Forest and Ecosystem Accounts

Day 6: Measuring Nature's Value under SEEA

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☀ Morning (09:30 – 13:00)

- **Session 1: Forest Accounts (SEEA-CF)**
  - Extent & Condition
  - Physical vs. Monetary Accounts
  - Timber & Non-Timber Values

- **Session 2: Ecosystem Accounts (SEEA-EA)**
  - Rwanda Ecosystem Typology
  - Condition Indicators (PSR Model)
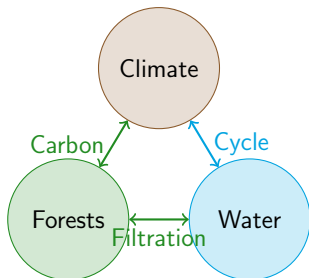 - Data Challenges

☁ Afternoon (14:00 – 16:00)

- **Session 3: Practical Exercise**
  - Selecting Condition Indicators
  - Drafting Extent & Condition Tables
  - Policy Interpretation

Day 6 Output

Shortlist of Ecosystem Classification and Condition Indicators for Rwanda.

Why Forest & Ecosystem Accounts?

- **Beyond GDP:** Forests provide more than just timber (water regulation, carbon storage, tourism).
- **Climate Governance:** Understanding forest stocks is crucial for carbon accounting (NDC reporting).
- **Water Governance:** Forests and wetlands are natural infrastructure for water security.

The SEEA Framework: A Quick Recap

System of Environmental-Economic Accounting (SEEA)

Two main complementary frameworks:

SEEA Central Framework (CF)

- View: **Individual Assets**
- Focus: Timber, Water, Minerals
- Question: "How much resource do we have?"

SEEA Ecosystem Accounting (EA)

- View: **Spatial Areas**
- Focus: Forests, Wetlands, Lakes
- Question: "Is the ecosystem healthy & functioning?"

Today we cover BOTH: Forest assets (CF) and Forest ecosystems (EA).

Forest Accounts
Tracking the Asset

Goal: Create a balance sheet for Rwanda's forests.

- Opening Stock + Growth + New Planting - Harvest - Deforestation = Closing Stock

Physical Forest Accounts

1. **Area Account (Extent)**

- Measured in hectares (ha).
- Disaggregated by forest type:
    - Natural Forest (e.g., Nyungwe)
    - Forest Plantation (e.g., Eucalyptus stands)
    - Bamboo / Shrubland

2. **Volume Account (Timber)**

- Measured in cubic meters (m^3).
- Requires data on "Growing Stock" (biomass).
- Vital for understanding sustainable yield (Are we cutting more than grows?).

Monetary Forest Accounts

Putting a price tag on forests:

- **Stumpage Value Method:**

$$\text{Value} = \text{Timber Price} - \text{Harvesting Cost}$$

- **Net Present Value (NPV):** *Value of the expected future stream of income from the forest.*

Challenge

Monetary accounts often only value **timber**. They usually miss the value of carbon storage or biodiversity unless explicitly modeled in Ecosystem Accounts.

Timber vs. Non-Timber Values

Timber Values (Direct)
- Firewood (Primary energy source)
- Charcoal
- Construction poles
- Sawn timber

Non-Timber Values (ES)
- **Carbon Sequestration:** Fighting climate change
- **Water Regulation:** Protecting watersheds
- **Soil Protection:** Preventing erosion on slopes
- **Biodiversity:** Habitat for gorillas, etc.

Note: For NCA 2026, we aim to include Carbon accounts.

Forest Extent vs. Condition

Why Extent is not enough:

Scenario

Rwanda might have **stable forest cover** (30%), but:

- Natural forests are being replaced by distinct plantations.
- Biodiversity is declining.
- Soil erosion is increasing in forest areas.

Condition Accounts measure the *quality* of the asset, not just the size.

Case Study: Reforestation in Rwanda

Success Story: Rwanda has achieved its goal of 30% forest cover.

The Challenge for Accounts:

- Much of the increase is **Forest Plantations** (Eucalyptus).
- **Ecosystem Services differ:**
  - *Natural Forest:* High biodiversity, high water retention.
  - *Plantation:* High timber value, fast carbon uptake, but lower biodiversity and water usage issues.

Our accounts must distinguish between these types!

Coffee Break
11:00 – 11:30

Ecosystem Accounts
Measuring Health & Function

Rwanda's Ecosystem Typology

Step 1: Classification (What do we have?)

Terrestrial:

- Natural Forests (Montane, Gallery)
- Savannas
- Plantations
- Shrublands

Anthropic:

- Cropland (Seasonal/Perennial)
- Settlements (Urban/Rural)

Freshwater:

- Lakes (Deep/Shallow)
- Rivers
- Wetlands (Papyrus/Reclaimed)

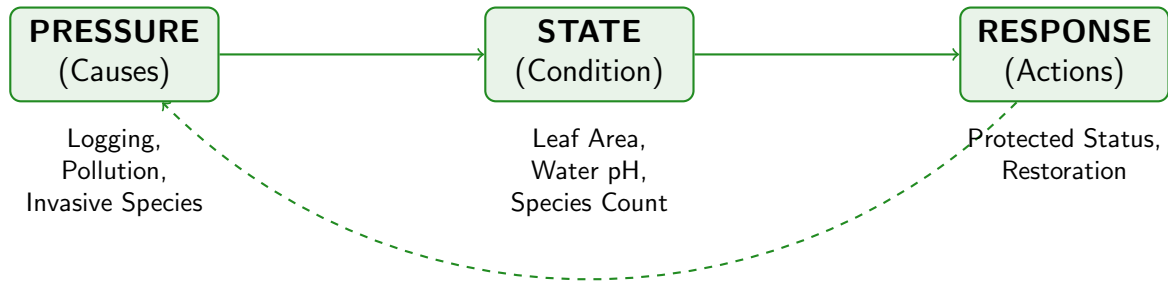*This typology must map to the National Land Use Master Plan.*

Why Typology Matters?

- You cannot measure "condition" if you don't define "what" you are measuring.
- A healthy **Wetland** looks very different from a healthy **Forest**.
- **Example:**
    - *High water table* is GOOD for a wetland.
    - *High water table* might be BAD for certain crop lands.

Rule: Define the ecosystem unit first, then defined the indicators.

Condition Indicators: The PSR Model

Pressure-State-Response Framework

PRESSURE (Causes)	→	STATE (Condition)	→	RESPONSE (Actions)
Logging, Pollution, Invasive Species		Leaf Area, Water pH, Species Count		Protected Status, Restoration

Example: Condition Indicators for Forests

Category	Potential Indicators
Abiotic (Non-living)	- Soil organic carbon - Soil erosion rate - Air quality in/near forest
Biotic (Living)	- Tree density / Biomass - Species richness (Biodiversity) - Presence of invasive species
Landscape	- Fragmentation (Patch size) - Connectivity

Example: Condition Indicators for Wetlands

Wetlands are crucial for Rwanda's water security.

1. **Hydrological:**
   - Water flow rate (discharge)
   - Water duration (hydroperiod)

2. **Chemical (Water Quality):**
   - Nitrogen / Phosphorus levels (Pollution)
   - Dissolved Oxygen
   - Turbidity (Sediment)

3. **Biological:**
   - Presence of key species (e.g., Papyrus health)
   - Bird counts (cranes)

Data Challenges in Rwanda

We know "what" to measure, but do we have the data?

- **Spatial Resolution:** Satellite data (Landsat) might be too coarse for small wetlands.
- **Temporal Frequency:** Forest inventories are done every 5-10 years (too slow?).
- **Data Silos:**
  - Water data is with RWB (Rwanda Water Board).
  - Forest data is with RFA.
  - We need NISR to integrate them.

Lunch Break

13:00 – 14:00

Afternoon: Practical Exercise

Task

Split into 3 Working Groups. We will select valid indicators for Rwanda and draft a condition account.

The Groups:

1. **Group A: Forests** (Focus on Production vs Protection)
2. **Group B: Wetlands** (Focus on Water Quality)
3. **Group C: Agriculture** (Focus on Soil Health)

Step 1: Drafting the Indicator List

Each group must select **3 Key Indicators** for their ecosystem.

Selection Criteria:

1. **Relevance:** Is it a good proxy for health?
2. **Feasibility:** Does data exist in Rwanda?
3. **Sensitivity:** Will it change if the ecosystem degrades?

Discuss for 20 minutes.

Step 2: The Condition Table

Fill in the table with hypothetical or real trends:

Indicator	2020 (Opening)	2025 (Closing)	Trend
Example			
1. Tree Cover	60%	55%	Degrading
2. Soil Erosion	10 t/ha/y	15 t/ha/y	Degrading
3. Protec. Status	10%	12%	Improving

Question: Overall, is the condition improving or declining?

Interpreting the Results for Policy

Once we have the condition index, we can advise policy:

If Condition is Declining:

- Need restoration?
- Need stricter protection?
- Reduce harvesting pressure?

If Condition is Stable/Improving:

- Validates current conservation.
- Potential for sustainable use (tourism, selective logging).

Accurate accounts leads to evidence-based NST2 implementation.

Summary of Day 6

Key Takeaways

1. **Forest Accounts** must track both *Physical Extent* and *Condition*.
2. **Monetary Valuation** should try to include non-timber values (Carbon/Water) to reflect true worth.
3. **Ecosystem Condition** is measured using the PSR (Pressure-State-Response) model.
4. **Data Integration** between RFA, RWB, and RLMUA is critical for success.

🌿

Murakoze Cyane!
(Thank you very much)

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NISR Technical Assistance

Tomorrow (Day 7): Water Accounts