7. Farmer institutions and capacity building: self-help group approach

In an effort to test participatory research and development in rubber agroforestry in Jambi Province, a pilot initiative for a self-help group approach was implemented in a number of villages. Three villages (Rantau Pandan, Sepunggur and Lubuk) with contrasting backgrounds and characteristics were selected. The following activities were organised to make participants aware of available technology and information relevant for jungle rubber agroforests:

1. farmers' field visit to ICRAF research sites (RAS experiments and observation plot of direct grafting under *sisipan* system) (Figure 33);
2. participatory appraisal of current rubber production systems;
3. a half day training course on budwood grafting in rubber seedlings (Figure 34).

Following these activities, farmers formally established self-help groups in all three villages. The common objective of all three groups was to establish local budwood gardens, where farmers could collectively

Figure 33. Farmer visits to research sites are useful not only in dissemination of information, but also for getting feedback from them on the technology (*Photo: Laxman Joshi*).

Figure 34. Farmers are able to learn grafting techniques without much difficulty (*Photo: Laxman Joshi*).

produce high yielding planting material and grafting material of *Hevea brasiliensis* at low cost and with minimal external support.

The initial stages of group mobilisation and self-help group formation were supported by the ICRAF staff in Muara Bungo. Labour, land and other local resources for the construction and running of the nursery were provided through contribution by group members (Figure 35). Weekly labour was contributed on a voluntary basis (locally called *gotong royong*) by members for routine nursery activities such as seeding, transplanting, watering and weeding. In the first season, ICRAF contributed most of the locally-unavailable input materials, such as mother plants (the source of clonal buds), fertilisers and seed for root-stock. However, subsequently, input material was provided only when requested by the groups, and only when other alternatives were difficult to implement ("drip" support).

The budwood garden in Lubuk village (Figure 36) was the most active and successful in terms of group dynamics and nursery operation. The majority of the members were Javanese migrants, and their positive attitude towards group work has been a crucial factor in the success of their initiative. By mid 2001, each member had received his or her share of more than 60 grafted plants, either rooted or potted. More plants were being distributed later in the year. In Rantau Pandan, Pak Yani, who was a group member and also a school teacher, had established a school nursery which he used for teaching his students. By the end of the first year of establishing the nurseries, a number of farmers in these villages had established their individual "home" nurseries, often just behind their houses. A few farmers had also carried out direct grafting in their recently planted fields with very promising results (grafting success rate between 70 and 90%).

Figure 35. Members of a self-help group in Lubuk village are collecting sand for their group nursery from a nearby river (*Photo: Ratna Akiefnawati*).

However, as time went on, in Rantau Pandan and Sepunggur villages, the

farmers' group approach proved less successful than in Lubuk village. Farmer participation at nursery activities and group meetings became progressively more and more difficult. Both groups stopped functioning within about 18 months of coming into existence. These two nurseries were then given up to their respective land owners to be managed as private nurseries.

Figure 36. Some members of a village nursery group pose proudly for a group photograph in front of their nursery (*Photo: Ratna Akiefnawati*).

The following are the highlights from the self-help group initiative implemented in the three villages in Jambi:

1. Farmers understood the value of incorporating high yielding planting material into their jungle rubber agroforestry system, and made efforts to do this.
2. Visits to research and demonstration plots significantly enhanced farmers' confidence in, and awareness of, available technology and developments.
3. Farmers were keen to acquire, and adept at learning, skills necessary for local production of high yielding clonal material.
4. Farmers were capable, following a brief training session, of carrying out direct grafting of rubber.
5. It was possible to mobilise farmer self-help groups to establish and manage budwood gardens for clonal bud and plant production. However, this required intensive social mobilisation.
6. Homogeneity among group members, inter-personal relationships and committed leadership were important driving forces that influenced the level of success achieved in three villages.
7. Communication and visits between farmer groups have the potential to augment farmer interest by sharing knowledge and developing positive competition between groups.

8. The long time delay (one year of weekly labour contribution involved in establishing and managing the nurseries) before any benefits could be realised was a major reason for a decline in group participation. Involving these groups in other activities, such as the joint marketing of latex, would significantly increase farmers' interest in such a self-help group approach.

8. Policy considerations

It is estimated that nearly 10% of Jambi Province is under rubber cultivation, most of which is still managed as complex jungle rubber agroforests. Current evidence indicates that around 47% of rubber farmers in Jambi practice '*sisipan*' (i.e. a gap-level interplanting management style) in at least one of their jungle rubber plots, as an alternative to slash-and-burn rubber agroforestry. However, there is a strong indication that this is a "second best" strategy for farmers, used to address the need for a continuous income, the need for high initial capital investment to restart a new rubber cycle, and to address the issues of increasing scarcity of new land for intensification and the risk of vertebrate pest damage and subsequent crop failure.

8.1 Recognising jungle rubber agroforestry and *sisipan* as viable management options

An international workshop held in Muara Bungo (September 3 - 6, 2001) carried out a broad systems analysis of the rubber agroforests of Sumatra's lowland peneplains. The current trajectories, with their consequences for profitability and environmental services, and the options to build on farmers' ecological knowledge and decision making in new ways, to face the challenges of a changing landscape, were discussed. It is now recognised that jungle rubber agroforests are potentially one of the primary reservoirs of the fast-disappearing biodiversity of the Sumatran peneplains. Plot-level inventories suggest that jungle rubber agroforests can maintain about 50% of the biodiversity found in natural forests.

On-farm Rubber Agroforestry Systems (RAS) trials have proven the feasibility of establishing clonal rubber under less intensive management regimes (when compared with monocrop plantations), using less labour

and lower levels of fertilizer. However, the regeneration of significant biodiversity values is far less than is the case in jungle rubber agroforests. Interestingly, current low rubber prices stimulate the development of *sisipan* style management of 'other tree' components of the system (for example, timber species). However, both the current price of natural rubber (the lowest in the last three decades) and the recently introduced Indonesian National Standard (SNI) regulations (Wibawa *et al.*, 2001) have jointly affected many resource poor farmers' income from rubber. The abandonment of old jungle rubber plots, and the conversion of these high biodiversity rubber gardens to oil palm or rubber monoculture, is becoming increasingly common in Jambi.

Despite the prevalence of jungle rubber agroforests in Jambi, and in many other rubber growing provinces in Indonesia, only meagre efforts have been made to develop them for higher productivity while maintaining the comparative advantages, such as biodiversity maintenance and management flexibility, they offer. All past rubber development projects have been largely geared to replacing these complex, flexible, low-input, yet diverse and less risky, systems with monocropping systems. The history of rubber development shows that most, if not all, rubber research and developments have favoured capital intensive and labour saving technologies that are less appropriate for capital-limited rubber farmers (Barlow *et al.*, 1994). It is time the Indonesian government and national institutions realized the value and importance of jungle rubber agroforests, not only for rubber producing households but also for their regional and global environmental services (Section 8.3). Recognition of the existence of extensive jungle rubber agroforests and research and development initiatives intended to improve them will be a positive step away from the eradication of these environmentally beneficial land use systems.

8.2 Agroforestry timber deregulation

The extraction and sale of timber, both from natural forests and from agroforests, is restricted in Indonesia by means of taxes, quotas and complex bureaucracy. These regulatory policy mechanisms, coupled with the fact that rubber timber needs to be processed within 72 hours of felling, are major constraints to rubber-wood harvesting and marketing. Consequently, farmers almost always burn old rubber trees, which are seen as being, essentially, a by-product of jungle rubber agroforests.

Figure 37. Large amounts of useful timber are wasted through burning because weak incentives and infrastructure do not encourage the marketing of timber (*Photo: Gede Wibawa*).

Figure 38. Conducive policies and infrastructure will increase farmers' interest in harvesting and marketing the rubber timber that would otherwise be wasted (*Photo: Gede Wibawa*).

Valuable natural resources are wasted (Figure 37), while the hazards posed by fire and smoke remain unresolved. Policy amendments, to encourage trade in rubber timber and non-rubber timber taken from rubber based agroforestry systems, will not only increase the appropriate use of timber from agroforests, but will also improve household incomes and promote polyculture in rubber-based agroforests while reducing farmers' dependency on a single commodity - latex. It will also reduce demand for other timbers extracted from natural forests, as well as diminishing the hazard posed by smoke and fire, and will cut greenhouse gas emissions. Procedures to properly identify timber extracted from agroforests, and to promote trade and processing of that extracted timber (Figure 38) need to be developed through targeted policy research and subsequent improvements in policy.

8.3 Environmental services of jungle rubber agroforests

In the context of the disappearance of natural forests, complex agroforests, such as jungle rubber agroforests, can provide external environmental services as well as meeting local production functions.

These environmental services include sequestering carbon from the atmosphere, maintaining biodiversity and retaining hydrological functions. Farmers and communities, who protect and maintain forests and complex agroforests, are not normally compensated for the provision of environmental services. Compared with more intensive monoculture plantations, and with other land-use systems, complex agroforests, such as jungle rubber agroforests, are less profitable and are currently being challenged by alternative land-use options. In the absence of incentives, farmers often opt for land use forms that provide fewer of the environmental services which are essential for external stakeholders and which often extend far beyond village, provincial and national boundaries.

Among research, development and donor communities, there is growing awareness of, and interest in that efficient payment transfer schemes, that (if implemented efficiently and fairly through appropriately-developed mechanisms) could help to preserve complex agroforests and the environmental services they provide. ICRAF has recently initiated research to quantify these environmental services, to develop methods to monitor them, and to evaluate the economic benefits of various land-use options. Farmers practising jungle rubber agroforestry are possible candidates for reward because of the biodiversity services their agroforests provide. In an institutional context, it is essential that both environmental service providers and beneficiaries of the services can freely negotiate and develop mutual agreements. Appropriate policy environments need to be developed, through appropriate negotiation and dialogue, in order to develop and nurture such reward mechanisms. All stakeholders (i.e. farmers, farmer groups, village organizations, local government, researchers, development professionals, non-governmental organizations, and donors) have important roles to play in this process.

References

Azhima F. 2001. Distribusi cahaya di hutan karet, Muara Kuamang, Jambi. Skripsi S1, Institut Pertanian Bogor, Indonesia: 22 pp.

Barlow C, Jayasuriya S and Tan CS. 1994. *The World of Rubber Industry*. Routledge, London and New York. 364 pp. ISBN 0-415-02369-6.

Beukema H. 2001. Terrestrial pteridophytes as indicators of a forest-like environment in rubber production systems in the lowlands of Jambi, Sumatra. *Agriculture, Ecosystems and Environment* (in press).

Boutin D, Penot E, Wibawa G and Akiefnawati R. 2000. Rubber Agroforestry Systems-type 1 (RAS1): a strategy towards a productive "jungle rubber". IRRDB annual conference, Bogor, Indonesia, IRRDB.

DITJENBUN. 1999. *Statistik Perkebunan Indonesia 1997-1999*: *Karet*. Departemen Kehutanan Dan Perkebunan. Jakarta.

Gouyon A, de Foresta H and Levang P. 1993. Does 'jungle rubber' deserve its name? An analysis of rubber agroforestry systems in southeast Sumatra. *Agroforestry Systems* 22: 181-206.

Joshi L, van Noordwijk M and Sinclair FL. (in press [a]). Bringing local knowledge into perspective – a case of sustainable technology development in jungle rubber agroforests in Jambi. Paper presented at "Participatory technology development and local knowledge for sustainable land use in Southeast Asia" workshop, 6-7 June 2001 in Chiangmai, Thailand. Proceedings forthcoming.

Joshi L, Wibawa G, Beukema H, Williams S, and van Noordwijk M. (in press [b]). Technological change and biodiversity in the rubber agroecosystem of Sumatra. Book chapter for J. Vandermeer (Ed.) *Tropical Agroecosystems: New Directions for Research*.

Ketterings QM and Bigham M. 2000. Soil color as an indicator of slash-and-burn fire severity and soil fertility in Sumatra, Indonesia. *Soil Sci. Soc. Am. J.* 64: 1826–1833.

Ketterings QM, Wibowo TT, van Noordwijk M and Penot E. 1999. Farmers' perspectives on slash-and-burn as a land clearing method for small-scale rubber producers in Sepunggur, Jambi Province, Sumatra, Indonesia. *Forest Ecology and Management:* 120: 157-169.

Martini E. 2001. Respon konduktansi stomata dan potensial air daun anakan bayur (*Pterospermum javanicum* Jungh.), Damar (*Shorea javanica* Koord. & Valeton.), Duku (*Lansium domesticum* Corr.), Karet (*Hevea brasiliensis* Muell. Arg.) dan Pulai (*Alstonia scholaris* (L.) R. Br.) terhadap kondisi stress air). Skripsi S1, Institut Pertanian Bogor, Indonesia: 71 pp.

Penot E and Wibawa G. 1997. Complex rubber agroforestry systems in Indonesia: an alternative to low productivity of jungle rubber conserving agroforestry practices and benefits. *Proc. symp. on farming system aspects of the cultivation of natural rubber* (*Hevea brasiliensis*). IRRDB: 56-80.

Ruhiyana A. 2000. Kemampuan adaptasi anakan pohon agroforest jenis bayur (*Pterospermum javanicum Jungh.*), duku (*Lansium domesticum* var. Corr.), durian (*Durio zibethinus* Murr.) dan karet (*Hevea brasiliensis* Muel. Arg.) pada berbagai intensitas cahaya.). Skripsi S2, Institut Pertanian Bogor, Indonesia**:** 115 pp.

Sanjaya KR. 2001. Studi pengaruh bukaan tajuk pada regenerasi karet (*Hevea brasiliensis* Muell. Arg.) secara alami pada sistem Agroforest di Kabupaten Bungo Tebo, Propinsi Jambi). Skripsi S1, Institut Pertanian Bogor, Indonesia: 71 pp.

Sibuea TTH and Tular BB. 2000. Ekologi babi hutan dan hubungannya dengan sistem agroforest karet tradisonal di Propinsi Jambi, Sumatera. Report submitted to ICRAF SEA.

Wibawa G, Boutin D and Budiman AFS. 2000a. Alternatif pengembangan perkebunan karet rakyat dengan pola wanatani. *Proc. Lokakarya dan Ekspose Teknologi Perkebunan. Buku I. Model Peremajaan Karet Rakyat Secara Swadaya*: 89-98.

Wibawa G, Hendratno S, Rosyid MJ, Budiman A and van Noordwijk M. 2000b. The role of socio-economic factors in farmer decision making: factors determine the choice between Permanent Rubber Agroforestry Systems (PRAS) and Cyclical Rubber Agroforestry System (CRAS) by farmers in Jambi and South Sumatra. Progress report submitted to ICRAF SEA. 43 pp.

Wibawa G, Rosyid MJ, Nancy C, van Noordwijk M and Joshi L. 2001. Rubber marketing in Jambi: Traditional systems and implications of the new Indonesian National Standard (SNI). Report submitted to ICRAF SEA.

Williams SE, van Noordwijk M, Penot E, Healey JR, Sinclair FL and Wibawa G. 2001. On-farm evaluation of the establishment of clonal rubber in multistrata agroforests in Jambi, Indonesia. *Agroforestry Systems*, 53 (2): 227-237.

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