Ecosystem Services (ES) Modeling

For the OAS course:
Diseño e Implementación de Esquemas de Pagos por Servicios Ambientales: Entrenamiento para Funcionarios de Gobierno

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New Forests Inc.
Washington, D.C.
Our Company

- New Forests Inc. in DC
  - head office in Sydney, Australia
- Offices in Malaysia and San Francisco
- Manage funds and assets worth 250M$
- Advisory services for ES
- Investments are
  - Environmentally and socially responsible
  - in carbon, biodiversity, water, forestry
My role at New Forests Inc.

• Responsible for all modeling:
  – Ecosystems
  – Project financials
  – Portfolio

• Involved in:
  – Policy
  – Ethics and Governance
Plan of the talk

• What is a model?
• What is the role of ES modeling?
• Looking back: ES models in the past
• Current approach in Eco-finance
• The future of ES modeling
• Policy imperatives
• Questions
What is a model?

Ceci n’est pas une pipe.
What is a model?

All models are wrong, some models are useful.
What is a model?

Entia non sunt multiplicanda praeter necessitatem
What is a model?

Model = Assumptions + Structure

What is important? What is the context? What are the initial quantities and rates? How are all pieces related?
What is a model?

• Can be very simple:
  – regression equation: \( y = a + bx \)

• Or very complex
  – no limit on complexity!
What is the role of ES modeling?

ES Modeling

- Decision-making / management
- Policy
- Market ES
- Communication (stakeholders, local communities, NGO’s, public)
Looking back: ES models in the past

- Growth and yield
Looking back: ES models in the past

- Growth and yield
- Fire modeling
Looking back: ES models in the past

• Growth and yield
• Fire modeling
• Wildlife population models
Looking back: ES models in the past

• Growth and yield
• Fire modeling
• Wildlife population models

• Problem:
  – single purpose models
  – very disciplinary
Current approach in Eco-finance

- Model ecosystem service: predict yield
  - timber
  - carbon
  - biodiversity
  - water
- Model financials
  - based on yields
  - set-up financial structure
Current approach in Eco-finance

- Predict yield of ES
  - e.g., REDD carbon

\[
\begin{align*}
\text{Avoided emissions} \\
\text{Project C stocks} \\
\text{No project C stocks} \\
\text{Deforestation rates}
\end{align*}
\]
Current approach in Eco-finance

• Predict yield of ES
  – e.g., wetlands
Current approach in Eco-finance

- Predict yield of ES
- Financials

### Cost Breakdown

<table>
<thead>
<tr>
<th>Description</th>
<th>5 Year Base</th>
<th>5 Year Setup</th>
<th>SSC Operations &amp; Improvement</th>
<th>Total over 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Site Preparation</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>Stage 2: Site Preparation</td>
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<td>0.000</td>
<td>0.000</td>
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<tr>
<td>SSC Setup</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>SSC Operations &amp; Improvement</td>
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<td>0.000</td>
<td>0.000</td>
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<tr>
<td>Project Costs (Internal)</td>
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<tr>
<td>Project Costs (External)</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Overall Costs (€m):**

| Description                              | 0.398       | 0.639        | 1.317                       | 2.617               | 5.234               |

### Benefit Breakdown

<table>
<thead>
<tr>
<th>Description</th>
<th>5 Year Base</th>
<th>5 Year Setup</th>
<th>SSC Operations &amp; Improvement</th>
<th>Total over 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsorship Benefits</td>
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<tr>
<td>Project Monitoring</td>
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<tr>
<td>Purchase to Pay</td>
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<tr>
<td>Sales to Collection</td>
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<tr>
<td>Project improvements in service provision</td>
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<tr>
<td>HR Benefits savings in services</td>
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<tr>
<td>Replacement of legacy systems</td>
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<tr>
<td>Improvement in maintenance contract</td>
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<td>0.000</td>
</tr>
</tbody>
</table>

**Overall Benefits (€m):**

| Description                              | 0.000       | 0.000        | 0.000                       | 0.000               |

**Net Benefit (€m):**

| Description                              | 0.255       | 0.430        | 1.351                       | 2.783               | 5.513               |

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NewForests
The future of ES modeling

Maintain and enhance the value of all ecosystem services over the very long-run.
The future of ES modeling

- **Multiple-use integrated socio-economic-ecosystem models**
  - Ecosystems have many uses
  - Many fields involved
    - hydrology, soil science, wildlife biology, forestry
  - Projects must be socially acceptable
  - Solutions must be viable
  - Policy must ensure markets benefit society
    - present and future generations
  - our survival depends on ecosystems
The future of ES modeling
The future of ES modeling
The future of ES modeling
The future of ES modeling
Policy imperatives

- Markets depend on regulatory framework
  - mechanisms to internalize externalities
  - in the U.S.
    - wetlands: Clean Water Act
    - biodiversity: Endangered Species Act
    - carbon: Cap and trade legislation
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Malua Biobank Background

- MWHCB protects 34,000 hectares of previously logged forest
- Partnership between EPF and Sabah Government
- Launched in 2008
Malua Biobank Background

- Buffer between virgin lowland tropical rainforest and plantations
- Highest concentrations of orangutans
- Also:
  - Clouded leopards
  - Pygmy elephants
  - Over 300 bird species
Forestry plus Case Study: Tarrangower, NSW, Australia

- 8500-hectare former cattle property in New South Wales
- Reforestation with Eucalypt for both timber market and conservation
- Will generate carbon credits for federal Australian emissions trading system
- AU$1M payment from government for biodiversity enhancement
- 100M liters of water rights associated with property