

Is Hutan Tanaman Rakyat a new paradigm in community based tree planting in Indonesia?

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Southeast Asia



World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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Transforming Lives and Landscapes

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Abstract

In the current discussion on 'Hutan Tanaman Rakyat' or 'peoples plantations' in Indonesia a number of paradigms are available for comparison. On one hand the nucleus-plasma-estate concept in fastwood timber plantations, where centrally controlled decisions on the trees to be planted and a centrally organized relationship with a processing unit provide a simple planning framework, but position smallholders essentially in the role of farm labourers. On the other hand the paradigm of 'community managed forests' where the government steps back and allows the local community to respond to market forces and manage state forest lands according to their own insights, within rules that require that public functions of land are met. As a third paradigm, the independent smallholders who operate on village and private lands are generally free to plant trees, but may still face difficulties to market and use tree products planted. The multiple policy goals involved in the 'peoples plantation' concept can be met in multiple ways by these three paradigms, but there are tradeoffs between degree of central control and overall efficiency. Currently the HTR concept can be seen as intermediate to these three paradigms, but the length of contracts (up to 100 years) with local communities is a big step towards effective local incentives for sustainable management. The paper further discusses a set of constraints that currently limit the role of local communities and smallholders from fully participating in the supply of timber and other tree products.

Keywords

Community-based forest management, fastwood, forest policy, illegal logging, Indonesia, land tenure, smallholder timber.

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Acronyms

| | |
|-----|---|
| HKM | Hutan Kemasyarakatan or Community Based Forest Management |
| HTI | Hutan Tanaman Industri or Industrial Timber Plantation |
| HTR | Hutan Tanaman Rakyat or "People Plantation" |

1. Introduction

In the ongoing development of policy instruments and menu of options that the Indonesia Forestry Department and local governments can use to match their policy objectives with those of other stakeholders, the concept of ‘peoples plantations’ or *Hutan Tanaman Rakyat* (HTR) has emerged. Under this program, a new type of concession for the use of state forest lands can be allocated to local communities for a period up to 100 years. As a contribution to the debate, we will review what the ‘objectives’ are that this instrument is intended to meet, and what existing paradigms and instruments are available as comparators with HTR.

1.1 Problems to be addressed: Sustainability of wood processing industry and demand-level controls of illegal logging

Indonesia’s forest sector is facing a crisis where the depletion of forests is reaching its natural end and a substantial change in direction is needed, either before or after all ‘low hanging fruit’ (or ‘timber next to the road’) has been used. At the macro-economic level the primary concern is that the forestry sectors contribution to export earnings and economic development will decline. At local level, the loss of jobs and income from legal and illegal logging industries threatens the livelihoods of rural people. Depending on the location, rapid forest resource loss and degradation may also affect the provision of local and external environmental services. A logical connection exists between these local and national concerns, and a multi-scale approach is needed (World Bank, 2007).

Overcapacity in the wood processing industry when compared with a sustainable supply of raw materials drives illegal and non-sustainable ways of providing logs to the pulpmills. Industrial restructuring and development of alternative timber resources are needed to bridge the growing gap between demand for forest products and sustainable supply. The Ministry of Forestry and most stakeholders recognize the problem of industrial over capacity and the obstacles to revitalization posed by continued illegal logging: cheap supplies of timber undermine the economics of growing trees. However, the regulatory approach to control the transport and marketing of illegal timber has, ironically, become an obstacle to revitalization, as they also undermine the economics of growing trees.

If the wood processing industry is to survive, more trees will have to be planted in places where they can be harvested. The main questions are *who* will plant the trees, on what *land*, at what physical and institutional distance from the existing wood-processing industry, using *which* species and sources of investment and *how*.

1.2 Problems to be addressed: Rural poverty

Poverty tends to be high in and around forests: 76% of Indonesians living below the poverty line in 1999 were in rural areas (Pradhan *et al*, 2000); more recent data show that the Human Development Index has a negative association with forest cover in Java and the southern part of Sumatra, but a positive one elsewhere in Indonesia (Murdiyarso *et al.*, 2006); the relationship between poverty and forests is complex and few generalizations hold up to scrutiny (Chomitz, 2007).

In recent decades it has become clear that forest policy in Indonesia largely failed to conserve resources when the poor communities living in the forests were not involved in conservation programs. Local examples abound: in Lampung Province on the tip of Sumatra Island, for instance, the forest rehabilitation program involved evicting farmers, cutting down the under-storey coffee trees that were their main source of income, and instead planting *kaliandra* (*Calliandra calothyrsus*), a naturalized exotic tree species, for conservation purposes. The program has caused ongoing conflict and worsened local poverty while the forest land itself has continued to degrade (Suyanto, 2007).

On the other side of the spectrum of lessons learnt, the positive experience in farmer-planted and managed tree enrichment in agricultural landscapes remains understudied and ignored. Analyses by the *Smallholder Agroforestry on Degraded Soils* project suggest that the net effect of current policies is a subsidy on food crops and a net tax on smallholder timber (forthcoming). Even so, smallholder tree planting is on the increase as it matches livelihood strategies that focus on temporary urban (or overseas) jobs as way out of poverty, while retaining a link with the rural home base.

1.3 Problems to be addressed: Access to state forest lands

Ten years ago, an analysis of the underlying causes and options for use of *Imperata* grasslands as ‘bottomed out’ stage of forest degradation, pointed at the urgency of providing ‘secure’ (conflict free) access to such lands as enabling condition for conversion (Tomich et al., 1997). The politically sensitive issue of ‘ownership’ is less important in this regard than the *de facto* rights to use (Kusters et al., 2007). The total area of *Imperata* grassland in Indonesia was estimated to be 8.5 M ha in the early nineties (Garrity et al, 1997)

“Large areas of sheet *Imperata* are on land designated as production forest. Tenure security is needed for community-based fire control and for people to establish trees.” (Garrity, 1997).

No substantive action was taken, and ten years later the area of ‘forest lands without trees’ had more than doubled: in 2003 there was 14.9 + 4.7 + 2.9 M ha of ‘forest lands without trees’ on production + protection + conservation forest lands, still intended to be part of a permanent forest estate (www.dephut.go.id/INFORMASI/BUKU2/Rekalkulasi_03.htm as quoted in Worldbank 2007).

Contreras-Hermosilla and Fay (2005) outlined the history and process of delineating the forest zone from the 1970s onwards. With an initial emphasis on biophysical criteria without much consideration of social criteria and realities, subsequent versions of the spatial planning process brought more harmonization with local perspectives, but major conflicts remained over both the priority function (production, watershed protection or conservation) and ownership of forest lands. Based on the existing laws for ownership of land and management of forests, a distinction has to be made between the ‘Kawasan Hutan’ (forest lands, with legal restrictions on land use) and ‘Kawasan Hutan Negara’ (forest lands managed by or on behalf of the state where no previous rights exists). According to data compiled by the Ministry of Forestry and summarized in Contreras-Hermosilla and Fay (2005), legal assertion of full state control of the ‘Kawasan Hutan’ has only been completed on 11% of Indonesia’s Forest Zone, and on a further 52% of Indonesia the states’ claim of control likely coincides with claims by local communities of traditional use rights and ownership.

Equally important to the ‘rights’, are the opportunities to assert them. Much of the ecological degradation and economic underutilization of forest lands is linked to the persistence of conflicts over ownership and use rights.

“Although changing forest land use remains a sensitive area, the Ministry of Forestry has prioritized rural economic empowerment and specifically discusses tenure in recent medium and long term planning documents. (World Bank, 2007)”

For example, in the Batang Toru Watershed, North Sumatra, from 148,570 ha of state forest, about 32,573 ha are actually under the control of local people and should be classified as agroforest. Half of them (17,391 ha) have been legalized by the National Land Agency (BPN) as customary rights, but this legalization process has been rejected by the forest authority (Sirait et al., forthcoming). Current efforts to enhance orang-utan conservation in the area need to take these views of stakeholders outside of the Ministry of Forestry into account, otherwise conflicts may make conservation efforts counter-productive.

Conflicts between communities and state-sanctioned large scale ‘concessionaires’ are not restricted to the ‘forest lands’. Reminiscent of, and partially in continuation, of colonial-day patterns of land allocation to agricultural plantations, the issues between oil palm and sugarcane plantations and local communities are as contentious as those with logging concessions and fastwood plantations (Colchester et al., 2006; Afrizal, 2007).

1.4 Problems to be addressed: Degree of spatial and institutional integration

Vertical integration in the production chain, where the primary producers are tightly linked with subsequent steps of the value chain, has its pro’s and con’s. It provides security and reduces transaction costs, but removes competition and the type of efficiency that markets can bring. Economies of scale in the production stage of any agriculture or forest product tend to be based on access to land, access and use of know-how and/or improved planting material and opportunities for mechanization. Yet, the national scales experiments in centrally planned, vertically integrated, large-scale agriculture in the 20th century have largely failed, and in crop production ‘small and medium enterprise’ farmers are widely recognized as the most efficient producer – partially because people agree to work below the minimum wage if they are building assets on their own farms. In recent plans for ‘revitalization of agriculture’ (Sutanto, 2006), one will not find any reference to a need for or efficiency of ‘vertical integration’ – rather a strong belief in markets as institutions that provide signals for efficient and adaptive decisions. Somehow, the tradition in forestry is essentially different.

Yet, experience with ‘contract farming with trees’ is mixed (Mayers and Vermeulen, 2002; Nawir and Santoso, 2005; Cossalter and Pye-Smith, 2005).

1.5 Problems to be addressed: Choice of species and production system

The concept of ‘plantation’ is normally associated with even-aged monocultural stands that are managed uniformly by a single management entity. As alternative, planted trees in landscape mosaics can also be grown in various forms of agroforestry and mixed systems. Which system fits best in local ecology and economy is an issue of debate – with relevance at both national and local scale, depending on the outcome of current decentralization debates.

Whether smallholder or plantation managed, the over-reliance on a few species carries considerable ecological risk. In parts of Java the *segonisasi* (planting of *Paraserianthes*

falcataria or 'sengon') has been successful and supported local wood processing industry. Currently, increase of a gall disease caused by the rust *Uromycladium tepperianum* spreads rapidly along all of the south coast of East Java, reaching towards Central Java (Kato, Pers. Comm.). It affects leaves and twigs and can induce mortality of the tree. On Java it first occurred only above 500 m a.s.l. but is now common in lowlands as well. Two decades after the 'sengonisasi' programs that promoted planting this species throughout the landscape it shouldn't come as a surprise that a devastating disease spreads. Much of the fastwood plantations rely on a few species, with *Acacia mangium* as favourite species for lowland habitat. However, the second rotation of plantations has serious problems (<http://www.aciar.gov.au/web.nsf/doc/ACIA-6SEW2F>) with fungal root rot: tree mortalities as high as 28% have been reported and have caused some commercial plantations to stop using the species. However, these plantation companies have not abandoned the concept of tree monocultures. In the agroforests of Krui, a number of pest (including a longhorn beetle that had previously only been described from Laos) and probably fungal disease problems have emerged in *Shorea javanica* over the past decade, suggesting that the increase in density of this species, substantially above the density at which it occurs naturally invites others to the party.

In the mean time, the technical aspects of conversion of grasslands to tree-based systems that were still considered to be among the priority topics in the 1995 workshop (Garrity, 1997), have – at least from an economic perspective -- largely been 'solved' by the cheap availability of broad spectrum herbicides that are now widely used by smallholders operating on a tight budget (Hairiah et al., 2000; Purnomosidhi et al., 2005; E. Penot, pers. Comm.).

1.6 Outline of the rest of the paper

In the rest of this paper we will explore how the *Hutan Tanaman Rakyat* ('Peoples plantations') program as currently conceived will answer these fundamental questions, and how it will or can be positioned between two existing paradigms for 'state forest lands', the Hutan Tanaman Industri-Plasma and Hutan Kemasyarakatan (HKm), paradigms and the paradigm of independent tree producers.

2. Three paradigms of community involvement in tree growing in Indonesia

2.1 Paradigm 1: Hutan Tanaman Industri-Plasma

The primary policy concern in this paradigm is over the capacity (relative to sustainable supply) of pulp and paper factories linked to national debt and as a driver of "illegal logging". Land allocation is centrally planned by the forestry department in the vicinity of existing pulp and paper processing plants; area per household based on technical coefficients from fastwood plantations. Household allocation of land is made on labour availability. The choice of species is limited, with strong preference for monocultures. 'Superior' germplasm and intensive technical specifications (include pest management regimes to guard against monoculture failure) are to be used and 'extended' to all interested households. Production targets are to be realized from even-aged fast-growing, monocultural plantations, managed by private and/or parastatal companies.

Table 1. Comparison of two existing paradigms for combining community involvement and tree production on 'forest lands', and one that applies outside of the Kawasan Hutan

| | Paradigm 1: Supply chain for agro/sylvo-industrial processing | Paradigm 2: Smallholder agroforestry enterprises, with access to degraded forest lands | Paradigm 3: Independent tree production on private and community lands |
|--|--|--|--|
| Primary policy concern | Over-capacity (relative to sustainable supply) of pulp and paper factories linked to <i>national debt</i> and as driver of ' <i>illegal logging</i> ' demand | <i>Poverty reduction</i> and <i>economic growth</i> : utilize unproductive forest lands without public benefits or functions next to poor rural communities with capacity to productively use land once provided with sufficient tenure security | <i>Local goods and services + income</i> |
| Institution | Hutan Tanaman Industri-Plasma | Hutan Ke-Masyarakatan (HKM) | Community management or private |
| Land | Centrally planned allocation by forestry department in the vicinity of existing pulp and paper processing plants; area per household based on technical coefficients from fastwood plantations | Allocation by local government (Bupati) on the basis of current underperformance of 'state forest land without trees'; flexible per capita agreements with local communities (farmer groups) on the basis of negotiated proposals | Based on traditional inheritance systems; only a small fraction of the land has fully documented private ownership; indicated as 'other land uses' (APL) on the land use classification maps |
| Choice of species | Limited list of ' <i>approved species</i> ', implicit choice for monocultures | No constraints to diversity or array of species; target overall tree density depending on local relevance of environmental service targets | No formal restrictions, but utilization of trees and transport over roads of logs requires permits; no distinctions between 'agricultural trees' (e.g. rubber, coffee), and 'forestry trees' |
| Know-how | Technical specifications and 'superior' germplasm from even-aged monocultural fastwood plantation sector are to be used and 'extended', including need for pest control to mitigate monoculture risk | Local ecological knowledge to manage mixed-age, mixed-species agroforests can be blended with 'new' tree species and technologies in a multifunctional landscape mosaic | Generally there is a shortage of know-how on tree management for targeted market segments, most available extension material is focused on tree planting and nurseries |
| Labour | Household allocation of land made on standardized labour availability | Variations in household labour availability will be linked to variation between farms in intensity of land use and choice of species | Depending on household situation and strategy; often tree planting fits in with an extensification phase of land use and availability of non-agricultural jobs |
| Capital and Risk | Government-sponsored tailored credit systems based on standard technical design (costly germplasm, fertilizer, herbicide and pesticide inputs; time lags to positive cash flow). State shares risk | Existing local investment and credit systems, investment of remittances from urban and overseas labour, potentially supplemented by <i>generic</i> micro-credit based on local appraisal of future profitability and risk | Trees may become a savings bank, used for risk buffering and retirement funds |
| Price formation (tree products) | Pulp and paper factories set the price, no or limited market function through effective local monopolies | Pulp and paper factories compete with markets for other tree products (including rubber) | Price and market access depends on location; mobile sawmills operate in parts of Java, where trees are sold standing |
| Main advantage | Central planners' sense of control; cheap supplies for factories | Facilitates rural development by stimulation of entrepreneurial spirit | Full flexibility and adjustment to household livelihood strategy |
| Main concern | Government expenditure, public subsidies to downstream factories | Loss of 'central planners control', restructuring/rationalization of forest industry still needed | Requirements of permits for use and transport of farm-grown wood, leading to high relative costs for small-scale operations |

Box 1. Smallholder agroforestry in Community based tree planting: lessons learnt from HKm in Sumberjaya (Suyanto et al., 2007)

In Indonesia, forestry law combined with a decree from the Ministry of Forestry has authorized community forestry permits since 2000. The permits promotes proper forest management practices by providing farmers conditional land tenure, if they contribute to watershed health by using appropriate coffee management practices and protect remaining areas of natural forest. Under those conditions farmers maintain the right to use the land for their livelihoods. However, in 2004 when RUPES (*Rewarding the Upland Poor for the Environmental Services they provide*) project first started work in Sumberjaya, only 5 farmer groups had been awarded such permits and these for only 5 years. Covering only 7 percent of the protection forest, the area with conditional land use permits was too small to bring measurable improvements to watershed functions.

The RUPES project started working in Sumberjaya with 18 farmer groups of about 40 members. All farmer groups were greatly interested in securing community forestry permits. ICRAF ensured that all required partners had a full voice, creating essential goodwill among change agents in local and national governments and as well as assisting the farmer groups. ICRAF research shows that without a trusted partner, local people have great difficulty in forming relationships with government agencies, which is essential for dialogue that creates needed policy change. On the technical side, ICRAF analyses on river flows and land use change kept other technical experts and powerful interests from disregarding farmer perspectives. RUPES empowered farmers groups and local collaborators through participatory mapping, developing working plans and nursery techniques, strengthening farmer groups and communicating the emerging reward mechanisms to members of farmer groups. In July 2006, all 18 farmer groups received community forestry permits; increasing the area covered from 1,367 ha to 11,633 ha. Nearly 6,400 farmers now have permits. With 70 percent of the protection forest now covered by conditional land use permits, analysis projects that Sumberjaya will soon start to see measurable improvements in watershed functions. While verification of these improvements awaits future measurement, conditional forestry permits have already demonstrated improvements for the farmers.

Recently, RUPES completed a study of the impact in Sumberjaya of land tenure with researchers from Michigan State University and the International Food Policy Research Institute (Kerr et al, 2006). The study found that the community forestry permits;

- increased land tenure security,
- double the local land value,
- reduced corruption,
- increased income, mostly due to reduction of bribes,
- increased equity, relative to the in-village resources farmers have, promoted tree planting/agroforestry,
- promoted soil and water conservation, and
- gave farmers good reasons to protect remaining natural forest.

Box 2. Damar Agroforest : conserving forest resource – securing farmers income

Damar agroforest or *repong*¹ damar in Krui is a forest-like land use system developed over generations by local people living at the margin of rainforest along the west coast of Lampung Province in Sumatra island (Torquebiau, 1984; Mary and Michon, 1987; Michon, 1993). The resin-producing tree called *damar* (*Shorea javanica*) that dominates its vegetation structure (de Foresta and Michon, 1994), had been domesticated by local people since the second half of 19 century (Rappard, 1937; Michon and de Foresta, 1995). The forest-like structure of this agroforest allows the conservation of large part of natural forest biodiversity (de Foresta and Michon, 1994). The mature damar agroforest is made up of an intimate mixture of various tree crops and managed by smallholder. The trees shade out the crops, occupy different strata and produce high value product such as fruits, resins, and medicinal and high-grade timber. Inventories of tree population in mature damar agroforest in Krui recorded 39 tree species (trees over 20 cm in diameter, on 75 randomly plots of 20x20m) with mean density 245 trees and mean basal area of 33 m² per hectare (Wijayanto, 1993). These quite high figures, associated with a well-balanced diameter class distribution, shows the close structural similarity between natural forest and mature damar agroforest managed by farmers.

Sibuea and Herdimansyah (1993) recorded that almost all forest mammal species are present in damar agroforest, hence 46 mammal species including 17 species protected by Indonesian law. Density of the primate population (macaques, leaf monkeys, gibbons, and *siamang*) in the agroforest are quite similar to those observed for natural forests. In addition, Thioly (1993) observed that at least 92 bird species present in this land use system.

From an economic perspective, this land use system provides a wide range of source of income to farmers, their neighborhood and the actors along damar trading chain (Levang, 1989; Dupain 1994; Bouamrane, 1996). Damar trees, with about 65% of the tree community, provide regular cash income from the harvesting and sale of damar resin. Fruit trees comprising almost a quarter of the tree community, also provide additional cash income, although not in monthly basis. According to de Foresta and Michon (1997), per hectare mature damar agroforest provided (at a time that US \$1 = Rp 2,248,-), annual farm income ranging between Rp 1.65 million (no fruiting season) and Rp 3.84 million (in fruiting season). Hence capital accumulation is possible through seasonal products with good market and large production.

Government-sponsored, tailored credit systems based on standard technical design (costly germplasm, fertilizer, herbicide and pesticide inputs) will provide capital to growers, who will face time lags to positive cash flow. The government shares risk. Pulp and paper factories set the price through effective local monopolies; there is no or limited market function. The main advantage of this scheme is a cheap supply of wood for factories. However, the main concern is high government expenditure, public subsidies to downstream factories, and the weak position (lack of decision making power) of the farmers – the primary biomass producers.

2.2 Paradigm 2: Hutan Kemasyarakatan (HKm)

The primary policy concern is to utilize unproductive forest lands near poor rural communities who have the capacity to productively use land once provided with sufficient tenure security. The goal

of the scheme is *Poverty reduction* and *rural economic growth*. Land allocation by regency governments (Bupati) on the basis of current underperformance of ‘state forest land without trees’ and flexible per capita agreements with local communities (farmer groups) on the basis of negotiated proposals. Variations in household labour availability will be linked to variation between farms in intensity of land use and choice of species.

There are no constraints to diversity or array of species; target overall tree density depends on local relevance of environmental service targets. Local ecological knowledge to manage mixed-age, mixed-species agroforests can be blended with ‘new’ tree species and technologies in a

Box 3. Seed orchard of Dipterocarp tree species in rubber agroforest in Jorong Sigantang, West Sumatra: threatened by contested forest status

Although the Krui agroforests of West Lampung, based on *Shorea javanica*, have become an icon of community-developed productive forest and the resolve of conflicts between the Forestry Department and local land managers, the threat to productive forests of ‘conversion to state forest land’ still continues elsewhere.

Mixed dipterocarp forest used to be the dominant forest type of Sumatra. Dipterocarps species are commercial timber trees and also produce non timber forest products, such as resin (dammar) and illipe nuts. As elsewhere, many forest areas in West Sumatra are devastated, however. Only isolated patches of natural forest remain. One of these remnant forest areas is located in Ranah Batahan sub-district, West Pasaman district. The Sigantang customary forest has been maintained over the years by the community of Jorong Sigantang. Trees belonging to the *Dipterocarpaceae* family dominate the forest, especially the genera *Anisoptera*, *Dipterocarpus*, *Dryobalanops*, *Shorea* and *Parashorea*.

Dipterocarp species fruit only periodically in ‘masting’ years, usually 4 to 5 years apart. Seeds of Dipterocarp are known as ‘recalcitrant seed’, because they directly germinate and loose viability when stored. Seed predation by insects, mice and rats makes collection in the wild difficult. Hence, seed orchards for organized seed collection are useful for preservation of Dipterocarp species in the agriculturally used landscape. Based on this local source of seedlings, a substantial part of the rubber agroforest in Jorong Sigantang (Nagari Batahan) has been enriched with Dipterocarp trees already.

People of Jorong Sigantang have high awareness to conserve forest by managing their kebun (rubber agroforest). They traditionally enrich their kebun with other trees (such as meranti and gaharu). In 2002, the community of Jorong Sigantang in collaboration with the *Balai Pengelolaan Daerah Aliran Sungai* (Watershed Management Unit) Agam Kuantan planted five species of *Shorea* in the rubber agroforest. The nursery has been developed in 2002. People collected Dipterocarp’s wildlings and seeds in the registered forest and then planted them in the nursery. Three farmer groups (kelompok tani) were involved.

The people of Jorong Sigantang defend their customary forest Batahan against local government officials who want to change the status of the registered forest to ‘production forest’ and issue *Ijin Pemanfaatan kayu* (timber utilization permit) to investors. In that sense, the story of the Krui dipterocarp damar agroforests continues...

multifunctional landscape mosaic. Existing local investment and credit systems, investment of remittances from urban and overseas labour, potentially supplemented by generic micro-credit based on local appraisal of future profitability and risk. Perhaps most important, the marketing of products is more competitive; pulp and paper factories compete with markets for other tree products (including rubber). The main advantage of the HKM is it facilitates rural development by stimulating an entrepreneurial spirit. The main MOF concern is the *loss of 'central planners control'*. In addition, a restructuring or rationalization of forest industry is still needed.

2.3 Paradigm 3: Independent smallholders

The third paradigm relates to independent small or medium scale farms that include and use trees, outside of the 'kawasan hutan'. These operate largely outside of current statistics, as much of the 'landscapes with trees' hover around the operational boundary between 'forest' and 'non-forest' in remote sensing data. A combination of vegetation-based tree cover data with 'agro-ecosystems' (Hadi and van Noordwijk, 2005) suggests that it is in fact an important category.

This paradigm forms an important point of reference in debates on what might happen if current regulations on 'forest lands' would be relaxed. The overall evidence indicates that such deregulation might increase rather than decrease the interests in planting trees as well as the supply of wood and other products in response to market demand. Currently, however, policies are in general not supportive of this type of development, as elaborated in a number of hypotheses with partial evidence (Table 2).

Recently, economists from the DFID Multi-stakeholder Forestry Programme quantified some of the economic contribution from independent small holder-based management of tree crops on forest lands and estimated the size of improvements possible under different enabling policies, such as increased land availability, secure access and tenure, or improved productivity (Brown and Simangunsong, 2006). The main objective of this work was to make visible both the existing tree-based contribution of small farmers to the national economy and estimate increases should the Department of Forestry deregulate land use over large areas of "production forest" that according to Department data, has no tree cover.

The main finding were that the current economic contribution of smallholder forestry activities represents a significant and underappreciated sector in the Indonesian economy:

- Based on 2002 data, smallholder tree-based and forest-based production activities together – including agroforestry crops that emulate forest functions (such as coffee, oil palm, rubber, spice trees, etc.), non-timber forest products, and private forest production (hutan rakyat) – contribute US\$ 6.2 billion in economic value each year. This is over 3% of Indonesia's overall economic output and provides jobs for nearly 4 million people.
- Small holder agroforestry crops that contribute to the expansion of tree cover are now found on 11 million ha. of land and account for the vast majority of these values. Community timber and non-timber forest production are relatively small.
- Smallholder agroforestry systems are very diverse and the mix of crops varies across islands.

Table 2. Ten hypotheses on smallholder timber production in agroforestry systems

| Hypothesis | Partial evidence |
|---|---|
| 1. Smallholder timber-based land use has no chance as long as open-access forests still provide for the resource below economic replacement cost | Experience with the timber component of rubber agroforests suggests that local use is the main driver until the forest has disappeared from the landscape; see also Tata et al 2007 |
| 2. Rules aimed at restricting illegal logging as providers of the demand for wood provide strong negative incentives for the smallholder timber production that would provide a long term alternative to illegal logging | Frequent anecdotal evidence of 'perverse effects' of current rules and 'law enforcement' on farmers with 'tolerated' or 'planted' timber trees as part of their agroforests |
| 3. Current agricultural policies provide positive incentives (net transfers) for food crop production and negative ones on timber production, providing net benefits and reduced financial risk for mixed agroforestry as enterprise | Analysis by the SAFODS project in Indonesia and the Philippines (forthcoming) |
| 4. Timber-based agroforestry systems provide superior returns to labour in an extensification phase when labour shifts from rural to urban jobs, land is less needed for local food production and rural links provide a security net and retirement savings component of livelihood strategies | Anecdotal evidence in areas in Central and East Java where a 'forest transformation' has occurred linked with an 'out of agriculture' scenario |
| 5. Adding a timber component to existing agroforests and mixed production systems (e.g. based on rubber or coffee) may be at least as economically feasible as conversion of degraded lands for timber production | With the profitability depending on both price fluctuations and trends, the stabilizing effect of timber is intuitively appealing, but not properly documented |
| 6. Tree management for specified product quality and markets can allow farmers to tap much higher into the value chain and be economically attractive | Evidence from the Philippines of the need for farmers to be more aware of the quality and size that is in actual demand (Bertomeu, 2006) points in this direction |
| 7. Farmer knowledge of and existing extension messages are biased towards the tree planting phase and undervalue tree management and post-harvest processing | Similar to hypothesis 6 |
| 8. Campaigns to enhance a 'tree planting ethic' may provide barriers for relevant tree management (including thinning and tree harvest) | Anecdotal evidence, e.g. in the Landcare experience in the Philippines |
| 9. Short rotation forestry with the existing array of species carries high risk | Pest and disease problems are probably in the increase in <i>Acacia mangium</i> and <i>Paraserianthes falcataria</i> ; Tree mixtures remain under-studied although the research tools (including models such as SEI-FS: http://www.icraf.org/sea/Products/AFModels/SEI/index.asp) |
| 10. Existing certification schemes with their high transaction costs provide strongly positive economies of scale that put smallholder producers at a disadvantage. | Costs of certification can easily reach \$ 30,000 which means that 1000 farmers will have to join in a single group certification scheme, if the certification increases prices by 10% and their farm forest income is \$ 300/year, to simply break even on transaction costs |

Analysis of potential national policy changes shows that:

- Small reallocations of land or increases in security for investment in land productivity can yield high returns, up to US\$ 1.4 billion per year in added revenues and possibly 1.6 million more jobs.
- These benefits would not materialize immediately, but only after investments in land and new crop plantings matured and came to market.
- The largest values come from policy changes that boost smallholder tree systems that emulate forest functions, because this is larger in area, value, and employment than other activities examined.
- The largest values also come from policy changes that increase the availability of land, rather than policies that affect the productivity or benefit sharing arrangements on existing lands.
- To gain these benefits, small holders need long-term security of access to land to make the required investments.
- Regional and national governments would benefit from increased economic activity, trade, and potential tax base.

2.4 The Peoples Plantation (HTR) as intermediate to these paradigms

The primary policy concern is to increase forest contribution towards economic growth and to reduce and minimize national unemployment and poverty (pro-growth, pro-job, pro-poor).

This program will be implemented on government *production forest land*, in particular logged over areas and degraded forest land. About 5.4 million hectares of land will be allocated by the central government to this program with local government consultation, in particular concerning the legitimacy of the government land (“clean and clear”).

Through this program, the government will provide local communities with wider access to law, credit, and market. Each household will receive approximately 15 hectares of land to manage, not to own, for the maximum period of 100 years, and 8 million rupiah per ha in the form of soft loan for this purposes. The 15 ha per household has been calculated by the government to be sufficient for local communities to make a decent living. Households should form a group in order to join the program. In total, about 360,000 households will be involved, with the total budget of 43.2 trillion rupiah. The program is scheduled to start in 2007, with a 10-year lifespan until the targets are achieved.

The government has published a guidebook book recommending the species they see as suitable to respective areas. This calls into question whether local preferences over species and the choice between monoculture and agroforest will respected. It appears this debate is intensifying. This relates to the need to draw upon local ecological knowledge and the ability of local people to manage their land and available labor. The market value of the trees planted in the future will be left open to the market. The main concern is how and from what sources to obtain the budget needed for this program and how to develop detailed implementation plans which will capacity building for relevant local institutions.

Table 3. Current understanding of the HTR (peoples plantation) concept in between the existing paradigms (as elaborated in table 1)

| | Paradigm 1: Supply chain for agro/sylvo-industrial processing | Paradigm 2: Smallholder agroforestry enterprises on degraded forest lands | Paradigm 3: Independent tree production on private and community lands | Intermediate paradigm: Peoples plantation (still under discussion...) |
|--|--|--|--|--|
| Primary policy concern | Over-capacity (relative to sustainable supply) of pulp and paper factories | Poverty reduction and economic growth: | Local goods and services + income | Increase forest contribution to economic growth, 'unemployment' and poverty reductions (pro-growth, pro-job, pro-poor) |
| Institution | Hutan Tanaman Industri-Plasma | Hutan Ke-Masyarakatan (HKM) | Community management or private | Peoples plantation (Hutan Tanaman Rakyat or HTR) |
| Land | Centrally planned allocation by forestry department in the vicinity of existing pulp and paper processing plants; | Allocation by local government (Bupati) on the basis of current underperformance of 'state forest land without trees'; | Based on traditional inheritance systems; only a small fraction of the land has fully documented private ownership; indicated as 'other land uses' (APL) on the land use classification maps | Allocation by central government consulted to the local government on the basis of 'clean and clear' unproductive state plantation forest land (log over area, bare land, bushes); 15 ha per household, maximum 100 years right to manage |
| Choice of species | Limited list of ' approved species ', implicit choice for monocultures | No constraints to diversity or array of species; target overall tree density | No distinctions between 'agricultural trees' (e.g. rubber, coffee), and 'forestry trees' | Wood for fibre processing is prioritized. A preference for polycultures is indicated. The position of rubber is unclear. Partnership and developer scheme are, however, most likely for monoculture plantation. Local community scheme (Pola Mandiri) can be for Agroforestry or monoculture plantation. |
| Know-how | Technical specifications and 'superior' germplasm from even-aged monocultural fastwood plantation sector are to be used and 'extended' | Local ecological knowledge to manage mixed-age, mixed-species agroforests can be blended with 'new' trees | Generally there is a shortage of know-how on tree management for targeted market segments, extension material is focused on tree planting and nurseries | Partnership and developer scheme are most likely similar to HTI plasma. Local community scheme (Pola Mandiri) is most likely similar to HKM |
| Labour | Household allocation of land made on standardized labour availability | Variations in household labour availability are linked to intensity of land use and choice of species | Tree planting fits in with an extensification phase of land use and availability of non-agricultural jobs | In between HTI plasma & HKM |
| Capital and Risk | Government-sponsored tailored credit systems based on standard technical design. State shares risk | Existing local investment and credit systems, investment of remittances from urban and overseas labour | Trees may become a savings bank, used for risk buffering and retirement funds | It will probably be like HTI plasma, where Government-sponsored tailored credit systems based on standard technical design (costly germplasm, fertilizer, herbicide and pesticide inputs; time lags to positive cash flow). State shares risk |
| Price formation (tree products) | No or limited market function through effective local monopolies | Pulp and paper factories compete with markets for other tree products | Price and market access depends on location; | Government intervention to stabilize the market price |
| Main advantage | Central planners' sense of control; cheap supplies for factories | Facilitates rural development by stimulation of entrepreneurial spirit | Full flexibility and adjustment to household livelihood strategy | Increase supply wood for factories and facilitate rural development by stimulation of entrepreneurial spirit |
| Main concern | Government expenditure, public subsidies to downstream factories | Loss of 'central planners control' | Requirements of permits for use and transport of farm-grown wood | Government expenditures, accountability, potential land conflict |

HTR policy concerns are wide, encompassing those of both the HTI plasma and HKm programs. Land allocation is like that of HTI plasma where land is allocated by the central government. Local community scheme (Pola Mandiri) can be for multi-species agroforestry systems or monoculture plantation. The credit scheme is like that of HTI plasma, where a Government-sponsored, tailored credit systems based on standard technical design (costly germplasm, fertilizer, herbicide and pesticide inputs) will provide capital to growers who will face time lags to positive cash flow. The government will share the risk. Main advantage of HTR is to increase supply wood for factories and to facilitate rural development by stimulation of entrepreneurial spirit. The main concerns of the HTR program are high government expenditures, accountability, and high potential for land conflict.

3. Discussion: Removing constraints to community-based tree planting in Indonesia, across paradigms⁴

3.1 Legal status and land tenure for small holders

In Indonesia the sectoral divide between forestry and agriculture is particularly pronounced. The Indonesian constitution places the control (not ownership) of natural resources in the hands of the State and articulates that these resources must be managed for the benefit of the Indonesian people. Authority for the establishment of a permanent forest estate is given to the Ministry of Forestry (MOF), which tends to be land-based in its focus, while the Ministry of Agriculture supports smallholders and a commercial plantation crop sector. The result is a regulatory framework that inhibits community agroforestry in large areas.

Considerable parts of Indonesia's closed canopy forests are actually agroforests planted by local people. Such agroforest provide approximately 70% of the total amount of rubber produced in the country (on about 2.5 M ha of land) (Wibawa et al., 2005), at least 80% of the damar resin, roughly 80 to 90 % of the various marketed fruits as well as important quantities of export tree crops such as cinnamon, clove, nutmeg, coffee and candle nut (Michon and de Foresta, 1995). In Sumatra alone, about 4 million hectares have been converted by local people into various kinds of agroforests (Michon and Bompard, 1987). According to the forestry regulatory framework, these landuse systems are illegal within the State Forest since they are considered agricultural activities. Cases of forced evictions and the destruction of these agroforestry systems by forestry officials (with assistance from the military) are well documented (Fay et al., 2000). Forestry officials often justify their actions as being in defense of "forest functions" (Kusworo, 2000), without specifying what these functions are or proving that these functions are deficient in the actual land use. ***Exclusion by definition*** is thus the main threat to the contributions agroforestry can make to sustainable forest management, directly related to criterion 7 of the Montreal process. Improvements in this situation will require a 'negotiation support system' that is based on critical examination of claims on real environmental service functions, along with recognition of the various stakeholder interests (Van Noordwijk et al., 2001).

⁴ This Section drawn from van Noordwijk et al, 2003.

3.2 Access to and production of quality planting material

The success or failure of any tree planting activity depends on many factors. The most important biological factor is tree seed quality and quantity. Seed quality determines the upper limit of yield and productivity of labor, fertilizers, and other inputs (Cromwell et al 1992, Cromwell 1990). In the absence of other inputs, seed quality will enhance growth and productivity, particularly on degraded sites (Simons et al., 1994). Adequate quantities of tree seed assure that planting targets can be achieved. Quality germplasm of appropriate species is an important innovation and intervention, particularly for smallholders farming marginal lands, who have low capacity to absorb high risk and few resource options. Unfortunately, the availability of adequate quantities of quality tree seed is often limited. In Southeast Asia, including Indonesia, quality tree seed is most often controlled by the formal seed sector, i.e. research organizations, government agencies, and forest industry (Harwood et al. 1999). In Indonesia, farmers, community organizations and even government projects/offices lack access to good quality tree seed (Roshetko 2001; Roshetko et al 2004a). Efforts must be made to link smallholders with sources of quality seed and expand access to a wider range of species that are suitable to the biophysical and socioeconomic conditions smallholders face. The publication of a Tree Seed Suppliers Directory (Roshetko et al 2003) helps address this need. Additionally, ICRAF and Winrock International have developed and field tested ‘tree seed collection and management guidelines’ that are appropriate for farmers and field workers (Mulawarman et al. 2003). Enhancing local tree seed access could include the development of smallscale farmer seed orchards, integrated into farmers multispecies, multiproduct traditional tree farming systems (Roshetko et al. 2004b). Farmer-designed trials (FDT) are a low-cost method to increase farmer participation in species evaluation and agroforestry technology development process for their specific biophysical and socioeconomic conditions (Roshetko et al 2004c), as well as to enhance the effectiveness of research activities to meet farmers’ needs and improve their welfare (Franzel et al. 1998). Efforts to improve germplasm security should include the development of farmers’ tree propagation and tree nursery management skills. Training and participatory nursery development are proven methods of building farmers awareness, leadership and technical skills; and independence regarding germplasm quality, production and management capacity (Koffa and Garrity 2001; Carandang et al 2006).

3.3 Producing quality products tailored to markets

Most smallholder agroforestry systems are characterized by limited proactive management and planning. Spacing is irregular and species components often primarily the result of chance. (Manurung et al 2006; Michon 2005) and farmers often lack technical capacity (Gintings et al., 1996; Daniel et al, 1999; Gunasena and Roshetko, 2000). Harvesting products is often the most common management activity, with minimal weeding to control herbaceous and woody competition. As a result, the quality and quantity of products may be far below the systems’ potential. The productivity of most smallholder agroforestry systems can be improved by enhancing smallholder management skills. Key skills include: species selection/site matching; identifying tree farming systems that match farmers’ land, labor and socioeconomic limitations – including annual crops, tree crops, intercropping and understorey cropping options; tree management options to produce high quality products; pest and disease management; and soil management. Efforts should seek to develop a range of deliberate management techniques for trees and systems that enable farmers to produce quality products for specific market opportunities (Roshetko et al. 2007).

Smallholders generally have weak market linkages and poor access to market information (Hammett 1994; Arocena-Fransico et al. 1999). In the Philippines, Predo (2002) found that tree farming was more profitable than annual crop production, but uncertain marketing conditions deterred tree planting. The existence of accessible markets for tree products is vital for the development of tree farming systems (Scherr 1995, 1999; Landell-Mills 2002). Otherwise, the development of economically viable systems is doubtful. However, the dynamics of tree product supply, market demand, and marketing channels at the smallholder level are poorly understood by farmers and researchers alike. Local and regional dealers serve very important roles – collecting, sorting, grading and transporting raw materials. One of the largest risks reported by middlemen is unreliable quality and quantity of smallholder products. This uncertainty, plus the time and expense required to interact with numerous smallholder, are usually cited as the reason dealers pay low rates to individual farmers (Roshetko et al. 2007). The absence of price incentives at farmer level for higher quality products, however, maintains the status quo on quality. This constraint on the contribution of agroforestry to sustainable forest management can be overcome, if public domain information access on market conditions improves. By understanding market linkages and interactions, it should be possible, at relatively low cost, to improve smallholder farmers' livelihoods by focusing their agroforestry production towards market opportunities (Roshetko and Yuliyanti, 2002).

3.4 Overregulation of access to markets

Many national policies that are intended to conserve and protect natural resources discourage the cultivation – and thus conservation – of indigenous species by restricting their utilization or trade. Selective deregulation of trade in agroforestry timber species is an attractive policy option (Tomich and Lewis, 2001b) that can stimulate equitable economic growth while protecting the environment. Partly in response to market regulation, industrial timber plantation schemes, especially those linked to a pulp and paper processing plant, often develop 'outgrower' schemes, that lead to a vertical integration of production and processing, providing credit for the initial investment, linked to an obligation to sell to the factory. A recent overview (Mayers and Vermeulen, 2002) of the experience with company-community forestry partnerships, shows that farmers appear to be best off where the credit requirements for tree planting and tending are evaluated on financial viability criteria and de-coupled from the obligation to sell to a specific processor. Getting the dynamics of decision-making efficient, equitable and sustainable in 'community- forestry partnerships' is not easy but examples exist where it has been achieved.

3.5 Lack of rewards for environmental services

Trees in a landscape, across the whole spectrum from natural forest to intensively managed plantations, can have positive environmental effects or 'provide environmental services'. In the absence of a 'reward structure', the presence or absence of these services is left to decision makers to whom off-farm benefits and costs are 'externalities'. Development of efficient and effective reward structures for environmental services, is thus an important way to achieve environment *plus* development goals (Landell-Mills and Porras, 2002; Murdiyarso et al., 2002; Tomich et al., 1998, 2001a; van Noordwijk et al 2006)). The possibility of 'rewards for carbon storage' can apply to smallholder tree planting in fine-grained landscape mosaics, once issues such as leakage and additionality are dealt with (Suyanto et al. 2006; Leimona et al, 2006).

Box 4. Multifunctionality in practice: environmental services from multistrata coffee

The multistrata coffee farms provide a livelihood to people with few other options and also control erosion similarly to natural forest. The multistrata system provides a complex canopy that protects the soil surface from heavy raindrops that cause erosion. The system creates tree litter on the garden floor that also helps weaken the erosive force water and provides nutrients to the soil. *Gliricidia sepium*, *Erythrina subumbrans* and are the most common of shade trees; all three species are nitrogen-fixing legumes contributing to increased soil nitrogen from the biomass litter. The rate of decomposition of the litter of these species is fast, which is good for improving soil fertility (Hairiah et al 2005).

Mix of tree species in coffee agroforestry system have different pattern of rooting depth that provide a good protection of the soil surface and also increase river bank stability (Hairiah, et al 2006). A combination of deep rooted trees for anchoring and shallow rooted grass with high root density for stabilizing topsoil is generally perceived to stabilize slopes prone to mass movement. Coffee is suitable for anchoring and soil surface holding at the river bank, but it has a low root length density. Therefore, planting coffee tree with other trees is an important and successful strategy to stabilize river banks. The common legume shade trees in coffee agroforestry systems - *Gliricidia sepiu*, *Leucaena leucocephala* and *Erythina subumbrans* - are the tree most frequently used for government reforestation programs. *Calliandra calothyrsus*, another common leguminous agroforestry tree, has shallow rooted and high root density, while most timber and fruit trees have deep rooted.

Deep tree rooting systems in coffee agroforestry also improve nutrient recycling by function as a nutrient safety net (taking up nutrients which leach out to the subsoil) and nutrients pump (taking up nutrients release from mineral weathering in deeper layers (Hairiah, et al, 2000).

Van Noordwijk, *et al.* (2002) and Hairiah, *et al.* (2002) assessed the carbon stocks in Sumberjaya catchment. It was found that coffee systems has soil C stocks in the upper 30 cm of the soil that were 57% - 76% of remnant forest in Sumberjaya or 45% - 60% of the values expected for the primary forest in Sumatra. The mean estimated aboveground carbon stocks of remnants forest in Sumberjaya is 176 Mg/ha and around 92% of this is derived from live trees. In coffee systems, the aboveground carbon estimates varied depending on the type of systems. Ranging from 7 Mg/ha for monoculture, 23 Mg.ha⁻¹ for shaded coffee and 34 Mg/ha for multistrata systems. The annual C accumulation rate of the coffee systems is 1 - 1.9 Mg C/ha/yr, depending on the type of systems.

From an economic perspective multistrata coffee system are financially and economically viable and also generate sustainable employment opportunity in rural area with better returns to labor. Internal rate of returns (IRR) of the systems varies between 21.4% and 36.5% and it employs 107 to 166 person-day per hectare per year (Budidarsono and Wijaya, 2004).

3.6 Lack of institutional support

Strong institution determines the sustainability of the program. Among the many institutional issues, the human resource of the extension organization is one of the most important things to discuss. With the decentralization era, the authority of the extension organization is under the jurisdiction of the district government. Most of the extension workers are in Java, while this HTR program will be implemented in the outer islands, in particular Sumatra and Kalimantan, not to mention the quality of those extension workers, and the government budget allocated for this program.

The HTR most likely will face a lot of conflicts since the data available on the legal status in the Department of Forestry is incomplete. Consequently, the 'clean and clear' policy of the State Forest can not be easily achieved. For this reasons, there is a need to have conflict resolution and management mechanism in the district levels, with forms of 'negotiation support' (Van Noordwijk et al., 2001).

4. Five policy implications

To increase the probability of success there must be:

1. A reduction of demand together with an increase in supply of fiber for pulp;
2. Contracts with local households and farmer organizations that are negotiated with those people who have proprietary rights over the areas to be planted;
3. A HTR program framework that is incentive-based and commercially competitive by proving "free choice" by farmers of the tree species they plant;
4. A deregulation and liberalization of the planting and transport of timber and other locally grown tree products (including a harmonization of "forest" and "non forest" tree species);
5. Investments into improved extension systems through a stronger partnership between the Departments of Forestry, Agriculture, Trade and Industry as well as between central and local government.

Of the five policy implications above, the Department of Forestry has taken action on some. Earlier this year, the Minister of Forestry signed a decree that deregulated the harvesting and transport of timber from Sengong (*Paraserianthes falataria*), coconut, and rubber trees (farmer grown trees that are easily recognizable). The Department is now working with local government to determine on a provincial basis which other species can follow. This is an important first step towards increasing economic competitiveness of these tree species and creating a better climate for local investments into planting and management.

The Department of Forestry has also demonstrated openness to civil society participation into the design and implementation of the HTR program. Several public seminars have been conducted. Many representatives of local government have participated in discussions on the HTR design. While the Ministerial Regulation that spells of the program design as a follow up to Government Regulation 6, 2007, is still in draft form, indications are that many of the issues outlined in this paper are being discussed and debated with the desired result being more and better options for local people to participate in increasing Indonesia's forest cover while increasing local welfare. The options for community forest leases of up to 100 years in the context of HTR will be a big step towards effective local incentives for sustainable management.

References

- Afrizal, 2007. The Nagari community, business and the state. The origin and the process of contemporary agrarian protests in West Sumatra, Indonesia. Sawit Watch and Forest Peoples Programme, Bogor, Indonesia.
- Arocena-Francisco, H., de Jong, W., Le Quoc Doanh, de Guzman, R.S., Koffa, S. Kuswanda, M., Lawrence, A., Pagulon, A., Rantan, D., Widawati, E. 1999. 'Working Group 1 – External factors affecting the domestication of agroforestry trees (economics and policy)'. In J.M. Roshetko and D.O. Evans. (eds), Domestication of agroforestry trees in Southeast Asia. Forest, Farm, and Community Tree Research Reports, special issue 1999, pp 212-213.
- Bertomeu M. 2004. Smallholder timber production on sloping lands in the Philippines: A systems approach. Laguna, Philippines. World Agroforestry Centre - ICRAF, SEA Regional Office. 257 p. <http://www.worldagroforestry.org/sea/Publications/searchpub.asp?publishid=1197>
- Bouamrane, M. 1996. A Season of Gold – putting a value on harvests from Indonesia agroforest. in *Agroforestry Today* 8 (1) : 8-11
- Brown T. and Simangunsong B., 2005. "CBFM" Contribution to the Economy: Analysis of Alternative Scenarios. DFID – MFP
- Budidarsono S and Wijaya K. 2004. Praktek konservasi dalam budidaya kopi robusta dan keuntungan petani. *AGRIVITA*. 26(1):P. 107-117.
- Carandang, W.M., E.L. Tolentino and J.M. Roshetko. 2006. Smallholder Tree Nursery Operations in Southern Philippines – Supporting Mechanisms for Timber Tree Domestication. *International Tree Crops Journal* (in press).
- Chomitz, K.M., 2007. At loggerheads? Agricultural expansion, poverty reduction and environment in the tropical forests. World Bank Policy Research Report, the Worldbank, Washington (DC), USA.
- Colchester, M., Jiwan, N., Andiko, Sirait, M., Firdaus, A.Y., A. Surambo and Pane, H., 2006. Promised Land: Palm Oil and Land Acquisition in Indonesia – Implications for Local Communities and Indigenous Peoples. Forest Peoples Programme, Sawit Watch, HuMA and ICRAF, Bogor. http://www.forestpeoples.org/documents/asia_pacific/bases/indonesia.shtml
- Contreras-Hermosilla A., Fay C. 2005 Strengthening Forest Management in Indonesia through Land Tenure Reform: Issues and Framework for Action. Washington, DC. and Bogor, Indonesia Forest Trends and World Agroforestry Center. 2005.
- Cossalter, C., Pye-Smith, C., 2003. Fast-wood forestry: myths and realities. CIFOR, Bogor.
- Cromwell, E. 1990. 'Seed Diffusion Mechanisms in Small Farmer Communities: Lessons Learned from Asia, Africa and Latin America. Overseas Development Institute, Network Paper No. 21. 57p.
- Cromwell, E, E. Friis-Hansen and M. Turner. 1992 . The Seed Sector in Developing Countries: a Framework for Performance Analysis. Overseas Development Institute, Working Paper No. 64. 71 p.
- Daniel, J, Verbist, B., Carandang, W.M. , Kaomein, M., Mangaoang, E., Nichols, M., Pasaribu, H. and Zeiger, Z. 1999. 'Working Group 4 – Linkages for training and information dissemination'. In J.M. Roshetko and D.O. Evans (eds), Domestication of agroforestry trees in Southeast Asia. Forest, Farm, and Community Tree Research Reports, special issue 1999, pp 226-228.
- de Foresta, H dan G. Michon. 1994. Agroforestry in Sumatra – Where ecology meets economy. *Agroforestry Today* 6-4 : 12-13
- de Foresta, H dan G. Michon. 1997. The Agroforest alternative to Imperata grassland :when smallholder agriculture and forestry reach sustainability. *Agroforestry System* 36 : 105-120
- Dupain, D. 1994, A Traditionally Agroforestry area in Mutation : Pesisir CNEARC, Montpellier, France
- Fay, C., Sirait, M. and Kusworo, A., 2000. Getting the Boundaries Right: Indonesia's Urgent Need to Redefine its Forests Estate, World Agroforestry Center, Bogor, Indonesia

- Franzel S. et al. 1998. Farmer-designed agroforestry trials: farmers' experiences in western Kenya. In: Franzel S. and Scherr S. (eds) *Trees on the Farm: Assessing the Adoption Potential of Agroforestry Practices in Africa*. CABI Publishing, Wallingford, UK, pp. 111–123.
- Garrity, D.P., 1997. Agroforestry innovations for Imperata grassland rehabilitation: workshop recommendations. *Agroforestry Systems* 36: 263-274.
- Garrity, D.P., Soekardi, M., Van Noordwijk, M., de la Cruz, R., Pathak, P.S., Gunasena, H.P.M., van So, N., Huijun, G. and Majid N.M., 1997. The Imperata grasslands of tropical Asia: area, distribution and typology. *Agroforestry Systems* 36: 3-29
- Gintings, A.N., Anwar, C., Samsudin, I., Siregar, M.E., Punama, B.M. and Kasirin. 1996. 'Agroforestry characterization in Pakuan Ratu and Tulang Bawang Tengah, North Lampung District, Lampung'. In M. van Noordwijk, T. Tomich, D. Garrity, and A. Fagi (eds.), *Proceedings of a workshop: Alternatives to Slash-and-Burn Research in Indonesia*, Bogor, Indonesia, 6-9 June 1995, ASB-Indonesia Report, Number 6. ASB-Indonesia and International Centre for Research in Agroforestry (ICRAF), Bogor, Indonesia. Pp 59-68.
- Gunasena, H.P.M. and Roshetko, J.M. 2000. *Tree Domestication in Southeast Asia: Results of a Regional Study on Institutional Capacity*, International Centre for Research in Agroforestry (ICRAF) Bogor, Indonesia. 86 pp.
- Hairiah, K., Van Noordwijk, M. and Purnomidhi, P., 2000. Agroforestration of imperata grasslands. – Lecture Notes. International Centre for Research in Agroforestry (ICRAF), Bogor, Indonesia.
- Hadi, D.P. and Van Noordwijk, M., 2005. Agro-ecosystems, their population densities and land cover in Indonesia in the context of upland-lowland relationships. ICRAF-Southeast Asia, Bogor.
- Hairiah K, Utami SR, Suprayogo D, Widiyanto, Sitompul SM, Sunaryo, Lusiana B, Mulia R, Van Noordwijk M, and Cadisch G. 2000. Agroforestri pada Tanah Masam di Daerah Tropika Basah: Pengelolaan Interaksi antara Pohon-Tanah-Tanaman Semusim. International Centre for Research in Agroforestry (ICRAF), Bogor, Indonesia.
- Hairiah K, Arifin J, Berlian, Prayogo C, and Van Noordwijk M. 2002. Carbon stock assessment for a forest-to-coffee landscape in Malang (East Java) and Sumber-Jaya (Lampung, Indonesia). In: Lin K, Lin J, Huang H. (eds.). *International Symposium on Forest Carbon Sequestration and Monitoring*, Taipei, Taiwan, p: 28-36.
- Hairiah K, Suprayogo D, Widiyanto, and Prayogo C. 2005. Trees that Produce Mulch Layers which Reduce Run-off and Soil Loss in Coffee Multistrata System.. In *Alternatives to Slash and Burn in Indonesia: Facilitating the Development of Agroforestry Systems, Phase 3 Synthesis and Summary Report. Proceedings of a Workshop held in Bogor*. Agus F and Van Noordwijk M. World Agroforestry Centre, Southeast Asia. Bogor, Indonesia.
- Hairiah K, Widiyanto, Suprayogo D, Lestari ND, Kurniasari V, Santosa A, Verbist B, and Van Noordwijk M. 2006. Root Effects on Slope Stability in Sumberjaya (Indonesia).. Paper presented at the International Symposium toward Sustainable Livelihood and Ecosystems in Mountainous Regions. Chiang Mai, 7-9 March 2006.
- Hammett, A.L. 1994. 'Developing community-based market information systems'. In J.B. Raintree and H.A. Francisco (eds), *Marketing Multipurpose Tree Species in Asia*. Proceedings of an International Workshop, Baguio City, Philippines, 6-9 December 1993. Winrock International. Bangkok, Thailand. Pp 289-300.
- Harwood, C., Roshetko, J.M., Cadiz, R.T., Christie, B., Crompton, H., Danarto, S., Djogo, T., Garrity, D., Palmer, J., Pedersen, A., Pottinger, A., Pushpakumara, D.K.N.G., Utama, R., van Cooten, D. 1999. 'Working Group 3 – Domestication strategies and process'. In: J.M. Roshetko and D.O. Evans. (eds) *Domestication of agroforestry trees in Southeast Asia*. Forest, Farm, and Community Tree Research Reports, special issue 1999, pp 217-225.
- Kerr J, Meinzen-Dick R, Pender J, Suyanto S, Swallow BM and van Noordwijk M. 2005. BASIS Brief: Property rights, environmental services and poverty in Indonesia. Madison, USA. Department of Agricultural and Applied Economics, University of Wisconsin.
- Koffa, S.N. and Garrity, D.P. 2001. Grassroots empowerment and sustainability in the management of critical natural resources: the Agroforestry Tree Seed Association of Lantapan'. In I. Coxhead and G. Buenavista (eds), *Seeking Sustainability: Challenges of Agricultural Development and Environmental Management in a Philippine Watershed*, Los Banos Laguna. Philippines, Philippine Council for Agriculture, Forestry and Natural Resources Research (PCCARD), pp 197-217.

- Kusters, K., de Foresta, H., Ekadinata, A. and van Noordwijk, M., 2007. Towards solutions for state vs. local community conflicts over forestland: the impact of formal recognition of user rights in Krui, Sumatra, Indonesia. *Human Ecology* 10.1007/s10745-006-9103-4
- Kusworo, A., 2000. Perambah hutan atau kambing hitam? Potret sengketa kawasan hutan di Lampung. Pustaka Latin, Bogor.
- Landell-Mills, N. 2002. Marketing Forest Environmental Services – Who Benefits?, Gatekeeper Series No. 104. International Institute for Environment and Development (IIED), London.
- Landell-Mills, N. and Porras, I.T. 2002. Silver Bullet or Fools' gold? A global review of markets for forest environmental services and their impacts on the poor. International Institute for Environment and Development. London: Russell Press.
- Leimona B, Boer R, Arifin B, Murdiyarso D and van Noordwijk M. 2006. Singkarak: Combining Environmental Service Markets for Carbon and Watershed Functions? In: Murdiyarso D and Skutsch M, eds. Community Forest Management as a Carbon Mitigation Option: Case studies. Bogor, Indonesia. Center for International Forestry Research.
<http://www.worldagroforestry.org/sea/Publications/searchpub.asp?publishid=1507>
- Levang, P. 1989. Farming System and Household Income" in Transmigration and Spontaneous Migration in Indonesia. Departement Transmigrasi – ORSTOM pp:193-283
- Manurung, G.E.S., Roshetko, J.M., Budidarsono, S., and Tukan, J.C. 2006. Dudukuhan – Traditional Tree Farming Systems for Poverty Reduction. 2006. Smallholder tree growing for sustainable development and environmental conservation and rehabilitation. In: Trees in Agricultural Landscapes: Smallholder tree growing for sustainable development and environmental conservation and rehabilitation. Leiden University and Isabela State University. Cabagan, Isebella, Philippines. In press.
- Mary, F. and G. Michon. 1987. When Agroforest driveback natural Forest : A socio- conomic analysis of a rice/agroforest system in South Sumatra; in *Agroforestry Systems* 5. ICRAF 1987 pp 27-55
- Mayers J. and Vermeulen, S., 2002. Company-community forestry partnerships: from raw deals to mutual gains. Instruments for sustainable private sector forestry series. International Institute for Environment and Development (IIED), London.
- Michon G., 1993 The damar gardens : existing buffer zones adjacent to Bukit barisan Selatan national park . ITTO Tropical Forest management Update 3(3) pp: 7- 8
- Michon, G. 2005. Domesticating Forests. How farmers manage forest resources. Center for International Forestry Research and World Agroforestry Centre. 187 p.
- Michon G. and J. M. Bompard, 1987. Agroforesteries indonésiennes: contributions paysannes à la conservation des forêts naturelles et de leurs ressources. *Rev. Ecol. (Terre Vie)* 42: 3-37.
- Michon, G. and H. de Foresta, 1995. 'Agroforest : an original agro-forestry model from smallholder farmers for environmental conservation and sustainable development, in Traditional Technology for Environmental Conservation and Sustainable Development in the Asian-Pacific Region' in Ishizuka, K., S. Hisajima, and D.R.J. Macer, 1995. Proceeding of the UNESCO-University of Tsukuba International Seminar on Traditional Technology for environmental Conservation and Sustainable Development in the sian-Pasific Region, held in Tsukuba Science City, Japan, 11-14 December, 1995. pp 52-58,
- Mulawarman, J.M. Roshetko, S.M. Sasongko and D. Irianto. 2003. Tree Seed management – Seed Sources, Seed Collection and Seed Handling : a Field Manual for Field Workers and Farmers. World Agroforestry Centre (ICRAF) and Winrock International. Bogor, Indonesia. 54 p.
- Murdiyarso D., Van Noordwijk M., Wasrin, U. R., Tomich T.P. and Gillison A.N., 2002. Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra, Indonesia. *Journal of Vegetation Science* 13: 429-438
- Murdiyarso D, Puntodewo A, Widayati A and van Noordwijk M. 2006. Determination of eligible lands for A/R CDM project activities and of priority districts for project development support in Indonesia. Bogor, Indonesia. Center for International Forestry Research (CIFOR). 39 p.
- Nawir, A. A. and L. Santoso. 2005. "Mutually beneficial company-community partnerships in plantation development: emerging lessons from Indonesia." *International Forestry Review* 7(3): 177-192

- Potter, L. and Lee, J. 1998. Tree Planting in Indonesia: Trends, Impacts and Directions. CIFOR Occasional Paper No.18. Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Pradhan, M., A. Suryahadi, S. Sumarto, L. Pritchett. 2000. Measurements of Poverty in Indonesia: 1996, 1999, and Beyond. Social Monitoring and Early Response Unit Working Paper June 2000.
- Predo, C. 2002. Bioeconomic Modeling of Alternatives Land Uses For Grasslands Areas and Farmers' Tree-Growing Decisions in Misamis Oriental, Philippines, Ph.D. Dissertation, Los Baños, Laguna, Philippines. University of the Philippines at Los Baños.
- Purnomosidhi, P., Hairiah, K., Subekti Rahayu, S., Van Noordwijk, M. 2005. Small-holder options for reclaiming and using *Imperata cylindrical* L. (alang-alang) grasslands in Indonesia. In: C.A.Palm, S.A. Vosti, P.A. Sanchez, P.J. Ericksen and A.S.R. Juo (Eds.) *Slash and Burn: The Search for Alternatives*. Columbia University Press, New York (USA) 248-262
- Rappard, F.W., 1937. Vervolgnota betreffende het voorkomen en de bevolkingscultuur van *Shorea javanica* in Kroe, Zuid Sumatra [Note about the occurrence and the plantation by the local people of *Shorea javanica* in Krui, South Sumatra]. Unpublished, 11 pp. Abstract 1102 in C.P. van Goor and J. Kartusubrata (Eds.) 1982. Indonesian Forestry Abstracts, Dutch Literature until about 1960, PUDOC Wageningen.
- Roshetko, J.M. 2001. Strengthening Germplasm Security for NGOs and Smallholders in Indonesia, First Annual Report. ICRAF and Winrock International, Bogor, Indonesia. 32 p.
- Roshetko, J.M. dan Yuliyanti. 2002. Pemasaran untuk hasil-hasil wanatani di tingkat petani. Dalam: J.M. Roshetko, Mulawarman, W.J. Santoso dan I.N. Oka. *Wanatani di Nusa Tenggara*. Prosiding Lokakarya Wanatani Se-Nusa Tenggara, 11-14 November 2001. Denpasar, Bali. International Centre for Research in Agroforestry (ICRAF) dan Winrock International.
- Roshetko, J.M., Mulawarman, Suharisno, D. Iriantono and F. Harum. 2003. *Direktori Penyedia Benih Pohon di Indonesia (Directory of Tree Seed Suppliers in Indonesia)*. Edisi Kedua (Second Edition). World Agroforestry Centre (ICRAF) dan Winrock International. Bogor, Indonesia. 110 p.
- Roshetko, J.M., Mulawarman, and A. Dianarto. 2004a. Tree seed procurement-diffusion pathways in Wonogiri and Ponorogo, Java: Indonesia's main source of tree seed. ICRAF Southeast Asia Working Paper, No. 2004-1.
- Roshetko, J.M., Mulawarman, and D. Iriantono. 2004b. Kebun benih untuk petani and LSM – Mengapa dan bagaimana. (Seed orchards for farmers and NGOs – Why and how.). *Gema Desa Hutan (GeDeHa)*, Special Supplement 2004 'Benih untuk Rakyat'.
- Roshetko, J.M., P. Purnomosidhi and Mulawarman. 2004c. Farmer Demonstration Trials (FDTs): Promoting tree planting and farmer innovation in Indonesia. P 384-392. In: J. Gonsalves, T. Becker, A. Braun, J. Caminade, D. Campilan, H. De Chavez, E. Fajber, M. Kaporiri and R. Vernooy (eds). *Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook*. International Potato Center-Users' Perspectives With Agricultural Research and Development, Laguna, Philippines; International Development Research Centre, Ottawa, Canada; International Fund for Agricultural Development, Rome, Italy. 3 volumes.
- Roshetko, J.M., E. Nugraha, J.C.M. Tukan, G. Manurung, C. Fay, and M. van Noordwijk. 2007. *Agroforestry for Livelihood Enhancement and Enterprise Development*. Proceedings of the international workshop for Integrated Rural Development in East Nusa Tenggara held 5-7 April 2006 in Kupang, West Timor, Indonesia. In press.
- Scherr, S.J. 1995. 'Economic factors in farmer adoption of agroforestry: Patterns observed in western Kenya', *World Development* 23(5): 787-804.
- Scherr, S.J. 1999. 'The economic context for agroforestry development: evidence from Central America and the Caribbean', *Outlook on Agriculture* 28(3): 163-170.
- Sibuea T, Herdimansyah Th. 1993. The variety of Mammal species in the agroforest reas of Krui (Lampung), Muara Bungo (Jambi) and Maninjau (West Sumatra). Final research report, Orstom and Himbio.
- Simons, A.J., D.J. MacQueen and J.L. Stewart. 1994. Strategic Concepts in the Domestication of non-industrial Trees. 91-102 pp. In: R.R.B Leakey and A.C. Newton (eds). *Tropical Trees: the Potential of Domestication and Rebuilding of the Forest Resources*, p. 91-102. Queensland, Australia.

- Sutanto, J. (Ed.), 2006. *Revitalisasi Pertanian dan Dialog Peradaban*. Penerbit Buku Kompas, Jakarta. 847 pp
- Suyanto DA, van Noordwijk M, Lusiana B and Eka Dinata A. 2006. Way Tenong and Sidrap: Tree Planting and Poverty Alleviation, Indonesia. In: Murdiyarso D and Skutsch M, eds. *Community Forest Management as a Carbon Mitigation Option: Case studies*. Bogor, Indonesia. Center for International Forestry Research (CIFOR). P. 74-84.
<http://www.worldagroforestry.org/sea/Publications/searchpub.asp?publishid=1508>
- Suyanto, S. 2006. *Conditional Land Tenure: A Pathway Healthy Landscapes and Enhance Livelihoods*” Sumberjaya Brief No. 1. World Agroforestry Centre. Bogor, Indonesia.
- Suyanto, S. Khususiyah, N. and Leimona, B. 2007. *Poverty and Environmental Services: Case Study in Way Besai Watershed –Lampung*. Ecology and Society. Forthcoming.
- Tata, M.H.L., M. van Noordwijk, S. Rasnovi, L. Joshi, 2007. *Pengayaan jenis di wanatani karet dengan meranti*. (forthcoming)
- Thiollay JM. 1995. The role of traditional agroforests in the conservation of rain forest bird diversity in Sumatra. *Conservation biology* 9(2): 335-353.
- Tomich, T.P. and J Lewis, J., 2001. *Deregulating Agroforestry Timber to Fight Poverty and Protect the Environment*. . ASB Policybrief #3. Nairobi: Alternatives to Slash-and-Burn Programme, October 2001.
- Tomich, T.P., Kuusipalo, J., Menz, K. and Byron, N., 1997. Imperata economics and policy. *Agroforestry Systems* 36: 233-261.
- Tomich, T.P., Van Noordwijk, M., Vosti, S. and Whitcover, J., 1998. *Agricultural Development with Rainforest Conservation: Methods for Seeking Best Bet Alternatives to Slash-and-Burn, with Applications to Brazil and Indonesia*. *Agricultural Economics* 19: 159-174
- Tomich, T.P., Van Noordwijk, M., Budidarsono, S., Gillison, A., Kusumanto T., Murdiyarso, D. Stolle, F. and Fagi, A.M., 2001. *Agricultural intensification, deforestation, and the environment: assessing tradeoffs in Sumatra, Indonesia*. In: Lee D.R. and Barrett, C.B. (eds.) *Tradeoffs or Synergies? Agricultural Intensification, Economic Development and the Environment*. CAB-International, Wallingford pp 221-244
- Torquebiau, E. 1984. *Man-made dipterocarp forest in Sumatra in Agroforestry System 2.2*, ICRAF 1984. pp. 103-128.
- Van Noordwijk, M., Tomich, T.P. and Verbist, B. 2001. *Negotiation support models for integrated natural resource management in tropical forest margins*. *Conservation Ecology* 5(2): 21. [online] URL: <http://www.consecol.org/vol5/iss2/art21>
- Van Noordwijk M, Rahayu S, Hairiah K, Wulan YC, Farida A, and Verbist B. 2002. *Carbon Stock Assessment for a forest-to-coffee Conversion Landscape in Sumberjaya (Lampung, Indonesia): from Allometric Equations to Land Use Change Analysis*. *Science Meeting in China, series C*. Vol.45 supp.
- Van Noordwijk, M., Roshetko, J.M., Murniati, Angeles1, M.D., Suyanto, Fay,C., and Tomich, T.P. 2003. *Agroforestry is a Form of Sustainable Forest Management: Lessons from South East Asia*. UNFF Intersessional Experts Meeting on the Role of Planted Forests in Sustainable Forest Management Conference, 24-28 March 2003, Wellington, New Zealand
- Van Noordwijk, M., Arifin, B. and Leimona, B., 2006. *Criteria and mechanisms for rewarding upland poor for the environmental services they provide*. In: Ai Dairah, L. Nurida, Irawan, Edi Husen and Fahmuddin Agus (Eds.) *Revitalisasi dan Multifungsi Pertanian [Multifunctionality and Revitalization of Agriculture]*. Proceedings of Seminar 27-28 June 2006, Bogor. Indonesian Agency for Agricultural Research and Development, Jakarta, Indonesia. pp 124 - 154.
- Wibawa, G., S. Hendratno dan M. Van Noordwijk. 2005. *Permanent smallholder rubber agroforestry systems in Sumatra, Indonesia*. In: C.A. Palm, S.A. Vosti, P.A. Sanchez & P.J. Ericksen (Eds.) *Slash and Burn: The Search for Alternatives*. Columbia University Press, New York (USA): 222-232.
- Wijayanto, N. 1993. *Potensi pohon kebun campuran damar matakucing di Desa ahmungan, Lampung*, Laporan Orstom-Biotrop
- Worldbank, 2007. *Sustaining economic growth, Rural livelihoods, and environmental benefits: Strategic options for forest assistance in Indonesia*. Worldbank, Jakarta

Attachment

A case study of areas indicated for HTR in Batang Toru, N. Sumatra

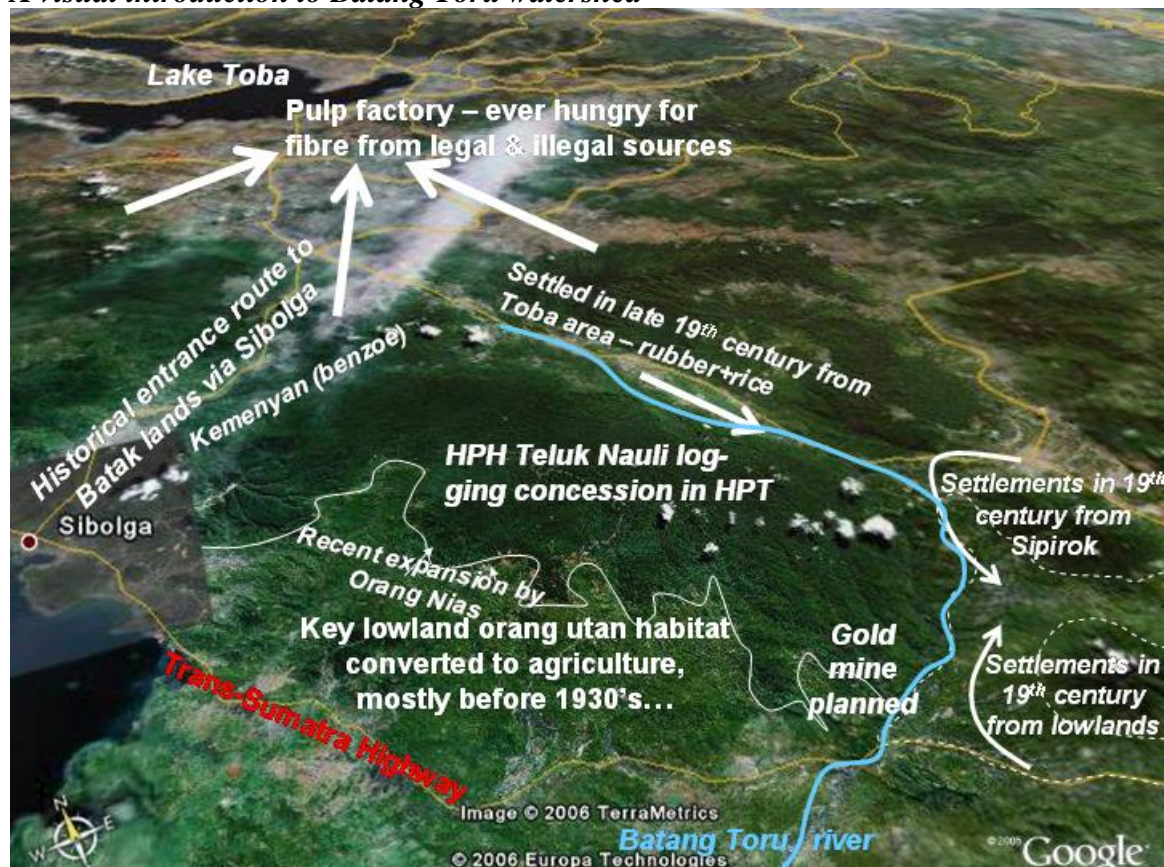
As part of the 'peoples plantation' or Hutan Tanaman Rakyat plans, the Ministry of Forestry, through its BaPlan & FORDA agencies, prepared maps for a number of provinces of the area where HTR rules could be applied, plus an indication of what species would be suitable for the local soil and climate. These are 'indicative' at this stage.

As a 'case study' we analyzed these maps and reports for an area in North Sumatra where we have done recent fieldwork: the Batang Toru watershed in Tapanuli Utara, Tapanuli Tengah and Tapanuli Selatan. We overlaid the map that indicated areas that could be used for HTR according to a recent FORDA report, with three other datasets in our geographic information system:

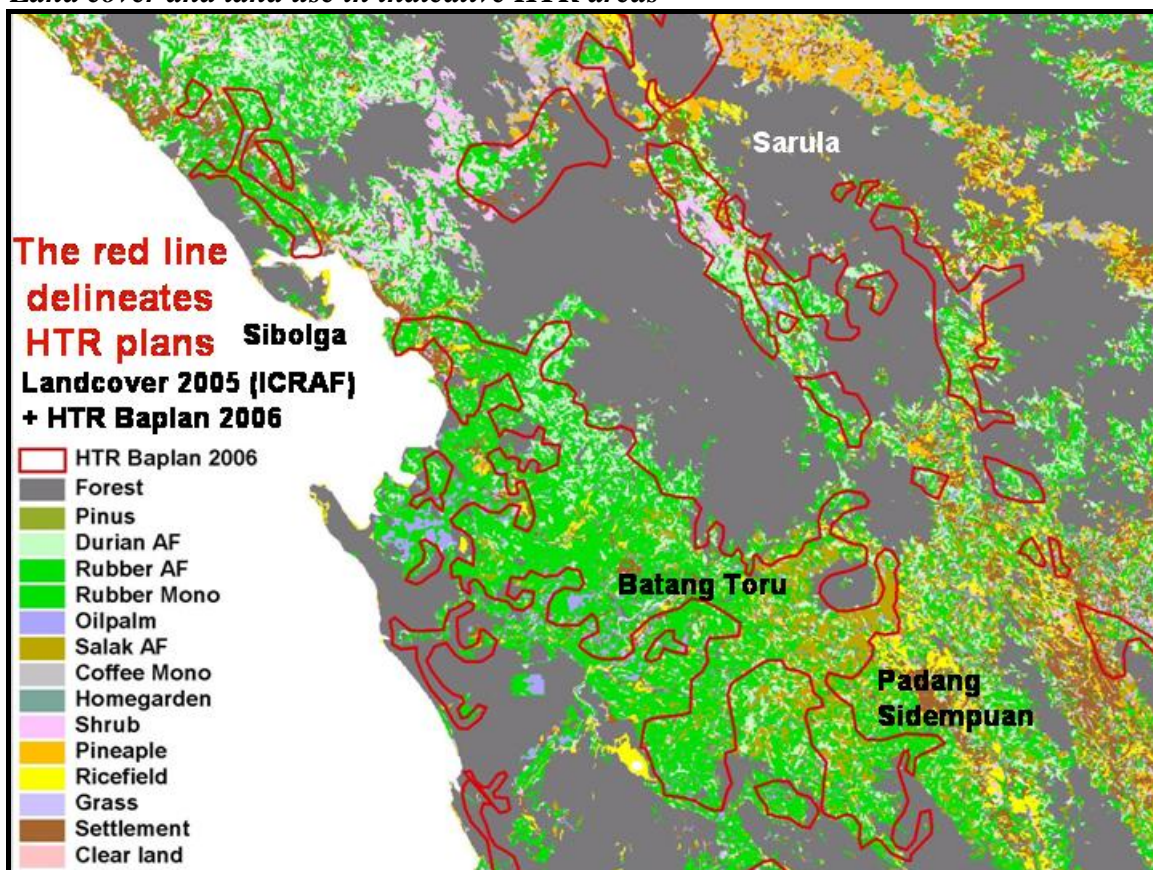
- current vegetation based on an interpreted 2005 satellite image (the expectation was that most HTR would have a 'shrub' (semak/belukar) type of land cover,
- indicative forest function (TGHK or RTRW), the expectation was that all HTR would be in 'production forest',
- land ownership, with the expectation that HTR would be part of the Kawasan Hutan Negara, where the Ministry of Forestry has indeed the right to develop contracts such as HTR.

In fact, all three expectations proved to be seriously in contrast with the data.

A visual introduction to Batang Toru watershed

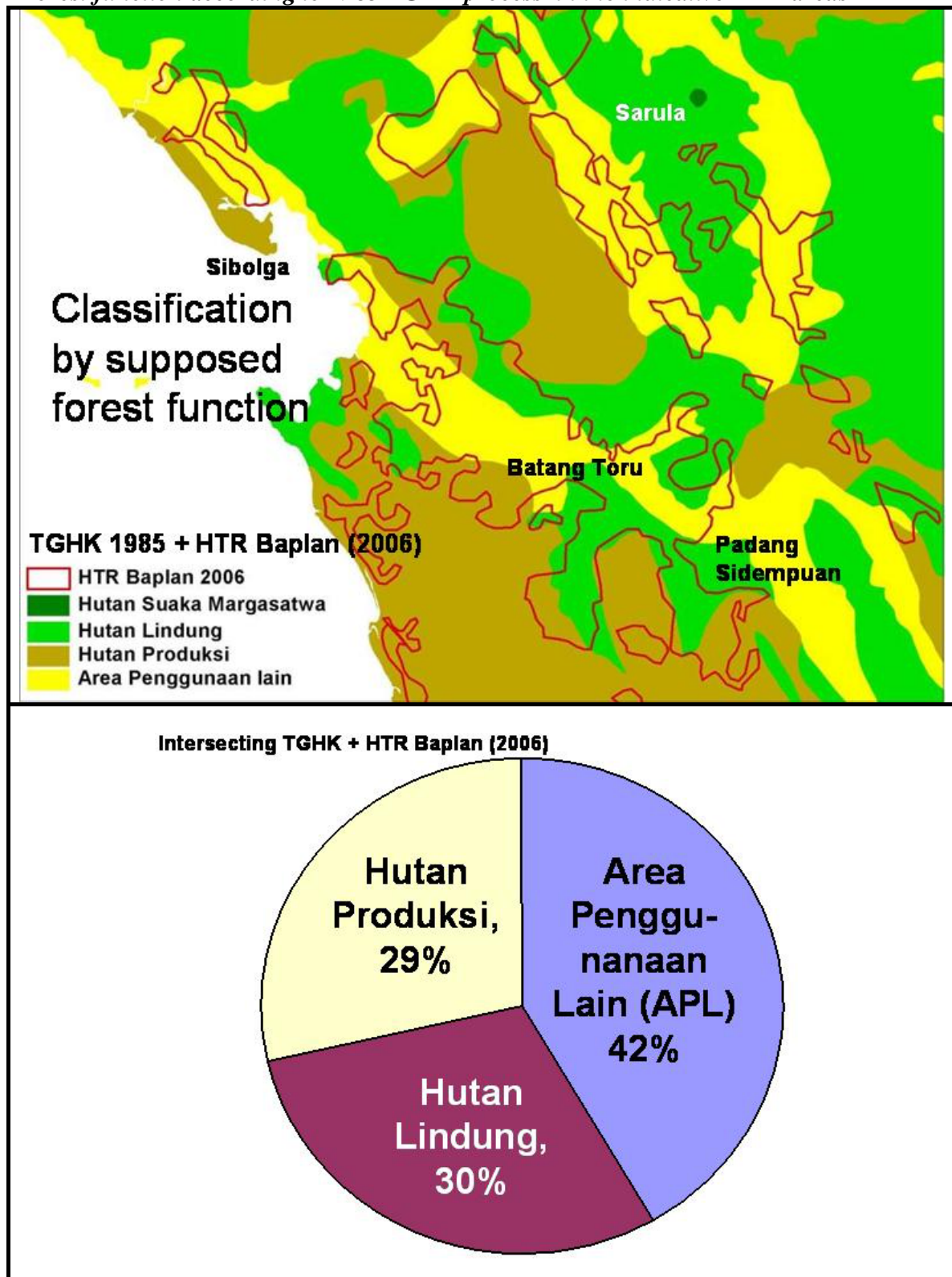


Land cover and land use in indicative HTR areas

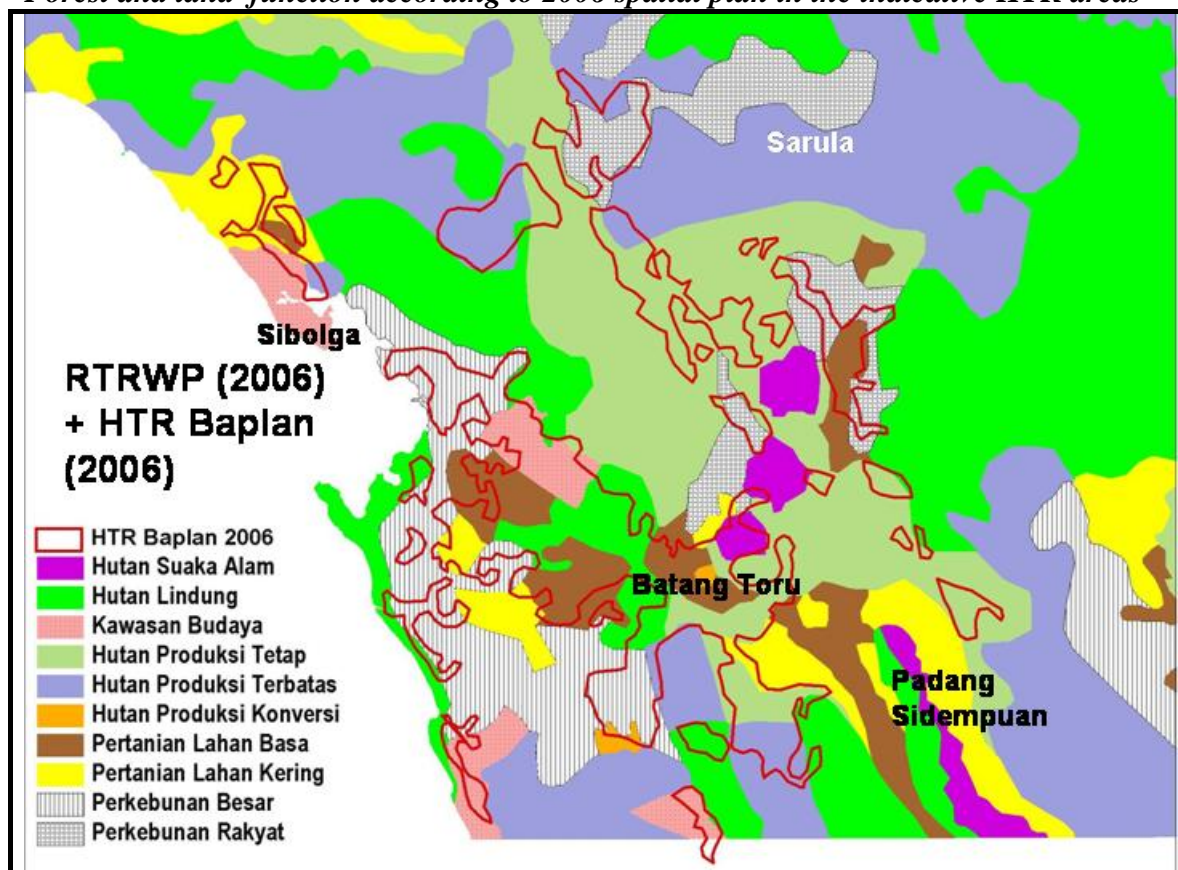


| Land cover | Area (ha) | % |
|---------------------------------------|---------------|------------|
| Belukar/early forest regrowth | 361 | 2 |
| Semak/shrub | 99 | 1 |
| Tanah Terbuka/open land | 3 | 0 |
| Karet Agroforest/ rubber AF | 4200 | 28 |
| Hutan/Forest + Kemenyan agroforest | 2762 | 18 |
| Durian Agroforest | 1746 | 12 |
| Karet Monokultur / Monoculture rubber | 1742 | 12 |
| Salak Agroforest | 1008 | 7 |
| Pemukiman / Settlements | 740 | 5 |
| Kebun Campur / Mixed gardens | 639 | 4 |
| Sawah / Paddy rice fields | 364 | 2 |
| Nanas /Ananas plantation | 164 | 1 |
| Sawit /Oil palm plantation | 162 | 1 |
| Kopi Monokultur / Coffee monoculture | 106 | 1 |
| Hutan rawa / Swamp forest | 659 | 4 |
| Pinus plantation | 37 | 0 |
| No data | 255 | 2 |
| Total | 15.047 | 100 |

Forest function according to 1985 TGHK process in the indicative HTR areas

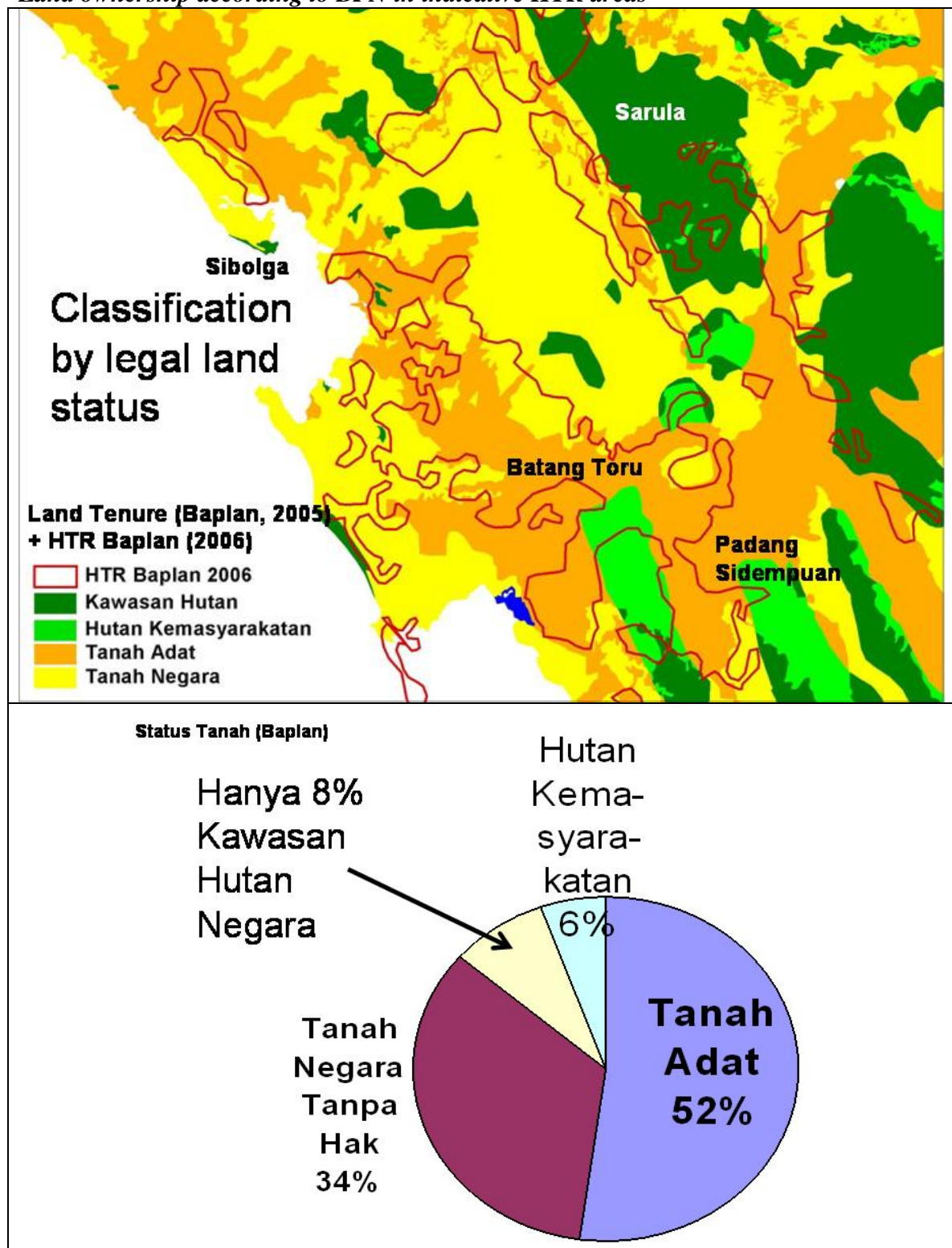


Forest and land function according to 2006 spatial plan in the indicative HTR areas



| No | RTRWP (2006) | % Luas |
|----|---|--------|
| 1 | Hutan Suaka Alam & Hutan Wisata | 2 |
| 2 | Hutan Lindung | 11 |
| 3 | Kawasan Budaya Bersumber dari Kawasan Hutan | 7 |
| 4 | Hutan Produksi Tetap | 22 |
| 5 | Hutan Produksi Terbatas | 14 |
| 6 | Hutan Produksi Konversi | 1 |
| 7 | Pertanian Lahan Basah | 15 |
| 8 | Pertanian Lahan Kering | 5 |
| 9 | Perkebunan Rakyat | 9 |
| 10 | Perkebunan Besar | 14 |
| 11 | | 100 |

Land ownership according to BPN in indicative HTR areas



Discussion

The case study data suggest a considerable gap between the reality on the ground (as represented in our data – there are obviously a number of inaccuracies in the data) and the initial perceptions of what a HTR area would look like:

- Only 3% of the area does not currently have a productive tree cover, agricultural use or is a settlement,
- Only 29% of the land is indicated as ‘production forest’; 30% is ‘protection forest’ from which supposedly no timber can be harvested, and 42% has a general (agricultural) land use indication, which might include farm forestry,
- In only 8% is the Forestry Department the legal land owner according to the Land Authority, and in a legal position to enter into contracts with other stakeholders.

This is only one ‘sample’, where we had ‘ground truth’ data from recent fieldwork. But it is at least suggestive that the existing ‘indicative’ HTR maps are not a reliable and sufficient basis to develop policies.

A brief discussion of the findings with respect to the three paradigms:

| Paradigm 1 | Paradigm 2 | Paradigm 3 |
|---|--|---|
| Within this paradigm the Batang Toru area is completely unsuitable for HTR, despite the vicinity of a large pulp factory around lake Toba; land clearing would involve considerable loss of capital in productive trees, currently providing for local livelihoods. | Within this paradigm, the government could enter into contracts with the local community on the 34% Tanah Negara Tanpa Hak + 8% of State Forest Lands, to regularize the status quo, and stimulate timber production (at least outside of the ‘protection forest’ zone; on 6% there is already a HKM arrangement | This paradigm could apply to the 52% Tanah Adat in the indicate HTR area, and could lead to a reduction of current constraints on farmers’ harvesting and marketing of trees from land they control |

The FORDA document also suggests tree species that would be suitable for the local soil and climate condition. Three of the most favoured ‘peoples trees’ are noticeably absent from this list: Durian (the most valued species from the local forest tree flora, and a producer of high quality timber as well as marketable fruits), Kemenyan (Styrax, Benzoe) the older agroforest species, with a 2-thousand year history of export and trade, and Para Rubber (Hevea brasiliensis), the exotic (naturalized) tree that provides for the largest share of local income, and is a valuable source of wood as well.

The questions of ‘which lands’, ‘which rules’, ‘what trees’ and ‘by whom’ will all have to be reconsidered before the concept of Hutan Tanaman Rakyat can be applied in an areas such as Batang Toru.

A substantial improvement in the quality and types of data that are used for policy development is needed before public policy in the forest sector can be said to be ‘informed by the facts’.

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The World Agroforestry Centre is the international leader in the science and practice of integrating 'working trees' on small farms and in rural landscapes. We have invigorated the ancient practice of growing trees on farms, using innovative science for development to transform lives and landscapes.

Our vision

Our Vision is an 'Agroforestry Transformation' in the developing world resulting in a massive increase in the use of working trees on working landscapes by smallholder rural households that helps ensure security in food, nutrition, income, health, shelter and energy and a regenerated environment.

Our mission

Our mission is to advance the science and practice of agroforestry to help realize an 'Agroforestry Transformation' throughout the developing world.



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