# How do rubber agroforestry systems affect the environment?

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| **Project title:** | Environmental impact assessment of rubber agroforestry systems |
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| **Timeframe:** | June 2009–May 2010 |
| **Funding partner:** | Standing Panel on Impact Assessment of the Consultative Group on International Agricultural Research (SPIA) |
| **Amount:** | USD 25 000 |
| **Location:** | Sanggau district, West Kalimantan, and Bungo district, Jambi province, Sumatra, Indonesia |

## Objectives

1. Assess the trade-off between profitability and environmental effects at plot and landscape levels during intensification of rubber agroforestry in Indonesia based on existing clonal selections.
2. Re-evaluate the intensification hypothesis to assess ex post environmental impacts of availability of productive rubber clones in tropical forest margins of Indonesia.
3. Advance SPIA's guidelines for conducting ex post impact assessments, with particular emphasis on environmental impacts within farms as well as through external effects on land-use change as comprehensive (integrated) assessment of impact.

## Key findings

1. Rubber agroforestry that uses selected clonal planting material can achieve similar yields as monoclonal smallholder plantations, that have for several decades been promoted by the World and Asian Development banks, with approximately 46% lower investment costs and 69% higher returns to labour. With several hundred millions of dollars invested in previous development projects promoting these smallholder plantations and a total research investment in rubber agroforestry of USD 5 million, there is considerable potential for development benefits per dollar of research funds invested.

Rubber system demoplot at West Kalimantan (Photo: Janudianto)

Children education for children (Photo: Kurniatun Hairiah)

Processed rubber slabs (Photo: World Agroforestry Centre (ICRAF) Indonesia archives)

2. The best practices for rubber agroforestry that emerged in interactions between farmers and researchers provide substantially higher net-present-value amounts of land at 75% of the investment cost and absorbing twice as much labour at returns that are competitive with those obtained from smallholder oil palm.

3. The emergence of these 'intermediate input' versions of rubber production thus contributed to reduction of pressure on forest conversion. Current conversion of 'jungle rubber' to such intensified production systems, however, leads to loss of the biodiversity retained in jungle rubber as well as a loss of stored carbon.

4. The lifecycle carbon-stock attributes of the various tree-crop systems assessed show a negative relation, or direct trade-off, between carbon storage and profitability, at a slope (opportunity cost) of > 50 USD/t$CO_2$e, out of reach of carbon markets. Schemes that reward other environmental services will be required if biodiversity-friendly rubber agroforests are to keep their place in vulnerable landscapes.

5. In villages where the rubber agroforestry systems project has been active, the area dedicated to the systems and the number of households involved increased tenfold during the project period.

6. Comparison of the villages where the rubber agroforestry systems project has been active with their direct neighbours and villages within the same district showed little difference in rate of adoption of clonal rubber in agroforestry systems.

7. The adoption of clonal rubber in rubber agroforestry was faster in West Kalimantan than in Jambi, reaching 259% and 66% of the area under monoculture plantation, respectively, with 40% and 60% of the total tree-crop area remaining under traditional rubber agroforest management, respectively. We were able to gain a qualitative understanding of factors explaining these differences.



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