while strengthening resilience through integrated mitigation and adaptation efforts. The NCCAP encourages the integration of NbS in various sectors such as agriculture, water, forestry, and urban development, recognising the critical role of ecosystems, such as forests, wetlands, and coastal ecosystems, in buffering climate risks and enhancing adaptive capacity.

Key targets include increasing forest cover to at least 10% of total land area through reforestation, afforestation, and participatory forest management, alongside the protection of wetlands and other critical ecosystems. Within agricultural systems, the NCCAP advances CSA, SLM, and FMNR to strengthen resilience while reducing emissions.



Water security and DRR are addressed through catchment protection, riverbank restoration, and water harvesting for irrigation, while sustainable energy transitions, including improved biomass production, aim to reduce emissions and relieve pressure on natural ecosystems.

These actions are underpinned by core strategies focused on strengthening forest management, conservation, and restoration for carbon sequestration; promoting CBNRM; and enhancing ecosystem restoration to support climate adaptation, particularly in ASALs.

NATIONAL AGRICULTURAL POLICY (NAP, 2012)

The overall goal of the NAP (2012) is to enhance agricultural productivity, promote food security, and support SLM. It integrates NbS through:

- Promoting agroecology and agroforestry, which are central to NbS.
- Encouraging the use of organic farming and soil conservation techniques to maintain soil health, reduce erosion, and increase carbon sequestration.
- Emphasising SLM practices such as conservation tillage, terracing, and crop rotation to restore degraded agricultural lands.

AGRICULTURE AND FOOD SECURITY POLICY (2018)

The goal of the Agriculture and Food Security Policy (2018) is to achieve food security, enhance livelihoods, and promote sustainable agricultural development. It integrates NbS through:

- Prioritising sustainable agricultural practices such as soil fertility management, which incorporate organic fertilizers, mulching, and composting to improve soil structure and retain moisture.
- Supporting the restoration of degraded lands and the integration of biodiversity-friendly agricultural practices, such as the promotion of pollinator-friendly farming and the restoration of wetlands to support food production and ecosystem services.
- Promoting resilient agricultural systems that integrate CSA and NbS principles, such as promoting drought-resistant crops and water-efficient farming techniques.

NATIONAL LAND USE POLICY (2017)

The National Land Use Policy (2017) aims to ensure effective and sustainable use of land in Kenya, balancing economic development with environmental conservation. It integrates NbS through promoting the:

- Rehabilitation of degraded lands and the restoration of ecosystems.
- Integration of natural infrastructure into agricultural landscapes to enhance water management, flood control, and soil fertility.
- Integration of ecosystem services into land planning and sustainable land use, ensuring that agricultural expansion does not come at the expense of valuable ecosystems like wetlands, forests, and grasslands.

NATIONAL ENVIRONMENT POLICY (2013)

The goal of the National Environment Policy (2013) is to provide a comprehensive framework for environmental management in Kenya, focusing on sustainability. It integrates NbS through promoting:

- Land restoration and forest conservation, key NbS approaches that support agricultural productivity and resilience.
- SLM practices such as crop diversification and agroforestry.

NATIONAL FOREST POLICY (2014)

The overall goal of the National Forest Policy (2014) is to conserve, manage and sustainably use Kenya's forest resources. It supports NbS through:

- Advocating for the restoration of degraded forests and ecosystems as part of broader national efforts.
- Supporting forest conservation through community involvement, which aligns with NbS principles.

Key strategies include expanding forest cover through tree planting and restoration initiatives (e.g. Greening Kenya programme) and promoting agroforestry to enhance livelihoods and ecosystem services.

KENYA FOREST SERVICE (KFS) AND THE FOREST CONSERVATION AND MANAGEMENT ACT (2016)

The goal is to manage and conserve forests sustainably, promote community involvement, and enhance carbon sequestration. NbS is integrated through:

- Supporting ecosystem restoration through sustainable forest management practices.
- Encouraging community-based forest management and includes provisions for managing forest landscapes.

Key strategies include:

- Protecting and restoring degraded forests, woodlands, and wetlands.
- Promoting forest-based carbon offset programmes and PES.

DISASTER RISK MANAGEMENT POLICY (2017)

The goal of the Disaster Risk Management Policy (2017) is to reduce the risk of natural disasters and improve resilience to environmental hazards. NbS is supported through:

- Acknowledgement of ecosystems such as forests, wetlands and mangroves being crucial in reducing disaster risks such as floods, landslides and drought.
- Integration of ecosystem-based disaster risk management (Eco-DRR).

Key strategies include promoting the use of natural ecosystems for disaster risk management (e.g. coastal mangrove restoration for flood protection) and integrating nature-based approaches into national disaster management plans.



WATER ACT (2016)

The goal of the Water Act (2016) is to promote the sustainable management of water resources. It integrates NbS by:

- Supporting the protection and restoration of water catchments and ecosystems that provide critical water supply services.
- Encouraging the sustainable management of wetlands, forests and rivers to maintain water quality and quantity, contributing to climate resilience.

Key strategies include:

- Integrating ecosystem management in water resources planning and policy.
- Promoting watershed restoration and the use of natural infrastructure to enhance water security.

WETLANDS POLICY AND STRATEGY (2014)

The overall goal of the Wetlands Policy (2014) is to ensure the sustainable management and conservation of Kenya's wetlands. It integrates NbS by encouraging the restoration and conservation of wetlands for environmental protection and climate resilience, which supports NbS strategies for water management and disaster risk reduction. Key strategies include promoting wetland restoration and conservation and integrating wetlands management into broader national development plans.

KENYA CLIMATE-SMART AGRICULTURE STRATEGY (KCSAS, 2017-2020)

The overall objective of the KCSAS is to adapt to climate change, build resilience of agricultural systems while minimising emissions for enhanced food and nutritional security and improved livelihoods. The specific objectives of the KCSAS are to:

- Enhance adaptive capacity and resilience of farmers, pastoralists and fisher-folk to the adverse impacts of climate change.
- Develop mechanisms that minimise greenhouse gas (GHG) emissions from agricultural production systems.
- Create an enabling regulatory and institutional framework.
- Address cross-cutting issues that adversely impact CSA.

Four broad strategic areas have been identified for KCSAS:

- Adaptation and building resilience by addressing vulnerability due to changes in rainfall and temperature, extreme weather events and unsustainable land/ water management and utilisation.
- Mitigation of GHG emissions from key and minor sources in the agriculture sector.Establishment of an enabling policy, legal and institutional framework for effective implementation of CSA.
- Minimising effects of underlying cross-cutting issues such as human resource capacity and finance which would potentially constrain realisation of CSA objectives.

Key NbS solutions promoted in the KCSAS include:

- Soil and water conservation (rainwater harvesting, mulching, land restoration);
- Agroforestry;
- PES;
- Use of indigenous plant species in agricultural landscapes;
- Indigenous Technical Knowledge (ITK).

KENYA INVESTMENT PLAN: NATURE, PEOPLE AND CLIMATE (NPC) PROGRAMME

The NPC Investment Plan focuses on NbS that are not only strongly aligned with climate adaptation and mitigation, but also nature-oriented with positive biodiversity outcomes. In this way, the Investment Plan addresses a key gap, in that funding for the restoration of natural and semi-natural ecosystems is well below that required. The Investment Plan takes action in both natural and cultivated areas focusing on three critical concepts:

- Securing key biodiversity and ecosystem services for climate-smart landscapes;
- Promoting nature-positive, climate-smart livelihoods in agricultural landscapes;
- Stimulating private sector investment in NbS.

Implementation of NbS in the water and forestry sectors

NbS are promoted within Kenya's water and forestry sectors, particularly through efforts to protect critical water towers, which serve as key sources of the country's rivers and ecosystems. These initiatives focus on conserving and restoring forested catchments to regulate water flows, reduce erosion, and enhance climate resilience. Community-based structures such as WRUAs play an important role in local water governance, supporting participatory management, conflict resolution, and sustainable resource use at catchment level. In parallel, catchment protection measures, including reforestation, riparian restoration, and SLM, help to safeguard water quality and availability while delivering broader ecosystem and livelihood benefits.

Domestication at the county level

At the county level, the domestication of NbS in Kenya is reflected in the integration of ecosystem-based approaches within County Integrated Development Plans (CIDPs), county Climate Change Action Plans (CCAPs), and sectoral policies. Counties such as Kajiado, Makueni, and Taita Taveta demonstrate how NbS are being translated into locally relevant strategies that address land degradation, water management, and climate resilience. Through instruments such as CCAPs, forest and landscape restoration implementation plans (FOLAREPs), and environmental policies, these counties are embedding NbS within development planning, resource mobilisation, and investment frameworks. This localisation of NbS ensures that national and global priorities are operationalised in ways that respond to specific ecological, socio-economic, and governance contexts at the county level.

Table 1. County planning and policy instruments for nature-based solutions implementation (Source: Authors)

Kajiado	Makueni	Taita Taveta
• CIDP • Kajiado County CCAP (2023-2027)	• CIDP • Makueni County FOLAREP (2024-2033) • Makueni County Environment and Climate Change Policy (2021)	• CIDP • FOLAREP (2024-2033) • Resource Mobilisation Strategy for FOLAREP

Institutions responsible for NbS in Kenya

NbS implementation in Kenya is supported by a diverse network of institutions operating across multiple levels. At the national level, the Ministry of Environment, Climate Change and Forestry (MoECCF) provides overall policy leadership and ensures coherence across climate, biodiversity, forestry and environmental agendas. Regulatory and implementing agencies such as the National Environment Management Authority (NEMA), KFS, and Kenya Wildlife Service (KWS) operationalise NbS across forests, wetlands, water catchments and protected areas, alongside specialised agencies such as the Kenya Water Towers Agency. At the sectoral level, the Ministry of Agriculture and Livestock Development (MoALD) drives the integration of NbS into agricultural and rangeland systems through climate-smart and ecosystem-based approaches.

County governments are the primary implementers of NbS, embedding them within CIDPs and sector strategies, supported by County Climate Change Units (CCCUs) and political leadership. At the local level, community institutions, including CFAs, WRUAs, conservancies, and initiatives such as the Chyulu Hills Conservation Trust, anchor stewardship and sustainability on the ground. These efforts are complemented by research and technical organisations

such as World Agroforestry (ICRAF), the Kenya Forestry Research Institute (KEFRI), and the University of Nairobi, which provide scientific evidence and innovation. International organisations and NGOs, including The Nature Conservancy (TNC), the IUCN, the World Bank, and the United Nations Environment Programme (UNEP), further support NbS implementation through financing, technical assistance, and global expertise

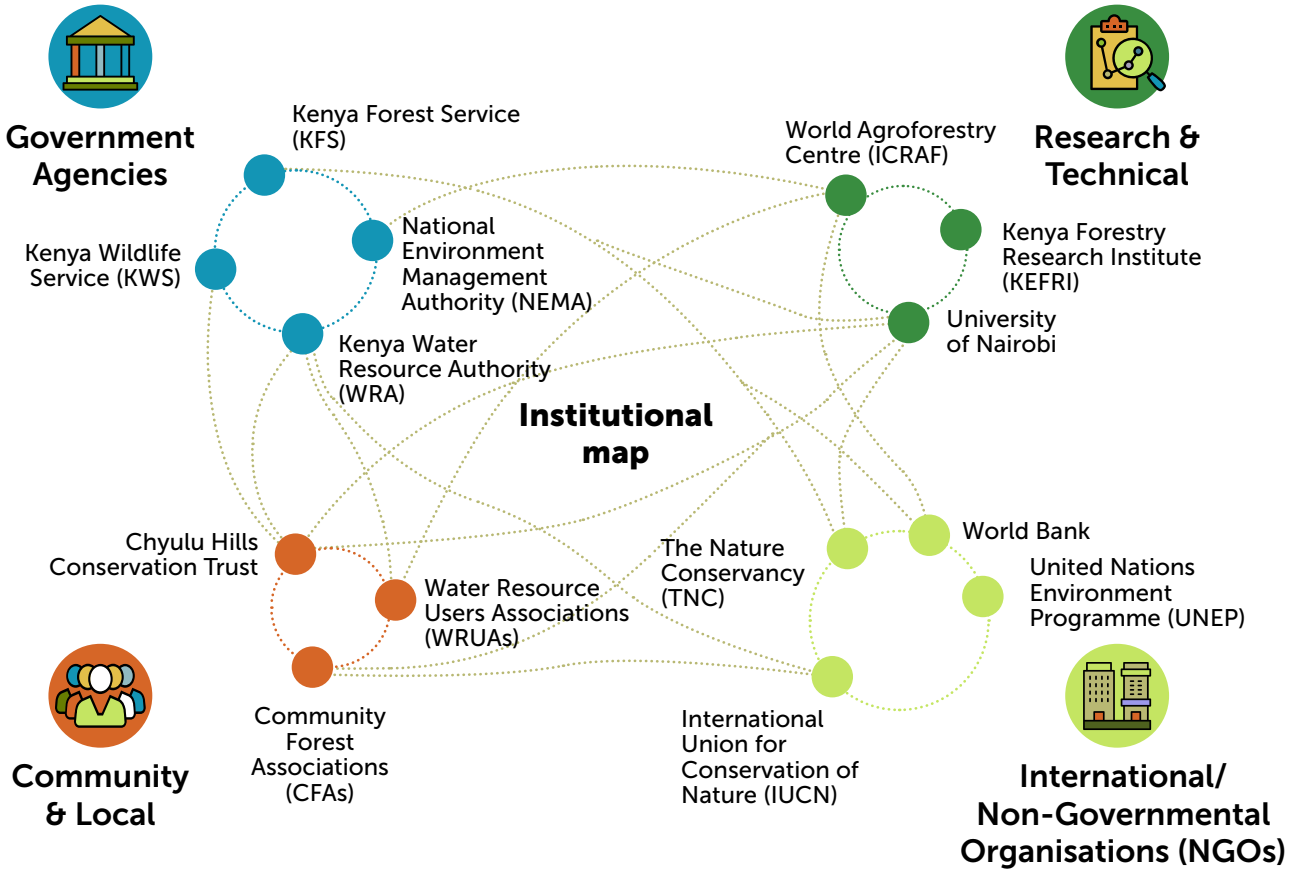


Figure 8. Map of institutions and organisations supporting nature-based solutions in Kenya (Source: Authors)

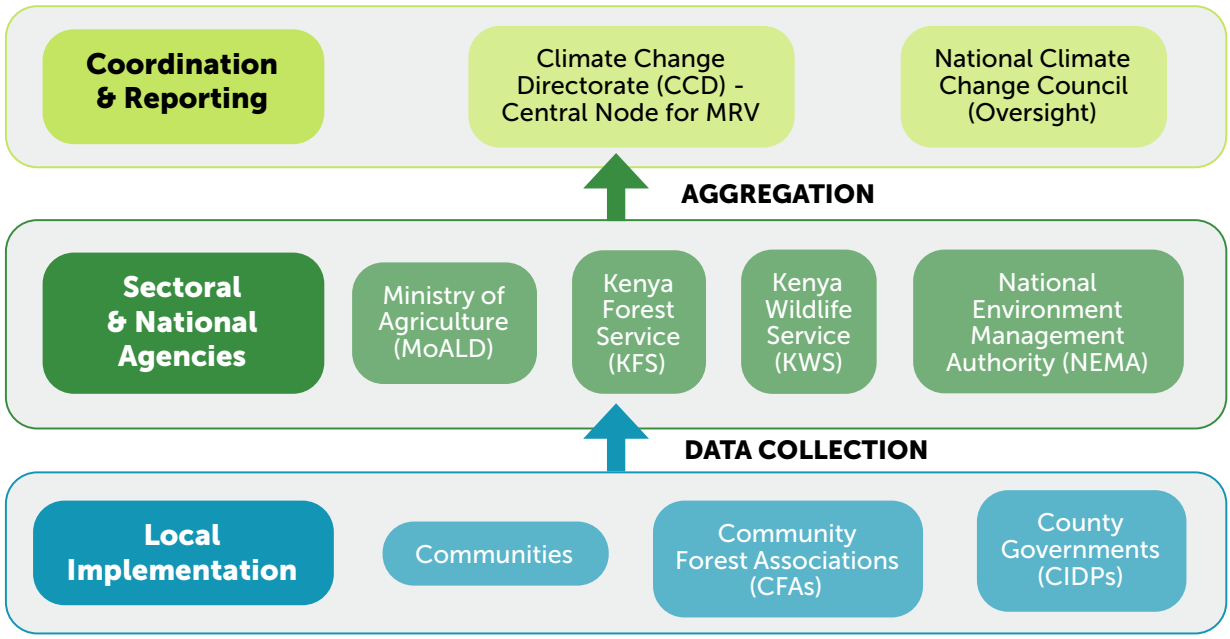


Figure 9. Institutional framework for coordination, data flow, and nature-based solutions implementation across national and county levels in Kenya (Source: Authors)

NbS in Kenya's Nationally Determined Contribution (NDC)

In its NDC, Kenya commits to reducing GHG emissions by 32% by 2030 compared to the business-as-usual scenario. This commitment includes specific NbS interventions such as the restoration of 5.1 million hectares of degraded landscapes, expanding forest cover to 10%, and enhancing the protection of critical ecosystems such as water towers, wetlands, and coastal habitats. Additionally, the NDC includes efforts to establish early warning systems, climate-proof infrastructure, and reduce the risks of floods and droughts through the protection of natural assets.



Figure 10. Kenya's Nationally Determined Contribution target and supporting nature-based solutions interventions (Source: Authors)

NDC MITIGATION STRATEGIES APPLYING NBS

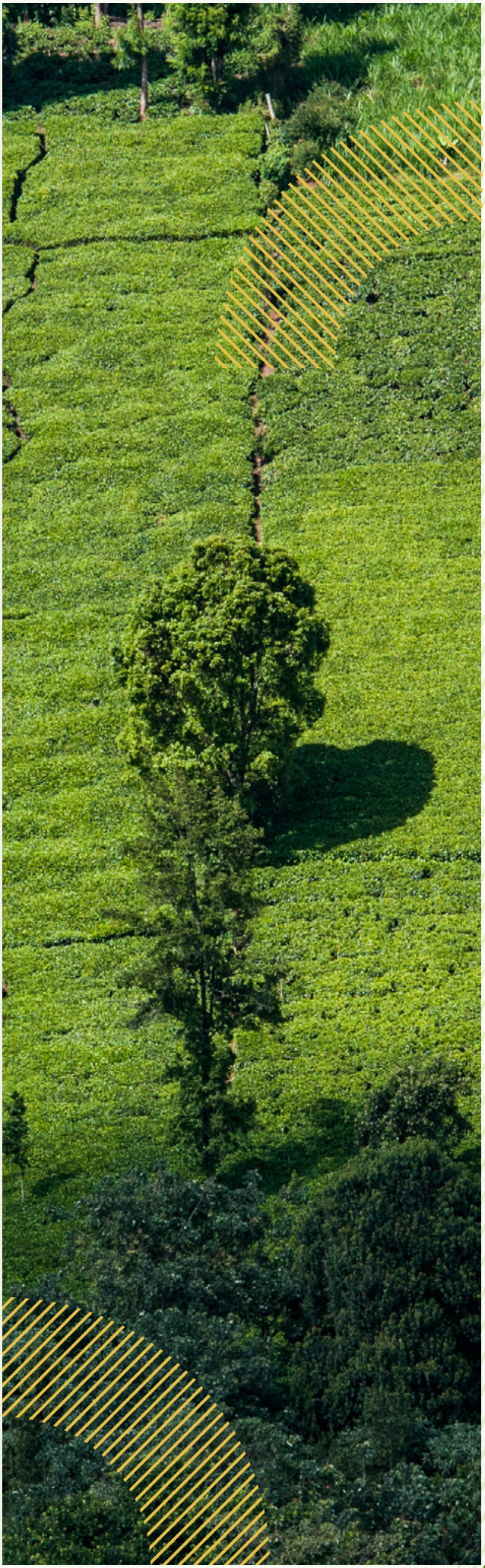
- **Forest conservation and afforestation** - Agroforestry is promoted as part of Kenya's approach to SLM. By integrating trees into agricultural landscapes, the country can reduce emissions from land-use change and improve soil carbon storage.
- **Restoration of degraded lands** - Includes the restoration of grasslands, wetlands, and mangroves. Rehabilitating degraded lands helps sequester carbon, prevent erosion, and improve water retention, contributing to both climate change mitigation and adaptation.
- **Soil carbon sequestration** - Practices such as no-till farming and crop rotation, as well as agro ecological farming systems, improve soil health and increase the amount of carbon stored in the soil. These practices contribute to the country's broader goal of mitigating emissions from agriculture.
- **Coastal and wetland ecosystem restoration** - Is an important NbS to sequester carbon and protect coastal communities from storm surges and rising sea levels. Kenya recognises the significant role of coastal ecosystems in climate resilience and aims to restore critical mangrove ecosystems as part of its climate action strategy.

NDC ADAPTATION STRATEGIES APPLYING NBS

- **Water management and ecosystem-based solutions** - Restoration and conservation of ecosystems like forests, wetlands, and mangroves to enhance natural resilience to climate impacts by improvement of water quality, prevention of flooding, and enhancing biodiversity, hence contributing to the adaptation needs of local communities dependent on these resources for livelihoods.
- **Agroforestry** - Restoring catchment areas, watersheds, and forests that help to regulate water flow, reduce the risk of flooding, and ensure reliable water supply for agriculture, drinking, and industrial use.
- **Eco-DRR** - Plays an important role in improving water retention and reducing the impact of droughts and floods on agricultural productivity. Eco-DRR is emphasised in the NDC through soil conservation, watershed management, habitat restoration, wildlife-friendly farming, and conserving biodiversity-rich areas.

SUSTAINABLE AGRICULTURE AND LAND USE IN THE NDC

Agriculture is a central pillar of the NDC, with NbS embedded within SLM and CSA approaches. The NDC promotes low-emission agricultural practices, including agroecology, agroforestry, and sustainable crop and livestock management. It also prioritises the scaling of climate-resilient crops and SLM practices to reduce farmers' vulnerability to climate extremes, such as droughts and floods, while sustaining productivity.



MONITORING AND REPORTING ON NBS

Kenya's NDC outlines the need for robust monitoring and reporting systems to track the progress of NbS implementation and ensure they contribute to achieving climate goals. This includes tracking carbon sequestration, land restoration, and other ecosystem services.

Biennial Transparency Reports (BTRs) are a critical component of tracking progress under the Paris Agreement, providing a structured mechanism for countries to report on climate actions, emissions, and support received or required. High-quality, credible data generated through these reports is essential for building investor confidence and attracting climate finance. However, Kenya faces challenges in data fragmentation across sectors, a lack of standardised indicators, and limited integration of community-level knowledge, all of which can constrain the effectiveness and inclusivity of reporting systems.

Table 2. Policy foundations, operational gaps, and solutions for monitoring and reporting on nature-based solutions in Kenya (Source: Authors)

Strong foundation	Operational gaps	Solutions
• Climate Change Act (2016, 2023) • National Biodiversity Strategy and Action Plan (NBSAP) • Kenya Climate-Smart Agriculture Strategy (KCSA)	• Data fragmentation – no unified NbS monitoring tool and sector silos • Inconsistency – tracking number of trees planted vs. tree survival rates • Capacity – County Climate Change Units lack resources for rigorous monitoring and evaluation	• Integrate data – break silos between Forestry, Water and Agriculture • Standardise indicators – Align with IUCN Global Standard • Value Local Knowledge – integrate Indigenous Technical Knowledge (ITK) • Digital transformation – aggregate data for the Enhanced Transparency Framework (ETF)

M&E frameworks (aligning with national policies, international agreements, and sectoral strategies) that may support NbS tracking include:

- National Climate Change M&E Framework established under the Climate Change Act (2016)
- National Performance and Benefit Measurement Framework (NPBMF)
- Integrated Monitoring, Reporting, and Verification (MRV) System
- Monitoring and Evaluation System for the Environment, Forestry, and Climate Change (MEFCC)

- Kenya's National Adaptation Plan (NAP) M&E Framework
- County Climate Change Fund (CCCF) M&E System
- National Biodiversity Strategy and Action Plan (NBSAP) M&E System
- Sustainable Development Goals (SDG) Monitoring Framework
- Kenya Climate-Smart Agriculture (CSA) Monitoring & Evaluation (M&E) Framework



Barriers to policy implementation

- **Weak coordination across sectors**. Fragmented institutional mandates and limited cross-sector alignment hinder the integrated planning and implementation of NbS across agriculture, water, forestry, and environment.
- **Lack of standardised NbS indicators and metrics**. The absence of harmonised frameworks and indicators makes it difficult to consistently measure, compare, and report NbS outcomes.
- **Data availability, accessibility, and quality constraints**. Gaps in reliable, up-to-date, and accessible data limit evidence-based planning, monitoring, and scaling of NbS interventions.
- **Complexity of ecosystem-based approaches**. NbS require context-specific, systems-based design and implementation, which can be technically complex and challenging to operationalise at scale.
- **Challenges in community engagement and reporting**. Ensuring that local communities and stakeholders have the capacity, incentives, and support to implement and report on NbS is critical but often insufficiently addressed.
- **Difficulty in measuring climate adaptation benefits**. Adaptation outcomes are often long-term, multidimensional, and context-specific, making them harder to quantify and track compared to mitigation benefits.
- **Limited financial and technical resources**. Inadequate funding, technical expertise, and institutional capacity constrain the effective implementation and sustainability of NbS initiatives.



Activity

- Select a sector relevant to your work or interest (e.g. agriculture, water, forestry, or county planning).
- Identify key policies and strategies related to that sector (e.g. NCCAP, NAP, NBSAP, CIDPs).
- Review each framework and note how NbS are reflected within them.

As you review, consider:

- Where is there strong alignment across policies?
- Are there any gaps or inconsistencies in how NbS are addressed?
- What opportunities exist to improve integration and coherence?



Technical resources

Republic of Kenya. 2025. Climate Investment Funds Nature, People and Climate Program. Kenya Investment Plan.

Winowiecki L, Chacha R, Mlamba J, Muthoka G, Trautman S. 2025. Advancing Kenya's 2035 Climate Commitments through Nature- Based Land Management: National Strategies and County Implementation in Makueni and Taita Taveta. Bogor, Indonesia: CIFOR; Nairobi, Kenya: ICRAF.



MODULE 03

Monitoring and evaluation for NbS



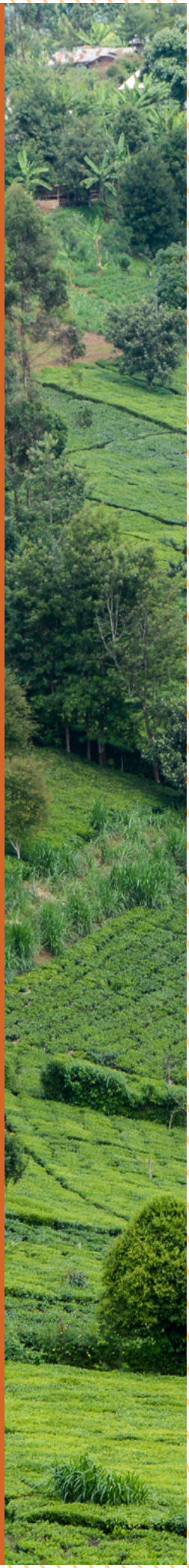
Purpose of this module

This module introduces the concepts, tools, and frameworks for M&E of NbS, with a specific focus on the Kenyan context. It aims to build understanding of why M&E is essential for tracking NbS performance, addressing existing gaps, and supporting evidence-based decision-making and contributing to Kenya's climate action and reporting commitments. The module also introduces Kenya's NbS M&E framework and its role in strengthening planning, policy, decision-making, and investment.



Learning objectives

- Understand key concepts of M&E in the context of NbS.
- Understand the role and importance of monitoring, tracking, and reporting NbS interventions.
- Understand the structure and role of Kenya's NbS M&E framework.



Key terms used in this module

- **Monitoring** - A continuous, routine process to collect and analyse data towards achieving results on activity, output and short-term outcome.
- **Evaluation** - The systematic and objective assessment of ongoing or completed projects.
- **Inputs** - The human, financial, material resources utilised that enable a programme activity to occur.
- **Activities** - Actions taken or work performed through which inputs are mobilised to produce specific outputs.
- **Outputs** - The immediate effects/ deliverables achieved after an intervention.
- **Outcomes** - Specific changes or results that occur as a direct consequence of a programme or intervention.
- **Impacts** - Longer-term effects of a programme or intervention on individuals, communities, or systems.
- **Indicators** - Specific, observable, and measurable variables used to track progress towards an objective or result.

What is M&E in the context of NbS?

- **Monitoring** involves the on-going activity to track progress towards planned tasks that are nature-based. This is usually a continuous and frequent process.
- **Evaluation** represents a systematic and objective assessment of ongoing or completed nature-based projects. This is time bound and not that frequent.

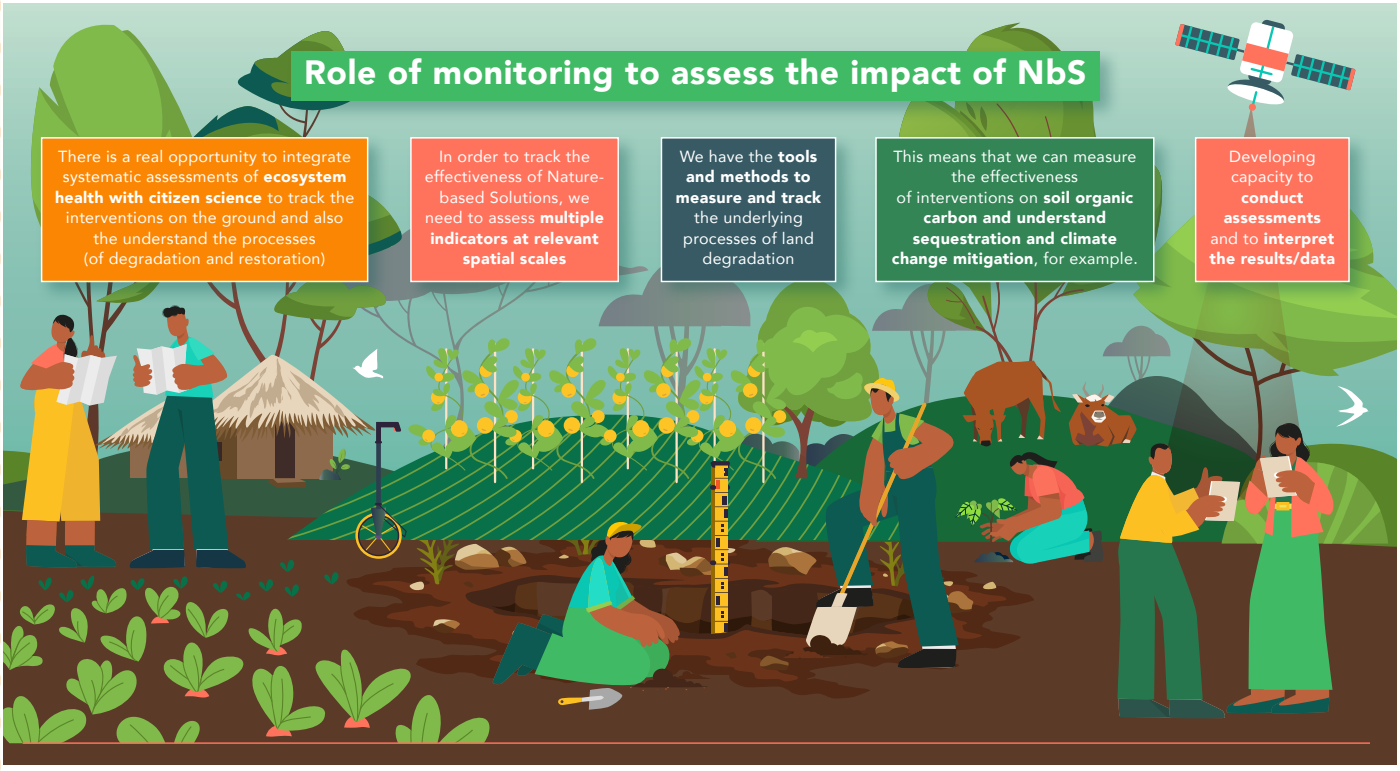


Figure 11. Role of monitoring to assess the impact of nature-based solutions (Source: Winowiecki et al., 2025)

Why is M&E important for NbS?

- **Guides planning and design**. Ensures interventions (e.g. reforestation, wetland restoration) are targeted for maximum ecological, social, and climate impact.
- **Enhances accountability and transparency**. Demonstrates to stakeholders how resources contribute to climate resilience, biodiversity, and community benefits.
- **Assesses effectiveness and value for money**. Evaluates costs, benefits, and implementation quality to inform budgeting and long-term sustainability.
- **Supports learning and adaptive management**. Provides evidence to refine strategies, improve effectiveness, and adapt to evolving conditions.
- **Establishes clear targets and indicators**. Defines measurable outcomes aligned with biodiversity, resilience, and ecosystem service objectives.
- **Tracks implementation progress**. Monitors activities against plans, milestones, and performance benchmarks.
- **Assesses the performance and results**. Combines monitoring (observations) and evaluation (analysis) to determine whether NbS are delivering intended outcomes.
- **Measures environmental, social and economic impacts**. Quantifies changes in biodiversity, ecosystem services, carbon sequestration, livelihoods, and well-being.
- **Captures ecosystem change across contexts**. Evaluates NbS effectiveness across diverse ecosystems and land-use types.
- **Strengthens the evidence base**. Generates credible data to inform policy, replication, and scaling of successful NbS models.

Existing frameworks for M&E of NbS

The **IUCN Global Standard for NbS** provides a globally recognised framework for designing, implementing, and verifying high-quality NbS. It outlines 8 criteria and 28 indicators covering governance, biodiversity net gain, stakeholder engagement, adaptive management, and measurable benefits. Accompanied by a user guide and self-assessment tool, it serves as a benchmark for practitioners and financiers to ensure NbS are credible, scalable, and deliver long-term ecological and social outcomes.

The **World Wide Fund for Nature (WWF) Nature-Positive Production (NPP) Framework** guides NbS monitoring by assessing impacts across three dimensions: people, nature, and climate. It is built on three pillars: protect, sustainably

manage, and restore ecosystems using indicators linked to soil health, biodiversity, livelihoods, governance, and climate benefits. The framework tracks both adoption practice and broader outcomes such as ecosystem services, income stability, carbon sequestration, and reduced climate risks, supporting adaptive learning and scalable, nature-positive production systems.

The **United Nations Environment Programme (UNEP) Directory of Indicators** supports harmonised monitoring of environmental and social impacts, particularly in land-use projects. It provides 22 practical indicators grouped under biodiversity, climate action, sustainable production, and livelihoods. The tool helps users select relevant metrics such as ecosystem area restored, GHG sequestration, income changes, and resilience improvements to improve reporting consistency and impact measurement.

The **ICRAF NbS Framework** focuses on agriculture and landscape systems, emphasising four core functions: sustainable production, green infrastructure, environmental restoration, and conservation. It includes a broad set of indicators to assess synergies, trade-offs, economic efficiency, policy support, and stakeholder engagement. The framework supports decision-making by evaluating long-term performance and adaptation to local conditions.

The **Kenya FOLAREP Monitoring Framework**, developed by ICRAF in collaboration with partners including KFS, provides a coordinated system for tracking and reporting national restoration progress. It includes 30 indicators and 45 sub-indicators, covering restoration processes and outcomes such as land area restored, investments, policy implementation, ecosystem health, and tree cover. The framework supports structured learning and guides restoration investments across diverse ecosystems.

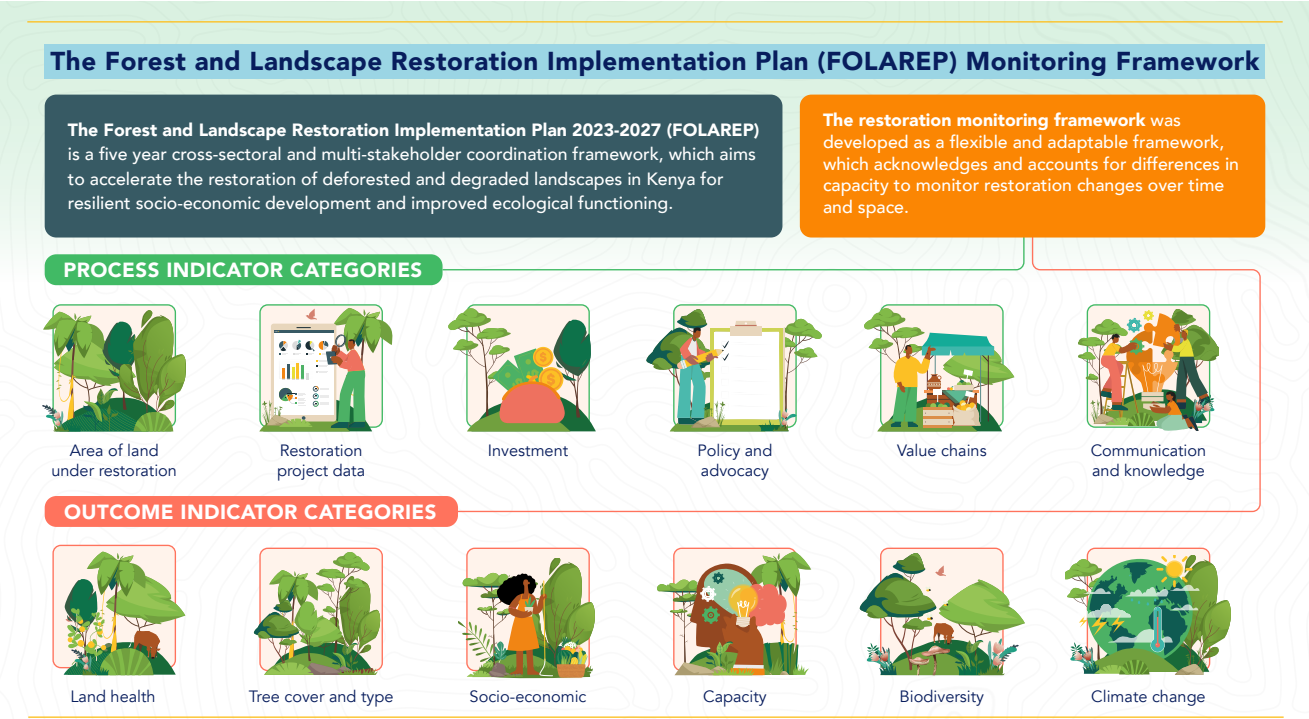


Figure 12. The Forest and Landscape Restoration Implementation Plan (FOLAREP) Monitoring Framework (Source: Winowiecki et al., 2025)

The **Kenya CSA M&E Framework** aligns with the Kenya CSA Strategy and the Kenya CSA Implementation Framework, supporting the agricultural sector's transition towards resilient, low-carbon development. It establishes clear indicators, baselines, targets, data collection protocols, and reporting tools that track adaptation, mitigation, productivity, and co-benefits across activity, output, outcome, and impact levels. By combining continuous monitoring (systematic data collection) with periodic evaluation (analysis and interpretation), the framework promotes evidence-based planning, adaptive management, transparency, accountability, and coordinated learning among national and county stakeholders.

The **GHG Activity Data Collection and Inventory Tool** was developed to strengthen Kenya's agricultural GHG reporting, particularly within the crop sub-sector. The tool enables systematic collection of disaggregated, farm-level activity data required for transitioning from Tier 1 to Tier 2 reporting in line with Intergovernmental Panel on Climate Change (IPCC) guidelines. It captures detailed information on fertilizer use, manure management, crop residue practices, liming, agroforestry, rice management, and land-use activities, allowing for more accurate and context-specific emission estimates.

Contribution to Transparency Reporting and MRV+

Kenya's Measuring, Reporting, and Verification (MRV+) system is an integrated national framework designed to track GHG emissions, climate mitigation actions, adaptation efforts, and NbS interventions in support of the country's climate commitments under the UNFCCC, the Paris Agreement, the revised NDC, and the Climate Change Act (2016, Amended 2023). The system strengthens transparent climate reporting, supports climate finance tracking, and enables compliance with international reporting obligations, including Biennial Transparency Reports (BTRs). The CSA M&E Framework and Reporting Tool, the GHG Inventory Tool, and the NbS M&E Framework and Reporting Tool are complementary components of this reporting architecture, supporting the collection, management, analysis, and reporting of climate adaptation, mitigation, and NbS data across sectors and administrative levels.

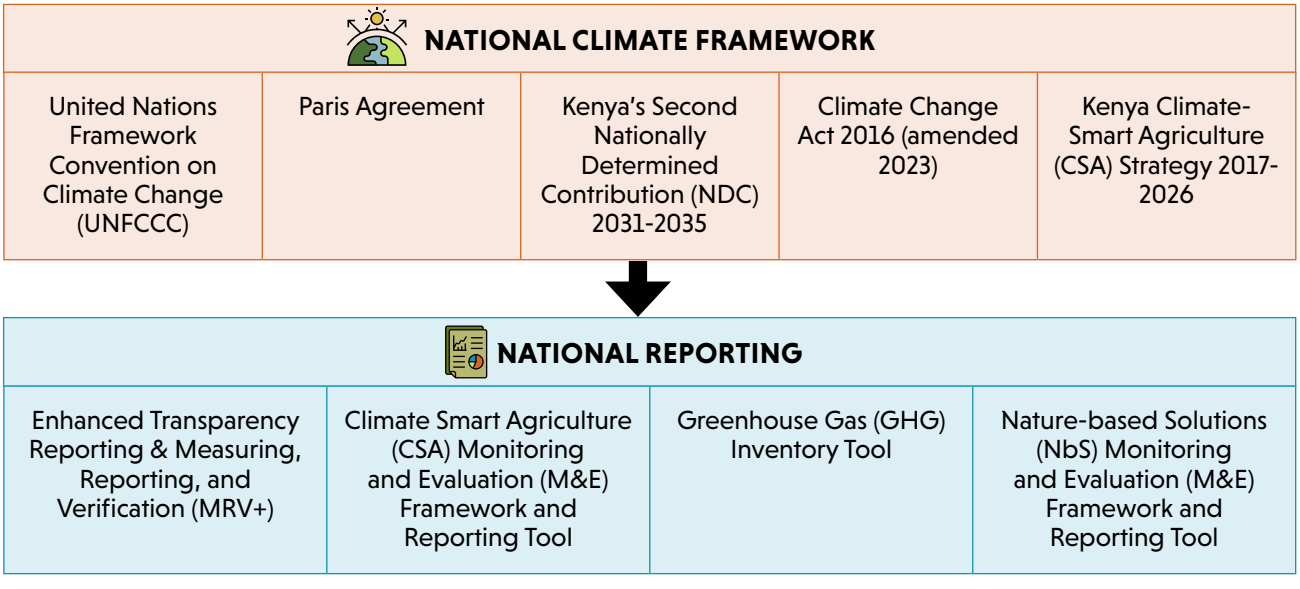


Figure 13. National reporting system for climate change adaptation and mitigation in Kenya's agricultural sector (Source: Authors)

Key challenges and gaps in monitoring NbS outcomes

Key challenges include:

- **Complexity of biophysical monitoring**. Difficulty in tracking ecosystem changes, both positive and negative that can be operationalised by national and sub-national governments.
- **Socioeconomic integration**. Limited capture of human and community livelihood impacts.
- **Process-oriented metrics**. Need near real-time tracking of pressures (e.g. land use, resource use, climate stress).
- **Governance and coordination**. Weak integration of biophysical, socioeconomic, and governance indicators across scales.

Gaps identified:

Lack of cohesive operational frameworks that:

- Combine biophysical, social and governance metrics.
- Capture resilience, social benefits, and mitigation co-benefits.
- Are scalable and applicable across diverse NbS landscapes.



Kenya's NbS M&E Framework



Context

Despite strong policy commitments and increasing investment, Kenya currently lacks a dedicated, harmonised system with clear indicators and metrics to track, monitor, and evaluate NbS, particularly in agricultural and productive landscapes where most investments are concentrated. This gap constrains the country's ability to generate credible evidence, report effectively against national and international commitments, inform policy refinement, and mobilise climate and nature finance at scale.

To address this, a comprehensive NbS M&E framework is being developed to integrate environmental, social, and economic indicators. In Kenya's biodiversity hotspots and climate-vulnerable landscapes, such a framework is critical for systematically tracking NbS interventions aimed at restoring degraded ecosystems, conserving biodiversity, and strengthening community resilience.

In response, the MoALD, through its CCU and with support from partners, is co-developing a national NbS M&E framework. The initiative aims to:

- Strengthen Kenya's capacity to track and report NbS impacts;
- Support MoALD in meeting climate reporting obligations and informing NDC updates;
- Generate evidence to guide policies that enhance agricultural productivity, ecosystem resilience, and climate adaptation and mitigation.

The development process is deliberately inclusive, involving inception and consultative workshops and structured engagement with development partners, CBOs, NGOs, academia, research institutions, and private-sector actors.



Objectives

The objectives of Kenya's NbS M&E Framework include:

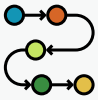
OVERALL OBJECTIVE

To establish a comprehensive and transparent M&E framework that tracks the ecological, climate, and socio-economic impacts of NbS implemented in Kenya's biodiversity hotspots in order to strengthen evidence-based conservation, climate action, and sustainable development.

SPECIFIC OBJECTIVES

- To monitor ecosystem health, biodiversity conservation, and restoration outcomes by tracking changes in habitat quality, ecosystem integrity, species diversity, and ecosystem resilience within biodiversity hotspots and protected landscapes.

- To assess the climate mitigation, adaptation, and socio-economic benefits of NbS interventions, including contributions to carbon sequestration, climate resilience, water regulation, disaster risk reduction, community livelihoods, food security, and sustainable natural resource use.
- To strengthen transparency, accountability, and adaptive management of NbS investments by generating reliable evidence to support decision-making, improve resource allocation, refine interventions, and respond to emerging environmental and socio-economic challenges.
- To support national and international reporting obligations by enabling aggregation and reporting of NbS outcomes towards Kenya's climate change, biodiversity, and sustainable development commitments under national policies and global environmental agreements.



Development process

The development of the NbS M&E framework was participatory and iterative in nature, involving national and county government institutions, technical experts, development partners, and local stakeholders. The process included the review of existing global and regional NbS frameworks and standards, identification of priority ecosystem and climate risks, development and validation of indicators, stakeholder consultations, and pilot testing in the Chyulu Hills landscape to assess the usability of indicators, data quality, and the practicality of community-based monitoring approaches. Lessons from these engagements informed the refinement of the framework and strengthened its alignment with existing national monitoring and reporting systems.



NOTE

Once complete the NbS M&E framework will be integrated with the CSA M&E framework and CSA Reporting Tool.

Overview of the NbS M&E Framework

The NbS Framework offers an adaptable framework for tracking progress on critical environmental and socio-economic challenges, along with the corresponding interventions and outcomes that influence sustainability and resilience. While grounded in the Chyulu Hills landscape, the matrix is designed to serve as a transferable reference tool, providing a broader library of indicators and measures applicable across similar contexts. It integrates both problem-focused and solution-driven approaches, thereby offering a dual structure that links observed environmental and socio-economic challenges (drivers) to practical actions and policy responses (interventions).



Drivers

Unsustainable agricultural practices

Indicator examples:

- Total area under monocropping
- Number of unadaptable livestock breeds and crops introduced
- Soil organic carbon content
- Amount of synthetic fertilisers and pesticides applied per season
- Livestock stocking rates

Increased climate change impacts and risks

Indicator examples:

- Type and frequency of extreme weather events
- Annual and seasonal rainfall deviation from baseline
- Yield losses due to unpredictable rainfall patterns
- Temperature variation over time
- Incidences of emerging and re-emerging pests and diseases

Encroachment on protected ecosystems

Indicator examples:

- Area of land degraded by resource extraction
- Area of protected land degraded through grazing
- Number of active illegal mining operations
- Number of fire outbreaks in the conserved area
- Number of reported human - wildlife conflict incidences

Interventions

OUTCOME AREA 1. Sustainable agricultural practices

OUTPUTS:

- **1.1.** Diversified NbS farming systems established and implemented
- **1.2.** Community-driven NbS enterprises established and operationalised
- **1.3.** Increased cultivation of local crop varieties and livestock breeds
- **1.4.** Increased adoption of organic inputs and integrated soil fertility management practices
- **1.5.** Integrated soil fertility management and soil conservation practices implemented

OUTCOME AREA 2. Enhanced resilience of communities to climatic shocks

OUTPUTS:

- **2.1** Enhanced climate-resilient water management and conservation
- **2.2** Strengthened climate information services
- **2.3** Increased adoption of climate-proving post-harvest technologies and infrastructure

OUTCOME AREA 3. Restored and sustained protected ecosystem

OUTPUTS:

- **3.1** Protected areas under biodiversity management protected or conserved
- **3.2** Illegal mining sites protected and restored
- **3.3** Fire management interventions established and operational in protected forest and rangeland ecosystems
- **3.4** Wildlife corridors rehabilitated and restored
- **3.5** Sustainable forage and grazing management practices promoted
- **3.6** Fragile ecosystems and buffers protected and restored

OUTCOME AREA 4. Enabling environment for NbS implementation

OUTPUTS:

- **4.1** Strengthened capacity to implement NbS interventions
- **4.2** Increased financial resources mobilised for NbS implementation
- **4.3** Strengthened policy and regulatory frameworks supporting NbS implementation
- **4.4** Enhanced institutional coordination for NbS implementation

Figure 14. Overview of NbS M&E Framework driver categories and associated outputs and outcome areas (Source: Authors)



Drivers

DRIVER CATEGORY 1: UNSUSTAINABLE AGRICULTURAL PRACTICES

Intensive monocropping farming system driving ecosystem degradation and biodiversity loss.

Indicators used to measure this driver:

- Number of seasons of same crop cultivation in the same parcel cosecutively
- Number of households practising monocropping
- Total area under monocropping
- Number of recorded pests and diseases outbreaks in monocropped areas
- Total area infested by pest and diseases due to monocropping

Cultivation of crop varieties, agroforestry trees and introduction of livestock breeds that are unadaptable to the local climatic conditions.

Indicators used to measure this driver:

- Number of unadaptable livestock breeds introduced
- Number of reduced local/indigenous livestock breeds
- Number of unadaptable crop varieties introduced
- Average daily water consumption

Inappropriate tillage practices

Indicators used to measure this driver:

- Number of inappropriate tillage practices per season
- Area of land under inappropriate tillage practices
- Number of households practicing inappropriate tillage practices
- Number of observed soil erosion features
- Soil organic carbon content

Inappropriate use of inorganic/synthetic chemicals

Indicators used to measure this driver:

- Amount of granular synthetic fertilisers applied per season
- Amount of foliar synthetic fertilisers applied per season
- Amount of synthetic pesticides applied per season
- Cost of synthetic fertilisers applied per season
- Cost of synthetic pesticides applied per season
- Concentration of pesticides residues in soil
- Maximum Residue Limit (MRL) of pesticide residues in harvested produce

Inappropriate livestock stocking

Indicators used to measure this driver:

- Livestock stocking rates
- Decline in forage productivity

DRIVER CATEGORY 2: INCREASED CLIMATE CHANGE IMPACTS AND RISKS

Increasing frequency of extreme weather events including floods, droughts, windstorms, and landslides.

Indicators used to measure this driver:

- Type of extreme weather events recorded per year (i.e. flood, drought, windstorm, landslide)
- Frequency of extreme weather events per year (i.e. flood, drought, windstorm, landslide)
- Area affected by extreme events (i.e. flood, drought, windstorm, landslide or wildfires)
- Number of households displaced by type of extreme weather events
- Post -harvest losses ratio from extreme weather events
- Value of damaged agricultural assets by type of extreme weather events

Unpredictable rainfall patterns

Indicators used to measure this driver:

- Annual and seasonal rainfall deviation from baseline (mm)
- Yield losses due to unpredictable rainfall patterns
- Income lost due to unpredictable rainfall patterns

Increasing temperatures

Indicators used to measure this driver:

- Temperature variation over time
- Emerging pests due to increased temperatures
- Incidences of emerging and re-emerging pests and diseases affecting crops and livestock
- Number of animals deaths recorded

DRIVER CATEGORY 3: ENCROACHMENT ON PROTECTED ECOSYSTEMS

Overharvesting and unsustainable extraction of forest and animal resources from protected area

Indicators used to measure this driver:

- Vegetation cover lost due to extraction of resources from protected area
- Area of land degraded by resource extraction
- Population size of key wildlife species in protected areas

Illegal grazing in protected areas

Indicators used to measure this driver:

- Area of the vegetation in protected area that is overgrazed
- Area of protected land damaged by livestock
- Area of protected land degraded through grazing

Mining activities and pollution in the protected areas

Indicators used to measure this driver:

- Number of active illegal mining operations
- Levels of mining related pollutants in water bodies
- Area of protected areas degraded due to illegal mining
- Reported incidences of accidents due to illegal mining
- Levels of particulate matter from illegal mining zones
- Reported incidences of accidents due to illegal mining
- Aquatic mortality incidents linked to pollution
- Number of visible oil spills in water bodies
- Number of incidences of illness in the household associated with polluted water or dust in the air

Fire damage in protected areas

Indicators used to measure this driver:

- Number of fire outbreaks in the conserved area
- Area affected by fire
- Biomass of vegetation lost in protected areas due to fire
- Number of fire-related fatalities or injuries to animals

Interference with wildlife corridors

Indicators used to measure this driver:

- Area of corridor or stock route encroached
- Number of reported human-wildlife conflict incidences



Interventions (Solutions)

These are strategic actions designed to address the identified drivers and strengthen the resilience of both ecosystems and communities.

OUTCOME AREA 1: SUSTAINABLE AGRICULTURAL PRACTICES

The aim of outcome 1 is to enhance ecosystem resilience, restore agricultural landscapes, and improve livelihoods through the widespread adoption of nature-based, diversified, and sustainable farming systems.

OUTPUT 1.1: Diversified NbS farming systems established and implemented

- Indicators used to measure this output:
- **Indicator 1.1.1.** Number of households practicing diversified NbS farming systems
- **Indicator 1.1.2.** Number of diversified NbS farming systems
- **Indicator 1.1.3.** Number of crop varieties cultivated per season
- **Indicator 1.1.4.** Number of agroforestry tree varieties

OUTPUT 1.2: Community-driven NbS enterprises established and operationalised

Indicators used to measure this output:

- **Indicator 1.2.1.** Number of operational community-driven NbS enterprises
- **Indicator 1.2.2.** Household income generated from NbS enterprises
- **Indicator 1.2.3.** Number of new jobs generated from NbS related activities

OUTPUT 1.3: Increased cultivation of local crop varieties and livestock breeds

Indicators used to measure this output:

- **Indicator 1.3.1.** Number of operational community-managed indigenous crops seedbanks
- **Indicator 1.3.2.** Number of local crop varieties grown
- **Indicator 1.3.3.** Number of local livestock breeds kept
- **Indicator 1.3.4.** Area under Indigenous crop varieties

OUTPUT 1.4: Increased adoption of organic inputs and integrated soil fertility management practices

Indicators used to measure this output:

- **Indicator 1.4.1.** Number of households using organic fertilizers
- **Indicator 1.4.2.** Number of households using nature-based pest management practices
- **Indicator 1.4.3**. Annual volume of organic inputs used

OUTPUT 1.5: Integrated soil fertility management and soil conservation practices implemented

Indicators used to measure this output:

- **Indicator 1.5.1.** Soil conservation structures
- **Indicator 1.5.2.** Number of farming households adopting soil fertility management and conservation agricultural practices
- **Indicator 1.5.3.** Area under FMNR and agroforestry restoration
- **Indicator 1.5.4.** Length of soil conservation structures (terraces, bunds, and check dams)

OUTCOME AREA 2: ENHANCED RESILIENCE OF COMMUNITIES TO CLIMATIC SHOCKS

Outcome 2 aims to strengthen community resilience to climatic shocks by promoting climate-resilient water management, improving access to and use of climate information and early warnings, deploying climate-proofed post-harvest technologies, and supporting heat-stress mitigation among livestock-keeping households.

OUTPUT 2.1: Enhanced climate-resilient water management and conservation

Indicators used to measure this output:

- **Indicator 2.1.1.** Number of nature-based water harvesting structures such as sand dams, nature-integrated water pans, check dams/gabions
- **Indicator 2.1.2**. Number of households with water harvesting structures

OUTPUT 2.2: Strengthened climate information services

Indicators used to measure this output:

- **Indicator 2.2.1.** Number of households accessing agroclimatic advisories
- **Indicator 2.2.2.** Channels of agroclimatic advisories
- **Indicator 2.2.3.** Number of households adjusting farming operation based on early warning systems

OUTPUT 2.3: Increased adoption of climate-proving post-harvest technologies and infrastructure

Indicators used to measure this output:

- **Indicator 2.3.1.** Number of households with storage and preservation facilities for post-harvest products
- **Indicator 2.3.2.** Number of households practicing value addition

OUTCOME 3: RESTORED AND SUSTAINED PROTECTED ECOSYSTEM

The aim of **Outcome 3** is to restore and safeguard critical ecosystems to support biodiversity and climate regulation; through increased vegetation canopy cover in protected areas, expansion of restored and protected land, improved species population abundance, and enhanced carbon stocks in forest and range ecosystems.

OUTPUT 3.1: Protected areas under biodiversity management protected or conserved

Indicators used to measure this output:

- **Indicator 3.1.1.** Area under sustainable forest management
- **Indicator 3.1.2.** Number of native trees and plants species reintroduced and established
- **Indicator 3.1.3.** Number of native animals reintroduced and established
- **Indicator 3.1.4.** Number of bird species
- **Indicator 3.1.5.** Area of land cleared of invasive species

OUTPUT 3.2: Illegal mining sites protected and restored

Indicators used to measure this output:

- **Indicator 3.2.1.** Number of preventive measures implemented to reduce illegal mining activities
- **Indicator 3.2.2.** Number of degraded mining sites rehabilitated
- **Indicator 3.2.3.** Area of degraded mining sites rehabilitated and restored
- **Indicator 3.2.4.** Number of NbS interventions implemented in mining-affected landscapes

OUTPUT 3.3: Fire management interventions established and operational in protected forest and rangeland ecosystems

Indicators used to measure this output:

- **Indicator 3.3.1.** Area under firebreaks in rangeland and forest ecosystems
- **Indicator 3.3.2.** Number of fire-prone areas mapped for targeted interventions
- **Indicator 3.3.3.** Number of NbS interventions implemented to reduce fire risk

OUTPUT 3.4: Wildlife corridors rehabilitated and restored

Indicators used to measure this output:

- **Indicator 3.4.1.** Number of community members/stakeholders engaged in wildlife corridor projects
- **Indicator 3.4.2.** Area of encroached wildlife corridor restored/recovered

OUTPUT 3.5: Sustainable forage and grazing management practices promoted

Indicators used to measure this output:

- **Indicator 3.5.1.** Total area under sustainable grazing management
- **Indicator 3.5.2.** Area of rangelands under invasive species that is restored for livestock use
- **Indicator 3.5.3.** Area under conservancy based management system
- **Indicator 3.5.4.** Area under communal ranching system
- **Indicator 3.5.5.** Number of pasture management initiatives

- **Indicator 3.5.6.** Number of forage species introduced or promoted under NbS interventions (e.g., indigenous grasses, legumes)
- **Indicator 3.5.7.** Number of community groups or sites implementing forage-based NbS interventions

OUTPUT 3.6: Fragile ecosystems and buffers protected and restored.

Indicator used to measure this output:

- **Indicator 3.6.1.** Area of riparian zones restored

OUTCOME 4: ENABLING ENVIRONMENT FOR NBS IMPLEMENTATION

The aim of **outcome 4** is to enhance an enabling environment for effective, coordinated, and scaled implementation of NbS is strengthened through enhanced capacity, financing, policy frameworks, and institutional coordination

OUTPUT 4.1: Strengthened capacity to implement NbS interventions

Indicators used to measure this output:

- **Indicator 4.1.1.** Number of NbS training materials developed and disseminated
- **Indicator 4.1.2**. Number of households or technical experts trained on NbS implementation and management
- **Indicator 4.1.3.** Number of households or technical experts applying new practices as a result of knowledge acquired from training
- **Indicator 4.1.4.** Level of community awareness about critical ecosystem management topics (e.g., wildlife corridors, laws and regulations such as land carrying capacity or ecosystem protection laws)
- **Indicator 4.1.5.** Number of research studies and knowledge products developed to inform NbS implementation

OUTPUT 4.2: Increased financial resources mobilised for NbS implementation

Indicators used to measure this output:

- **Indicator 4.2.1.** Total financial resources disbursed for NbS initiatives
- **Indicator 4.2.2.** Total budget allocated to NbS interventions
- **Indicator 4.2.3.** Proportion of NbS financing linked to verified results
- **Indicator 4.2.4.** Number of financial products developed and accessed for NbS
- **Indicator 4.2.5.** Share of NbS financing reaching local communities for NbS interventions

OUTPUT 4.3: Strengthened policy and regulatory frameworks supporting NbS implementation.

Indicators used to measure this output

- **Indicator 4.3.1.** Number of sectoral policies and regulatory instruments integrating NbS
- **Indicator 4.3.2.** Number of national policies, laws, and regulations integrating NbS principles developed or revised



- **Indicator 4.3.3.** Number of NbS sectoral guidelines, standards, and plans developed and disseminated
- **Indicator 4.3.4.** Number of county NbS strategies, guidelines, or policies developed
- **Indicator 4.3.5.** Number of community NbS by-laws enacted and operationalised
- **Indicator 4.3.6.** Number of NbS projects implemented within established NbS policy and regulatory frameworks
- **Indicator 4.3.7.** Number of active community governance committees established to oversee NbS activities

OUTPUT 4.4: Enhanced institutional coordination for NbS implementation

Indicators used to measure this output

- **Indicator 4.4.1.** Number of organisations actively engaged in NbS coordination mechanisms
- **Indicator 4.4.2.** Number of multi-stakeholder NbS coordination platforms established and operational
- **Indicator 4.4.3.** Number of coordination meetings and joint planning processes conducted by NbS platforms
- **Indicator 4.4.4.** Number of joint NbS programmes or projects implemented across institutions
- **Indicator 4.4.5.** Number of NbS data-sharing, monitoring, and joint reporting systems established and operational

Data collection, frequency of collection and responsibility

The NbS M&E Framework relies on a diverse and integrated data system that combines community-level evidence, scientific measurements, institutional records, and geospatial technologies to generate robust and context-relevant information across all outcome areas.

DATA SOURCES

- **Community-level data:** Household surveys capture information on livelihoods, farming practices, climate impacts, pest incidence, and technology adoption.
- **Field-based monitoring:** Includes ecological assessments, on-farm surveillance, ranger patrols, soil and water testing, and post-disturbance (e.g., fire) assessments.
- **Remote sensing and GIS:** Satellite data (Landsat, Sentinel, MODIS, VIIRS) supports large-scale monitoring of vegetation cover, land-use change, fires, rangeland condition, and ecosystem restoration.
- **Government and institutional records:** Data from KFS, KWS, NEMA, KMD, NDMA, and MoALD provide standardised national statistics on climate, agriculture, biodiversity, and environmental compliance.
- **Laboratory and financial data:** Lab analyses (soil, water, pesticide residues), plus financial and administrative records from government, counties, and donors track environmental quality and resource flows.
- **Training and knowledge records:** Document capacity building, institutional learning, and dissemination of NbS knowledge products.

FREQUENCY OF DATA COLLECTION

Data collection follows a **tiered monitoring system** based on indicator dynamics:

- **Monthly:** Rapid indicators such as household income from NbS enterprises and disaster displacement.
- **Quarterly:** Climate events, livestock dynamics, erosion trends, water harvesting, air quality, and input adoption.
- **Biannual/Semi-annual:** Agricultural and ecological indicators aligned with cropping seasons (e.g., monocropping area, pest surveys, vegetation loss, water pollution).
- **Annual:** Broad system indicators such as biodiversity, soil health, forest management, financial flows, capacity building, and policy compliance.
- **Seasonal:** Farming system indicators linked to planting and harvest cycles (e.g., crop diversity, agroforestry adoption).
- **Event-based:** Immediate monitoring following shocks such as fires or disasters.
- **Long-term (1–5 years):** Policy, governance, and institutional change indicators.

RESPONSIBLE INSTITUTIONS

Responsibilities are distributed across multiple governance levels:

- **National agencies:** KFS, KWS, NEMA, WRA, KMD, NDMA, MoALD, and National Treasury lead official environmental, agricultural, climate, and financial monitoring.
- **County governments:** Handle frontline data collection, extension services, enforcement, and local reporting across agriculture, water, livestock, and environment sectors.
- **Research institutions:** KALRO, ILRI, ICRAF, KEFRI, universities, and CGIAR centres provide technical expertise, scientific validation, and long-term research data.
- **NGOs and community organisations:** WRUAs, CFAs, conservancies, CBOs, and NGOs support participatory monitoring, household surveys, natural resource tracking, and grassroots implementation data.



BOX 1. WHY MONITORING MANAGEMENT PRACTICES MATTERS

Monitoring approaches for NbS need to go beyond basic metrics to assess whether interventions are delivering meaningful and lasting impacts. For example:

- **Agroforestry** interventions may increase tree cover, but information on species selection, survival rates, and performance is needed to confirm improvements in soil health and household income through diversified products.
- **Soil and water conservation** measures should be evaluated for their effectiveness in reducing erosion, improving water infiltration, and maintaining yields during dry periods.
- **Rangeland restoration** should be assessed based on improvements in pasture quality, including vegetation density and diversity, as well as reductions in bare ground.

There is therefore a need for systematic monitoring protocols that capture plot-level data across landscapes. Such data provide critical insights into how land management practices influence NbS indicators and outcomes. They also support adaptive management by enabling interventions to be refined based on evidence, strengthening credibility and ensuring that restoration efforts contribute effectively to emission reductions and enhanced resilience.



Activity

Select one NbS intervention relevant to your context (e.g. agroforestry, wetland restoration, or sustainable grazing). Then:

- Identify at least one input, output, outcome, and impact related to the intervention.
- Propose 2–3 indicators that could be used to measure its performance (e.g. ecological, social, or economic).
- Reflect on:
  - What data would be needed to measure these indicators?
  - What challenges might arise in collecting this data?



Technical resources

ICAT, CSAMSP, Alliance. n.d. Kenya Climate Smart Agriculture (CSA) Monitoring and Evaluation Framework and CSA Reporting Tool. Module 1 Transparency Reporting Requirements.

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Winowiecki L, Chacha R, Mlamba J, Muthoka G, Trautman S. 2025. Advancing Kenya's 2035 Climate Commitments through Nature- Based Land Management: National Strategies and County Implementation in Makueni and Taita Taveta. Bogor, Indonesia: CIFOR; Nairobi, Kenya: ICRAF.

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