

In Bungo (Sumatra) farmers look for global beneficiaries to purchase the mega biodiversity sustained by their jungle rubber

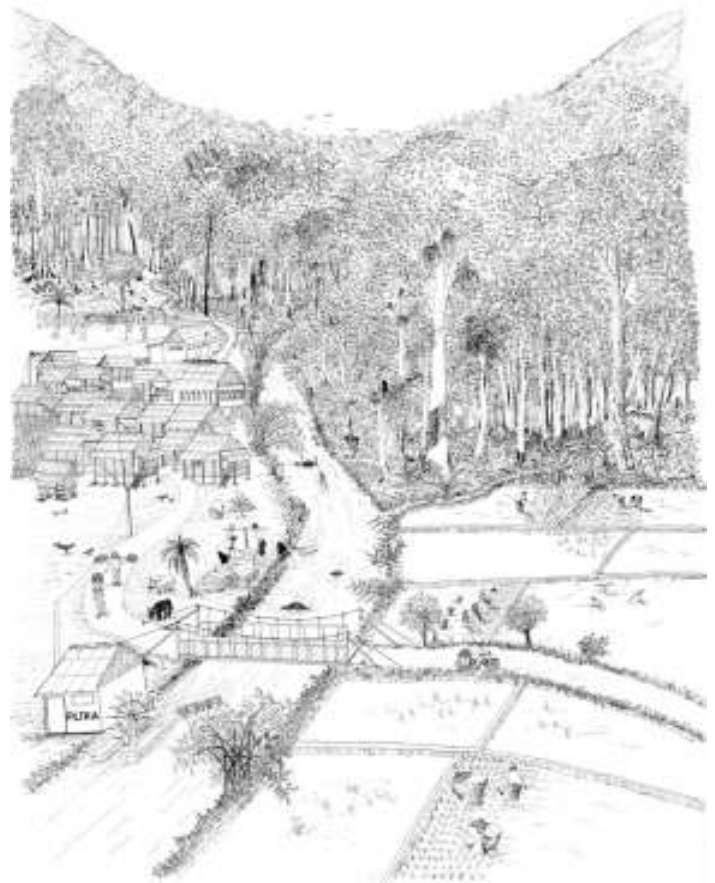
Why Bungo? Disappearing Rubber Agroforests, Disappearing Species

Jungle rubber, a term used to refer to the traditional rubber agroforests in Indonesia, can almost fool a new observer into thinking it is natural, secondary forest. Its jungle-like characteristics have attracted many scientific studies, including ones on its rich biodiversity. Jungle rubber in Bungo District in Jambi is a good example. Currently jungle rubber covers an estimated 2 million hectares of Indonesia, mostly on the islands of Sumatra and Kalimantan, both islands of megadiversity. An estimated 7 million people directly or indirectly earn their livelihood from jungle rubber. Indonesia is the second biggest rubber producer in the world after Thailand and 70 percent of its rubber comes from jungle rubber systems. A significant percent of the cars and trucks in western countries and China drive on tires that come out of forest-like systems, produced by farmers defined as poor by government standards.

Jungle rubber is normally a succession from a previous rubber plantation initiated through a slash and burn system. It is essentially a rubber-enriched fallow practice. Many rubber farmers lack the capital to reclear and plant new monocultures as the trees grow past their prime productivity phase. Instead the farmers only replace trees when old trees die while selectively nurturing other valuable trees (fruit, fibre and timber). The result is a mix of species like secondary forest, but with a higher proportion of economically valuable trees. With aging rubber trees becoming less productive and gradually die, the rubber productivity of these plots gradually declines to a stage when rubber collection become unprofitable.

Farmers regard jungle rubber as a second best management system, after the more intensive monoculture plantations they would plant if they had the resources to do so. For the Indonesian government, too, jungle rubber is a second best system. The government wants to increase its foreign earnings through higher production and export of natural rubber, its second largest estate crop. The government also believes that higher production strategy will help improve lives of millions of rubber farmers.

Jungle rubber also represents a second-best biodiversity option. While it harbours impressive numbers of faunal and floral



Agroforest that combine spontaneous and planted trees act as 'domesticated forests' on the interface of rice paddies and the natural forest of protected areas in the mountains

species, it does not shelter many charismatic species. Nonetheless, species such as the endangered Sumatran tiger and *Rafflesia arnoldi* the world's biggest flower, do use jungle rubber for movement and dispersal. In many places in Sumatra jungle rubber connects national parks and protected areas, hence functioning as important corridors that allow movement of wild animals and dispersal of plant species.

The challenge for RUPES Bungo is to see if the 'triple second-best' jungle rubber can become an overall winner as a competitive alternative to more intensive rubber or oil palm plantations. For now, the RUPES Bungo project has focused primarily on documenting and capturing the value of biodiversity conservation services and exploring potential reward options.

What Needed to be Done?

Collect evidence Biodiversity's Global Value To persuade outside buyers to purchase biodiversity conservation required researchers to conduct more rigorous investigations than those already done to confirm that species richness in jungle rubber was not mere myth. Researchers also needed to identify potential buyers and payment mechanisms. Biodiversity is valuable to various people for commercial, ecological, aesthetic, ethical, and even spiritual reasons, but the value in financial terms is more difficult to compute than for some other ecological services. Also, it is not always clear who benefits from these services, because beneficiaries are not always located in the proximity of the service production.

Increasing Incomes by Increasing the Value of Farmers' Portfolios

Rubber farms in Bungo portfolios consist of small, intensively managed rubber plots and small extensively managed plots of jungle rubber either in the vicinity of their villages or further away.

Taking full account of the jungle rubber values

A conundrum in developing payment mechanisms for environmental services is that in many cases the service being sold to external groups also benefits the seller. While this often appears to weaken the negotiating position of sellers, RUPES saw that in Bungo payments from outsiders alone might not be enough to make jungle rubber a competitive choice against monocultures. But, if farmers included the value they received from jungle rubber, it could alter their decision calculus. Therefore, researchers set

out to investigate with the farmers all the values jungle rubber delivered to them.

Increasing the value of the intensively managed plots

RUPES researchers reasoned that technical assistance that increased the productivity of farmers' intensively managed plots could serve as a reward, coupled with increased awareness of value of jungle rubber, for keeping their jungle rubber plots intact. However, instead of monocultures, RUPES promotes known technology of diversified rubber agroforests with other high value crops.

Limiting the Potential for Unintended Consequences and the Challenge of Conservation Agreements

A potential risk exists that increasing incomes to save current practices could ironically give farmers enough capital to replace jungle rubber with rubber or oil palm monocultures. RUPES researchers needed to develop a participatory process for creating and implementing conservation agreements based on mutual understanding and trust.

Provide Data Needed to Create Consistent Local and National Government Policy

At the national level, the Indonesian government has committed to international conventions for forest and biodiversity preservation. At the district level, government officials have had to confront flooding of the capital city. These officials have expressed some interest in conservation as a measure to stave off the land degradation that can lead to such flooding. At the same time the Indonesian government at various levels has adopted policies that conflict with conservation pursuits, including direct subsidizing of monoculture plantations. To assist in creating policies with more long term sustainability, RUPES needed data showing how the full benefits from environmental service could support multiple government goals.

What Worked?

Confirmed: No Myth in Jungle Rubber Biodiversity RUPES scientists have now completed work that conclusively demonstrates jungle rubber has similar richness and diversity to natural forest, but a much higher proportion of rubber and other economically valuable plants. A comparative survey indicated that out of total 850 plants encountered, 60 percent species were found both in jungle rubber and natural forests.

Bungo Farmers Now Include the Full Value of Jungle Rubber Plots in Decision-Making

When RUPES Bungo first started working with jungle rubber farmers, many said they would convert it to monoculture plantations if they had enough money. But now, after analyzing with RUPES facilitators the economics of their situation, they have concluded that substituting monoculture plantations in their land portfolios would not yield all the

Category	Jungle Rubber Biodiversity Data from Research Studies
Tree Diversity	971 species identified Simpson's index .72 for jungle rubber compared to .07 for rubber monoculture
Mammal Diversity	37 species identified 9 endangered species
Bat Diversity	10 species of bats identified
Primate Diversity	6 species identified in study area; 2 further species reported by local people
Bird Diversity	167 species identified 28 species are protected by Indonesian law; 10 species covered by CITES

anticipated gains. They would get more rubber, but without their jungle rubber plots they would have to buy fruit, wood, fiber and medicines they now harvest from their plots. Also, they would eliminate the potential to sell environmental services to international buyers. The farmers have gained pride and delight from finding that their jungle rubber produces something of value to the world that other rubber farmers do not.

RUPES also helped with one factor that carried strong weight with the farmers about the value to them of jungle rubber: Installing microhydro power plants to bring electrical supply to the villages. The farmers appreciate that jungle rubber helps provide the necessary clean water supply to generate electricity.

Intensification Strategies Mutually Rewarding

Farmers have enthusiastically worked with researchers to make reality the second part of the portfolio strategy: increasing the productivity of their intensively managed lands. Researchers have introduced to them clones and seedlings that outproduce their current clones up to 3 times the current level. Supported by a variety of NGO teams as well as RUPES, the farmers are well on their way to establishing nurseries and farmer groups needed for producing and distributing the better clones. The farmers also watch with anticipation the results from demonstration plots researchers have set up in their communities to test the most productive intercropping practices for their agroforestry systems.

As evidence that farmers have found this support rewarding, in November 2006 all four Bungo test-site communities agreed in principle to sign conservation agreements committing them to maintain jungle rubber practices in exchange for support offered by RUPES for improving the productivity of their systems.

Policy Gains

Progress in influencing government policy shows through two forms of government recognition for RUPES efforts. In June 2006, the Lubuk Beringin village, one of the RUPES Bungo sites received a prestigious Calpataru Award at the Provincial level that recognizes its contributions to conservation efforts. This year the Letung subvillage, also part of RUPES Bungo, has been nominated for the prize at the national level. Also, at the local district level, recognizing the biodiversity value of the RUPES Bungo site, the government agreed not to include the area in their 5-year plans for land conversion to monoculture plantations.

What's Next?

With farmers committed to preserving proven biodiversity, where are the global buyers?

So far, finding buyers who will negotiate to directly purchase the biodiversity conservation services that jungle rubber



Construction of small-scale hydropower facility that allows villagers to get electricity from their stream proved to be an incentive to maintain the forested landscape mosaic intact, with its global benefits

provides is still a promise to be fulfilled. Lack of fulfillment could erode farmers' confidence in conservation rewards. Also, lack of buyer participation has limited RUPES ability to design and test reward mechanisms that are realistic for sellers and buyers and assure buyers that they will receive actual value for their money. For now, farmers have agreed to maintain jungle rubber based on rewards that enhance the value of their intensively managed agroforestry plots, but receiving external payment has been part of their decision calculus to maintain jungle rubber. Within the current context of rapid intensification of rubber production and quick-money attitudes, the calculus could change very quickly. A feasible reward mechanism is urgent.

Pursuing eco-certification as reward mechanism

If consumers will pay a price premium for products using rubber from forests with certified conservation value, the premium could serve as a reward for farmers. RUPES initial analysis suggests that jungle rubber can meet forest certification criteria. RUPES needs to begin the certification process and look for buyers who will pay a premium to find out if eco-certification can provide sufficient reward at reasonable transaction cost.

Evaluating bundling

RUPES has collected preliminary data indicating that jungle rubber sequesters more carbon than rubber monocultures. Similarly, hydrological principles strongly suggest that jungle rubber can better handle watershed services than monocultures. Signs from other sites hint that sales of single services will not produce enough income to change land-use decisions. RUPES needs to evaluate whether if jungle rubber farmers could find a way to collect the entire bundle of environmental service coming from jungle rubber they would gain enough income to make this second best system a first class option.



Inauguration of the small-scale hydropower turbine, implies getting recognition of the local government for the conservation + development plans developed by the community of Lubuk Beringin

Ensuring that progress is sustainable

With guidance from RUPES Bungo, many changes have been set in motion from the formation of farmer groups to increased awareness by local officials of the environmental consequences of monoculture plantations. However, to maintain these fledgling improvements and to respond to changes, the jungle rubber communities must have the internal capacity to monitor the factors that affect their world and to adapt to change. They need guidance and support for doing so. Local and national institutions such as universities are best situated for providing this support and acting as brokers to solidify relationships with international biodiversity buyers. RUPES Bungo must educate to build: 1) internal capacity; and 2) local and national networks of institutional support. To progress on government development of rational, synergistic policy, RUPES needs to intensify efforts to convince and involve policy makers at village, district and provincial levels.

The RUPES Project:

Throughout the world, upland people, many of them poor, earn their livelihoods from lands and landscapes that, when properly managed, provide valuable environmental services to others. However, management practices that maintain or increase environmental services often have a cost to the upland people in time or income. Regulations and prescriptions of land use aimed at securing the services are often ill-designed and enhance rural poverty. RUPES aims to work with both potential users and producers of environmental services to find conditions for positive incentives that are voluntary (within the existing regulatory framework), realistic (aligned with real opportunity costs and real benefits) and conditional (linked to actual effects on environmental services), while reducing important dimensions of poverty in upland areas.

At each of the 6 RUPES action sites, local institutions partner with the World Agroforestry Centre (ICRAF) to implement action research aimed at developing effective reward mechanisms in the local context. The sites are Kulekhani in Nepal; Sumberjaya, Muara Bungo, and Singkarak in Indonesia; and Kalahan and Bakun in the Philippines. National policy dialogues are aimed at making policy frameworks more conducive to positive incentives.

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