

Agroforestry for Livelihood Enhancement and Enterprise Development

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Abstract: Agroforestry is a dynamic, ecologically based, natural resources management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels. By nurturing trees on their farms, pastures and homesteads farmers have been managing agroforestry systems for millennia. Most smallholder farmer agroforestry systems are diverse, multi-species, and integrate trees with annual crops and/or animals. Traditionally, these systems are extensive in nature, with small quantities of many products produced for household consumption. Tree management tends to be non-intensive and largely limited to product harvesting. The advent of market economies and improved rural infrastructure has expanded commercial opportunities to many farm communities. However, traditional tree management often leaves communities ill-equipped to produce reliable quantities of high-quality products that meet market specifications. In addition, a lack of security of land tenure has, in many places, led to a corresponding lack of incentives for farmers to invest in long-term land management improvements. Experience also indicates that farmers lack access to professional technical assistance and have limited linkages to market channels and information. As a result, most farmers do not manage their trees because they are not sure where to focus and not sure what can be sold. A system of technical assistance and innovations is needed to empower farmers to seize market opportunities by enhancing and diversifying the productivity/profitability of their agroforestry systems. This paper presents an integrated approach that emphasizes market studies and analysis that appraise existing and future demand for products that are or can be produced by farmers; farmer group extension to help farmers address market opportunities; and farmer group evolution towards farmer enterprise development when appropriate. Examples of impact achieved through the implementation of this approach and its components are provided.

Introduction

Agroforestry is a dynamic, ecologically based, natural resources management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels (ICRAF 2006). Agroforestry systems maybe defined as land-use systems in which woody perennials (trees, shrubs, palms, bamboos) are deliberately used on the same land management unit as agricultural crops (woody or annual), animals or both, in some form of spatial arrangement or temporal sequence (Huxley and van Houten 1997). For millennia, farmers developed and managed agroforestry systems by nurturing trees on their farms, pasture lands and homesteads. Traditionally these systems produced a wide variety of products such as timber, fuelwood, fruits, vegetables, spices, resins, and medicines, primarily to meet household needs but also to generate some income through sales in local markets. Decline in the area of forests, the advent of market economies and improvement of rural infrastructure have opened commercial opportunities for farm communities to expand or intensify their agroforestry systems. This type of process has been documented in Bangladesh (Byron 1984), Sri Lanka (Gunasena 1999), North Mindanao, the Philippines and the highlands of Kenya (Place et al. 2002). In Indonesia the following commodity-oriented agroforestry systems have evolved: repong damar system (Krui, Lampung), jungle rubber system (Jambi and South Sumatera), tembawang fruit and timber system (West Kalimantan), pelak cinnamon system (Kerinci, Jambi), durian fruit garden (Gunung Palung, West Kalimantan), and parak fruit system (Maninjau, West Sumatra) (de Foresta et al, 2000).

Market opportunity and willingness to establish agroforestry systems, does not always translate directly to technical capacity and success. Although market-oriented agroforestry systems have developed in many areas, there are a greater number of areas where such systems have not yet developed. Our experience indicates there are a number of factors that might stifle the development of smallholder agroforestry. In many areas smallholder farmers have little experience with intensive tree planting; and little access to technical information and germplasm (seed or seedlings). In Central America, the Caribbean and Kenya Scherr (1995 and 1999) identified that the following conditions favor the development of successful

smallholder agroforestry systems: available planting material of species that are appropriate for the site and agroforestry system, experience with tree planting and management, and accessible markets. Potter and Lee (1998) found that the ability of smallholders to plant trees or expand traditional tree-based systems is limited by resource scarcity, absence of technical capacity and experience, as well as market and policy disincentives. In Lampung, Indonesia a team of socioeconomic, forestry, horticulture and livestock specialists determined that smallholder agroforestry systems and the productivity of those systems are limited by a lack of technical information, resources and consultation (Gintings et al. 1996). Across Southeast Asia, smallholders' tree planting activities are often restricted by limited access to quality planting material, poor nursery skills and a dearth of appropriate technical information (Daniel et al 1999; Gunasena and Roshetko 2000).

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 (Cromwell et al. 1993; Simons et al. 1994). In Southeast Asia quality tree seed is most often controlled by the formal seed sector (research organizations, government agencies, and forest industry) to which smallholders have little access (Harwood et al. 1999). Efforts must be made to link smallholders with these sources of quality germplasm and expand smallholder access to a wider range of species that are suitable to the biophysical and socioeconomic conditions they confront. This should include developing 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).

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). 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.

Smallholders generally have weak market linkages and poor access to market information (Hammett 1994; Arocena-Fransico et al. 1999). Working 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 a vital criterion for site selection (Scherr 1999 and 1995; Landell-Mills 2002). Otherwise, the development of economically viable systems is doubtful.

In summary, the following factors seem to have strong bearing on the successful development of market-oriented smallholder agroforestry systems: i) secure land tenure/use conditions; ii) supportive policy conditions; iii) access to and knowledge regarding the management of quality germplasm; iv) tree management skills and information; and v) adequate market information and linkages. The first two factors, land tenure and policy support, are basic enabling conditions required to facilitate the development of smallholder systems. Developing supportive tenure and policy conditions often requires broad-based negotiations that include participation from local, regional and national governments as well as the private sector and community organizations. A central part of such negotiations is determining just what environmental services require careful regulation (Fay et al. 2005). Successful negotiations lead to consensus land management agreements and natural resource security for local farmers. The other three factors: quality germplasm, tree management and market linkages, are technical issues that can be effectively addressed at the local level by government extension agencies, non-government organizations (NGOs), farmer organizations and/or individual farmers.

The World Agroforestry Centre and Winrock International have worked on these three technical factors in Southeast Asia since the early 1990s. Our experience indicates that these factors can be successfully

addressed through a replicable and efficient extension approach designed to reach motivated and innovative farmers who are committed to improving their incomes by increasing the production and market acceptance for their agroforestry products (Roshetko et al. 2004a). The approach includes emphasis in three components: market studies and analysis to appraise the existing and future demand for products that are or can be produced by farmers; farmer group extension to help farmers address market opportunities; and farmer group evolution towards farmer enterprise development when appropriate. These three components are interdependent and conducted simultaneously, with technical assistance and farmer group development based on market opportunities. This paper documents our experience with this approach and its three components.

Market Studies and Analysis

Experience in Indonesia indicates that farmers generally: i) lack access to market information (product demand, specifications and prices); ii) lack understanding of market channels; iii) produce products of unreliable quality and quantity; iv) rarely engage in grading or processing to improve product quality (and their profit-margin); and v) sell their products as individuals (not through groups to achieve economies of scale). These conditions also have negative consequences for market agents. They spend a lot of time and other resources searching for, collecting and sorting smallholder products of some quantity and mixed quality. According to marketing agents, the time/effort consuming nature of engaging farmers is one of the main reasons why farmers are paid low rates for their products (Roshetko and Yulianti 2002, Tukan et al 2006a). In order to enhance farmers' livelihoods and develop agroforestry-based enterprises the shortcomings mentioned above should be documented and then addressed.

Our approach is to conduct market surveys using a rapid survey format modified from ILO (2000) and Betser (2001) to identify and understand: i) the agroforestry species and products that hold potential for farmers (their specifications, quantities, seasonality, etc.); ii) the market channels that are used and hold commercial potential for smallholder products; iii) the marketing problems faced by farmers and market agents; iv) the opportunities to improve the quantity and quality of farmers' agroforestry products; and v) market integration (through vertical price correlation and price transmission elasticity) and efficiency.

We start with informal visits to make observations in the study area and hold discussions with farmers and other stakeholders. The information from these visits and knowledge gained from relevant secondary information is used to customize the market survey. The survey is then conducted with farmers, market agents and other key stakeholders within the project area. The information provided by each respondent is followed through the market chain to the end consumer until information concerning the market channel is complete. The information gathered is cross-checked with direct observation and informal discussions with relevant respondents and different groups of stakeholders in the project area. The cross-checking process continues until the information gathered is clear and consistent, with no new information being found. A draft summary of the information is then shared with stakeholders in a formal meeting or workshop. This provides an opportunity for additional cross-checking with individual and groups of stakeholders. Any inconsistencies or gaps in the information are identified and addressed through further field investigation. Once these questions are answered a summary of 'farmer marketing conditions and priorities' (priority species, marketing channels and agents, farmers' market roles, marketing problems, and opportunities) is finalized. At this point, work plans are developed to identify and agree on actions that farmers, market agents and other stakeholders can take to improve the production and marketing of smallholder products.

Our approach is an iterative process. It utilizes relevant information gathered from participatory appraisals (both individual and group discussions) with various stakeholders, direct observation, detailed surveys, and secondary data sources. Its iterative feature and the utilization of multiple sources allow all the information and data to be reviewed and checked for accuracy. Appropriate planning is a prerequisite for successful implementation of the complete marketing approach as well as for each component activity.

Farmer Group Extension

Our farmer group extension approach seeks to empower motivated farmers to enhance and diversify the productivity/profitability of their agroforestry systems strengthening their capacity to seize market opportunities, both existing and developing. This approach can be used with NGOs as well. Initial training

is provided to farmer or NGO leaders that i) analyzes existing conditions and problems, ii) identifies technical options, and iii) sets work agendas. According to work agendas, more intensive follow up assistance is provided to farmer groups that these leaders have helped to organize. The approach is flexible and dynamic, adjusting to actual conditions of the target communities. Furthermore, it is informal, practical, impact-oriented and focused on priorities identified by target communities. To avoid wasting resources and time, efforts are made to keep the structure and process of the farmer group approach simple and straightforward. Farmer groups are seen as an effective means of reaching a large number of farmers. The formation and maintenance of farmer groups is not an objectives in itself (see Box 1).

Farmer leader training workshops focus on priority species, systems, problems, markets and/or other priorities. Common topics include seedling propagation and nursery management, tree and agroforestry system management, farmer–market linkages, and farmer-operated commercial enterprises. Training events are participatory and follow particular planning and implementation procedures. After initial discussions, our staff develop a training curriculum which is then reviewed by farmer leaders. During the training events, our staff or other resource persons provide relevant background information and then facilitate discussions. Working group sessions are held for farmer leaders to share and compile their experience and knowledge on relevant topics. Working groups then report to all participants in plenary. Hands-on sessions where farmers can practice new skills are common. The training events build the technical capacity of farmer leader participants. More importantly the training exposes leaders to new ideas and helps them recognize the depth of their own knowledgeable and the capacity they can offer to local community development. The training is very valuable in motivating the farmer leaders and helping them identify appropriate local priorities. Development of draft work plans is an integral part of each training event.

Following training workshops, staff assist farmer leaders or NGOs to: i) share the workshop ideas and results with a greater number of farmers, and ii) review, revise and implement the work plan drafted at the workshop. These follow-up technical assistance activities may include farmer meetings, mini-trainings, and field implementations such as nursery construction/operation or a farmer demonstration trial (FDT) establishment/management (Roshetko et al. 2005). The activities are mutually supportive and integrated so that the objectives and topics of each activity are relevant to the objectives and results of earlier activities. The follow-up assistance forms a continuous flow of contact and activities between the farmer groups and staff. Activities are implemented through three main channels: i) staff facilitating and monitoring progress towards achievement of farmer groups objectives on a periodic (monthly, bi-weekly, weekly) basis; ii) staff and other technical specialists (including market agents) providing subject-specific technical assistance as requested by farmer groups; and iii) farmer-to-farmer and farmer group-to-farmer group technical assistance on an informal basis, with facilitation by staff as illustrated in Figure 1).

INSERT Figure 1 near here.

The first channel assures frequent contact enabling staff to assist farmer groups to concentrate on their objectives and plans, monitor/gauge progress, and if necessary change their objectives. The second channel enables staff or other specialists to provide technical assistance related to previous activities or new topics requested by the group. These two channels allow staff to assist farmers develop their organizational capacity and provide opportunities to coordinate activities between farmer groups. They are important early in a program or series of activities. Experience indicates that the greatest impact is achieved through the third channel, farmer-to-farmer and farmer group-to-farmer group technical assistance. Farmer specialists are ‘farmers’ who intimately understand the conditions and concerns of fellow farmers. Their language and communication style is readily understood by the farmer participants. More comfortable under such conditions, farmer participants are more likely to ask questions and share their own experiences when farmer specialists lead the sessions. Active farmer participation leads to greater learning and sharing of knowledge. In the third channel staff retain the role of providing technical input, although their main role evolves to facilitating the extension process. A key function of staff is identify local ‘farmer specialists’ and communities where relevant successful ‘farmer based enterprises’ are located. Identifying these farmer specialists leads to the establishment of a strong network of farmers, farmer groups, technical specialists and related institutions – including market agents.

The third channel and resulting farmer network can lead to spontaneous farmer adoption, spontaneous farmer-to-farmer extension, and expansion of the farmer network. This may be the single greatest impact of the approach. For example, in Nanggung, West Java the ICRAF/Winrock team helped strengthen or form eight farmer groups which established eight tree nurseries. As the success of program activities was recognized, farmers from neighboring areas sought help from ICRAF/Winrock, but also directly from the program farmer groups. Those farmer groups helped neighboring communities develop eight sub-groups and together with ICRAF/Winrock provided technical assistance resulting in the establishment of an additional 38 group and individual nurseries. Using their own funds, some farmer groups even hired farmer specialists to provide training.

INSERT Box 1.

Farmer group evolution towards farmer enterprise development

The implementation of *market studies* and the *farmer group extension* components builds farmers' awareness of market conditions, enhances their technical skills, and forms and strengthens community-based farmer groups. The development of market awareness, technical skills and groups facilitate the development of farmer-based enterprises. What is an enterprise? An *enterprise* can be broadly defined as any *venture, project, endeavor, or activity*. Farmer-based enterprises encompass any activity that contributes to farmers' livelihoods or incomes. The role of ICRAF/Winrock is to assist or empower farmers to expand their activities (enterprises) to achieve improved livelihoods or higher incomes.

Experience indicates that initial efforts to expand farmers' activities/enterprises should focus on:

- improving the quality and quantity of farmers products through intensification or expansion of their agroforestry system
- improving quality and value of farmers' products through sorting, grading and packaging
- transforming farmers' products from a raw to semi-processed state
- learning about markets (product demand and specification) and developing market access (identifying channels and developing linkages with agents).

Intensification of farmers' usual activities typically involves the use of more/better agricultural inputs (improved germplasm, fertilizers, pesticides, and labor) and most importantly better planning to develop/utilize deliberate management regimes that will yield quality products to meet market specifications. The other three activities are likely to represent new initiatives for most farmers that are well within their capacity. Undertaking these activities also requires more inputs from the farmer – labor, time, capital, skills and planning. This is a significant investment for farmers that will be rewarded with higher incomes. The key to success is a well planned and executed market study and expanding farmer enterprises based on the market opportunities identified in the market study.

Any of the four activities mentioned above can be conducted more efficiently by a farmer group united in purpose and social context. Group members can share experience, knowledge, resources and responsibilities related to the enterprise for mutual benefit. It is an appropriate next step for the farmer group to assume a marketing role through proactive and cooperative involvement with willing market agents. This process should start small, gradually expanding as the capacity of farmers, program staff and agents grows.

In most circumstances, additional opportunity exists for individual farmers or farmer groups to form businesses or associations that focus on one or more of the following activities:

- transportation, wholesaling and other mid-channel activities
- processing raw materials and manufacturing finished goods.

Such enterprises require a profoundly different set of resources, information, skills, planning, and capital, than are available to most individual farmers or farmer groups. They also involve a lot of financial risk. Forming/operating those types of enterprises is not an easy progression and should be carefully evaluated before being pursued. Observation indicates that the development of such enterprises is dependent on an outside champion or local leader who is connected and knowledgeable regarding the operation of the

enterprise and/or able to shoulder financial risk. It is advisable that farmer groups focus on: i) the capacity to supply reliable quantities of high quality products; ii) establishment of permanent and profitable market linkages; and iii) development of sufficient entrepreneurial capacity to assure financial success – before considering investment in off-farm enterprises. In other words, farmer groups should first master the four activities listed previously before consider forming enterprises that tackle these other activities.

Successful applications of the extension approach in Indonesia

ICRAF/Winrock have implemented the market analysis, farmer group extension, and farmer enterprise development components across a range of locations, over different time periods, at various intensities. The components have been used both separately and together as a single approach. Examples of the application and associated impacts of each of the components and/or the full approach used by ICRAF/Winrock, or of similar approaches applied by associates, are presented here.

Indonesia contains large areas of degraded land and has a long history of both government and privately organized reforestation and tree planting activities. Tree seed is a key input for conducting these activities. With encouragement from government organizations, private seed companies, NGOs and their own activities, farmers are often a primary source of tree seed, operating seed collection enterprises at the family or farmer group level. Based on orders for specific quantities and species, farmers collect, dry, clean, grade and even package tree seed. Some individual farmers and farmer groups even plant trees for the purpose of seed production. In the Wonogiri-Ponorogo area of Central and East Java it is estimated that up to 22,500 farmers are involved in tree seed collection activities annually (Roshetko et al 2004b). These farm families earn Rp 275,000 to Rp 795,000 from their seed collection enterprises, which is equivalent to from 33 to 66% of their 3-monthly dry-season income. An ICRAF/Winrock survey of associates indicates that 15 of 22 NGO respondents are involved in tree seed enterprises directly or through farmer group partners. In total these enterprises sell 16 tons of seed annually, earning a gross income of Rp 36 million (Harum et al 2006). NGOs consider tree seed enterprises as positive programmatic components that provide tree seed to support their planting activities and income to offset operational expenses. Farmers, farmer groups and NGOs have developed the market awareness, technical skills and market linkages to operate viable tree seed and seedling enterprises. ICRAF/Winrock work with these individuals and organizations in Indonesia and the Philippines to strengthen their enterprises. Market information, capital investment, policy support, and technical training are the types of assistance these enterprises need to further expand their business (Carandang et al 2006; Harum et al. 2006).

In Krui, Lampung farmers have developed an agroforestry system based on the production of the resin damar (*Shorea javanica*), durain (*Durio zibethinus*), duku (*Lansium domesticum*) and other fruit and timber trees. Over roughly a 100-year period, farmers have developed keen market awareness and market linkages with regional, national and international dealers. Farmers plant and deliberately manage these priority species to produce products that meet market demand. Farmers' roles include harvesting, processing, and grading fruits and resins. They are rewarded with higher prices for their higher quality products (Michon et al 2000). ICRAF and IRD (Institut de Recherche pour le Development) have worked with these communities to enhance and document these locally-developed agroforestry enterprises.

ICRAF/Winrock implemented all three components in Nanggung, West Java to help farmers enhance their livelihoods through the development of agroforestry enterprises. Market studies identified a large unsatisfied demand in the greater Jakarta-Bogor area for five varieties of bananas (*Musa paradisiacal*). Results of the study included market specifications for different grades of bananas. ICRAF/Winrock conducted market awareness and technical training for interested farmer leaders regarding banana production, handling and marketing. We also revitalized farmer groups and conducted mini-training for a larger number of interested farmers. Market agents enthusiastically participated in these activities. Farmers and agents agreed that initial efforts would focus on improving post-harvest practices; farmers assuming fruit grading responsibilities; and bananas being sold and purchased by grade weekly at a specific day, time and place. Through these efforts, participating farmers more than doubled their gross receipts from bananas (from Rp. 6,500-10,000 to Rp. 20,000/bunch) without incurring additional monetary costs. Farmers estimate that their workload increased by two days a week, although these activities were conducted jointly with other farm activities and did not represent an absolute increase in their actual

workload. While agents and their staff spent more time and effort with farmer groups, their overall workload decreased because they dealt with 'groups' rather than individual farmers; received bananas that were already sorted by grade; and procured larger quantities or better quality bananas (Tukan et al. 2006a). After successfully developing this market link farmers began to expand banana cultivation focusing on the five priority varieties identified by the market study, and intensified cultivation according to recommendations made by ICRAF/Winrock (Tukan et al. 2006b). As a result banana productivity (fruit weight per stem) increased by 20-25%. Additionally, deliberate stem management and improved post-harvest management increased the portion of farmers' banana crop that met market grade specifications from 50-60% to 85%. As a result of improved banana production, handling, and marketing practices farmers reported that their agriculture-based income increased by about Rp2,161,000/year, representing an increase of 152% (Roshetko and Tukan 2006).

Similar process have been used at other sites in West Java, where farmer group partners of ICRAF/Winrock have made field visits to study successful farmer-based enterprises. In Purwakarta and Cimande, Bogor District an agriculture development project implemented by the District Agriculture Office from 1990 to 1994 promoted the production and marketing of mangosteen (*Garcinia mangostana*) and salak (*Salacca edulis*). After the project finished, district agricultural officers and farmer leaders maintained cooperation and forged linkages with regional and international markets. The farmer group enterprise is now well established and operates independently, while maintaining collaboration with the district agriculture officers. In 1998 farmers in Cipaku, Bogor District developed an enterprise focused on durian production and marketing with the assistance of the Fruit Research Agency in Bogor. A direct market linkage was developed with Jakarta-based agents, who guaranteed a high price for quality fruit. This linkage benefited both the producers (farmers) and the agent by avoiding local and district level collectors and agents. Farmers protect this lucrative market linkage by maintaining high quality products through deliberate management of their durian gardens. Cipaku farmers have also diversified their enterprise by developing commercial tree nurseries that produce high-quality seedlings of durian and other fruit species. These farmers have also become technical specialists and have been hired by farmer groups in neighboring villages and by projects in Aceh to provide 'farmer-to-farmer' technical training. Farmers and farmer groups from other parts of West Java frequently visit Nanggung, Purwakarta, Cimande and Cipaku, seeking to duplicate successful farmer enterprises in their communities. In most cases, these individuals and groups lack the knowledge, experience, resources and confidence to start an enterprise themselves. Empowering such farmers and farmer groups to initiate agroforestry enterprises is an important role for development organizations, research organizations, NGOs and government agencies.

Conclusions

Commercial opportunities exist for farm communities to transform their traditional agroforestry systems towards market orientation. To achieve this transformation, smallholder farmers must develop intensive deliberate management systems designed to yield quality products from priority species that meet market specifications. Most farmers are ill-prepared for this challenge because their traditional extensive management approach produces small quantities of many products primarily for household consumption with limited market sales. Based on experience at multiple sites in Indonesia, ICRAF/Winrock recommend a replicable and efficient extension approach designed to reach motivated and innovative farmers who are committed to improving their incomes by increasing the production and market access for their agroforestry products. The approach includes three components: i) market studies and analysis; ii) farmer group extension; and iii) farmer enterprise development. Training and activities undertaken in the farmer group extension and enterprise development components are based on market opportunities identified by the market survey. Initial attention is focused on farmer leaders, who then help extend more intensive follow-up assistance to farmer groups they have helped to organize. The approach is flexible and dynamic, adjusting to the conditions of target communities. The approach also can be used with NGOs. The approach defines *enterprises* broadly as any *venture, project, endeavor or activity*. Experience shows that farmers are best positioned to enhance their agroforestry-based incomes through the following activities (enterprises): i) improving the quality and quantity of their products through intensification or expansion of their agroforestry system; ii) improving the quality and value of their product through sorting, grading and packaging; iii) transforming their product from the raw to semi-processed state; and iv) learning about markets (product demand and specification) and developing market access (identifying channels and developing linkages with agents). These four activities can be efficiently implemented through a farmer

group that is united in purpose and social context. It is a natural next step for the farmer group to assume a marketing role through proactive/cooperative involvement with willing market agents. Program staff have the role of initiating and facilitating the approach and associated program activities. The involvement of farmer leaders, farmer specialists and market agents in planning and implementation should be from the start of the process. In time they should assume a leading role. Experience shows that farmer leaders, farmer specialists and market agents are keenly interested in the approach. The technical capacity, leadership qualities and confidence built through involvement in the approach benefit these stakeholders and lead to spontaneous farmer-to-farmer extension and spontaneous adaptation of program-promoted technologies by non-program farmers. We suggest that this approach has great potential to strengthen the success of national reforestation programs and environmental service programs through the development of market-based rewards.

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References

- 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.
- Betsler, L. and Degrande, A. 2001. Marketing Surveys. Lecture note. In: Tree Domestication in Agroforestry Module 2, Session 5. The World Agroforestry Center (ICRAF). Nairobi.
- Byron, N. 1984. 'People's forestry: a novel perspective of forestry in Bangladesh', *Association of Development Agencies in Bangladesh News* 11, 31-37.
- 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).
- Cromwell E., Friis-Hansen, E. and Turner, M. 1993. *The Seed Sector in Developing Countries: A Framework for Performance Analysis*, Overseas Development Institute Working Paper No. 64, Overseas Development Institute, London, UK.
- 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., A. Kusworo, G. Michon, dan W.A. Djatmiko. 2000. *Ketika Kebun Berupa Hutan: Agroforest Khas Indonesia Sebuah Sumbangan Masyarakat*. International Centre for Research in Agroforestry, Bogor.
- Fay, C., and G. Michon. 2005. Redressing forestry hegemony: When a forestry regulatory framework is best replaced by an agrarian one. *Forest, Trees and Livelihoods*. 15:
- 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. 1999. 'Domestication of agroforestry trees in Sri Lanka'. 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 49-53.
- 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.

- 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.
- Harum, F., D. Iriantono, and J.M. Roshetko. 2006. Role of the Forest Tree Seed Sub-sector in Procurement of High-quality Germplasm for Tree Planting Programs in Indonesia. 10 p. Paper presented at the National Tree Seed Forum, 27 January 2006, Manila, Philippines.
- 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.
- Huxley, P and van Houten, H. 1997. *Glossary for Agroforestry*. Nairobi, Kenya, International Centre for Research in Agroforestry (ICRAF). 108 pp.
- ICRAF: 2006, World Agroforestry Centre, Southeast Asia web site. (<http://www.worldagroforestrycentre.org/sea>).
- ILO (International Labor Organization). 2000. Rapid Market Appraisal: A Manual for Entrepreneurs. The FIT Manual Series. International Labor Organization. Geneva.
- 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.
- Landell-Mills, N. 2002. *Marketing Forest Environmental Services – Who Benefits?*, Gatekeeper Series No. 104. International Institute for Environment and Development (IIED), London.
- Manurung, G.E.S., Roshetko, J.M., Budidarsono, S., and Tukan, J.C. 2005. 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.
- Michon, G. 2005. Domesticating Forests. How farmers manage forest resources. Center for International Forestry Research and World Agroforestry Centre. 187 p.
- Michon, G., H. de Foresta, Kusworo, and P. Levang. 2000. The damar agroforests of Krui, Indonesia: Justice for forest farmers. In: C. Zerner (ed). *People, plants, and justice: The politics of nature conservation*. Columbia University Press, New York.
- Place, F, Zomer, R., Kruska, R., de Wolff, T., Kristjanson, P., Staal, S. and Njuguna, E.C. 2002. 'Development pathways in medium-high potential Kenya: A meso level analysis of agricultural patterns and determinants'. Paper presented at the Conference on Policies for Sustainable Land Management in the East African Highlands, held 24-26 April 2002 in Addis Ababa, Ethiopia.
- 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.
- 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.
- Roshetko, J.M. and Yuliyanti. 2002. Pemasaran untuk hasil-hasil wanatani di tingkat petani. In: J.M. Roshetko, Mulawarman, W.J. Santoso and I.N. Oka (eds.). *Wanatani di Nusa Tenggara*. Prosiding Lokakarya Wanatani Se-Nusa Tenggara, 11-14 November 2001. Denpasar, Bali. International Centre for Research in Agroforestry (ICRAF) and Winrock International.
- Roshetko, JM, C. Fay, S. Budidarsono, J. Tukan, E. Nugraha, N. Pratowo, and G. Manurung. 2004a. Agroforestry Innovations and Livelihood Enhancement in West Java. Final Report January 2003-September 2004. The World Agroforestry Centre (ICRAF), Winrock International and the Indonesia Institute for Forest and Environment (RMI). Bogor, Indonesia.
- Roshetko, J.M., Mulawarman, and A. Dianarto. 2004b. *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., Purnomosidhi, P. and Mulawarman. 2005. 'Farmer Demonstration Trials (FDTs):

- Promoting tree planting and farmer innovation in Indonesia'. In J. Gonsalves, T. Becker, A. Braun, J. Caminade, D. Campilan, H. De Chavez, E. Fajber, M. Kipiriri and R. Vernooy (eds). *Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook*, Laguna, Philippines, International Potato Center (CIP); Ottawa, Canada, International Development Research Centre; Rome, Italy, International Fund for Agricultural Development. 3 volumes. pp 384-392.
- Roshetko, J.M. and J.C.M. Tukan. 2006. Impact Assessment of Banana Production and Marketing Specialist Assignment. Winrock International. Little Rock, Arkansas. 8 p.
- Scherr, S.J. 1999. 'The economic context for agroforestry development: evidence from Central America and the Caribbean', *Outlook on Agriculture* 28(3): 163-170.
- Scherr, S.J. 1995. 'Economic factors in farmer adoption of agroforestry: Patterns observed in western Kenya', *World Development* 23(5): 787-804.
- Simons, A.J., MacQueen, D.J., and Stewart, J.L. 1994. 'Strategic concepts in the domestication of non-industrial trees'. In R.R.B. Leakey and A.C. Newton (eds), *Tropical Trees: the Potential for Domestication and Rebuilding of the Forest Resources*. Queensland, Australia, publisher, 284 pp.
- Tukan, C.M.J, J.M. Roshetko, S. Budidarsono, and G.S. Manurung. 2006a. Market Chain Improvement: Linking Farmers to Markets in Nanggung, West Java, Indonesia. *Acta Horticulturae*. (In press).
- Tukan, C.M.J, J.M. Roshetko, S. Budidarsono, and G.S. Manurung. 2006b. Banana Market Chain Improvement - Enhance Farmers' Market Linkages in West Java, Indonesia. Paper presented January 30, 2006 in Cairo, Egypt at the *Regional Consultation on Linking Farmers to Markets: Lessons Learned and Successful Practices to share innovative ideas resulting from Building New Partnerships in the Global Food Chain*.

BOX 1 – Farmer Groups as an Appropriate Method to Achieve Effective Impact

Focusing on farmer groups or NGOs is an appropriate method for achieving more efficient use of resources, reaching a large number of farmers and promoting the development of agroforestry-based enterprises. However, it is important to remember that the development or existence of 'farmer groups' is not an objective in itself. Farmer groups are an avenue to reach farmers, implement activities, affect change and achieve objectives. Farmer groups often change and may be ephemeral. Members come and go. The farmer group exists to serve the needs of the farmers – not a project, program or outside institution. Successful farmer groups may disappear after farmers have learned all they can under group conditions. At such times it may be more appropriate for farmers to focus on individual action. Effort should not be wasted trying to maintain a farmer group that has served its purpose or is not a cohesive unit.