



Photo by Sigit Dheni Sasmito/CIFOR

Social and Economic Benefits of CIFOR's Sustainable Wetlands Adaptation and Mitigation Program (SWAMP)



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BACKGROUND AND CONTEXT

By storing carbon, wetlands¹ have a crucial role to play in mitigating climate change. Tropical peatlands and mangrove forests, in particular, are among the most effective carbon sinks in the world. Indonesia's 21 million hectares of peatlands cover more than 10 percent of the country's land surface and represent 65 percent of the total volume of tropical peat in the world, but they are rapidly disappearing. In Southeast Asia, mangrove forests are vital to people's livelihoods—all shrimp catches and one-third of fish catches rely on mangroves—but they are one of the world's most threatened ecosystems. Tropical wetlands also provide other ecosystem services, such as supporting services (nutrient cycling, soil formation), regulating services (flood and erosion control, carbon sequestration), and cultural services (recreational).

The [Sustainable Wetlands Adaptation and Mitigation Program \(SWAMP\)](#) of the [Center for International Forestry Research \(CIFOR\)](#) aims to provide policy makers with the scientific information they need to make sound policy and strategy decisions about wetlands. Researchers from [Virginia Tech](#) and CIFOR estimated the potential economic value of SWAMP-generated knowledge through two pathways: (1) improved implementation of the Indonesian forest moratorium in peatlands, and (2) increased retention of peatlands and mangroves worldwide.

SUSTAINABLE MANAGEMENT OF WETLANDS

CIFOR's work plays an important role in generating wetland conservation strategies and policies globally. SWAMP scientists contributed to the 2013 *Wetlands Supplement* to the 2006 *IPCC Guidelines for National Greenhouse Gas Inventories*, a global reference that enables countries to develop conservation strategies and participate in conservation finance mechanisms for wetlands. CIFOR is also a part of the Blue Carbon Initiative—a global program that advances the sustainable management of coastal and marine ecosystems (including mangroves) as a climate change mitigation strategy.

CIFOR scientists also claim a direct influence on the development of Indonesia's forest moratorium, enacted in 2011, just before the creation of SWAMP. The moratorium bans granting new concessions to oil palm, timber, and logging plantations in all primary forests and to forested and non-forested peatlands—this study focuses on the peatlands within areas identified as primary forest². SWAMP research activities are likely to reinforce Indonesia's commitment to the moratorium and help identify strategies for more effective enforcement.

DATA AND METHODOLOGY

The analysis relies on a geographic information systems

¹ Wetlands, by definition, include mangrove forests, peatlands, marshes, rivers, lakes, deltas, floodplains and flooded forests, rice fields and even coral reefs. Peatlands (moors, bogs, mires, peat swamp forests, permafrost tundra) represent half of all wetlands: <https://www.wetlands.org/wetlands/what-are-wetlands>.

² That is, peatlands map was overlaid with forest cover maps of areas of woody vegetation >0.25 and with >30% tree cover; and those peatlands in primary forest areas were selected for study. These overlapping areas are termed 'peat forests' in the study.

(GIS) dataset that details peatlands in primary forest areas, gain, and loss at a 30-meter spatial resolution. The data are aggregated into 1-km × 1-km cells (equal to 100 hectares) to create 139,274 grid cell units covering all of Indonesia's peat forests for the years 2000 to 2013. The dependent variable is the logarithm of hectares of peat forests in each grid cell in each year.

The effect of the moratorium is estimated by comparing pre- and post-moratorium impacts of land use classification (concessions, protected areas, and non-designated areas) on peat forest cover. Time-invariant cell-specific influences on land-use changes are controlled for with a fixed-effect econometric model. Concessions consist of land that is formally licensed by the Indonesian government as oil palm, logging, or timber plantations. Protected areas are formally designated for long-term conservation.

A business-as-usual scenario assumes that in the absence of the 2011 moratorium, the rate of deforestation in non-designated areas from 2011 to 2013 would be consistent with trends observed in 2000-2010. If the moratorium as initially implemented is effective, a positive and significant change in the rate of forest retention in non-designated areas will be observed after 2010 relative to the pre-moratorium period. For comparison, the study also estimates pre- and post-moratorium changes in rates of forest retention in protected areas and concession areas.

ACTUAL MORATORIUM RESULTS ARE MEAGER, BUT POTENTIAL IMPACTS COULD BE LARGE

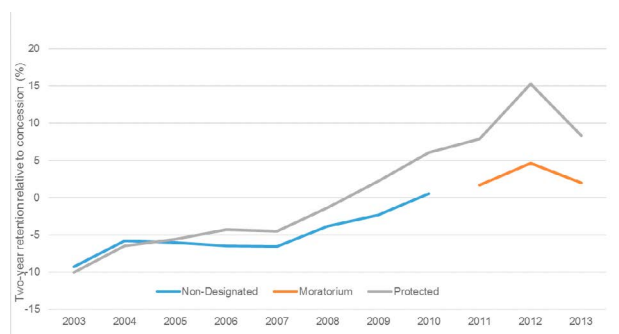
The forest moratorium conserved forests in protected areas, but not in non-designated and concession areas. Estimates show that after the moratorium was implemented, retained forest cover rose in protected areas relative to rates in concession areas (Figure 1). Non-designated areas (i.e., areas not designated as protected forests), which were expected to gain additional protection under the moratorium, show little change relative to concession areas (See the orange post-moratorium trend line in figure 1).

An effectively enforced moratorium could have large potential benefits. The study estimated how much deforestation and CO₂ emissions could be avoided if the moratorium

offered the same effective protection to forested peatlands as was observed in protected peatlands. Calculations showed that an effective moratorium could have reduced emissions from peat deforestation by 4.02 million tons of CO₂ during 2011-2013 and, looking forward, by up to 20.13 million tons over 15 years. With a social cost of carbon of US\$ 40 per ton and a 3 percent discount rate, the social value of avoided carbon emissions over 15 years would be US\$ 805 million.

The potential economic benefits of SWAMP research greatly outweigh investments in SWAMP. The study also estimated the value of CIFOR's contributions to an effective Indonesian forest moratorium in wetland areas using evidence from the SWAMP Outcome Assessment Report. It examined a range of scenarios based on conservative, moderate, and optimistic assumptions about the contributions of CIFOR research and based on social costs of carbon ranging from US\$ 12 to US\$ 117 per ton. It shows that returns exceed the US\$ 1.54 million investment in the research program even in the conservative cases.

Figure 1. Relative rates of retained forest cover with concession lands as base, 2003-2013



SOURCE

Flores, Nicole L., (2016). *Impact Assessment of Natural Resource Management Policy Research: A case study of the contribution of the Sustainable Wetlands Adaptation and Mitigation Project to the effectiveness of the Indonesian Forest Moratorium*. Masters Thesis. Department of Agricultural and Applied Economics, Virginia Tech. <http://hdl.handle.net/10919/71894>

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