Eco-certification of jungle rubber: promise and realization

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Abstract

Jungle rubber -- a traditional agroforestry practice in which native plant co-exist with rubber trees – allows people and species to derive livelihoods from the same land and supply raw rubber demanded for tires and thousands of other products. In Bungo and throughout the Sundaland biodiversity hot spot, farmers are replacing jungle rubber with monocultures which drastically reduce the number of species the land supports. This paper reports ideas generated from investigating the possibility that eco-certifation could arrest the destruction of jungle rubbers biodiversity services. Eco-certification appeared to have promise for conserving eco-system services and improve livelihoods; however as currently designed it had obstacles that hindered implementation among poorsmallholders. Measures to test for reducing these obstacles include:

- Using contracts to shorten the biodiversity value chain
- Providing assistance to eco-certification in reaching potential buyers and in increasing marketing savvy among organizations engaged in conservation work
- Working with end-market intermediaries to see how they could improve the effectiveness of their efforts to ensure sustainable supplies and benefit in the
- Adopting account chains of custody

Jungle rubber's protective matrix under threat

Sundaland, which includes Indonesia's Sumatra and Java islands, is recognized as a biodiversity hot spot both for the irreplaceability of its species and the high degree of threat to them. (Myers 2000) It is one of only three regions on earth to be in the top 10 for all five factors used to define biodiversity hot spots. (Myers 2000) However, Indonesia also ranks as the world's 4th most populous country, but ranks only 16th in land area. Nearly 50 percent of Indonesians earn less than $2 per day and 72 percent of these poor work in agriculture. In Indonesia as in many other places in the developing world, biodiversity preservation means finding a way for both people and species to produce livelihoods from the same land (World Bank 2006)

Jungle rubber is a traditional agroforestry practice that facilitates this sharing. Farmers clear the jungle, plant rubber trees, and then allow natural vegetation to reclaim the space around the trees (Joshi 2002). In time, jungle rubber develops a complex, multi-

strata canopy that resembles natural secondary forest and shares up to 70% percent of the species found in primary natural forest. In the last decade or so, as ecosystems untouched by humans have dwindled, researchers have shifted from seeing this matrix as a barren sea between islands of biodiversity to seeing it as an important resource for conservation (Rosenzweig 2003; Mayfield 2005; Harvey C.A. 2006). However, even this human-modified matrix is disappearing as many areas slide down the curve in **Error! Reference source not found.** from extensive, biodiverse agricultural practices to intensive, low diversity practices.

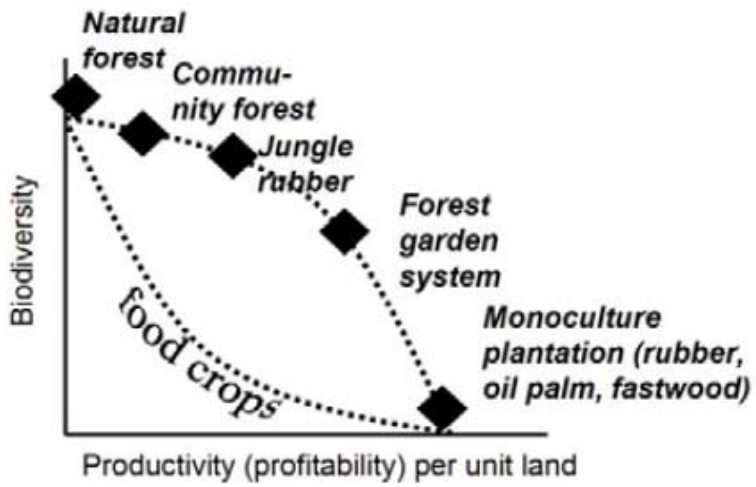

Figure 1 Sliding down the transitional agricultural system trade-off curve (van Noordwijk et al. 1997). Jungle rubber in Indonesia is following the trajectory from extensive systems that support high levels of biodiversity to very low biodiversity systems that offer more crop productivity.

For example, Landsat images of Sumatra's Jambi Province show that in 1973, 92.4 percent of the land had forest or jungle rubber cover while only 2.3 percent of land cover came from oil palm or rubber monocultures. However, by 2002, forest and jungle rubber accounted for only 40.6 percent of land cover while oil palm and rubber moncultures accounted for 41.4 percent. As *Table 1* shows, the monocultures harbour only a handful of species compared to the hundreds of trees, mammals and reptiles that jungle rubber sustains.

Table 1 Measures of biodiversity of jungle rubber and monoculture rubber in Bungo, Indonesia

Rubber system	Trees – Simpson's Index	Mammals – species found	Birds – species found
Jungle	0.72	37, 9 endangered	167, 28 endangered, 10 CITES
Monoculture	0.07	2	3

Source: Tree data: Tata 2007. Other data: Joshi, L et al. 2006.

To stop these kinds of slides in key biodiversity areas, a group of environmental organizations, private foundations and other allies formed the Forest Stewardship Council (FSC) in 1993 to develop eco-certification of forest products (Cashore 2006). As shown in Figure 2, the system FSC designed starts with establishment of standards intended to protect forest ecosystems and requires producers to obtain independent confirmation of compliance. In addition, before products can be sold to consumers as eco-certified, chain of custody must be verified to guarantee only products produced according to standards are sold under a certification label. Consumers can then select products certified by the eco-label to minimize ecosystem impacts. (Gullison 2003).

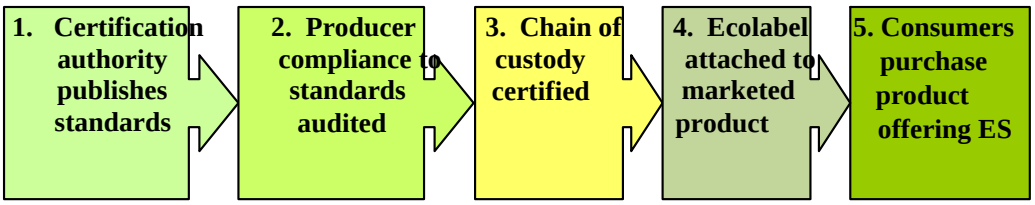

Figure 2 Eco-certification components

FSC achieved significant enough success with its eco-certification scheme to attract emulators. By 2005 more than 50 certification schemes had appeared around the world, certifying approximately 252 million hectares of the world's forests. However, these schemes covered only about 22 million hectares of the world's tropical forests (or just under 9 percent of the total) – an ironic result since eco-certification came about as an effort to protect tropical forests (Gullison 2003; Cashore 2006).

What happened?

This paper reports on information gained from the Bungo site of the Rewards for Upland Poor for Environmental Services (RUPES) project conducted by the World Agroforestry Center (ICRAF) and other partners. Jungle rubber farmers in this Sumatra, Indonesia district agreed to research with project staff ways to develop income streams that would defray the costs of producing jungle rubber. This would preserve biodiversity services and improve livelihoods while still allowing production the raw rubber that meets world demand for car, truck and aircraft tires as well as thousands of other products.

Eco-certification was among the mechanisms investigated. While it appeared promising, to date it has not been initiated.[1] This paper asks what obstacles limited eco-certification in Bungo and what are some concrete measures that might overcome these obstacles.

Obstacle 1: No buyer or price premium

Before embarking on the RUPES program, ICRAF staff had developed trust among the jungle rubber farmers in Bungo through several prior projects to improve rubber production and incomes in the area. The RUPES project verified the biodiversity value of the Bungo area. (RUPES Consortium 2005)Project staff then worked to acquaint the farmers with the biodiversity benefits of their production practices. These benefits were for farmers' own households as well global ecosystem services. The RUPES efforts changed farmers' decision-making dynamics. When the project started, most farmers said they would switch to monoculture systems if they could afford it. After reflecting on the ecosystem benefits of their jungle rubber systems, they wanted to work with RUPES to preserve their systems and explore potential rewards from providing these services globally (RUPES Consortium 2005; RUPES undated). Furthermore, conversations with an eco-certifier confirmed that jungle rubber could most likely qualify for certification with little change to production practices (Jones 2006).

Even with these positive factors, RUPES could not identify any accessible channels to reach likely buyers for certified jungle rubber, not to mention buyers that would pay a price premium. The project needed a buyer willing to pay a price premium for several reasons: to justify diverting farmers' time from livelihood producing activities to the organizing for internal control and other aspects of certification; to have a source of funding for costs of certification and to make jungle rubber a competitive land use with monoculture rubber (Nussbaum et al. 2003; Jasnari 2006)

The function of a price premium -- tipping the scales toward a land use that includes global biodiversity services

Practitioners, researchers and others have conceptualized eco-certification in a variety of ways (Bass 2001; Gullison 2003; Taylor 2005) The way that fully draws out its potential

[1] As of September 2009, a tire producer has begun participating with ICRAF to investigate the possibilities of the tire producer using certified rubber from Bungo in tire production. This is a welcome development, however many details still need to be worked out. Also, nearly 3 years has elapsed since ICRAF first started looking for buyers of certified jungle rubber. If suggestions in this paper could make eco-certification projects proceed faster, they do have relevance.

as a market-based, voluntary mechanism is to look at it as creating products with their own value chains that allow the market to price ecosystem services which then signal demand for socially desirable levels of the services.

Figure 3 illustrates how this works. The flower diagrams illustrate various trade-offs among land-use choices. The last diagram shows land-use choices that provide multiple ecosystem services. So far, this land use choice does not compete with the intensive practice of the first diagram because there has been no mechanism for the market to recognize the value of these services and generate returns to compensate farmers for the opportunity costs they incur (Foley et al. 2005).

For example, farmers in Bungo bear significant opportunity costs when they use jungle rubber practices that provide global biodiversity services. According to one study returns to land for jungle rubber were actually negative over the long term, but mildly positive for monocultures. Returns to labor were about $1.70 per day for jungle rubber, but $2.40 for monoculture rubber.[2] Much of the labor comes from the farmers' households which the study suggests is among the reasons jungle rubber persists even with negative returns to land. (Budidarsono 1997)

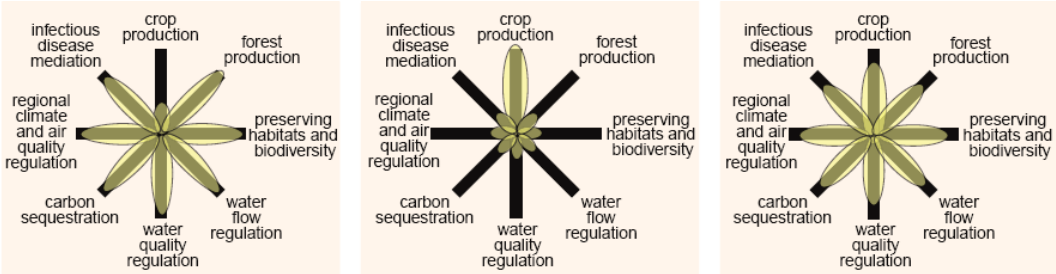

Figure 3 Flower diagrams of land-use and ecosystem trade-offs. Taken from Foley et al. 2005**.**

Eco-certifying a product allows global expression of demand for the ecosystem services that certification protects and creates the potential for farmers to earn a return for providing the service. This return then makes land uses that provide multiple ecosystem services a competitive choice over those that emphasize only crop production. Money

[2] The study was published in 1997 and reported in Indonesian rupiah. The figures here were converted to dollars using the average exchange rate for 1996 as reported at: http://fx.sauder.ubc.ca/cgi/fxdata. These amounts have not been converted to current dollars due to the extreme discontinuity in exchange rates with Indonesia. The 2000 exchange rate for rupiah to dollars dropped to around a third of the 1996 rate.

paid to farmers via a price premium can be viewed as forming a conservation fund that purchases the ecosystem service directly from the farmers whose choices preserve it, as illustrated in *Figure 4*

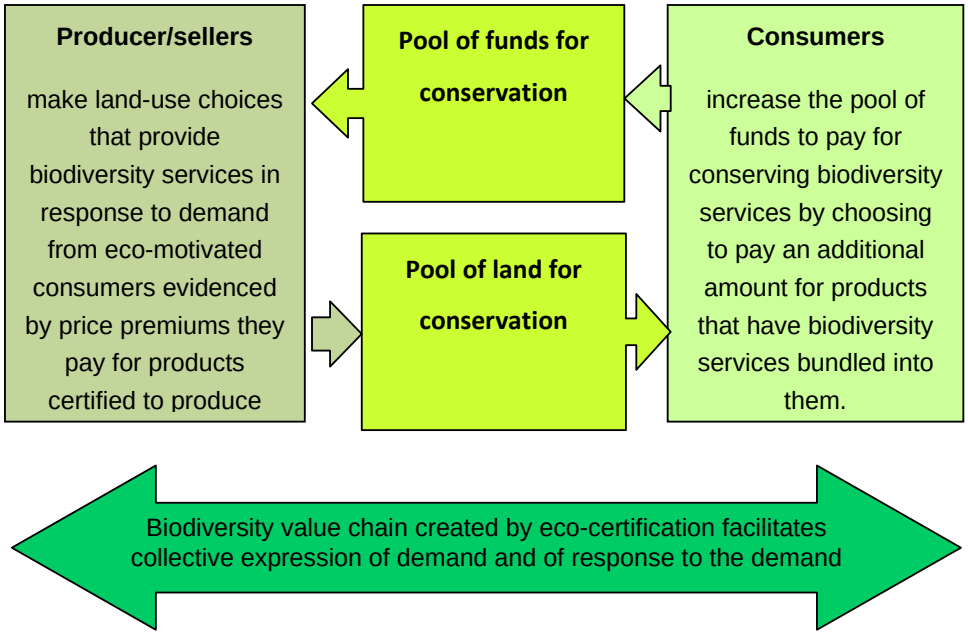

Figure 4 Eco-certification provides a way for the market value eco-system services thus generating funds for conservation.

Connecting the raw material and ecosystem services value chains may inhibit price premiums

While the concept of eco-certification creating markets for ecosystem services as products in their own right has conceptual appeal, evidence from wood suggests that reality has not worked out this way. In wood, certification has evolved so that biodiversity value has just sort of "stuck" to the raw material value chain. This has not effectively led to price premiums or transmitted to farmers any premiums that may have occurred (Bass et al. 2001; Rametsteiner and Simula 2002; Taylor 2005). Sticking the biodiversity value chain to the raw material value chain adds costs and has not necessarily maximized conservation results. Evidence from Bungo about the rubber value chain suggests that the issues with rubber would be similar.

A value chain consists of all the intermediaries that transform or add value to a product starting from the production of the raw materials to the ultimate consumer (Kaplinsky and Morris 2001). Figure 5 shows the value chain for Bungo rubber. It has a high

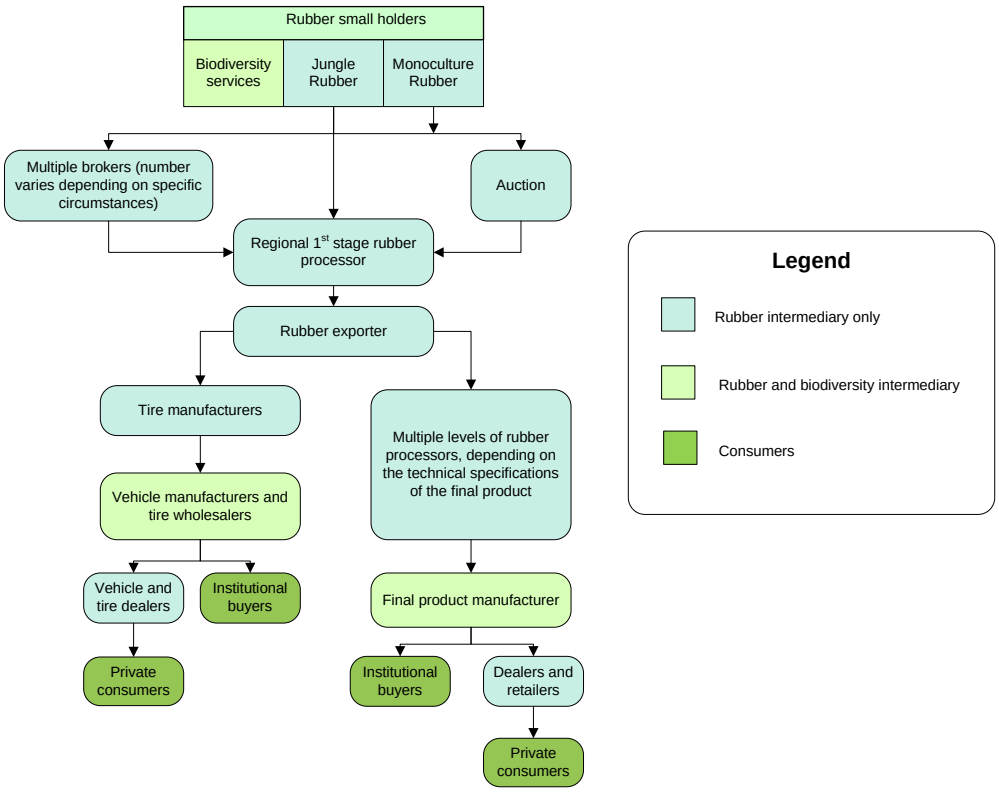

Figure 5 The rubber value chain in Bungo -- The colors distinguish among intermediaries that only transform or add value for the ultimate rubber product consumer and those that add value for biodiversity consumers.

number of intermediaries who add value by transforming the product according to specification that will meet users' needs. In most current eco-certification schemes, any price premiums that eco-motivated consumers pay for biodiversity services would have to be transmitted through all the intermediaries in the rubber value chain to reach the rubber farmer. Depending on the power individual intermediaries can exert, they can potentially absorb some of this premium (Talbot 1997). In addition, if pricing within the value chain is based on percentage mark-ups then each node along the way amplifies whatever premium the farmer might be paid. This could potentially make a significant difference in price to the ultimate consumer even thought the initial premium may have been small. However, few of these intermediaries add any value to the *biodiversity*.

The key biodiversity intermediaries shown in light green in Figure 5 are jungle rubber farmers and the end-market intermediaries positioned to understand consumer needs and design products that feature ecosystem services. Examples of end-market

intermediaries in the wood sector are retailers such as the Home Depot and B&Q in the do-it-yourself construction sector and manufacturer-retailers like the international furniture giant IKEA. Such firms can add value for eco-motivated consumers in the evolving green marketing of ecosystem services. They create products that use eco-certified raw materials and a marketing strategy that creates awareness about the biodiversity benefits in addition to communicating a set of overall product benefits valuable to targeted consumer segments (Crosby and Johnson 2006; Ottman et al. 2006; Selden and MacMillan 2006).

While advertising may not, on the surface, seem to add value, informing consumers and giving them the opportunity to select products with environmental qualities they value does generate benefit for them. It helps them save time and reduce uncertainty in dealing with the information asymmetry arising because they do not know what impacts specific products and production practices (Ponte and Gibbon 2005). And it offers them market choices that would not be otherwise available. Also, these firms can claim value from providing these services through enhancing consumer loyalty and gaining potentially larger market share by attracting eco-motivated consumers.

Could contracts shorten the biodiversity value chain and ensure biodiversity conservation by guaranteeing payments to farmers?

Contracts directly between farmers and end-market intermediaries could get price premiums to farmers. Such contracts are used in fair-trade certification which has effectively transmitted price premiums and other benefits to farmers. (Bacon 2005; Becchetti and Constantino 2005; Taylor 2005; FLO_International 2007).

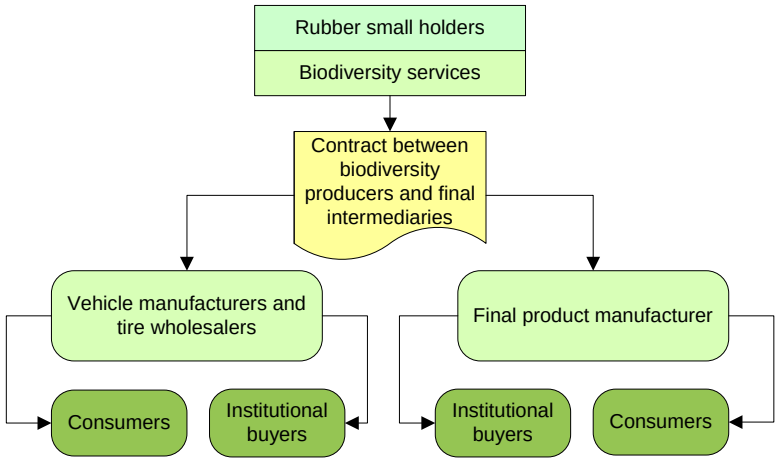

Figure 6 A biodiversity value chain enabled by a contract directly from the biodiversity producers to the end-market intermediaries.

The contracts would, in effect, separate the *value chain for raw materials* from the *biodiversity value chain*, shortening and simplifying it as shown in Figure 6*Figure 6* **A biodiversity value chain enabled by a contract directly from the biodiversity producers to the end-market intermediaries.**. To maximize conservation results, the contracts would provide for payment to farmers conditioned upon the farmers' achievements in maintaining biodiversity habitat measured by indicators. With this structure, price premiums no longer would go through all the intermediaries in the rubber value chain, each of whom may absorb some of it for themselves. End-market biodiversity intermediaries would recoup their investment in biodiversity services by figuring out how to translate consumer demand into payment for the service.

Potential benefits

- *End-market producer would know that moneys meant for biodiversity conservation would end-up in the hands of the farmers for real conservation results*.

- *Use of indicators would lead to expanded science tying specific practices to biodiversity results* – Doing so would allow rigorous requirements for biodiversity that were justifiable by according site specific realities*Box 1* lists indicators that according to research are associated with jungle rubber areas displaying the highest amounts of biodiversity. In most cases, farmers themselves could make the measurements. With such measures, farmers could do their own monitoring – even if the certification process would require independent verification – a feedback loop could develop where farmers see the effects of changing their practices and then adjust them, potentially creating a cycle of continuous improvement. A rigorous, documented program of self-monitoring could also reduce certification transaction costs by reducing the time the independent auditors must spend in the individual sites. A similar approach is standard in financial auditing where reliance on a verified system of internal controls allows reduced testing time by the independent auditors and lowers costs. (AICPA 2006)

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Box 1 Indicators for jungle rubber characteristics associated with sustaining biodiversity

- Trees of the present indicators
  - more than 4 trees other than rubber at least 10 cm diameter at breast height (dbh) per 200 m2 plot and
  - less than 2/3s of total basal area at breast height accounted for by rubber (when there are more than 8 trees with dbh at least 10 cm this measure need not be taken as it is labor intensive and when the 8 tree criteria is met the basal area criteria is usually met also)
- Trees of the past indicator – at least 1 tree per 200 m2 plot with dbh greater than 40 cm;
- Trees of the future indicator – at least 4 species of saplings within randomly selected 200 m2 plots.

(Tata et al. 2007)

- *Using indicators could also lead to better conservation results by reducing the potential for perverse incentives* – Shade coffee, like jungle rubber, is a traditional agroforestry practice in which the cash crop coffee grows among native forest species. This multistrata matrix provides an important refuge for species diversity in many high-conservation value areas. However, coffee monocultures yield more cash per land unit than the multi-strata systems, causing conversions away from traditional shade coffee (Philpott and Dietsch 2003; Perfecto et al. 2005). To combat this trend, certified shade programs attempt to make the practice more lucrative by certifying farmers who meet standards for canopy density, structure and floristic makeup. The farmers then attempt to negotiate with coffee roasters for higher per pound prices for their bird-friendly labelled coffee. (Migratory_Bird_Center 2008)

  This set-up could create perverse incentives. Farmers willing to take extra steps to produce more *canopy* for truly optimal bird habitat could only improve their livelihood if they grew more *coffee*. If the farmers' habitat improvements reduced their *coffee* production, they would actually get *less money* for producing more of the *canopy,* encouraging them to skirt the edge of minimally acceptable requirements, rather than look for trade-off between canopy and coffee production that gave the best overall result for both them and the birds. (Rappole et al.2003)

Contracts that paid farmers more for reaching measures for indicators would allow farmers to truly aim for the trade-offs between quantity of raw material production and habitat production that maximized income.

- *Provide for necessary financing* – Another potential lesson from Fair Trade is that it explicitly recognizes North-South disparities and thus requires that buyers in Northern countries pick up certification costs. Contracts would provide a mechanism for splitting costs with farmers as circumstances merit.

Obstacle 2: Small farmers can't market to the end-market intermediaries

Ninety percent of the world's rubber supply ends up in tires for cars, trucks and airplanes (Gouyon 2003). A single tire maker could conceivably purchase a significant portion the jungle rubber produced on the estimated one to two million hectares Indonesia's jungle rubber through the certification mechanisms described above. However, gaining access, attention and priority from decision makers in huge, international corporations did not fall within the core-competencies of the project staff conducting the action research on jungle rubber.

For eco-certification to become potent at saving unique landscapes and the species they harbor, effective ways for small farmers in remote villages in one hemisphere to **sell** their biodiversity products to end-market intermediaries in another hemisphere. RUPES project staff intended to create the initial bridges to such buyers and then work with the Bungo farmers to build the internal capacities necessary to keep up the supplier-buyer relationships and stay abreast of trends in the market.

Lack of marketing skills on the part of project staff hampered this effort. Project staff consisted of agriculturists, plant breeders, community and agricultural development specialists and economists, but not professional marketers. Also, none of the development and/or conservation organizations conducting the project had built organizational resources for: 1) identifying key decision makers within firms likely to purchase the certified jungle rubber, 2) gaining access to the decision-makers, or 3) developing marketing campaigns or promotional strategies. Project staff did attempt to build partnerships with international conservation NGOs (ICNGOs) who do have marketing expertise; however, the project did not find a way to enter into sustained work with them.

This situation of biodiversity and development projects constrained by lack of marketing expertise is repeated in biodiversity rich sites across the earth. ICRAF alone is working in three areas with biodiversity hot spots (as defined by Myer et al. 2000): the

Northwestern Yunnan area of China, the East Usambara Mountains of Tanzania, and the Bungo and Batang Toru sites in Sundaland (Indonesia). An internet search for "conservation projects smallholders" yielded more than 300,000 hits while the same search for scholarly articles yielded 28,000 hits. This indicates significant activity, but the potential effect of all these projects together is unknown since no clearing house exists that catalogues the habitats they attempt to conserve and the extent of their efforts.

Can ICNGOs improve conservation clout by leveraging their marketing capabilities to assist smallholders producing certified NTFPs?

Some ICNGO have developed the marketing competencies to pursue their own organizations' conservation priorities. With these competencies, they have secured impressive victories in getting end-market intermediaries to purchase eco-certified wood (Cashore et al. 2006). As the ICNGOs continue to hone their abilities to negotiate the international wood trade, they can expand the conservation effects of eco-certification by 1) initiating stewardship programs for conservation and development projects seeking to market eco-certified products other than wood; 2) mentor the projects in developing effective marketing strategies rather than allowing them to spend valuable resources on *ad hoc* efforts that endlessly invent the same (probably less effective) wheel; 3) continue to build skills and resources in identifying and reaching appropriate decision makers and prudently using these resources to help other efforts; and 4) work with other groups in promoting eco-certified products from high value biodiversity areas, including to their own members members (which number in the millions).

Benefits

- *More area and more species could possibly be conserved* – Carefully matching organizations to complement core competencies could help more conservation efforts to succeed. In particular, organizations such as large ICNGOs which have developed strong marketing skills could lend significant marketing clout to smaller organzations that can bring strong relationships with communities in high conservation value areas and competencies in conservation and development. Often these organizaions. These types of organizations may be working with smallholders developing new or small-volume products from small, but important, biodiversity areas. Partnering with development projects with smallholders offers rich opportunities for conservation as their lands often have more diversity than lands of large landholders (Pinedo-Vasques 2000; Boyce 2004; Humphries and Kainer 2006)
- *Conservation advocates would have more accurate data about the extent of efforts to maintain biodiversity* – By offering mentoring services, ICNGOs would automatically create an incentive for smaller organizations to communicate about their work. With this

information, the ICNGOs could estimate the potential to achieve their own conservation goals by providing help to the smaller organization. ICNGOs may want to start collating this information before embarking on mentoring initiative to see if working with the smaller groups would more effectively leverage their funds than some of their current activities.

- *Marketing mentoring that included the producers themselves would make smallholder eco-certification initiatives more sustainable* –A review of several case studies of local groups attempting to produce and sell new, natural products highlighted lack of marketing capability as a key constraint to success. While using outside agents or other resources is often a solution for small enterprises (Ham et al. 2009), smallholder groups still must understand marketing principals and context well enough to select a geniunely competent contracter for their situation and to negotiate terms. An ultimate test development projects is for participants to be able to maintain and advance their own initiatives without outside assistance (Burkey 1993; Bingen et al. 2003).

Obstacle 3: Some end-market intermediaries don't market to consumers

Even for smallholders who might manage to secure buyers for their certified NTFPs, the question is still open as to whether consumers will pay enough for the ecosystem services to make land-uses that produce them represent a competitive choice for poor farmers. Research is inconclusive about how much consumers will pay, if anything. Surveys asking consumers how much they would pay for goods produced through practices that preserve ecosystem services indicate consumers would pay significantly more (Donovan 2004, Aguilar 2007). However, in a documented test where actual consumers were offered eco-certified wood at a higher price than conventional wood, they did not choose the eco-certified wood. However, the study provided very limited information about the certification and its intended effects (Anderson and Hansen 2004). This would be important as end-market intermediaries have largely not informed consumers about eco-certified products or invited them to choose such product. Instead, large end-market intermediaries have adopted sourcing policies stating they will stock or use to stock eco-certified wood whenever possible. However, these firms do not identify items as eco-certified or conventional on their store floors. Thus, consumers have no option to "vote with their dollars" by choosing items that also provide biodiversity services versus purchasing products that do not include these services (Bass 2001; Taylor 2005).

When end-market intermediaries do not promote products as eco-certified, an important opportunity is lost for synergy between their interests in developing a competitive

advantage through a positive environmental image and conservationists' interests in raising awareness and concern for ecosystem services. So far, ICNGOs with budgets in the tens of millions of dollars for promotion have not made a serious dent in consumer awareness about the impact of product choices on the environment (Teisl et al. 2001; Hubbard and Bowe 2005). However, many end-market intermediaries have large budgets for promoting their products. Considering the possibility for jungle rubber, 90 percent of rubber makes its way to intermediaries that produce car, truck or airplane tires (Gouyon 2003). In a single year, Goodyear Tire company was estimated to have spent $50 to $60 million in the US alone on creative (promotion) services (Elliott 2004). If Goodyear would devote only 10 percent of those funds to advertising that included messages intended to build competitive advantage based on environmental actions, it would significantly augment the amounts ICNGOs have to spend on raising consumer awareness about the biodiversity consequences of their purchases.

Can end-market intermediaries be convinced to actively market eco-certified products to consumers?

Some factors about the wood sector suggest that end-market intermediaries have developed policies to source eco-certified material as a strategy to protect against the potential for consumer backlash if concerns arose about whether they were contributing to biodiversity destruction (Sasser 2003). However, they then bury the identity of eco-certified products due to fear that consumers will stop buying non-certified products because they will interpret that they are destructive. Also, value chain analysis predicts that end-market intermediaries with a large market shares can demand eco-certified products from suppliers and force intermediaries further up the value-chain to absorb the costs (Bass et al. 2001; Sasser 2003; Taylor 2005). This is a rational competitive strategy when dealing with large producers in temperate regions and given the current structure of eco-certification processes (Sasser 2003, Taylor 2005). However, it can exclude poor, tropical farmers like the jungle rubber producers in Bungo from participating in eco-certification to the detriment of biodiversity conservation.

The ICNGOs could set as a goal the development of an effective strategy for convincing end-market intermediaries to market eco-certified products with price premiums. Such a strategy would need to be informed by sophisticated value-chain analysis that could demonstrate to these intermediaries the potential to gain consumer loyalty and larger market share by effectively researching messages and product mixes that meet the needs

of eco-motivated consumers. Recent research suggests that a segment of eco-motivated consumers exists across product sectors (Thogersen 2006). However, design and marketing of "green products" that make the best use of their ecosystem attributes is at a very nascent stage (Ginsberg and Bloom 2004; Hansmann et al. 2004; Ottman et al. 2006). Certified organic products do offer one counter to the fear that promoting certified products can harm competitiveness overall as large food retailers are beginning to carry feature certified and conventional products side by side, apparently to good advantage (Gogoi 2006). Furthermore, if these end-market intermediaries used contracts as suggested above, they could potentially develop compelling marketing stories about the smallholder farmers and the species that they protected together. The end-market intermediaries could also be certain the true producers of the biodiversity services would benefit from price premiums rather than some opportunistic intermediary somewhere along the raw material value chain.

Benefits

- *Full realization of the eco-certification concept* – With end-market intermediaries marketing to consumers the opportunity to purchase ecosystem services in addition to physical products, conservation funds really could materialize that would go directly to protecting valuable habitat. This could lead to much more extensive protection of tropical biodiversity than now exists.

- *Multi-million dollar marketing efforts could begin to be leveraged in favor of products that protecd ecosystem services* – These marketing efforts would likely include both marketing research on the best: 1) methods and product designs to attract consumers to the products; and 2) promotional efforts could make consumers aware of ecosystem issues.

Obstacle 4: Transaction costs

Making payments based on indicators directly to farmers from end- product intermediaries could possibly diminish another barrier to adoption of eco-certification by smallholders – the need for chain of custody. Chain of custody provides a vital function by ensuring that when consumers pay for eco-certification, they really receive goods produced with biodiversity-friendly practices. However, it also adds to transaction costs. Obtaining FSC certified chain of custody requires that **every intermediary** performing **any transformation** or taking physical or legal ownership of

the certified product must ensure all inputs to its products have valid chains of custody by:

- Keeping certified inputs separate and identifiable from non-certified products and keeping records on purchase, delivery, receipt, forwarding and invoicing of certified products.
- Maintaining a secure system of product labeling for its outputs.
- Maintaining an invoicing system that ensures any product sold as eco-certified has necessary documents to confirm that it came from eco-certified sources and is correctly labeled.
- Ensuring auditors have sufficient records to trace back any certified output to the certified inputs.

(Gomes 2002)

These requirements create barriers to participation in eco-certification schemes, particularly for small farmers (Germany 2002; Vidal 2005) without adding anything to create biodiversity services.

Could an accounting chain of custody provide assurance that materials labeled as eco-certified really protect a specified amount of biodiversity?

Using jungle rubber as an example, Figure 7 illustrates an accounting chain of custody that could ensure that only the *quantity of rubber* – but not the *exact same rubber* – produced using practices that conserved biodiversity was marketed as eco-certified. This depiction is more descriptive than prescriptive, designed to focus attention on possibilities and to start addressing any short-comings in this proposed system. The key components shown in Figure 7are:

A – the end-market intermediary contracts to buy at prevailing market prices all the rubber produced from a specified area of certified jungle rubber over a specified time. The contract also sets a price to pay to farmers who achieve the specified levels of biodiversity conservation measured by established indicators. The intermediary uses average production rates for the area to set terms that provide the quantity of rubber needed.

B – farmers sell to a local processor the raw rubber from the certified jungle rubber area. The processor issues receipts which the farmers retain for the rubber.

C – end-market intermediaries purchase rubber products equivalent to at least the contracted amount of raw rubber and receive invoices from the manufacturers. The intermediaries retain the receipts.

D – using defined indicators, auditors from the certifier verify the level of biodiversity services the farmers produced. Intermediaries pay the farmers the agreed upon amount for biodiversity services.

E –chain of custody audits verify that the amounts of certified rubber documented by receipts as sold by the farmers to the raw rubber processor is equivalent to rubber purchased from the processor and used to produce the products the intermediary labels as eco-certified.

Benefits

- *By eliminating significant amounts of paperwork, labor (administrative and logistical), and facilities, reduces transaction costs of certification so that more smallholders can afford to provide conservation services* -- This process could be used for eco-certified products, but not for certified organic products that buyers wear or consume. In these cases, consumers perceive health benefits in products with no chemical residues. Thus the separation between the chemically-treated and organic products is important.

- *The accounting chain of custody along with the contracts and indicators puts in place elements that could potentially make eco-certified raw materials more attractive to end-market intermediaries and extend eco-certification's conservation abilities to a wider set of lands under threat* – The decision to purchase eco-certified materials usually comes from marketing departments. However, a change to a new eco-certified supplier has consequences for production department responsibilities such as the cost of acquiring the raw materials and the quality. A modified accounting chain of custody could mitigate these consequences if it required that an end-market intermediary could only market as eco-certified the products made from the quantity of rubber from on land using eco-certification standards. The Conclusions section describes how allowing this modification could give eco-certification wider conservation capability. A difficulty with this approach that could make it controversial is that it takes on features of mitigation as well as eco-certification. It would need careful testing for acceptance among consumers and conservation advocates before adoption.

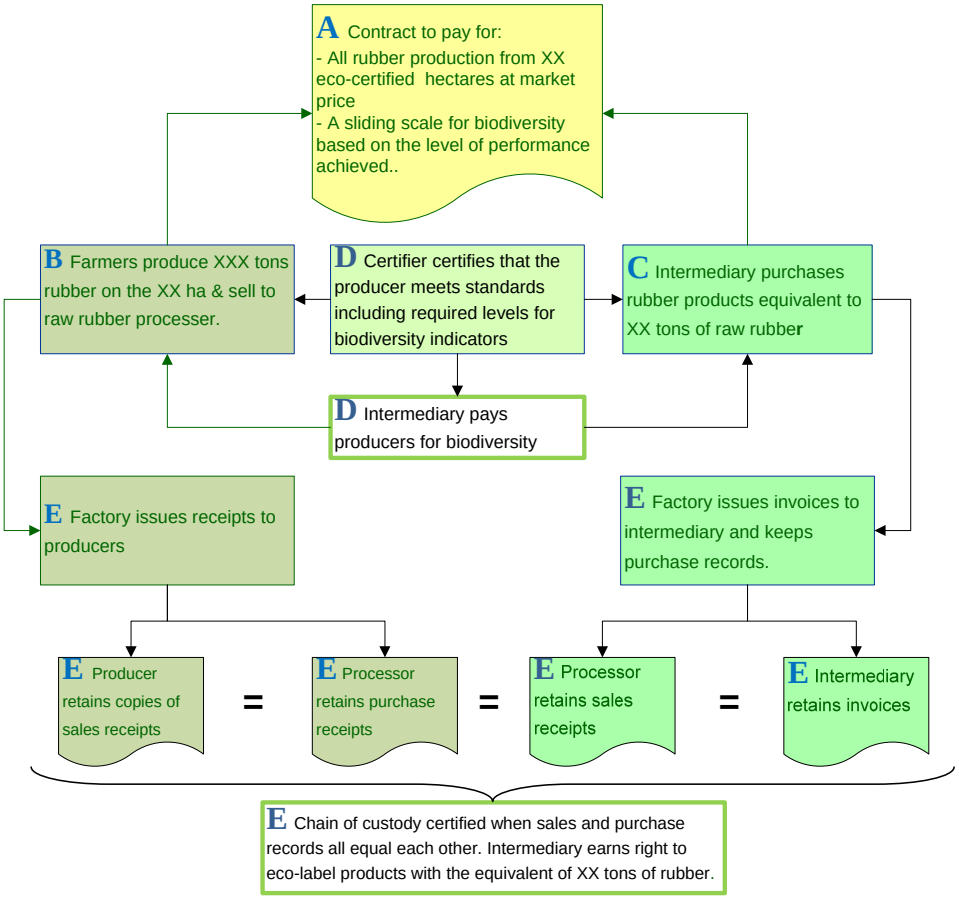

Figure 7 Example of an "Accounting Chain of Custody" that could have the potential to guarantee that only the quantity of rubber produced in association with specified biodiversity conservation could be marketed with an eco-certification label.

Conclusions

The suggestions described above:

- Using contracts to shorten the biodiversity value chain to maximize funds going to conservation, improve conservation results, and provide mechanisms for upfront financing of certification efforts
- Providing enhanced assistance both in reaching potential buyers and in increasing marketing savvy among organizations engaged in conservation work, either through a consortium of ICNGOs or as separate efforts by individual organizations
- Working with end-market intermediaries to see how they could improve the effectiveness of their efforts to ensure sustainable supplies and benefit in the market through enhanced consumer loyalty and increased market share by actively informing the public of eco-certification options – backed by solid value chain analysis to show the end-market intermediaries
- Adopting account chains of custody

all need varying degrees of testing for practicality, effectiveness in protecting biodiversity and acceptance from stakeholders especially consumers. But, to the extent that they can make eco-certification an option that can truly take hold in places like Bungo, the results could very well justify the effort to try out these modifications.

Furthermore, these mechanisms have potential to extend eco-certification to settings where current eco-certification process will not work. These suggestions will likely be controversial as they take on aspects of mitigation. However if fine-tuning can enhance acceptability, they have the potential to expand the areas and species that eco-certification can protect even further.

The opportunity for wider applicability

Table 2shows three categories of systems in transition. As currently designed, most eco-certification schemes requiring third-party verification primarily address the two scenarios. However, the current design does not apply to settings where ntensive production of a valuable crop in one area could provide sufficient returns to farmers to leave other areas in high biodiversity uses. This last category has the potential to make some headway in the debate over whether conservation is best served by intensifying production in some areas so that human needs can be met on a smaller land area, leaving

larger areas without human modification rather than encouraging more extensive uses that offer multiple services but compromise each to some degree. While the intensification argument may have some merit, without conservation agreements backed by some enforcement mechanism – such as loss of an economically valuable option like certification – there would be nothing to keep intensive practice from extending to any land an owner thought could support the intensive production, at least in the short term.

The table lists some features that sustainable eco-certification would need in these settings.

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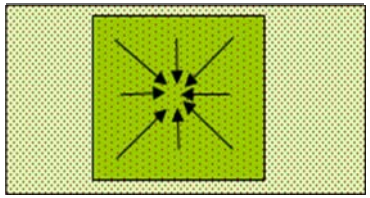
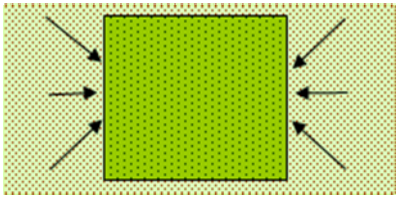
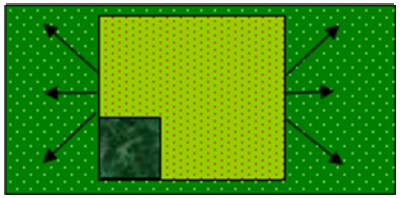
Table 2 **Settings and features needed where eco-certification could potentially contribute to conservation goals**

Cases of System in Transition		
		
Potential of Eco-Certification to Mitigate Biodiversity Threat		
Competing crop practices – Certification could keep less biodiversity friendly practices from supplanting more friendly practices, if certification produced returns competitive with the alternative practice.	*One crop practice, competing land-use* – certification of biodiversity friendly land-use could generate returns that would compete against a less friendly land-use.	*Certified intensive use in one area of a landscape provides benefits to producers so they can forego use of critical conservation areas*.
Examples		
Timber – clear-cutting and/or monoculture plantations that threaten sustainably managed natural forest *Coffee and Cacao* – monoculture systems threaten shade systems *Rubber* – monocultures threaten jungle rubber	*Shea butter* – conversion to other crops and systems threaten African grassland tree systems *Truffles* – Forest systems necessary for truffle production are threatened with conversion to non-forest system	*Domestication of forest species* – Farmers using improved varieties of indigenous forest products would prevent depletion of the native species in forest lands. *Nepenthes* –Producing a very high value crop on a small land area might provide income for communities to maintain livelihoods without expanding intensive management into orangutan habitat
Level		
Plot	Plot	Landscape
Key features needed for eco-certification scheme to ensure conservation & development		
Producer knowledge about biodiversity consequences of different management practices. *Indicators* of successful biodiversity conservation. *Price premiums* so biodiversity friendly land-uses can compete with hostile uses. *Consumer education* so they understand the biodiversity services they are purchasing.	*Producer knowledge* *Indicators* *Price premiums* *Consumer education*	*Conservation agreement* that makes payments conditional on achieving biodiversity performance in lands nearby the intensive production areas *Producer knowledge* *Indicators* *Price premium* *Consumer education*
Facilitated by existing conservation schemes		
Yes	Yes	No

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