

Climate Change Mitigation Projects in the Forestry Sector: The Significance of Co-Benefits Beyond Carbon Sequestration

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ABSTRACT

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are planning a global market for CO₂ emissions reductions as part of a strategy to slow down the atmospheric build-up of CO₂. There are plans to include carbon sinks in the CO₂ market. Projects utilizing forests as carbon sinks provide developed nations the opportunity to invest in forests, which are currently being exploited at unsustainable rates around the world. This study focuses on the potential of capturing multiple environmental benefits through the conservation of forests for carbon sequestration purposes.

Carbon sequestration projects in forests contain co-benefits that are important to recognize. In addition to sequestering carbon, forests provide benefits related to biodiversity conservation, watershed function, soil retention, soil formation and nutrient cycling, waste treatment, disturbance regulation, ecosystem goods such as food and raw materials, and cultural and recreational benefits. These benefits are accrued at the local, regional and global levels. Attention can be brought to the benefits in different ways. One way of highlighting the value of the co-benefits is to monetize them. I have chosen to do so, based on previous work by other authors, in my study on the significance of co-benefits of forest carbon sequestration projects.

It is problematic to attach a dollar value to ecosystem services, which many of the co-benefits to carbon sequestration projects represent. The entire field of economic valuation of ecosystem services is young and incomplete. Authors who choose to work within the field use it explicitly as a strategy to prove a point and foster debate. Costanza et. al. (1997) conducted an extensive review of over 100 studies, and calculate a summarized value of all ecosystem services at the global level. Global level co-benefits of carbon sequestration projects in the forestry sector are interesting to reflect on, using the provocative work by Costanza et. al. According to my analysis:

- a) The value of the co-benefits of carbon sequestration projects in forests can be up to eight times higher than the value of the primary benefit.
- b) The total value of co-benefits in tropical forests (\$1,800/ha) is almost an order of magnitude higher than that of temperate and boreal forests (\$210/ha). The same services generate a higher value across the line when located in a tropical region.
- c) Most co-benefits are captured at the local and regional level.
- d) The most significant global benefit is that of carbon sequestration. Biodiversity is the second global co-benefit. However, the biodiversity benefit is only 1% of the carbon benefit, based on estimates by Costanza et. al.
- e) The magnitude of carbon sequestration and co-benefits globally is crucially dependent on the availability of land. In total, 700 Mha of land, of which 485 Mha is located in the tropics and 215 Mha in the mid and high latitudes, is available for forest carbon sequestration. (IPCC 1995: 784)

At a more specific level, the estimates calculated by Costanza et. al. do not hold, but need to be supplemented by estimates based on case specific information. Currently, technical data at the project level is missing almost completely.

Based on two case studies I selected (carbon sequestration projects in forests, already initiated on a voluntary basis within the framework of the Climate Change Convention), there is great variation in the ratio between the co-benefits and the carbon sequestration benefit provided in forestry projects (0.2-43). In both cases, however, most of the value added by incorporating the co-benefits was derived from one or two benefits that will be most important to further research.

- a) In the Krkonose and Sumava National Parks in the Czech Republic, the upper-bound estimate yields a ratio of co-benefits to the primary benefits of 43 to 1, and the lower-bound estimate a ratio of 20 to 1. Waste treatment, in the form of pollution removal by trees, was the most important co-benefit.
- b) In the Upper Virilla Basin in Costa Rica, the upper-bound estimate yields a ratio of co-benefits to the primary benefit of 1 to 1.5, and the lower-bound estimate a ratio of 1 to 0.2. Recreation, watershed management and (in the upper-bound estimate) genetic resources were the most important co-benefits

c) My study does not support the general conclusions of the work by Costanza et. al (1997) which implies that the potential of tropical forests is greater than temperate forests, both for carbon sequester purposes and due to higher co-benefits. According to my specific case studies, the per-hectare value of co-benefits is higher in the Czech Republic than in Costa Rica.

Four categories of co-benefits of carbon sequestration merit further attention and research. According to the estimates by Costanza et. al. nutrient cycling generates more value to humans than any other ecosystem service. This category has not yet been extensively studied nor has it been valued in economic terms in more than one study. Pollution removal turned out to be an exceptionally important category based on my Czech Republic case study only, while watershed management stands out in the Costa Rica case. Hydroelectric power companies are starting to recognize the important role forests play in erosion control, and erosion control is beginning to be assigned a market value.

If a global market for CO₂ emissions reductions under the UNFCCC is developed, it will be possible for two or more countries to implement forest carbon sequestration projects jointly. A donor country will provide funding for a project in a recipient country, and in turn the donor country will face less stringent CO₂ reduction requirements at home. Co-benefits of forest carbon sequestration projects generally accrue to the recipient country. These projects should thus be appealing to the host. In forest carbon sequestration projects only biodiversity, in addition to carbon, provides a clearly global benefit. Considering the high value of local co-benefits, and that these benefits may outweigh the carbon sequestration benefit, it would make economic sense for the host country to undertake these projects on their own. It has been argued that co-benefits be considered in the project baseline, i.e. when the "without project" scenario is developed, the recipient country would be assumed to pay for the realization of the co-benefits. The amount of donor country funding needed to undertake the project would decrease accordingly. The value of the co-benefit would be subtracted from the amount of financing provided by the donor at the project development stage. Including co-benefits in the project baseline would lead to higher cost-effectiveness, as the donor country money could be invested in a more extensive project, or in several projects, and net climate benefits would follow.

However, since the value of ecosystem services fails to be realized in the market, conservation is highly unlikely to take place without the extra funding provided through the project. The carbon sequestration project would provide key financial resources, which would allow for the conservation of co-benefits that otherwise lost. The forests targeted for carbon sequestration are forests threatened by degradation, or afforestation projects on degraded land, for which the donor country is able to receive carbon credits. In both conservation and afforestation cases, the project baseline should not be adjusted to include co-benefits, since many co-benefits would be lost without the project.

Creating rules regarding projects to be included in a global carbon market is complex and time-consuming. If the procedures and rules to be followed when undertaking a project, including rules on establishing baselines, become too complex, it will be difficult to reach political consensus among nations on the rules or to adopt any rules at all. The establishment of a carbon market may be delayed. If project procedures are very complex and baselines, including the consideration of co-benefits, have to be established for each project, transaction costs will be high, and the carbon market will become less efficient and less attractive to donor countries.

When procedures are developed for forest carbon sequestration projects, co-benefits could be included as a consideration. The co-benefits could be quantified in monetary terms, or in another metric. This study develops a Forest/Climate Matrix, in which potential co-benefits are simply displayed, without being quantified. The matrix can be used as a check-list, to highlight co-benefits accrued in a particular project. The co-benefits could be considered in individual project calculations, even though they would not adjust the project baseline. Making co-benefits a consideration would, however, help policy-makers allocate money more efficiently. The value added by the co-benefits associated with forest carbon sequestration projects would free up resources in the host country, immediately or in the future, which could be used for other purposes. This paper highlights the fact that channeling scarce financial resources into forest carbon sequestration projects that contain important co-benefits is profitable.