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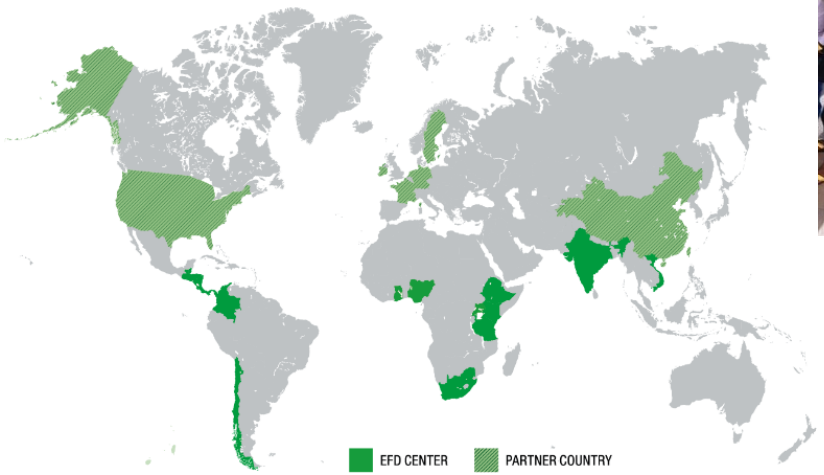


EfD vision and overarching objective

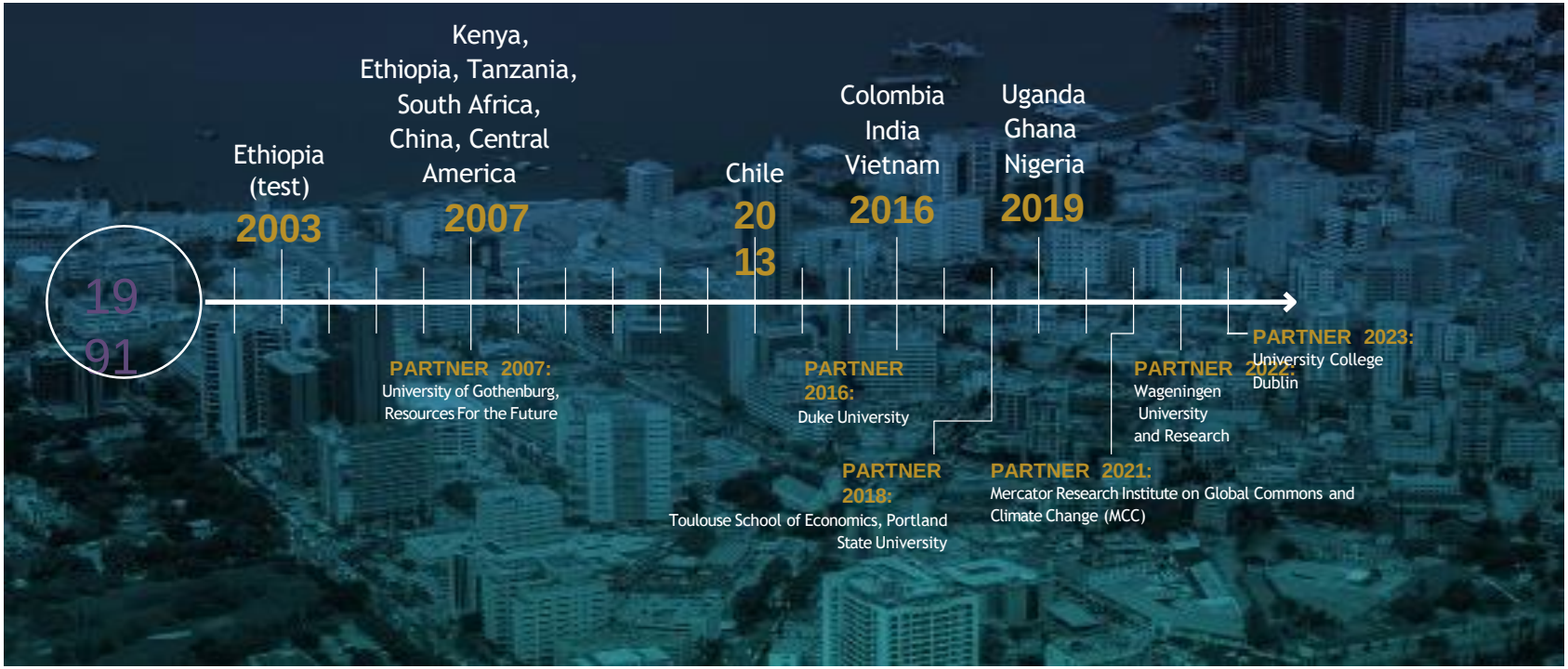
The vision

Inclusive sustainable development in the Global South is founded on evidence-based management of the environment, natural resources, and climate change impacts.

Overarching objective

EfD contributes to evidence-based domestic and international policies for poverty reduction, environmental and resource management, and climate change impacts in the Global South through integrated capacity development, research, and policy engagement.

EfD's History




EfD

Training Workshop:

Biodiversity Conservation, Community-Based Natural Resource Management, and National Parks Valuation & Regulation

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Welcome and Introduction

- Welcome to this two-day training course on biodiversity conservation, community-based natural resource management, and the valuation and regulation of national parks in Uganda.
- The course is designed for government officials and others who play a key role in managing Uganda's natural resources.
- We hope to provide practical knowledge that links biodiversity protection with local livelihoods and national development priorities.

Course Objectives

- The first objective of this course is to strengthen biodiversity conservation practices across Uganda, focusing on approaches that are both effective and sustainable.
- The second objective is to enhance community participation in the management of natural resources, recognizing that local involvement is key to long-term success.
- The third objective is to provide participants with practical tools for applying economic valuation in the development of policies and regulatory frameworks for natural resource management.

Day 1 Agenda

- Today, we will focus specifically on Uganda's biodiversity and the ways in which community-centered approaches can strengthen conservation.
  - Session 1 will provide an overview of Uganda's biodiversity landscape, highlighting key ecosystems and species.
  - Session 2 will cover the fundamental principles of biodiversity conservation, including ecological and management approaches.
  - Session 3 will focus on community-based natural resource management (CBNRM) in Uganda, exploring legal frameworks, rights, and collaborative strategies.
  - Session 4 will present case studies from Uganda and the wider region, illustrating successful models of conservation and community engagement.

Key lesson from economics

- Resources are renewable when they have a **capacity for reproduction and growth**
- Renewable resources are **capable of being fully exhausted** if too much harvesting is carried out over some time period
- For optimality, **do not interfere with reproductive capability** and harvesting should not continually exceed natural growth

Session 1: Uganda’s Biodiversity Landscape

What is Biodiversity?

- Commonly used to describe the number and variety of living organisms on the planet
- United Nations Convention on Biological Diversity defines "biodiversity":
  - "**The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part**."

What is Biodiversity?

- Components of biodiversity:
  - Genetic diversity: genetic variation within populations or species
  - Species diversity: numbers of species within an area
  - Ecosystem diversity: variation among ecosystems, communities, landscapes

Why is biodiversity important?

Ecosystem services

Provisioning services:	Regulating services:	Cultural services:	Supporting services:
Products obtained from ecosystems.	Regulate ecosystem processes.	Non-material benefits obtained from ecosystems.	Necessary for production of all other ecosystem services.
Including: - Food - Fibre - Fuel - Genetic resources - Biochemicals, natural medicines & pharmaceuticals - Ornamental resources - Fresh water.	*Including:* – Air quality regulation – Climate regulation – Water regulation – Erosion regulation – Water purification & waste treatment – Disease regulation – Pest regulation – Pollination	*Including:* – Cultural diversity – Spiritual & religious values – Knowledge systems – Education values – Inspiration – Aesthetic values – Social relations – Sense of place – Cultural heritage values	*Including:* – Soil formation – Photosynthesis – Primary production – Nutrient cycling – Water cycling.

The biggest threats to biodiversity?

- Habitat destruction and fragmentation
- Habitat modification
- Introduced species
- Overexploitation

Uganda's Biodiversity Overview

- Uganda is home to a wide range of ecosystems, including forests, wetlands, savannahs, and lakes, which support an impressive diversity of wildlife.
- Iconic species in Uganda include mountain gorillas, the shoebill stork, and the unique tree-climbing lions found in certain regions.
- The country is recognized as one of Africa's most biodiverse nations, with numerous endemic species and globally important habitats.

Policy Commitments for Biodiversity

- Uganda is a signatory to the Convention on Biological Diversity (CBD), which commits the country to international standards for biodiversity protection.
- National policies, such as Uganda Vision 2040, provide a framework for integrating conservation into long-term development planning.
- Domestic laws, including the National Environment Act of 2019, establish the legal foundation for biodiversity governance in Uganda.

Kunming-Montreal Global Biodiversity Framework

- **30x30 Goal:** By 2030, conserve at least 30% of terrestrial, freshwater, and marine ecosystems globally. This includes restoring 30% of degraded ecosystems, focusing on areas of high biodiversity importance.
- **Indigenous and Local Communities:** Acknowledge and incorporate the roles and rights of indigenous peoples in biodiversity conservation efforts. Their traditional knowledge is emphasized as crucial for sustainable ecosystem management.
- **Reducing Harmful Subsidies:** Phase out or reform at least $500 billion per year in subsidies harmful to biodiversity, redirecting financial resources toward conservation initiatives.
- **Biodiversity Financing:** Mobilize substantial financial resources, aiming for at least $20 billion annually by 2025 and $30 billion by 2030, with a focus on supporting developing countries.

Kunming-Montreal Global Biodiversity Framework

- **Halt Species Extinction:** Commit to halting human-induced extinction of threatened species and improving their conservation status by 2030.
- **Sustainable Use of Resources:** Promote sustainable use, harvesting, and trade of biodiversity-based resources to support conservation and equitable benefit-sharing.
- **Addressing Biodiversity Loss Drivers:** Target invasive species, pollution, habitat destruction, and unsustainable agricultural and fishing practices as key drivers of biodiversity decline.
- **Monitoring and Accountability:** Establish mechanisms to assess progress through clear, measurable indicators, allowing for adaptive management of conservation strategies.

Kunming-Montreal Global Biodiversity Framework: Uganda's Progress

Area of Progress	Key Actions Taken
Target Alignment	Submitted national KMGBF-aligned targets ahead of COP16
Strategy Updates	NBSAP II under review to align with framework goals
Finance Mobilization	Developed NBFP under BIOFIN to close biodiversity finance gaps
Sector Integration	Integrated agroforestry with biodiversity objectives
Spatial Planning	Identified and institutionalized KBAs for planning and conservation
Reporting & Transparency	Preparing inclusive 7th national report to the CBD

Threats and Pressures on Biodiversity

- Uganda's rapid population growth places significant pressure on natural resources and land use.
- The expansion of agriculture has become the primary driver of deforestation and habitat loss in many regions.
- Poaching and illegal logging continue to threaten both wildlife populations and forest ecosystems.
- Climate change exacerbates these pressures by increasing the frequency of droughts, floods, and other extreme events that alter habitats.

Interactive Discussion: Biodiversity Pressures

Title: *Which ecosystems in your districts are under the most pressure?*

- Which ecosystems in your districts are under the most pressure, and why?
- How do Uganda's biodiversity challenges compare to those of neighboring countries?
- What are the main drivers of biodiversity loss that government policy should prioritize?

Group Activity:
District Biodiversity Mapping

Title: *Mapping Biodiversity Assets and Pressures*

- Form small groups by region.
- Sketch a simple district map (forests, wetlands, parks, etc.).
- Mark one **major pressure** and one **opportunity**.
  - See both challenges and opportunities in your local contexts.
- Prepare to share one insight with plenary.

Session 2: Principles of Biodiversity Conservation

Ecological Foundations of Conservation

- Biodiversity encompasses species diversity, genetic diversity, and ecosystem diversity, all of which are essential for ecological resilience.
- Ecosystem services, such as water purification, soil fertility, and climate regulation, directly support human well-being and economic development.
- The loss of biodiversity threatens Uganda's long-term development, food security, and the livelihoods of local communities.

Conservation Strategies

- In-situ conservation strategies focus on protecting species within their natural habitats, such as national parks and wildlife reserves.
- Ex-situ conservation strategies involve safeguarding species outside their natural habitats, including zoos, seed banks, and botanical gardens.
- Uganda primarily relies on in-situ conservation through protected areas managed by the Uganda Wildlife Authority (UWA).

Interactive Discussion: Conservation Challenges

Title: *Balancing In-Situ and Ex-Situ Approaches*

- Which ecosystem services are most valuable to your communities?
- What challenges exist in implementing in-situ conservation in Uganda?
- How can ex-situ approaches complement in-situ conservation?

Group Activity:
Ecosystem Services Prioritization

Title: *Which Ecosystem Services Matter Most?*

- List the main ecosystem services (water, pollination, tourism, fuelwood, climate regulation, etc.) in your part of the country.
- Rank them by importance to Uganda's economy and livelihoods.
- **In plenary, compare rankings across groups — why do priorities differ?**

Uganda's Protected Areas

- The Uganda Wildlife Authority manages a variety of protected areas under different categories, including national parks, wildlife reserves, and sanctuaries.
- Uganda has over ten national parks, which are home to iconic species and globally important habitats.
  - Iconic parks include Bwindi Impenetrable, Queen Elizabeth, and Murchison Falls.
- Effective conservation requires partnerships with local communities to ensure sustainable management and support.

Session 3: Community-Based Natural Resource Management (CBNRM)

Legal Framework for Community Participation

- The Wildlife Act of 2019 provides a legal framework for community participation in wildlife management.
- The Land Act of 1998 governs land tenure and use, which is critical for effective conservation.
- The National Forestry and Tree Planting Act of 2003 guides forest management and encourages community involvement in tree planting initiatives.

Wildlife Use Rights

- Uganda recognizes wildlife use rights, which allow communities to legally benefit from hunting, farming, trade, and tourism.
- These rights are granted through licensing and strict regulation to ensure sustainable use.
- Proper management of wildlife use rights helps prevent overexploitation while promoting local economic development.

Lessons from Elinor Ostrom

Eight design principles for successful co-management of resources:

- **Clearly Defined Boundaries**: Clear delineation of the resource and its users.
- **Congruence with Local Conditions**: Rules must align with local needs and conditions.
- **Collective-Choice Arrangements**: Users participate in decision-making.
- **Monitoring**: Effective monitoring by accountable individuals.
- **Graduated Sanctions**: Consequences for rule violations, proportionate to the offense.
- **Conflict-Resolution Mechanisms**: Accessible and low-cost conflict resolution.
- **Minimal Recognition of Rights**: External authorities respect local resource governance.
- **Nested Enterprises**: For large systems, governance activities are organized at multiple levels.

Collaborative Management Approaches

- Revenue-sharing schemes provide local communities with a portion of income generated from park fees and tourism activities.
- Co-management agreements enable joint decision-making between UWA and local communities for park management.
- Effective collaborative management reduces conflicts and increases local support for conservation.
- Trust, transparency, and timely payments are key to successful collaboration.

Interactive Discussion: Community Incentives & Challenges

Title: *How Can Communities Benefit More Fully from CBNRM?*

- How effective are Uganda's revenue-sharing schemes in reducing human–wildlife conflict?
- What barriers prevent communities from fully benefiting from Wildlife Use Rights?
- In your view, what incentives would motivate communities to protect biodiversity?

Group Activity:
Role Play – Co-Management Negotiation

Title: *Negotiating Community–UWA Partnerships*

- *Role Play:* Divide into two groups: one represents UWA, the other a community adjacent to a national park.
- *Task:* Negotiate a new co-management agreement (covering benefits, responsibilities, enforcement).
- **In plenary, debrief: What were the biggest challenges?**

Session 4: Ugandan & Regional Case Studies

Case Study: Bwindi Impenetrable National Park

- Gorilla tourism at Bwindi generates significant revenue and provides a model for high-value, sustainable conservation.
- Revenue-sharing mechanisms support local community development and strengthen conservation incentives.
- The key lesson from Bwindi is that strong community involvement is critical for long-term sustainability.

Case Study: Lake Mburo National Park

- Lake Mburo demonstrates how livestock and wildlife can coexist through carefully managed grazing practices.
- Conflict mitigation strategies have been developed to reduce tensions over grazing rights and wildlife interactions.
- What types of human–wildlife conflicts are present in the districts and possible solutions?

Regional Lessons in Community-Based Conservation

- Namibia's conservancy model grants legal ownership of wildlife to communities, leading to strong conservation outcomes.
- Kenya's tourism-based conservancies attract investment and provide sustainable economic benefits to local communities.
- The key message is that empowered communities are central to successful conservation initiatives.

Interactive Discussion: Learning from Cases

Title: *What Can Uganda Learn from Within and Beyond?*

- What makes the Bwindi gorilla tourism model successful, and can it be replicated elsewhere?
- What lessons from Lake Mburo's livestock–wildlife coexistence are transferable to other parks?
- From Namibia and Kenya, which elements of community conservancies could Uganda realistically adopt?

Group Activity:
Case Study Analysis

Title: *Analyzing Success Factors & Challenges*

- Assign each group one case: Bwindi, Lake Mburo, Namibia, Kenya.
- Identify 3 key success factors and 2 major challenges.
- Share lessons Uganda can apply nationally.

Key Takeaways from Day 1

- Uganda's biodiversity is of global significance and requires proactive protection.
- Effective conservation integrates ecological knowledge with community engagement.
- Legal frameworks exist to support conservation, but enforcement and implementation remain critical.
- Regional models offer practical inspiration.

Wrap-Up (End of Day 1)

Plenary Reflection

Title: *Reflections on Day 1*

- One key insight from today?
- One concrete action (*not abstract ideas*) your department can take?

Optional Energizer: Word Cloud Exercise

Title: *One Word to Capture Today*

- Each person says one word that sums up Day 1.
- Facilitator records words on flipchart/board.

Looking Ahead to Day 2

- Economic valuation of parks and ecosystem services.
- Policy applications of valuation results.
- Regulation, enforcement, and compliance strategies.
- Action planning exercise for practical application.

Applied fishery models

- the simplest applied fishery models are based on the (Schaefer) stock-growth relationship shown earlier
- the mathematical functions can now be given a specific form suitable for numerical calculations, and their parameters estimated from available data.
- it is important to model the processes of nature as closely as possible.
- there are three common applied fishery models
  - the Schaefer, the Riker and the Beverton-Holt
- focusing on the Schaefer we have already looked at

The Schaefer model

- $G(S)=gS(1-S/k)$ where $k=S_{MAX}$ (1)
- $G_s(S)=g(1-2S/k)$ (2)
- $H=eES$ (3)
- setting $H=G$
- $eES= gS(1-S/k)$ (4)
- $S=k(1-eE/g)$ (5)
- substitute for S in (3)
- $H=Eek(1-Ee/g)$ (6)
- which may be written as
- $H=\alpha E-\beta E^2$ or $H/E=\alpha-\beta E$ where $\alpha=ek$ and $\beta=e^2k/a$

The Schaefer model

- H/E (the catch per unit of effort) is a linear function of effort.
- data on fish catches and effort are usually available if anything at all is known about a fishery.
- such data allow estimation of parameters α and β.
- consider the hypothetical fishery data in the next table.

The Schaefer model

Year	Catch (H)	Effort (E)	Catch/Effort (H/E)
2001	60	100	0.6
2002	50	100	0.5
2003	125	250	0.5
2004	120	300	0.4
2005	180	450	0.4
2006	150	500	0.3
2007	180	600	0.3
2008	140	700	0.2
2009	160	800	0.2
2010	80	800	0.1
2011	90	900	0.1

- by linear regression we can estimate the coefficients α and β
- H/E=0.61227-0.00057E
- $H = 0.61227E - 0.00057E^2$

The Schaefer model

- we also need to know how the price varies with the quantity landed and how the cost of fishing varies with fishing effort to find the economic optimum.

The Schaefer model

- the best way to proceed in the analysis of cost is probably to survey a sample of representative boats.
- this would allow one to estimate the marginal cost of effort i.e. the cost of adding on a new boat, or of using one of the boats that exist.

Economic optimum

- suppose the price (p) of fish is 10, the long-term cost per unit of effort (c) is 1 and there is no discounting.
- the long-term economic optimum is where the value of marginal sustainable yield is equal to the cost of an additional unit of effort.
  - the value of marginal sustainable yield is
  - $p(dH/dE)= 6.1227-0.0114E$
  - the marginal cost of effort is 1
  - equilibrium condition is $6.1227-0.0114E=1$
  - $E^*=449$, $H^*=160$, $\pi^*=1151$

Maximum sustainable yield

- set p(dH/dE)=0 to get the maximum sustainable yield
- equilibrium condition is 6.1227-0.0114E=0
- E_{MSY}=537
- H_{MSY}=164
- the maximum sustainable yield and effort are more than optimum sustainable yield and effort.

Open access

- under open access we set the value of the catch per unit of effort equal to the cost per unit of effort.
- value of catch per unit of effort is p(H/E)
- cost per unit of effort is c
- equilibrium condition is 6.1227-0.0057E=1
- E_{OA}=899
- H_{OA}=90
- the fishery is wasteful as it uses double optimum effort to catch only 56.25% of optimum yield

Regulation of wasteful fisheries

- if the fishing fleet is already too large, the question is how much of its capacity to use.
- in that case, one would disregard long-term capital costs because they are fixed in the short term.
- such costs include depreciation and interest on the capital.

Ugandan National Parks

- Uganda has **10 national parks**, all managed by the **Uganda Wildlife Authority (UWA)**. Each one is distinct in biodiversity and tourism focus:
  - **Bwindi Impenetrable National Park** – Famous for mountain gorilla trekking (UNESCO World Heritage Site).
  - **Mgahinga Gorilla National Park** – Gorilla and golden monkey tracking, part of the Virunga range.
  - **Queen Elizabeth National Park** – Known for tree-climbing lions, diverse ecosystems, and Kazinga Channel.
  - **Murchison Falls National Park** – Largest park, with the Nile rushing through the Murchison Falls.
  - **Kibale National Park** – The "primate capital of the world," home to chimpanzees and 12 other primate species.
  - **Lake Mburo National Park** – Smallest savannah park, known for zebras, impalas, and proximity to Kampala.
  - **Rwenzori Mountains National Park** – UNESCO World Heritage Site, with glaciers and alpine vegetation.
  - **Semuliki National Park** – Unique lowland tropical forest, hot springs, and Central African bird species.
  - **Kidepo Valley National Park** – Remote, rugged wilderness with lions, cheetahs, and ostriches.
  - **Mount Elgon National Park** – Centered on an extinct volcano with the world's largest caldera.