

# Banana Market Chain Improvement – Enhance Farmers' Market Linkages in West Java, Indonesia

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## *Abstract*

*Farmers in Nanggung subdistrict live on or below the poverty line with access to less than 1 hectare of land, consisting of irrigated rice fields (0.3 ha) and upland tree gardens (0.5 ha). Traditionally, tree gardens products are intended for household consumption with some sales in local markets. Management is not intensive, the use agricultural inputs (fertilizers, pesticides, quality germplasm) is infrequent, and labor is focused on harvesting. Proximity to Jakarta and its infrastructure offer Nanggung farmers opportunity to target production to meet raising demand for fruit and vegetable products in lucrative urban and international markets. Fruit and vegetable products with a high demand include: banana, durian, mangosteen, rambutan, petai, jackfruit, chili peppers, tomatoes, sweet corn, peanuts, green beans and chickpeas. Banana holds particularly high potential, being the most common and profitable tree garden crop in Nanggung. Market demand far exceeds supply. Under Nanggung conditions bananas will produce fruit 12 months after establishment and then every 4-6 months thereafter. However, the quality of garden products is inconsistent and often inferior. Farmers have limited market knowledge and linkages. Farmers are interested in intensifying their tree farming activities, but hesitate because they are not sure where to focus their efforts. We report here ongoing work to assist Nanggung farmers improve their tree garden management to enhance both the quantity and quality of the products and strengthen their ability to respond to market opportunities. Banana is used as an example of how to achieve success.*

**Key words:** *agroforestry, tree gardens, deliberate management, market channel, banana, farmer income, poverty reduction*

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## **INTRODUCTION**

Farmers in Nanggung subdistrict live on or below the poverty line with access to less than 1 hectare of land, consisting of irrigated rice fields (0.3 ha) and tree gardens (0.5 ha). The tree gardens are complex multi-species systems integrated with perennial/annual crops, to monoculture timber plantations and fallow lands with low tree stocking. The tree component includes a large number of horticultural fruit/vegetable species, timber species and commodity species (coffee, rubber and cloves). Traditionally, tree garden products are intended for household consumption with some sales in local markets. The problem is however, that traditional farmers are taking a very messy approach to managing their crops. Management is not intensive, the use agricultural inputs (fertilizers, pesticides, quality germplasm) are infrequent, and labor is focused on harvesting. They do not prune trees, thin or bag fruit nor do they focus on varieties of crop species that have high commercial value.

Proximity to Jakarta and its infrastructure offer Nanggung farmers opportunity to target production to meet raising demand for fruit and vegetable products in lucrative urban and international markets. In 2001, Indonesia imported 241 million and 324 million kgs of fruit and vegetables, respectively, while exporting only 21 million kgs and 113 million kgs respectively (Ditjen BP2HP, 2004). This data indicates the huge market demand of fruits and vegetables in Indonesia. Market, forestry and agricultural professions agree that the tree gardens in Nanggung hold great market potential. However, the quality of garden products is inconsistent and often inferior. Although this situation is promising, Nanggung farmers are poorly linked to commercial markets. Farmers are interested in intensifying their tree farming activities, but hesitate because they are not sure where to focus their efforts. A mechanism of technical assistance and innovations is needed to empower farmers to gain market opportunities by enhancing and diversifying tree garden productivity. In January 2003, the World Agroforestry Centre (ICRAF), Winrock International and the Indonesia Institute for Forest and Environment (RMI), through the support of the United States Agency for International Development (USAID) Jakarta Mission, initiated a program in Nanggung to develop an extension approach to improve the agroforestry production systems and strengthen farmers' ability to respond to market opportunities. This program addresses the dual goals of livelihood enhancement (poverty reduction) and conservation by empowering farmer to improve the farm productivity and market linkages while preserving their traditional sustainable natural resource management approach. This paper summarizes program efforts to enhance smallholders' market linkages as a means to address livelihood enhancement.

## **MATERIALS AND METHODS**

### **Site**

Nanggung subdistrict, West Java covers 110 km<sup>2</sup> and is characterized by gently to steep slopes (BPS 2000). Nanggung subdistrict is divided into the lower, middle and upper stream, it is made up of 10 villages, 2 upstream, 4 middle and 4 down stream. Nanggung covers growing areas of varying altitude from 400 to 1800 meters above sea level. Rainfall is very dependable averaging over 4500mm per year with good distributed throughout the year. Soils are primarily andosols and latosols (Djuwansah 1997). The subdistrict has a human population of 74,000 and 7,002 ha of arable land, of which 47.7% are managed by government agencies, state companies and private corporations (BPS 2003). The remainder of the land is owned by farmers.

Nanggung area within 3 hours drive of Jakarta, the largest city in Indonesia and it takes 1 to 1.5 hours from the city of Bogor with a population of close to a million. These cities are a ready market for all of the products that can be produced in the Nanggung area, which is market linkages in Nanggung are relatively underdeveloped.

### **Target Audience and Program Partnership**

The research/development program was designed to develop 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 program was premised on providing initial training to farmer leaders and more intensive follow-up assistance to farmer groups organized by those farmer leaders. Farmer leaders were identified with community participation and program partners through introductory visits to each of the subdistricts' 10 villages and a formal inception workshop. ICRAF and Winrock personnel lead the program with assistance from RMI staff, district agriculture and forestry extension staff, national park field staff, university researchers, commercial nursery operators and traders. Partners' roles and responsibilities were discussed and agreed to at the program inception workshop, but continued to evolve throughout the program. As a group this partnership is referred to as *Team Kebun*.

### **Surveys**

Program implementation included a number of surveys and inventories. Those relevant to this discussion are (1) a baseline data survey to identify the socioeconomic characteristics of smallholder farmers; identify annual and tree cropping systems cultivated by those farmers; and identify marketing practices they follow; (2) market surveys to identify and understand the agroforestry species and products that hold potential for Nanggung farmers; identify the market channels that are used and hold commercial potential for smallholder products; identify the marketing problems faced by farmers and market agents; identify the opportunities to improve the quality and quantity of farmers' agroforestry products; identify market integration (through vertical price correlation and price transmission elasticity) and efficiency. and (3) tree garden inventory to verify the tree garden types previously noted through discussions with farmers and observation; identify species composition by garden type; and analyze the relationship between garden size, remoteness from the home, landscape location and tree diversity variables.

### **Technical Assistance**

Farmer leaders participated in a series of training workshops held over an 18-month period to enhance farmer leaders' technical capacity and market knowledge. Workshop activities concentrated on the following topics: i) species, problems and market prioritization; ii) tree propagation and nursery management; iii) tree garden management; iv) farmer-market linkages; v) cross-visit to farmer-operated commercial enterprises; and vi) participatory evaluation. Workshops are the foundation of the project core activity and provide farmer leaders technical training to enhance their capacity to analyze existing conditions and problems, identify technical options, set the work plan and the implementation. Workshops conducted with participatory approach, with sharing knowledge and information within farmers and farmer specialist, also input provided by technical specialist. Farmer leaders select and approve workshop topics and agendas. Farmer leaders and program staff are responsible to share

workshop information and results with the farmer groups and wider community through various follow-up assistance activities including farmer meetings, mini-trainings, field days, market-visits, cross-visits, demonstration trials and consultation with technical specialists. These activities were intended to confirm and implement follow-up work plans, as well as, develop farmer innovations and opportunities to achieve the program objective.

### **Farmer Demonstration Trials**

To help farmers enhance the quality and selection of banana trees and varieties on their farm a number Farmer Demonstration Trials (FDTs) were designed and established. FDTs are evaluation trials designed by researchers/extension staff with farmers for establishment and management under farmers' biophysical, socioeconomic, and management condition intended to: i) test and demonstrate the advantages of good germplasm (species, provenance, varieties, clones or seed sources); ii) expand on-farm tree resources; iii) inspire farmer/NGO innovation and iv) serve as a future source of on-farm germplasm (Roshetko et al. 2005). Such farmer-designed trials are the best way to evaluate farmer acceptability and profitability of the species and technologies tested, and to promote farmer innovation (Franzel et al. 1998).

## **RESULTS**

### **Farmer Profile**

Nanggung farmers controlled lands that comprise of irrigated paddy rice field, *kebun* (tree garden), *tegalan* (dry land for food crop cultivation) and *pekarangan* (home yard). Nanggung households own and/or control at least one parcel of land for cultivation. Regardless to type of lands, the average Nanggung smallholder cultivates 0.3 ha of irrigated rice and 0.5 ha of upland tree garden to support a family of 5. Although most of household in Nanggung engage in agriculture (consider themselves as farmers) agricultural does not the main contributor of the family incomes. Annual average income per household is Rp 9.22 million, ranging between Rp 325,000 and Rp 37.7 million. From living standard point of view, applying the poverty line of BPS (2002) for rural area of Indonesia and West Java Province in 2002 (Rp. 96,512 and Rp 96,455 capita<sup>-1</sup> month<sup>-1</sup> respectively or Rp 1,158,144 and Rp 1,157,460 capita<sup>-1</sup> year<sup>-1</sup>), 37.4% of respondent household live below the poverty line. Agricultural income contributed only 31.2% of the total households' incomes. Only 20% of households have agricultural income that account for 60% or more of their total income, and only 3.8% rely on agricultural income, as their sole source of income. Trade (operating small shops), service sector and industry are the most common sources of off-farm income. Industrial employment includes mining (gold and bentonite) and plantation work. Farmers engage in gold and sand mining as a means of self-employment.

### **Priority Species**

Priority species were identified by triangulating data from the first workshop, market studies and tree garden inventories. Comparison indicates that those species (or products) that hold the greatest potential to smallholder incomes in Nanggung are: banana (*Musa paradisiaca* L.), durian (*Durio zibethinus* Murr.), mangosteen (*Garcinia mangostana* L.), rambutan (*Nephelium lappaceum* L.), petai (*Parkia speciosa* Hassk.), jackfruit (*Artocarpus heterophyllus* Lam.), sengan (*Paraserianthes falcataria* L.), African wood (*Maesopsis eminii* L.), chili

peppers (*Capsicum annuum* L.), tomatoes (*Lycopersicon esculentum* Mill.), sweet corn (*Zea mays* L.), peanuts (*Arachis hipogaea* L.), green beans (*Vigna radiata* (L.) Wilczek) and chickpeas (*Cicer arietinum* L.) (Budidarsono et al. 2004).

### **Market Channels and Agents**

Fruit and vegetable products from Nanggung are market through four channels:

Channel 1: Farmer → local household or local market

Channel 2: Farmer → local collector → local trader → local customer or local market

Channel 3: Farmer → local collector → regional trader or retailer → urban customer (Bogor or Jakarta)

Channel 4: Farmer → local collector → local trader → regional trader → regional retailer → urban customer (Bogor or Jakarta)

The main types of market agents are farmers, collectors, local and regional traders and regional retailers. The role of farmers is largely restricted to production. Collectors, traders and retailers, to different degrees, all are engage in sorting, grading, storage and transportation. They also contribute market intelligence and capital to the marketing process.

Farmers sell 22% of their bananas through channel 2; 64% through channel 3; and 7% through channel 4. About 7% of the banana crop is consumed in homes. Although the price received by farmers is highest in channel 1, the volume of bananas sold through this channel is small because of limited local demand. On average, the price received by farmers does not vary between the other three channels. Farmers know little about how the different channels function. Channels 2, 3 and 4 are interlinked, but generally procure bananas of different quality - channel 2 (like channel 1) average quality bananas, channel 3 good quality bananas, and channel 4 the best quality bananas. The collectors in each channel are generally familiar with each other. Collectors in channel 2 sort bananas and sells high quality products in bulk to collectors in channels 3 or 4. Collectors and traders in channel 3 and 4 sort the bananas they procure for sale to down channel agents according to quality.

Table 1 provides a comparison of prices, costs and margins between the four channels. Buying price is the price an agent or customer pays for bananas. Selling price is the price a farmer or agent receives for the bananas. Marketing margin is the difference between buying and selling price. Marketing costs are the expenses incurred by an agent to prepare and sell the bananas. These costs include time, labor, transportation, processing and government fees. Marketing costs vary greatly by channel and agent. Farmers do not incur marketing costs because collectors purchase bananas directly from the farm. Profit margin is marketing margin minus marketing costs. The profit margin is different for each channel and agent. The highest profit margin is received by regional retailers (Rp 21,800/bunch) in channel 3; followed by local traders (Rp. 14,335) and local collectors (Rp 12,850) in channel 4; and then local collectors (Rp 12,050) in channel 3 and regional retailers (Rp 11,960) in channel 4. These profit margins do not consider fixed costs (vehicles, rents, maintenance of facilities, miscellaneous equipment and supplies) agents incur to operate their businesses.

Table 1. *Comparison of prices, costs and margins associates with different banana marketing channels.*

No	Descriptions	Channel 1		Channel 2		Channel 3		Channel 4	
		Price/ bunch (Rp)	Percen tage (%)	Price/ Bunch (Rp)	Percen tage (%)	Price/ bunch (Rp)	Percen tage (%)	Price/ bunch (Rp)	Percen tage (%)
1	<b>Farmers</b>								
	Selling Price	10,000	<b>100.00</b>	6,500	<b>23.21</b>	6,500	<b>14.77</b>	6,500	<b>10.83</b>
2	<b>Collectors</b>								
	Buying Price			6,500	<b>23.21</b>	6,500	<b>14.77</b>	6,500	<b>10.83</b>
	Selling Price			15,000	<b>53.57</b>	20,000	<b>45.45</b>	20,000	<b>33.33</b>
	Marketing Margin			8,500	<b>30.36</b>	13,500	<b>30.68</b>	13,500	<b>22.50</b>
	Marketing Cost:			1,450	<b>5.18</b>	1,450	<b>3.30</b>	650	<b>1.08</b>
	Profit Margin			7,050	<b>25.18</b>	12,050	<b>27.39</b>	12,850	<b>21.42</b>
3	<b>Local Traders</b>								
	Buying Price			15,000	<b>53.57</b>			20,000	<b>33.33</b>
	Selling Price			28,000	<b>100.00</b>			40,000	<b>66.67</b>
	Marketing Margin			13,000	<b>46.43</b>			20,000	<b>33.33</b>
	Marketing Cost			1,465	<b>5.23</b>			5,665	<b>9.44</b>
	Profit Margin			11,535	<b>41.20</b>			14,335	<b>23.89</b>
4	<b>Regional Traders</b>								
	Buying Price							40,000	<b>66.67</b>
	Selling Price							48,000	<b>80.00</b>
	Marketing Margin							8,000	<b>13.33</b>
	Marketing Cost							40	<b>0.07</b>
	Profit Margin							7,960	<b>13.27</b>
5	<b>Regional Retailers</b>								
	Buying Price					20,000	<b>45.45</b>	48,000	<b>80.00</b>
	Selling Price					44,000	<b>100.00</b>	60,000	<b>100.00</b>
	Marketing Margin					24,000	<b>54.55</b>	12,000	<b>20.00</b>
	Marketing Cost:					2,200	<b>5.00</b>	40	<b>0.07</b>
	Profit Margin					21,800	<b>49.55</b>	11,960	<b>19.93</b>
6	<b>Consumer</b>								
	Buying Price	10,000	<b>100.00</b>	28,000	<b>100.00</b>	44,000	<b>100.00</b>	60,000	<b>100.00</b>

- i) Farmers sell bananas to collectors at a price of Rp 5,000-Rp 7,000/bunch. Prices indicates in the Table are averages. (Collectors assume one bunch can produce 8 hands of banana).
- ii) Percentage indicates percentage of consumer *buying prices*.

## DISCUSSION

Banana (*Musa paradisiaca*) holds particularly high potential for Nanggung farmers. It accounts for 45.3% of the trees growing in tree gardens (Manurung 2004) and is cultivated in 75.9% of gardens (Budidarsono et al 2004). It grows well in the rainfall range, elevation range and soils found in Nanggung (DTB 2002 and Poerwanto 2003). Under these conditions bananas

produce fruit 12 months after establishment and then every 4-6 months thereafter. No significant banana diseases, such as fusarium, blood disease bacterium (BDB) and banana bunchy top virus (BBTV), are current present in Nanggung, but do occur in other parts of West Java (Tabbada 2003 and CRC-TPP 2004). Current management is best described as no management. Lacking access to quality germplasm farmers plant whatever is available regardless of the variety, although they are aware that certain varieties maintain a high market demand and command a higher price. The use of other agricultural inputs (fertilizers and pesticides) is infrequent and when available used for annual crop production. Fundamental banana cultivation is not practiced. Little to no weed control is conducted under and near bananas. Systematic or uniform spacing is not followed. A minimal number of stems per plant are not maintained – it is common to see 6-7 stems per plant. The removal of senescent leaves and male flowers is not conducted. Harvesting is not based on fruit maturity but rather on the arrival or anticipated arrival of local collectors, which is often unannounced. Post-harvest, bunches are often stored on the floors of homes or farm sheds for 1-3 days before collectors' arrival. Bananas are sold in bulk by bunch regardless of quality. Collectors do not pay a price differential based on variety. Under current production system farmers estimate that only 58.0% of the banana crop is sold. The remainders are not merchantable because they are of poor quality or the wrong variety. For most other priority garden species the portion of the crop sold is even lower – durian 25.3%, mangosteen 30.6%, rambutan 10.2%, petai 51.9% and jackfruit 41.4% (Budidarsono et al. 2004).

Team Kebun implemented a series of activities to address farmers' banana production systems. Meetings and farm visits were held to identify farmers' current practices and problems. Market surveys were conducted to identify exist market channels, marketing problems, market specifications, market opportunities and traders willing to work with farm communities. Visits to markets and with traders were held so farmers could gain awareness and experience with marketing. Workshops and mini-trainings were held to enhance farmers' banana production and handling skills. *Farmer Demonstration Trials* were designed by Team Kebun and farmers to demonstrate the advantages of quality germplasm and deliberate management. ICRAF and Winrock were responsible for organizing all activities and implemented technical, marketing and community organizing activities. RMI assisted with community organization. District agriculture officers participated in all technical activities. The subdistrict government supported all activities. Banana specialists from the Center for Tropical Fruit Studies, Bogor Agricultural University and Winrock specific technical input on how farmers could enhance their banana production systems. Farmer groups provided an avenue through which Team Kebun could reach larger number of farmers. Farmer specialist help convey technical and marketing information in terms that could be readily understood by the farming community. This series of activities culminated in the following recommendations to help farmers improve their banana crop production.

- 1. Variety and germplasm selection** – use only good quality germplasm of the five banana varieties that have a strong and steady market demand: Ambon (Gros Michel), raja sereh, raja bulu, tanduk and mas. Demand for these varieties is higher than supply. There is little if any commercial demand for 'local' banana varieties commonly grown Nanggung.
- 2. Simple management** – i) using appropriate spacing; ii) fertilizer application; (iii) weed control - removing grass and herbaceous weeds growing under and near bananas; iv) thinning bananas to retain only 2-3 stems, a leader in fruit, a main follower to replace the leader upon harvest, and a young follower; v) pest and disease control; vi) remove all leaves that may

touch and potentially damage hanging fruit; vii) remove male flowers; viii) prop stems that are endanger of falling with wooden or bamboo poles and ix) develop good garden drainage.

3. **Improving post-harvest handling** – i) harvesting banana based on maturity and market specifications; ii) harvesting banana immediately before the pre-arranged arrival of collectors/traders; iii) hanging bananas on tripods after harvesting not stored on the ground for several days; iv) sorting and grading bananas by variety and quality and v) using plastic crates from the village.
4. **Implement collective marketing** – through farmer groups by pre-arranging regular weekly or biweekly by traders to purchase bananas in large quantities. Both farmers and the trader must maintain a tight schedule.

FDT was implemented by applying the above recommendations which is using only good quality germplasm of the five banana varieties and simple management. Before program started in Nanggung farmers were planted their tree garden with all varieties of banana (approximately 10 varieties) for all purpose. Through the program farmers have a better understand of and experience in the local marketing system. Now most participating farmers only plant 3-5 varieties of the recommended banana in their tree garden (they may plant small number of other bananas varieties near the house for household consumption). Farmers have also intensified banana management practices. Table 2 indicates the portion of farmers who have adopted various recommended management practices.

Table 2. *Actual activities implemented by farmers*

No	Activity	Percentage of farmers (%)
1.	Using appropriate spacing	100
2.	Utilize recommended varieties (quality germplasm)	100
3.	Using Fertilizer	89
4.	Circle Weeding	78
5.	Number of stem retained	78
6.	Good harvesting	78
7.	Pest and Disease management	33
8.	Leaf Pruning	22
9.	Drainage	11

Most farmers have adopted: use of recommended varieties (seedlings have been provide free through the program); appropriate spacing; fertilizer; weeding; reducing the number of stems per plant; and appropriate harvesting methods. Farmers perceive the following management practices as the most important for enhancing banana productivity: i) using high quality of germplasm of recommended varieties (88% of farmers); ii) using fertilizer (80%); iii) circle weeding (70%); iv) spacing (60%) and then number of stem retaining and harvesting (48%). Farmers are least focused on implement the pest and disease management, pruning and drainage. The main reason these activities are avoided to minimize cost and because they are not perceived as important as the other management options. Farmers are preferred to implement the activities that do not require a lot cash input. To implement pest and disease management, farmers need to purchase pesticides; and for drainage farmers must build the water system.

In applying these recommendations, farmers have noted a 20-25% increase in banana productivity (fruit weight) per stem. More importantly, through a combination of deliberate tree management and improved post-harvest management 85% of farmers' banana production now



meet market specification and can be sold. Previously, only 50-60% of their banana production was sold. Traders have noted increase in the quality of bananas purchased from Nanggung farmers. Traders are also benefit from the program by adopting the use of plastic crates to transport bananas from the village to wholesale and regional retail markets. Plastic crates have decreased transportation damage to bananas from 10% to 3%, and the volume of transported banana increase to 38%.

Recently Nanggung farmers (the Lestari farmer group) have begun to organize themselves for collective marketing and proactively engage traders. Farmers now arrange banana harvesting closely to the arrival day of traders. Learning from success of developed a new market linkage; other farmer groups in two neighboring villages now are interesting in adopting the same practices.

Other farmers groups in Cipaku and Cimande, Bogor, West Java also becoming the role model of success farmer groups whose implement collective marketing to market their high quality of tree fruits and timber seedlings. They became successful through the initiation of a government program, but are now completely independent and self-supporting. Although socioeconomic studies have not yet been, farmers in Cipaku and Cimande feel their incomes are higher than neighboring villages. Observations indicate that these farmers live in better quality houses (cement walls with tile roofs) and motorcycle ownership is much more common. Nanggung farmers visited these communities and hope to emulate their success. Even though the process is running in Nanggung, it is not spontaneously spreading to other village because of farmers' limitation of capacity, resources and confidence. Most of the farmers are poor and risk averse and need assist to adopt technologies that are proven successful and appropriate for their conditions.

Farmers and traders have effectively developed a 'new' innovative market channel, providing mutual benefits to both parties. Traders have explained market specifications and grading criteria for bananas in terms farmers can understand and offered a price differential based on these specifications and criteria (Table 3).

Table 3. *Market specifications and average prices for different grades of banana in Nanggung.*

Grade	Description	Price/bunch (Rp)	
		Local market of Nanggung	Reginal market and retailer
<b>Bulk sales</b>	Pre-program norm for Grade A and B	Rp 6,500	Not specified
<b>Grade C*</b>	Less the 13 fingers/bunch; uniformity not necessary and a lot of surface stain allowed	Rp 5,600	Not specified
<b>Grade B</b>	13-18 fingers/bunch; limited size difference between rows, minor deformities and minor surface stains allowed	Rp 19,600	Rp 40,000
<b>Grade A</b>	18-20 full fingers/bunch; front-row and back-row fingers of equal-size; no surface stains	Rp 22,800	Rp 48.000

\*) Commercial demand for grade C is very low. These bananas are generally sold in local markets.

Farmer have assumed the role of collection, sorting and grading; and begun to understand and meet traders' time requirements. While discussion continue regarding market specifications, grading criteria and other details both parties are happy. The additional effort by traders and their staff is justified by the time saved in dealing with a 'group' of farmers (instead of

individuals), receiving bananas that are already sorted and graded, and procuring larger quantities of bananas. (Collaborating traders are still unable to meet market demand due to a shortage of supply). Farmers estimate their workload has increased by 2 days/week to meet traders' requirements. This is easily justified by their additional income received.

## **CONCLUSION**

### **Successful Examples**

- Farmers have doubled the gross income received from bananas (from Rp 10,000 to Rp 20,000/bunch), without incurring additional costs, organizing themselves and proactively engaging with traders.
- Farmer have assumed the role of collection, sorting and grading; and begun to understand and meet traders' time requirements.
- Traders have explained market specifications and grading criteria for bananas in terms farmers can understand and offered a price differential based on these specifications and criteria.
- The additional effort by traders and their staff is justified by the time saved in dealing with a 'group' of farmers (instead of individuals), receiving bananas that are already sorted and graded, and procuring larger quantities of bananas.
- Farmers and traders have effectively developed a 'new' innovative market channel, providing mutual benefits to both parties.
- Improvements in agronomic management are just now having an impact, with traders noting higher quality and quantities of bananas being available through the new market channel.
- Use of plastic crates by transport bananas from the farm to markets has decreased damage and increased the quantity for bananas transported per load.

### **Lessons**

The training workshop series for farmer leaders is the foundation of the technical assistance provided to program participants. The workshop series should be well-organized. The first event focused on market opportunities for key tree species and tree garden products. Subsequent workshops would be designed and implemented to address the priorities identified at the marketing workshop. Additionally, farmers and market agents would be able to develop linkages from the beginning of the workshop series.

Experience to date indicates at farmers are best served by transforming their traditional subsistence tree garden systems to semi-commercial systems that yield products for both home and market. This process requires that farmers to: 1) focus on a limited number of species that are appropriate for local biophysical conditions and have a high market value/demand; 2) utilizing high quality germplasm (provenance, varieties, etc) to increase productivity and profitability; 3) manage the tree gardens to yield tree products that meet market specifications; and 4) develop permanent market linkages. Banana is used as an example of how to achieve success, with instances of other species cited when appropriate.

## Scaling Up

Villages within sub-district have a good opportunity to learn from Lestari Farmer Group, and trying to do the same activities by themselves. Using the approach that implemented in Nanggung sub-district, ICRAF now able to duplicate and replicate this approach to another Project in Indonesia such as Develop a Better Market Linkages for Smallholder Rubber Agroforestry Farmers in Jambi and Sanggau, West Kalimantan funded by CFC and *Orangutan Project* in Batang Toru, South Sumatera funded by USAID. Some local NGO (Diantanma in West Kalimantan, Yayasan Tenanua Waingapu and YMTM Kefamenanu in East Nusa Tenggara) and group of farmers in Nusa Tenggara were trained to duplicate this approach. The methods of marketing approach will able to extend with some modification and improvement.

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