



ABOUT ROBIN

ROBIN has assessed the role of biodiversity in terrestrial ecosystems in South and Mesoamerica in mitigating climate change. It has evaluated socio-ecological consequences of changes in biodiversity and ecosystem services under climate change.

MODELLING ECOSYSTEM SERVICES FOR POLICY: CARBON STOCKS AND CARBON SEQUESTRATION

Key findings

We looked at how much carbon (C) is stored and sequestered in Mexico, Bolivia and the Brazilian Amazon under current land use conditions, at the change in C stock and sequestration as a result of past changes in land use, and at the relevance of our results to the design of policies. Using models, we found that:

- Total country level carbon stocks were highest in the Amazon, followed by Mexico and Bolivia. Carbon uptake exceeded carbon release by a small amount in all studied countries.
- Carbon stocks and sequestration have decreased in all countries as a result of past land use changes.
- Total carbon stock value is two times greater than the value recognized by national price markets in the countries studied, while the eligible area for C sequestration credits is overestimated in the global market.

Recommendations

- Estimations of the economic value of the carbon that tropical forests can store and sequester need to take into account different C pools and the difference between C uptake and release.
- The Lund-Potsdam-Jena managed Land (LPJmL) model can quantify, model and map ecosystem services related to the carbon cycle, which can be linked to biodiversity and climate change.

Evidence

We modelled the supply and value of ecosystem services using the LPJmL model for the period 1980-2000. For carbon stock, supply is defined as the average amount of carbon stored in the terrestrial ecosystem. Three C pools were assessed: aboveground biomass (AGB), soil and litter. Carbon sequestration is defined as the ecosystem level balance, i.e. the difference between the amount of C that is taken up and the amount that is released. To calculate the economic value of C stock and sequestration, we considered the state of forest carbon markets in the studied countries.





Modelled total C stock under current land use was highest for the Amazon, followed by Mexico and Bolivia. The fraction of total C stock from each pool differed between countries. We found that C uptake exceeded C release in all studied regions. Nevertheless, the final balance was quite small because we found large values for C release compared with uptake.

The modelled total C stock value showed that the national carbon price market underestimates the value of this ecosystem service in the three countries. For C sequestration values, which are based on actual ecosystem level C balance, we found large areas with negative C balance, which are ineligible for credits in the global market.



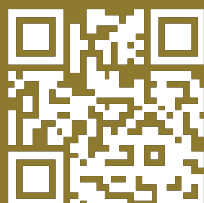
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ROBIN outputs

- Balvanera P, et al. Assessment of main trade-offs between biodiversity, climate change mitigation measures and other ecosystem services and human well-being at national scale and in local case study areas. ROBIN project report (2015).
- Quijas, S., et al. Modelling carbon stock and sequestration from a dynamic vegetation model for policy design. In preparation.



More information

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