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#### AGENDA

- A few key considerations
- Regional road planning: Multi-criteria analysis
  - Example: Regional road planning in Amazon
- Identifying and measuring: Valuation
  - Example: Forestry sector in Myanmar
- Road project evaluation: Cost-benefit analysis (CBA)
  - Example: Ecotourism road in Uganda
- Evaluating alternatives: Least-cost path analysis
  - Example: Mining roads in Indonesia
- Final Thoughts



#### SOME KEY CONSIDERATIONS





## Tradeoffs and indirect impacts





#### Net economic benefits





## Avoidance before mitigation



#### **MULTI-CRITERIA ANALYSIS:**

#### A BETTER AMAZON ROAD NETWORK FOR PEOPLE AND THE ENVIRONMMENT







#### Efficiency Index

- Set of road investments
- Multicriteria approach:



Efficiency =  $\frac{1}{0.5 \times \text{Environmental Damage} + 0.5 \times \text{Net Social Benefit}}$ 



#### CRITERIA





## **Environmental Risk**





#### **RESULTS: BETTER CHOICES**



Percentage of the total socioenvironmental damage score



#### AMAZON ROADS: CONCLUSIONS AND OPPORTUNITY

- I. "Win-win": cancel ~50% of projects with economic losses (NPV<0). Are there more efficient investments?
- 2. Study roads with both high economic efficiency and low impact in greater detail
- 3. Invest in rigorous analyses and use the information to inform better regional planning and decision making in relation to roads
- 4. By focusing resources on the least risky roads, governments in this region could avoid economic losses of more than US \$7.6 billion and deforestation of more than I million hectares



#### **ECONOMIC VALUATION**

- Placing a value or price on environmental goods and services that are left out of market transactions
- Price does not equal value for most environmental goods and services due to market failures such as public goods and externalities



#### Myanmar



Forestry sector:

- Official statistics: forests contribute <0.5% (US\$ 160M) to the economy</li>
- Almost all from commercial timber

Emerton, L. and Yan Min Aung (2013) The Economic Value of Forest Ecosystem Services in Myanmar and Options for Sustainable Financing. IMG, Yangon and Ministry of Environmental Conservation and Forests, Nay Pyi Daw.





#### **COST-BENEFIT ANALYSIS**

- Framework to assess the merits of a project, policy or investment versus its cost
- A process of identifying, measuring, and comparing the benefits and costs of a project or program





# THE ECONOMIC CASE TO AVOID ENVIRONMENTAL AND SOCIAL DAMAGE IN ROAD DEVELOPMENT

- Should Uganda pave the road through Bwindi Impenetrable National Park?
- Goals of Ikumba Ruhija road (through Bwindi):
  - improve performance of the tourism sector
  - improve access to goods/passengers
  - reduce transport costs
  - improve access to development opportunities
  - ensure no roadside communities worse off



#### RESULTS

- Costs > Benefits for all road options
- Alternatives that costs \$3-\$5 million more could avoid a potential loss of 10s of millions of dollars in lost tourism income
- More communities served by roads outside of park



### **BWINDI CONCLUSIONS**

Any tourism investment should focus on:

- Protection of current gorilla population
- Potential to grow gorilla population

Road alternatives outside Bwindi NP should be further explored:

- Minimal cost increase
- Lower risk to tourism
- Lower risk to gorillas
- Greater local benefit



Pave the Impenetrable? An economic analysis of potential Ikumba - Ruhija road alternatives in and around Uganda's Bwindi Impenetrable National Park

#### LEAST-COST PATH ANALYSIS



<image>



Plate 4: Financial LCP with Environmental Considerations



 $https://www.conservation-strategy.org/sites/default/files/field-file/CSFPolicyBrief\_14\_english\_1.pdf$ 

#### **INDONESIAN MINING ROAD**



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#### **FINAL THOUGHTS**

- I. Roads in rural areas, especially in protected areas, have significant environmental impacts and often bring a wave of illegal activity, resource extraction, immigration and local community disruption.
- 2. Environmental and social costs should be incorporated from the beginning of the planning process to help prioritize road infrastructure investments, and road projects that generate more costs than benefits for society should be avoided.
- 3. Alternatives are often less costly from both a financial and economic point of view, and investing in avoidance is often less expensive than investing in mitigation.
- 4. The benefits (not just the financial costs) of any safeguard mitigation measures such as wildlife crossings should be incorporated into the feasibility analysis. Benefits are often the reduction of environmental and social costs.



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