Ecosystem Service Valuation of Key Watersheds in Kenya

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U.S. Forest Service

A Community on Ecosystem Services
Washington, DC
December 5, 2018
Economic Valuation of Ecosystem Services

“A well-functioning environment is the foundation of Kenya’s economic future.”

Wangari Maathai
Founder, Green Belt Movement
2004 Nobel Peace Prize Laureate
“Undervaluation and inadequate information has resulted in marginalization of forest ecosystems in budget allocations, land-use change decisions, leading to excisions and degradation.”

~ David Langat, Kenya Forest Research Institute
Ecosystem Service Valuation of Key Watersheds in Kenya
Alignment with Government of Kenya Initiatives

“Big Four” Agenda

- Food Security
- Manufacturing
- Health
- Housing
Goal

To develop and sustainably manage, conserve, restore and utilize forests and allied resources for socio-economic growth and climate resilience.

Strategic Objective

Strategic Objective 2:
“Enhance forest-based economic, social and developmental benefits. Need for valuation of forests’ provisioning of ecosystem goods & services”

Stakeholders

- Communities
- Private Sector
- National Government
- County Governments
- Civil Society
Forest Conservation and Management Act

Reporting on the state of forests and forest resource strategies

Incentives to maintain forest cover, including the Forest Conservation and Management Trust Fund (PES mechanism)

Provision for community participation in forest management
Focus on Three Key Watersheds

- Mau Forest Complex
- Cherangani Hills
- Mt. Elgon
Ecosystem Services Valuation (ESV)

**purpose and objectives**

Systematic assessment of the economic value of the 3 target watersheds, including non-monetary benefits

Model methodology and coordinated database for future use in other watersheds

Inform decision-making and policy at multiple levels (national and county); set the stage for implementation
<table>
<thead>
<tr>
<th>Literature Review</th>
<th>existing valuation studies in the focus watersheds or related ecosystems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder Consultations</td>
<td>identify data gaps and key focus areas</td>
</tr>
<tr>
<td>Secondary Data Collection</td>
<td>from natural resource management agencies (Kenya Forest Service, Kenya Wildlife Service, Water Resource Management Authority, etc.)</td>
</tr>
<tr>
<td>Primary Data Collection</td>
<td>household surveys</td>
</tr>
<tr>
<td></td>
<td>market and industry surveys</td>
</tr>
<tr>
<td></td>
<td>participatory rural appraisals</td>
</tr>
</tbody>
</table>
Direct Use
Provisioning
Food, water, timber, construction materials, energy, medicinal herbs, fodder

Market Prices
Market Price Proxies
Contingent Values
Replacement Values

Indirect Use
Regulating & Supporting
Flood control, water purification, climate regulation, air quality improvement
Nutrient cycling, soil erosion control, pollination

Replacement Cost
Avoided Cost

Non-Use
Option, Existence & Bequest
Aesthetic, cultural, religious, ritual, heritage
Use by future generations

Contingent Valuation
Benefit Transfer
Primary Data Collection

Household Surveys

Forest products and economic dependence

Water quality and uses

Relative importance of benefits

- Economic
- Subsistence
- Spiritual / Cultural
- Future use

Threats

- Over grazing
- Land degradation
- Soil erosion

over 1,000 surveys conducted
Primary Data Collection
Community Focus Groups
<table>
<thead>
<tr>
<th>ES type</th>
<th>Ecosystem Services</th>
<th>Mt. Elgon</th>
<th>Cherangany</th>
<th>Mau</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisioning</strong></td>
<td>Water</td>
<td>0.15</td>
<td>0.20</td>
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<tr>
<td></td>
<td>Firewood</td>
<td>0.12</td>
<td>0.14</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Fodder/Pasture</td>
<td>0.10</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Maize</td>
<td>0.08</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Medicine</td>
<td>0.06</td>
<td>0.10</td>
<td>0.10</td>
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<tr>
<td></td>
<td>Timber</td>
<td>0.05</td>
<td>0.12</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Bamboo Shoots</td>
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</tr>
<tr>
<td></td>
<td>Charcoal</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poles</td>
<td>0.03</td>
<td></td>
<td>0.06</td>
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<td>Vegetables/Mushrooms</td>
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<td>0.03</td>
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<tr>
<td></td>
<td>Honey</td>
<td>0.02</td>
<td>0.06</td>
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<tr>
<td></td>
<td>Game Meat</td>
<td>0.02</td>
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</tr>
<tr>
<td></td>
<td>Salt Lick</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hides and Skin</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruits</td>
<td>0.01</td>
<td>0.04</td>
<td>0.03</td>
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<tr>
<td></td>
<td>Twinning Material</td>
<td></td>
<td>0.04</td>
<td>0.03</td>
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<tr>
<td></td>
<td>Agricultural Tools</td>
<td></td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Thatch Grass</td>
<td></td>
<td></td>
<td>0.02</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>0.81</strong></td>
<td><strong>0.82</strong></td>
<td><strong>0.75</strong></td>
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<tr>
<td><strong>Cultural, education</strong></td>
<td>Tourism</td>
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<td>0.06</td>
<td>0.02</td>
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<tr>
<td></td>
<td>Aesthetic</td>
<td>0.03</td>
<td>0.06</td>
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<tr>
<td></td>
<td>Education and Research</td>
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<tr>
<td></td>
<td>Cultural/Ceremonial Sites</td>
<td>0.01</td>
<td>0.04</td>
<td>0.05</td>
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<tr>
<td><strong>Sub-total</strong></td>
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<td><strong>0.09</strong></td>
<td><strong>0.10</strong></td>
<td><strong>0.13</strong></td>
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<tr>
<td><strong>Regulation</strong></td>
<td>Air Quality</td>
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<td>0.06</td>
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<tr>
<td><strong>Supporting</strong></td>
<td>Habitat/Biodiversity</td>
<td>0.03</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1.00</strong></td>
<td><strong>1.00</strong></td>
<td><strong>1.00</strong></td>
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</table>
The **Total Economic Value** of the three watersheds is estimated to be KES 357 billion (USD 3.5 billion) per year.

**Regulating services** (e.g. water storage and climate regulation) provide more than half of this value.
Valuation Findings

• **Subsistence use** by households: KES 22.9 billion/year (~US $229 million). This represents 50% of the total annual value of tea exports (2017)

• Approximately 35 million m$^3$ of **water** valued at KES 3.4 billion/year (~US $34 million) is extracted for irrigation, industry and commercial uses

• The **total value added by the forest industry and trade** is approximately KES 4.3 billion/year (~US $43 million)
Hydropower stations in these watersheds generate 170 megawatts per year valued at US $119 million.

**What are the tradeoffs?**
Tourism is one of Kenya’s largest foreign-currency earners.

Direct contribution to GDP is forecast to reach USD 3.7 billion by 2025.

(World Travel and Tourism Council, 2015)
“Increasingly, forests and agriculture are being considered together as synergistic components of sustainable development.” (FAO, 2016)

Agriculture production in the study area contributes 24% of Kenya’s GDP
Forests and Agriculture

Total Economic Value of insect **pollination** for crop production estimated at KES 930 million (2015)

**Micro-climatic influences** of forests on tea yield estimated at KES 2 billion/year

*Courtesy of GRID-Arendal, Vital Forest Graphics*
Understanding Ecosystem Services Over Space and Time
Connections with land use / land cover change

Degradation within the Mau Forest Complex from 1995-2014

IGAD Climate Predication and Applications Centre
Sustaining Ecosystem Services in the Face of Climate Change

Vulnerability Index into the Future

Session 65
Thursday Dec. 6
2:45 pm
Tom DeMeo

Vulnerability Index into the Future
Next Steps and Recommendations

Chart a way forward for integration of ecosystem services into **national accounts**

Use ecosystem service **mapping** to identify strategic areas providing key services and hotspots for intervention measures

Apply ecosystem service valuation to **reforestation goals**, including meeting Kenya’s Bonn Challenge pledge of restoring 5.1 million forest hectares by 2030
Next Steps and Recommendations

Integrate ecosystem service assessments into County Integrated Development Plans

Make the business case for green infrastructure for water storage and quality improvements

Engage partners in watershed investments (e.g. tea sector, hydropower, tourism) including PES and water funds
Thank you!

<table>
<thead>
<tr>
<th>Products</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water</td>
<td>8. Products</td>
</tr>
<tr>
<td>2. Firewood</td>
<td>9. Environmental quality</td>
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<tr>
<td>3. Medicinal herbs</td>
<td>10. Ceremonial sites</td>
</tr>
<tr>
<td>4. Honey</td>
<td>11. Game meat</td>
</tr>
<tr>
<td>5. Fencing &amp; construction material</td>
<td>12. Fibre</td>
</tr>
</tbody>
</table>

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