

Building on an earlier exploratory study, in 2007–2008 the CGIAR's Standing Panel on Impact Assessment (SPIA) undertook an initiative in collaboration with seven CGIAR centers to augment the evidence of policy-oriented research (POR) impacts within the CGIAR system and to further the development of methodologies in this challenging area of impact assessment. Seven case studies were commissioned. This impact brief describes the major results that emerged from the Center for International Forestry Research (CIFOR). The summary version of the full case study report can be found in: Raitzer, D.A. 2008. Assessing the impact of CIFOR's influence on policy and practice in the Indonesian pulp and paper sector. In: CGIAR Science Council. 2008. *Impact Assessment of Policy-Oriented Research in the CGIAR: Evidence and Insights from Case Studies*. A study commissioned by the Science Council Standing Panel on Impact Assessment. CGIAR Science Council Secretariat: Rome, Italy. (Available at <http://impact.cgiar.org/>)



# SCIENCE COUNCIL BRIEF

## STANDING PANEL ON IMPACT ASSESSMENT

NUMBER 25



Romain Pirard

*Nourishing the Future  
through Scientific  
Excellence*

## Policy and Practice in the Indonesian Pulp and Paper Sector: Assessing the Impact of CIFOR's Research

From 1993 to 2003 the Center for International Forestry Research (CIFOR) undertook a research program on *Underlying Causes of Deforestation* that focused on analyzing determinants of deforestation from outside of the forestry sector. Case studies were conducted in 13 countries including Indonesia, where CIFOR scientists began to observe a worrying trend: while Indonesia's pulp and paper producers were establishing some plantations to feed their pulp mills, the mills were expanding faster than plantation development, with substantial fiber shortfalls likely to result.

CIFOR's analysis documented how, once mills were established, plans to establish plantation fiber supplies were not implemented, and most fiber was harvested from natural forests for extended periods of time. Capital subsidies for mill expansion, underpriced royalties for wood from natural forests, a lack of publicly available information, and poor performance of due diligence on the part of investors were identified as major causes of this pattern. Prior to the release of this study, no independent researcher had been able to amass quantitative evidence of the fiber-sourcing patterns of the pulp industry and the risks that these posed. A number of outputs based on this research were published between 2000 and 2006, including a joint publication with the WorldWide Fund for Nature (WWF). Further dissemination activities included presentations at seminars and conferences, media work, finance and pulp industry meetings, and donor fora.

### Identifying influence: the methodology

This study took an iterative approach to identifying possible channels of influence, assessing the importance of CIFOR's contributions, establishing plausible counterfactuals, and identifying attributable impact. The counterfactual scenario aimed to identify what would have been the situation if all other players had been active, but CIFOR's research had not occurred. This counterfactual is used to identify the proportion of the benefits from policy change that should be attributed to CIFOR's research.

A total of 31 key informant interviews were conducted in 2007 with representatives of 16 organizations. Informants included 11 representatives from four non-governmental organizations (NGOs), 10 officials involved with international financial institutions, three informants from private-sector financial institutions, two key Indonesian Ministry of Forestry officials, two independent academics, and three representatives from the two largest pulp and paper companies in Indonesia, Asia Pulp and Paper (APP) and Asia Pacific Resources International Limited (APRIL)<sup>1</sup>.

Given the uncertainty associated with the attribution and valuation of impact in this case, a range of assumptions was applied to generate plausible economic values attributable to CIFOR's research. For each parameter there is a main, a conservative, and a liberal estimate, which are employed to create three scenarios.

## Impact pathways

Hypothetical impact pathways were elicited from CIFOR scientists involved in the research through a series of interviews (Figure 1). Three clusters of impact pathways were identified:

- Improvements to the sustainability of pulp production practices by APP and APRIL. CIFOR's research and the detailed data it provided were quickly utilized by WWF, Friends of the Earth, Environmental Defense, and other NGOs. This 'credible ammunition' strengthened the NGOs' demands for environmental improvements to fiber-sourcing practices.

- Improved regulation of the pulp and paper sector in Indonesia. A Ministerial Decree was adopted in 2003, requiring specific improvements in fiber-sourcing practices by 2009, and was subsequently interpreted to require that each of Indonesia's pulp mills must source all of its wood from plantations by 2009. APP and APRIL together account for 90 percent of the pulp production capacity directly targeted by the 2003 Decree.
- Improved due diligence for forestry investments. CIFOR's research may have played a role in persuading investment institutions to undertake improved due diligence related to their forestry investments.

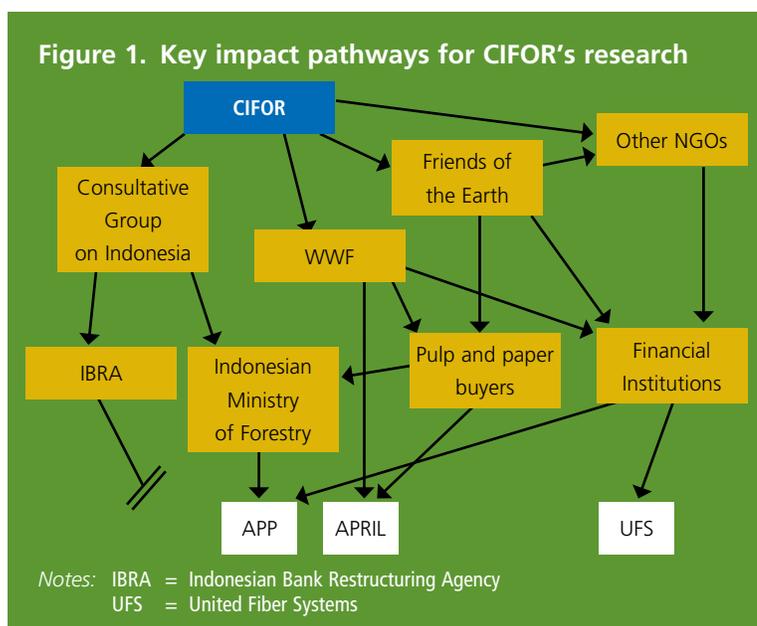
## Attribution of CIFOR's contribution

Key informants from environmental NGOs credit CIFOR's research with substantial contributions to their advocacy campaigns, which resulted in losses of pulp sales for APP and APRIL in European and North American markets. These losses provided the impetus for the companies to begin moving towards more sustainable practices. In the absence of the data from CIFOR's research, effective advocacy would have been difficult and there would have been a significant time lag before similar information could have been generated, so effective advocacy would have been considerably delayed.

Informants in the Indonesian Ministry of Forestry report that the stricter environmental standards applied by international pulp buyers were an important factor influencing the formulation and adoption of the Ministerial Decree requiring accelerated plantation development for the pulp and paper sector.

APRIL officials state that the company has increased its commitment to environmental sustainability in response to NGO campaigns that built on CIFOR's research. CIFOR's influence and NGO advocacy were also important in securing specific conservation commitments that included undertaking assessments in four 'pilot' concessions with the aim of identifying conservation set-aside areas. These assessments piloted the use of a toolkit for the identification of 'High Conservation Value Forests' (HCVF), ensuring that the most critical conservation habitats were allocated for conservation.

Other officials – from the United States Treasury, the World Bank Group, and the European Union Forest Law Enforcement Governance and Trade Initiative – substantiated the influence of CIFOR on slowing the expansion of pulp processing capacity.



## Effects on natural forest clearance

The effects of the research on natural forest clearance were examined under three headings:

- Increased conservation set-asides: APP and APRIL have both made specific conservation commitments in response to NGO advocacy. These include HCVF assessments of four APP-affiliated concessions by the certification body SmartWood, which led to the protection of 107,000 hectares of forest, as well as HCVF assessments of new APRIL-affiliated concession areas. Using simple assumptions about the rate of natural forest clearance that would have occurred in the absence of set-aside areas, and comparing this with the actual clearance occurring with set-asides, the area of natural forest where clearance is avoided was calculated for each year between 2002 and 2017. The highest area of 'net conservation' as a result of advocacy ranges between 33,000 and 102,000 ha.
- Natural forest clearance averted through accelerated plantation development: The rate of plantation establishment has risen quickly since the publication of CIFOR's research, and the difference in the rate of increase is statistically significant. The exact contribution of the Decree to the accelerated plantation establishment rates is difficult to discern. However, CIFOR's influence directly and via the Decree is assumed to account for 35 percent of the observed acceleration in first-rotation planting. Between 4.1 and 9.9 million cubic meters of wood consumption from clearing of natural forest areas are estimated to have been averted annually as a result of the assumed contributions of research and advocacy to the acceleration of plantation development. As a result, between 32,000 and 76,000 ha of natural forest areas will not be cleared by 2013.
- Averted capacity expansion: Interviewees suggested that increased awareness of fiber supply issues has resulted in one specific, previously planned, mill not being established. This means that between

1.5 and 4.4 million cubic meters of wood will not be consumed from natural forest, avoiding a further 11,000 to 34,000 ha of natural forest clearance for an additional 3 years (between 2009 and 2011).

## Valuation framework

A valuation framework (which is presented in the full study<sup>2</sup>) was developed based on the fact that Indonesian pulp producers do not pay the full market price, let alone the social cost, for the wood they consume from natural forests in their concessions. This constitutes an implicit subsidy to the producers, in addition to external environmental costs imposed by consumption on the rest of society. This subsidy was estimated at US\$7 per cubic meter, based on the difference between plantation production costs of US\$11 per cubic meter of standing wood and the royalty actually paid, which is US\$4 per cubic meter.

## Valuation of averted natural forest clearance

In order to value the averted natural forest clearance, the difference between the marginal social cost of natural forest conversion and the unsubsidized marginal private cost of conversion was estimated, in addition to the reduced consumption of implicit subsidies. The analysis identifies rough values for climate, watershed, and biodiversity services, based on previous literature.

As shown in Table 1, the total environmental costs of natural forest clearance under the main set of assumptions are calculated at US\$265 per ha *per annum* on mineral soils and at US\$565 on peat soils, the higher figure for peat soils being due to their much higher level of carbon storage. The conservative set of assumptions result in values of US\$185 and US\$395, whereas liberal assumptions result in US\$345 and US\$765. In accordance with much of the literature, carbon values are the main contributor to these estimates.

**Table 1.**  
Non-market external economic benefits from forests, as estimated in the present analysis for Sumatra and Kalimantan

	Annual economic values per hectare (US\$)					
	Main scenario		Conservative assumptions		Liberal assumptions	
	Mineral soil	Peatland	Mineral soil	Peatland	Mineral soil	Peatland
Biodiversity	50		25		75	
Water regulation	30		20		40	
Carbon sequestration	185	485	140	350	230	650
Total value of external benefits	265	565	185	395	345	765

Given the large difference in values between forests on peatlands and on mineral soils, the study used a weighted average to calculate the external environmental cost of clearing. On the basis of an assumed 45:55 ratio of peat to mineral soils, this is calculated at US\$400 per ha *per annum* under the main scenario (US\$280 per ha under conservative assumptions; US\$534 per ha under liberal assumptions). If the main assumptions are used to calculate a 20-year net present value (NPV), this equates to US\$40 of external costs per cubic meter of wood delivered to the mill gate.

## Identifying relevant costs and attributing benefits

The economic benefits calculated in the study represent the effects of much more than just CIFOR's research. The 'without CIFOR' counterfactual was therefore needed to identify the proportion of the benefits that should be attributed to CIFOR. This used the following assumptions with regard to the effect of CIFOR's research on the advancement of benefit flows:

- Increase in conservation set-asides: advanced (i.e., brought forward) by 3 years
- Increased acceleration of plantation development: advanced by 2 years
- Averted mill capacity expansion: advanced by 1 year.

The main scenario uses a value of US\$500,000 *per annum* for the research cost, an estimate that is 10 times higher than CIFOR's direct costs, so as to encompass potential associated efforts that lack quantifiable impact. The 'liberal' scenario is based on the direct costs of the research alone, whereas the 'conservative' estimates apply half of the entire budget of the former *Underlying Causes of Deforestation* program, reflecting the potential role of prior research in underpinning the POR under study.

Under the main scenario, over a 20-year timeframe, some US\$133 million of benefits is generated by US\$3.4 million of investment, giving a benefit–cost ratio (BCR) of 39:1 and an internal rate of return (IRR) of 65 percent. The benefits attributable to CIFOR comprise roughly half of the total improvements resulting from advocacy and research. The largest proportion of the benefits accrues from the earlier (by 3 years) setting aside of 80,000 ha of forest for conservation set-aside.

Under a conservative scenario, over the 20-year timeframe, some US\$19.1 million of benefits are generated by a US\$5.0 million investment, with a BCR of 3.8:1 and an IRR of 27 percent. Benefits attributable to CIFOR comprise roughly one-quarter of the benefits from advocacy and research. In contrast, under the liberal scenario, over the 20-year timeframe, some US\$583 million of benefits are generated by US\$390,000 of investment, with a BCR of 1512:1 and an IRR of 170 percent. Roughly two-thirds (69 percent) of the total benefits from advocacy and research are attributed to CIFOR in this scenario.

Although the benefits of the research range widely among the different scenarios, they are consistently much higher than the costs incurred. However, the estimates are somewhat uncertain, and reliance on projections is unavoidable, as even the natural forest clearance avoided to date creates benefits that flow well into the future. Moreover, there has scarcely been sufficient time for the very first plantations established since the research to come to maturity, as only 7 years have passed since publication of the initial CIFOR report. It should also be noted that, while there have been important improvements in industry practice in Indonesia, sustainable plantation-based fiber supplies remain insufficient to supply current pulp processing capacity, and the possibility remains that this capacity will be further increased through new mills or mill expansions.

At the same time, even the most conservative of these estimates only partially accounts for the many impact pathways of CIFOR's pulp and paper research. These include the impacts associated with the broader processes of reform in the implementation and enforcement of Indonesian forestry regulations for pulpwood concessions. In addition, key NGO informants report that they have improved the quality of the evidence that they use in their campaigns, partially as a result of experience with CIFOR's research, and that in some cases they have even begun to fund formal research themselves.

---

## Notes

- 1 For simplicity, APP and APRIL are used to refer to all companies within or at least partially owned by their respective conglomerates (the Sinar Mas Group for APP and the Raja Garuda Mas Group for APRIL).
- 2 Raitzer, D.A. 2008. *Assessing the Impact of CIFOR's Influence on Policy and Practice in the Indonesian Pulp and Paper Sector*. Impact Assessment Paper. Center for International Forestry Research (CIFOR): Bogor, Indonesia. 85 pp.