



Carbon Sequestration and Biodiversity

Benefits:
Linkages, Synergies
and Limitations

OECD Climate Change and
Biodiversity Workshop

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26 March 2008

Overview

- Linkages between climate change & biodiversity
- Methods for targeting benefits
- Synergies
- Limitations
- Issues and Questions

Linkages

- Climate change impacts biodiversity
 - Increased atmospheric CO₂ concentrations, increased land & ocean temperature, and changes in precipitation and sea level rise have affected biodiversity
 - Timing of reproduction of animals and plants and/or migration of species, length of growing seasons, species distribution & population sizes, and frequency of pest & disease outbreak

Linkages

- For a given ecosystem, functionally diverse communities are more likely to adapt to climate change and climate variability than impoverished ones

Background

- Ecosystem services (ES) provided by forests
 - Carbon sequestration
 - Biological diversity
- A rigorous, systematic methodology for planning for ecosystem services has not been developed
 - ES remain poorly characterised at local to regional scales and protection has not been made a priority (Chan et al. 2002) = “information failure”
- Ecosystem services planning must involve multidisciplinary and transdisciplinary teams
 - e.g. biology, chemistry, economics, finance, geosciences and particular analytical tools

Methodology

- Need spatially explicit cost-benefit analysis
 - Identify areas with high ES benefits
 - Identify areas of high risk of deforestation
 - Identify opportunity costs
 - Develop policies and incentives to capture and market the benefits
 - Will help to ensure efficiency and effectiveness
 - Also need to integrate equity considerations - ES beneficiaries are often different and distant from those who gain from ecosystem transformation

Synergies

- Some studies
 - Naidoo and Adamowicz 2005
 - Naidoo and Ricketts 2006 (Paraguay)
 - Chan et al. 2006 (California, USA)
 - Turner et al. 2007 (Global)
 - Yasue and Ebeling, 2007 (Global)
 - OECD Environmental Outlook 2008 (Global)

Chan et al. 2006

- Explore trade-offs and opportunities for aligning conservation goals for biodiversity with 6 ES (including carbon storage)
- Distinctly different spatial distribution
- Spatial correlation b/w carbon storage and biodiversity is low ($r=0.03$)

Turner et al. 2007

- Examine how biodiversity and ES coincide at global scale (climate regulation)
- Use global priority maps for biodiversity conservation
- Overlap varies among regions
 - High in Congo and the Amazon, and in smaller regions (central Chile, India's Western Ghats), patchily in SE Asia
- Overall, findings suggest opportunities for safeguarding both, greatest synergy in areas of tropical forests

Yasue and Ebeling (2007)

- Examine difference b/w baseline deforestation rates and forest carbon densities in different countries
 - ⇒ Variability in potential income benefits
 - Large income potential in Brazil, DR Congo, Nigeria, Indonesia. As %of GDP, highest is DR Congo, Malawi, Zambia, followed by Bolivia, Myanmar, PNG
- Look at different biodiversity indicators
 - # of forest dependent bird species (Birdlife Intl)
 - National Biodiversity Indices (from CBD and ESI)
- Find few countries with strong correlation b/w economic attractiveness of REDD and biodiversity conservation (at national scale)

Ancillary biodiversity benefits of climate change mitigation policies

- Use Mean Species Abundance (MSA) indicator to compare 450ppm to Baseline
- Results depend on avoided climate change impacts and mitigation approaches embedded in the 450ppm case
 - Large scale production of 2nd generation biofuels are important part of policy portfolio
 - Will affect land use and biodiversity in various ways
 - Increased land use for biofuel production causes substantial additional biodiversity loss
- Net balance is slightly positive
 - 1% less decrease in MSA than in Baseline by 2050
(OECD Environmental Outlook 2008)

Limitations

- Biodiversity co-benefits do not necessarily accrue automatically
- Depends on how activity is:
 - designed
 - managed
 - located

For reforestation, restoration and agro-forestry

– Design

- Plant native species
- Create diverse multi-strata plantations

– Management

- Minimise harvesting, thinning, weeding

– Location

- Reforest only degraded, deforested lands (not native grasslands, wetlands, or other intact habitats)

Designing REDD activities for forest conservation

- Location
 - Conserve forests in areas critical for biodiversity
 - High species diversity
 - Endemic (limited range) species
 - Species under threat (e.g. Red list)
 - E.g., use Key Biodiversity Areas, Important Bird Areas or Alliance for Zero Extinction Sites
 - Prioritise large contiguous forest areas or areas that form biological corridors
 - Include altitudinal gradients to allow animal movement in face of climate change

Designing REDD activities for forest conservation

- **Management**
 - Prevent fires and illegal logging
 - Prevent hunting

(IPCC, 2001; Harvey, 2007)

Issues/Questions

- Is there sufficient data? Is there agreement on metrics? How to establish baselines? Methods for monitoring, reporting, verification are necessary to assess performance
- Capacity building (institutional and technical)
- Efforts of ecosystem service tool building
 - Duke University
 - University of Vermont <http://ecovalue.uvm.edu>
 - Others?

Issues/Questions

- How to minimise transaction costs? Who will bear additional costs?
- Need to combine this with thorough scoping of potential partnerships and new incentives/markets for biodiversity
 - What are the financing needs/gaps?
 - Who are the beneficiaries?
 - How to capture the benefits?
 - How to prioritise allocation of resources?