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Roger Montgomery

ASIA RESEARCH CENTRE WORKING PAPER 69

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ASIA RESEARCH CENTRE WORKING PAPER 69

WILL NO ONE PLANT A TREE IN INDONESIA?

YES, THE POOR WILL, AND ON ISLANDS NOT KNOWN FOR THEIR FORESTS: ONE SUCH IS TIMOR

Roger D. Montgomery, London School of Economics[1]:

SUMMARY

In this paper we explore an innovative approach to poverty reduction by the introduction of an agro-forestry variant of sustainable agricultural land technology among the rural farming population of an upland district on the western half Timor Island, East Nusa Tenggara. The approach was devised by an obscure and previously unknown non-governmental organisation which has now won world-wide recognition and awards. The element of time is introduced. Measures adopted – short term, medium term and long term – for detecting and addressing various aspects and causes of rural poverty are discussed. The technique proved so successful that 8.5 million trees have been planted even though tree planting was only a minor component of the approach.

SURPRISING AWARDS

In July 2010, Mr. Vinsensius Nurak[2], head of a small and relatively unknown non-governmental organisation or NGO working in the western, Indonesian, half of Timor Island received a surprising letter from the United Nations. The UN letter said that his NGO, called Yayasan Mitra Tani Mandiri or YMTM in Indonesian (Foundation for Partnership with Independent Farmers) had won an Equator Prize. Vinsen as he is commonly called, unaware that he had even been nominated for the prize, was invited to New York to address the UN's Community Summit and Special Session on Biodiversity, held on 22 September

[1] This draft working paper was prepared at the Asia Research Centre (ARC), a part of the London School of Economics. The ARC aims to foster and promote research and programmes related to Asia across the School. ARC fosters and supports the development of climate change research on adaptation and mitigation in Asia. A key research issue for climate change is deforestation. The author is grateful for advice from Ruth Kattumuri of the ARC, Esnawan Budisantoso, Richard Manning and John Schottler of AusAID's ANTARA project. Funding for field work was provided by AusAID. The views expressed in this article are the sole responsibility of the author and do not necessarily reflect the views of the ARC.

[2] Vinsensius Nurak. Address: Jl. Nuri, Kefamenanu, TTU. Telp. 0388-31444/31999, E-mail: ymtm-ttu@telkom.net,

2010. This is a man who had seldom if ever been to the national capital, Jakarta and was now to go to New York. He also could not speak English or any other official UN or colonial language[3].

The Community Summit was the Equator Initiative's participation in the 2010 Millennium Review Summit. More will be said below about the 25 year long Millennium poverty reduction goals that started in 1990. The actual cash prize money from the UN was quite modest (US$5,000). The Equator prize must be seen as a minor level award compared say to a Nobel Peace Prize[4]. Nor is the Equator prize exclusive; every second year, 25 such Equator Prizes are awarded. Nonetheless it was the beginning of recognition for a successful effort by a small dedicated group to help a large number of people to escape poverty and especially to escape indebtedness; they are not the same. The award was also symbolic of the now substantial and rapidly growing effort made by small civil society groups to reduce poverty throughout Indonesia. In 2012, the US based Ashoka Foundation, founded by environmental activist Bill Drayton, elected Vinsen a member.

In the following year, on the 10th of June 2013, Vinsen was awarded Indonesia's highest honour for environmental conservation. He was called by President Susilo Bambang Yudhoyono to the palace to receive the Kalpataru award. This Sanskrit name for the award is the Wish-Fulfilling Divine Tree of Life of Hindu and Buddhist legends. The actual tree it represents is inexact; it is most likely a banyan tree but might also be the Bo tree, the religious fig tree under which the Buddha was enlightened[5]. Eighth century images of a Kalpataru tree are found near Yogyakarta in the centre of Java on the Hindu temples at Prambanan and on the Buddhist temple at Pawon, near Borobudur, Java.

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[3] Salome (Syalomi Natalia) from the AusAID Kupang office was available to accompany and translate for him. Salome also narrated a short slide show presentation of the activities of YMTM on Vimeo or YouTube: http://vimeo.com/15746142 or http://www.youtube.com/watch?v=dUxJ1vMj3ck. A short Indonesian language film is available on http://www.youtube.com/watch?v=_RH6oPka6U8

[4] A related question is: how many trees does a group need to plant to deserve a Nobel Prize? The winner of the 2004 Nobel Peace Prize was the late Wangari Mutu Maathai, whose Green Belt Movement in Kenya to date has planted more than 51 million trees ...about 30 million by the time of the award in 2004 (http://www.nobelprize.org/nobel_prizes/peace/laureates/2004/press.html).

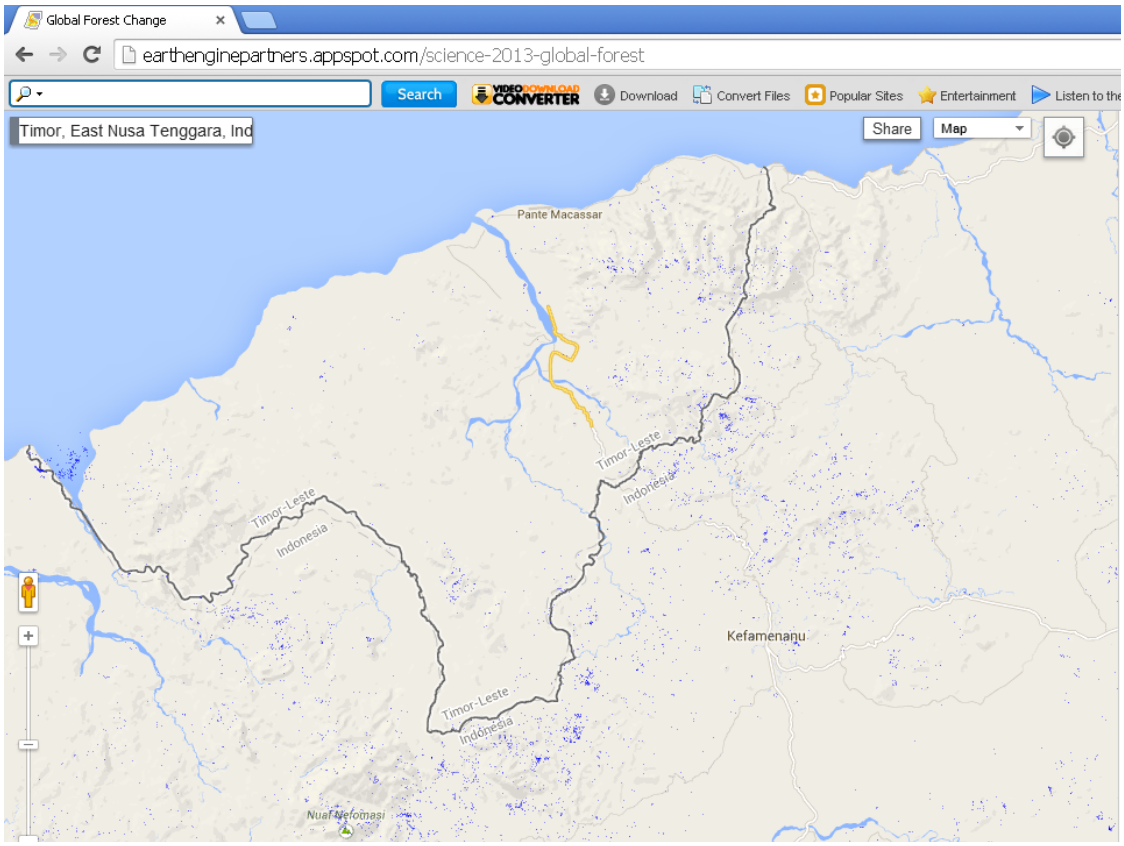
[5] http://www.omkalpataru.in/kalpataru.html

Vinsensius Nurak, notebook in hand, in a village level participatory meeting, Feb 2010. Photo by author

What had this small charitable group done to deserve these awards? Vinsen's YMTM group had been working with very poor farmers in the uplands of the dry and inhospitable Indonesian western half of Timor Island, one of the poorest places on earth. Probably the most significant thing accomplished was that, from 1996 until 2010, they had assisted the farming community of North Central Timor district in the middle of Timor to plant more than 6.5 million economically useful trees as part of adopting soil conserving, contour agro-forestry on their steeply sloping land. The total number of trees planted with guidance from YMTM now exceeds 8.5 million[6]. The plantings are visible from space as scattered blue dots in satellite imagery as shown below. This is the product of Hansen (Hansen, 2013) who worked with Google on interpreting and making available to the public a time-lapse series of Landsat images to show deforestation and reforestation in the period 2000 to 2012.

[6] Dr. Esnawan Budisantoso, personal communication

Map 1: The Hansen-Google map of Global Forest Change focussed on Kefamananu, West Timor, East Nusa Tenggara. Blue dots represent forest gain.



Source: This interactive map is on http://earthenginepartners.appspot.com/science-2013-global-forest

Indonesia is more widely known for deforestation than for planting trees. Millions of trees were cut down during the time of President Suharto which ended in 1998. The most destructive period was 1985-1997, when 24 million ha of Indonesia's forest (1/8th of Indonesia's land mass of 190 million ha) were destroyed at an annual rate 1.67 million hectares per year (Holmes, p 3). At a density of, say, 620 mature trees per hectare[7] (and this can be a controversial number – how many trees there are on average in a hectare of natural forest), this would represent a loss of approximately 1 billion trees being cut each year in Indonesia. At the beginning of this millennium, deforestation continued, but at a much

[7] Slik et. al. found a range from 320 to 920 stems per hectare in a study of an inventory of 83 old-growth Indonesian Borneo forests that showed no signs of human disturbance. As Slik points out, actual number of trees per hectare for any particular forest will depend upon a number of environmental factors such as rainfall, rainfall seasonality, altitude, temperature (plus its seasonality and high-low range), and as many as 15 soil nutrient characteristics.

slower pace. Indonesia lost another 0.5 million ha per year according to FAO (FAO, 2010) and government sources; annual deforestation had slowed to less than a third of the rate during Suharto's presidency. Unfortunately, that slowing down appears now to have been reversed. The latest evidence (Hansen, 2013, p. 850) is that Indonesia's deforestation has increased again to about 2.0 million ha per year by 2011/12.

The environmental benefits of planting trees are widely known (taking carbon out of the atmosphere or sequestration, reducing rapid runoff thereby reducing downstream flooding and siltation of waterways and irrigation systems in the lowlands, recharging of aquifers, reducing soil erosion). These benefits are externalities; they accrue to people other than the hillside farmers. This NGO's objective was not to see trees planted for environmental purposes. Instead the objective was to improve both the short and long term incomes of some of Indonesia's and indeed the world's poorest rural people.

In its initial years, YMTM NGO had no funding whatsoever; volunteer workers lived in villages on no salary. By about the year 2000 YMTM had drawn attention from several international NGOs[8] who made small grants to YMTM. In 2007, Australian Aid (AusAID) provided YMTM with a more substantial budget to cover the inclusion of 1,000 farm families in various income generating activities including soil conservation, upland agriculture and especially tree planting.

In 2008 (one year after the grant was made) and then again in 2010, I was engaged by AusAID to undertake an independent evaluation of the performance of a number of NGOs (including YMTM) which had received grants to work with poor farmers and fishers on Timor and other islands of East Nusa Tenggara. During our 2008 review of YMTM in the field we found not 1,000, but more than 4,300 farm families had joined the programme with no increase in budget. By the time of the UN's award to YMTM in 2010 the number had increased to over 5,000 families.

[8] World Neighbors, the Dutch Vreideseilanden, Catholic Relief Services and Caritas Australia

Most of the upland farm families had previously been practising slash-and-burn / shifting cultivation on steeply sloping land. It is not elevation, but instead steep slope that is the main cause of erosion, rapid runoff, and siltation. Shifting cultivation agriculture goes by different names in different parts of the world. Practised in northern Europe until at least the 1860s, shifting cultivation was called *swidden* (or *swithen*, from Old Norse *svidhna*, meaning "to burn"). In most parts of Indonesia it is usually called *ladang* (Colfer, 1997) cultivation. But in Borneo, Dayaks and Iban usually call it *pindah* (to move) according to the Royal Society for Asian Affairs's Erik Jensen (Jensen, 138-139). Although initially the hill farmers might have been able to farm a plot of land for two or even three years before needing to shift, by the year 2000 they were reduced to shifting to a new plot every year because of rapid soil nutrient depletion. The fallow period (before being used again) was down to as little as five years, too short to regain the former nutrient status. Incomes decreased and malnutrition increased.

The form of shifting cultivation had moved from being a stable or *integral* system (a term devised by Harold Conklin (Conklin 1957, 1961), one of the first to study shifting cultivation in SE Asia in the post WW2 era, to an unstable, unsustainable system (*incipient* in Conklin's terminology). Increasing frequency of shifts also meant increasing annual burning, with the resulting smoke, a thorny issue with Indonesia's neighbours who suffer the consequences.

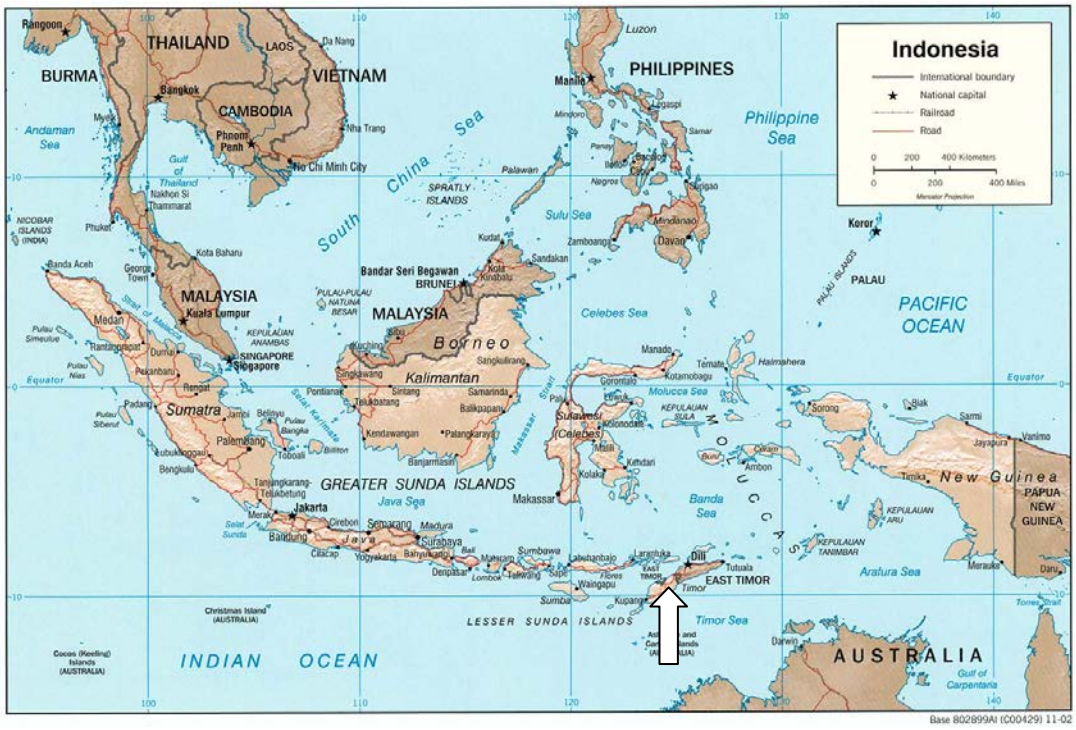
The additional households who joined YMTM's programme asked for no financial support or subsidy. They asked only to be allowed to come and learn the new techniques. Those who acquired the new skills experienced a dramatic increase in income, usually from growing trees. More importantly, most of the farm families had also gotten out of debt. Their never-ending indebtedness was caused by having to borrow from "squeeze-dry" money lenders charging exorbitant interest rates, a subject to which we will return. Loan-sharking is a major problem not just in the eastern islands, but throughout Indonesia. One of the major activities Vinsensius and his group introduced was the formation of small saving-lending groups, operating much like credit unions, to help avoid loan-sharking.

The subject of this article will be to describe how poverty reduction was achieved, by whom, why they did it, where they did it and how they did it – when so many previous poverty reduction efforts failed. The subject therefore is poverty reduction, not just the planting of trees.

LOCATION

Timor is the largest island of Indonesia's East Nusa Tenggara province (Nusa Tenggara Timur or NTT in Indonesian, Lesser Sunda Islands in English). NTT is made up of three larger islands (the western half of Timor, Flores, and Sumba) and many smaller islands. There are actually 566 islands in the province, but only 246 even have names; just 42 are inhabited.

Map 2: Location of East Nusa Tenggara (Lesser Sunda Islands)

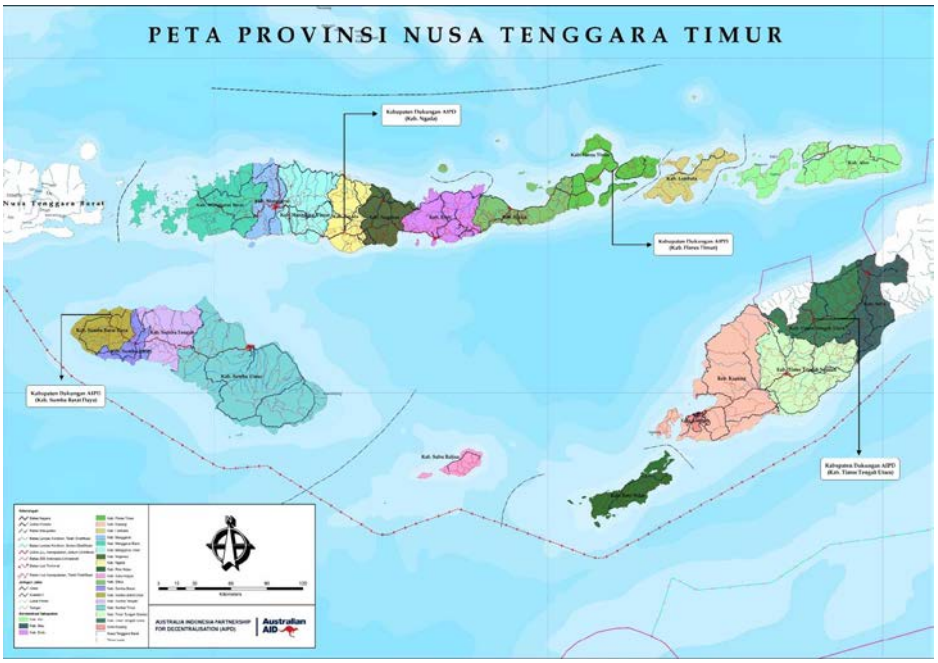


Source: http://images.nationmaster.com/images/motw/middle_east_and_asia/indonesia_rel_2002.jpg

Available free for educational purposes on internet from the Perry-Castañeda Library Map Collection, University of Texas, Austin, Texas, USA

The northern string of islands (the “inner arc”) is a continuation of the still active or at least recent volcanoes of Sumatera, Java, Bali, Lombok, Sumbawa, Flores, continuing to the smaller eastern islands such as Alor. This is part of the ring of fire. These islands tend to be unstable. While areas along this volcanic line are mostly fertile, they are prone to both tectonic movements (plates striking, slipping, subducting) and volcanic earthquakes and landslides.

Map 3: Map of East Nusa Tenggara



Source: Australia Indonesia Partnership for Decentralisation

http://www.aipd.or.id/area-profiles/nusa-tenggara-timur-map/

Indonesia’s southern, “outer arc” of islands, which includes Timor, is non-volcanic but still subject to earthquakes and tsunamis. These islands, less than four million years old according to the WWF (WWF, Eco-region AA 0204), are part of the continental margin of the Australian plate not yet subducted under Indonesia. In contrast to the northern “inner arc”, East Nusa Tenggara’s southern islands (Sumba, Sabu, Rote, Timor) are rather infertile, formed on limestone. The few volcanic rocks that occur are ancient. But on NTT’s non-volcanic southern islands, the low rainfall has not induced the intensive leaching and

acidification processes characteristic of soils of the wetter islands of western Indonesia. Limestone soils are often chemically rather favourable, having higher pH than the more acid volcanic regions (especially Sumatera).

Topography or slope is the most important factor limiting food crop production, even more important than soil type or parent material. The slope of the terrain has a predominant influence on how marginal the farming will be, particularly in view of the impact of intense tropical rain on soil erosion during the region's short rainy season (November-March). Owing to the nature of tropical weathering and erosion processes, geologically young land surfaces are almost invariably deeply dissected by valleys and are steep. Very steep land is not suitable for food crop agriculture of any kind and simply must be left under tree cover or reforested or planted to other trees if degraded (RePPProT, 1998)[9]. Only 6% of NTT is flat land and just 13% is gently undulating land, i.e. the most suitable for food crops. A full 33% is classed as hilly and 38% is mountainous. Map 4 below shows the topography.

Vinsensius's group work in the northern middle part of Timor, on the slopes of the extinct volcano Gunung Mutis, not far from the white shaded Oecussi separate enclave, part of Timor Leste (East Timor).

THE POVERTY PROBLEM IN INDONESIA'S EAST NUSA TENGGARA ISLANDS

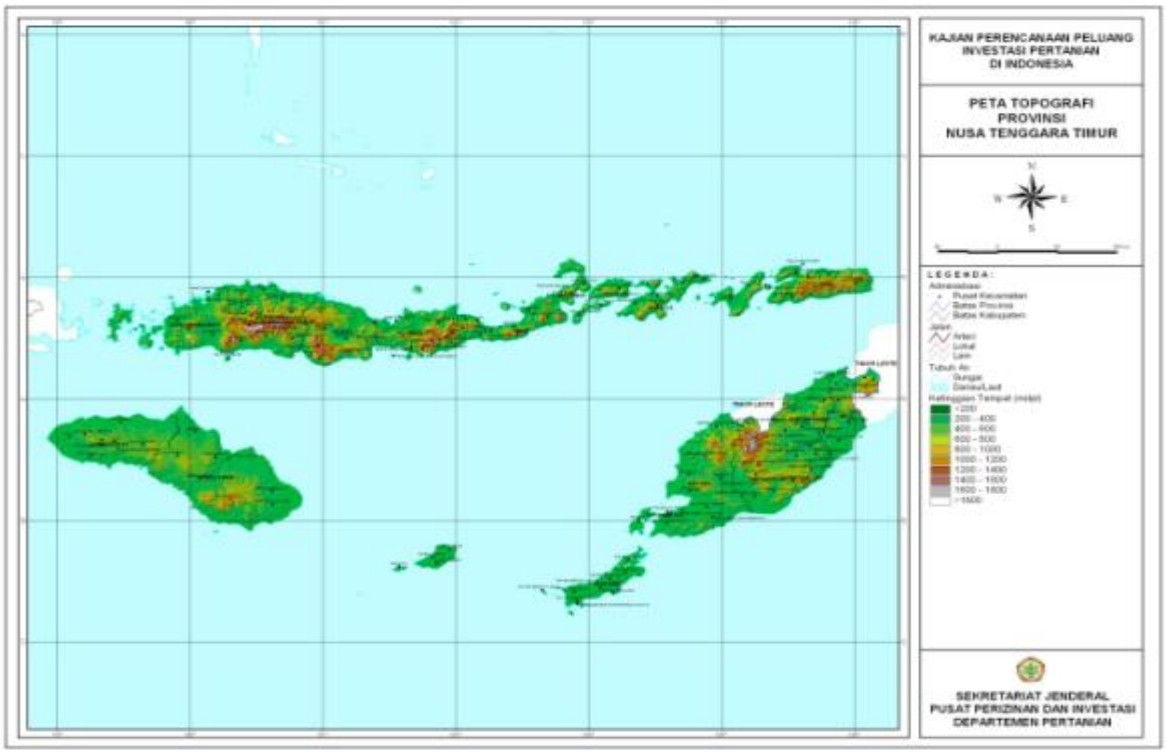
Timor lies only three islands east of Bali, the relatively wealthy tourist destination. Yet the difference is as night and day. There is almost no spread or spill over of Bali's tourism-derived prosperity to the islands of East Nusa Tenggara.

Poverty has many facets. It is broader than just lack of income (monetary poverty in the literature). Other dimensions of poverty include malnutrition, lack of educational achievement or even opportunity, infant mortality, maternal mortality and many others. These non-monetary measures of poverty can be grouped under five main basic needs: food, health,

[9] The original RePPProT data was revised, updated and interpreted by the late Derek Holmes for Marginal Farmer Community Development Project ADB TA 1400-IND, Phase One Report (Accompanying Maps), Sept 1991. Hunting Tech,nical Services, Hemel Hempstead, UK

water/sanitation, education, and shelter. Poverty, in all its dimensions, is as severe in eastern Indonesia as it is in the most hard-hit parts of sub-Saharan Africa.

Map 4: Topographic Map of East Nusa Tenggara



Source: Ministry of Agriculture, Secretariat General, Data and Investment Centre, Jakarta

In the wetter, western part of Indonesia (e.g. Java, Sumatera), child malnutrition and food scarcity declined almost continuously over the years, with a temporary sharp increase during the 1997/98 Asian Financial Crisis, but improvement resumed shortly thereafter (UNDP 2004, p 30). This was not the case in the eastern Nusa Tenggara islands. From 1998 to date, East Nusa Tenggara province has remained one of the poorest provinces in Indonesia; its island of Timor has four of the poorest districts in the country. Malnutrition caused by failing upland agriculture is the main symptom to be seen.

NTT's many dimensions of poverty have been quantified by measuring its severity periodically during the 25 year long world-wide struggle against poverty: the 1990 Millennium Development Declaration. This agreement at the United Nations set out realistic poverty reduction goals and targets for each country, called the Millennium Development Goals

(MDGs). There are 8 such goals and 18 targets; the full list is presented in an endnote[i]. Indonesia's statistical agency and its Susenas (national socio-economic survey) are among the most competent in Asia at detecting and measuring the many facets of poverty. They have geared themselves to work with the UN to measure the MDG indicators not just at a national, but also provincial level (34 provinces), and in some years of large sample size, even down to individual districts/cities (more than 500 such) according to the Ministry of Home Affairs[10]. These permit observations of change over time as well as comparisons across regions. We select two poverty indicators, low incomes and malnutrition, but could equally have taken others.

Monetary poverty in East Nusa Tenggara

In 2012 a full 20.4% of the people of NTT province lived below the poverty line. This was almost unchanged from the 22% estimated in 1993 (UNDP, 2004, p 90), the baseline for the MDG measurement period. The NTT provincial poverty rate has consistently been much higher than the national average, now only 11.7% in September 2012[11]. In North Central District, the place where Vinsensius and YMTM were working, the proportion of poor families in was 33%.

The high cost of food

The high cost of basic staple food and the unavailability of stored food supplies during the lean months (called *Fun Am Nahas* "unlucky months" in the local language, or *Paceklik* in Indonesian) before the single annual harvest had become major issues for rural people in NTT and other eastern islands. In developed areas of the world, only 15% to 30% of a household's budget is typically spent on food. For instance in the UK the proportion of the household budget spent on food consumed in the house declined steadily from 29% in 1978 to only 18% by 1999 (Blow, 2003, p 5). In stark contrast, all Indonesians spend a much

[10] http://www.kemendagri.go.id/pages/data-wilayah

[11] About 28 million of Indonesia's 245 million people currently live under the poverty line on Rp 8,651 (US $0.75) per day. Source: ADB Institute e-newsline, 2 October 2013, citing official BPS estimates for mid 2013.

higher percentage of their total weekly expenditure just on food, even in the richer urban areas of Java. The food-budget share in Indonesia's better-off provinces ranges from 40% (Jakarta) of all expenditures to 55%-60% (rest of Java). But in the eastern islands, a very high proportion of total expenditure goes to food. Using the BPS's Susenas in 2004, we measured the food portion of the household budget of the poor at 70% in East Nusa Tenggara[12]. This frequently used key indicator, the Engel coefficient[13], is an accurate indicator of poverty: the higher the household budget allocation to food, the poorer the family. For those who cannot afford sufficient food, the result is malnutrition, especially for children under the age of five. With so much spent just on food, there is little left for expenditures on health, education, shelter, clothing or transportation. The high cost of obtaining food is still certainly a major concern of all Indonesians. It is especially important for the rural poor of East Nusa Tenggara.

Non-monetary aspects of poverty: Malnutrition in the Nusa Tenggara Islands

Food insecurity remains a major issue in East Nusa Tenggara. In the middle of the first decade of this century, malnutrition caused alarm in many areas of Indonesia. During the months of May and June 2005, the English language Jakarta Post [JP] and Indonesian language [*Kompas*] carried up to 4 or 5 articles per day on malnutrition mostly in, but not limited to, the Nusa Tenggara islands. Examples:

- "Malnutrition in West Nusa Tenggara" (Jakarta Post [JP]: May 27, 2005),
- "Susilo Seeks Accurate Data on Malnutrition Cases (JP: June 8, 2005)
- "Neglect and Ignorance Blamed for Malnutrition in NTB" (JP:June 8, 2005)
- "1.2 million children … malnutrition" (*Kompas*: June 9, 2005)
- "Why is the Wealth Gap so Wide: 8,455 children… malnutrition", (JP: June 14, 2005)
- "Malnutrition: A Sickness of Government, Society" (B. Herry Priono, JP: June 15, 2005)
- "A Human Rights Perspective about Hunger in Indonesia" (S. Nasir, JP: June 15, 2005)
- "Severe Malnutrition" [letter to editor] (JP: June 15, 2005)
- "Misguided Poverty Eradication … Blamed for Malnutrition" (H. Diani, JP:June 17, 2005)
- "I'd do anything to see my children eat well" [letter to editor], (JP: June 17, 2005)

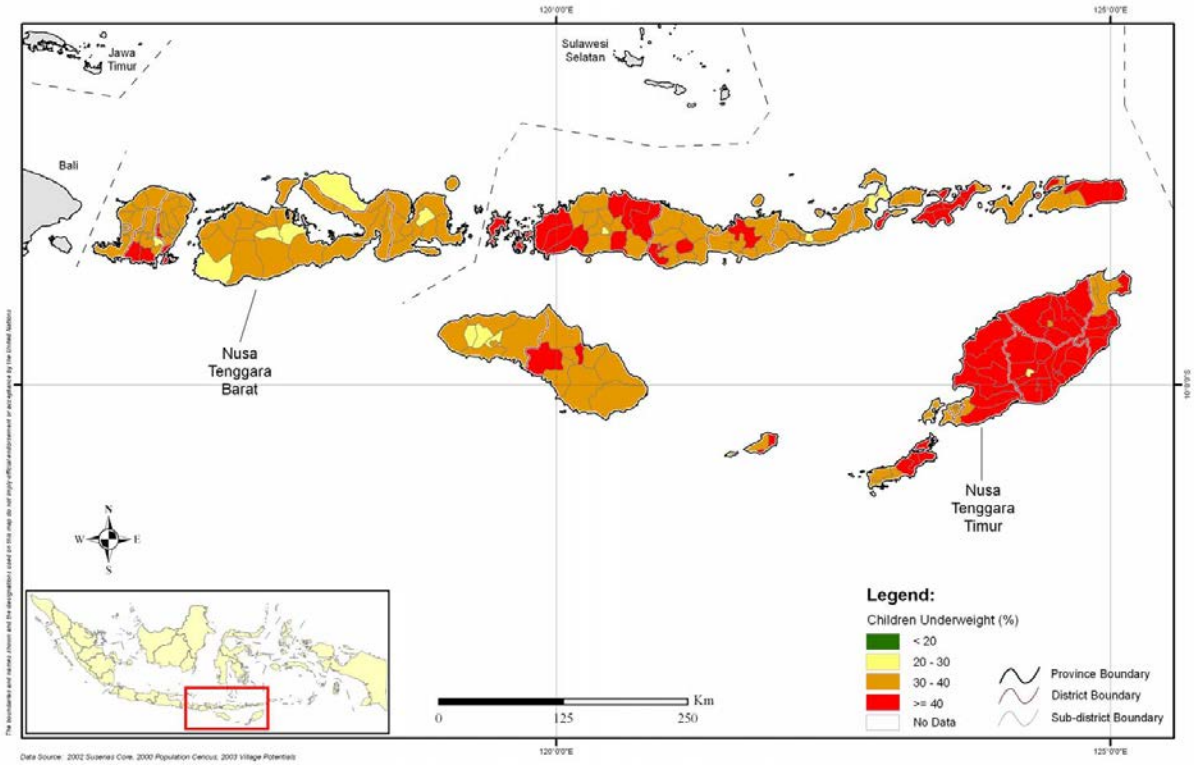
[12] In a World Bank study of rural Mexico, Attansio and Lechene (2010, p 14) found the food budget share to be as high as 80%. This number did not move downward even after the introduction of a cash-transfer programme which increased household incomes by as much as 20%. The cash-transfer was conditioned on children attending school, so, much of the income increase was absorbed by higher schooling costs. Source:

[13] Named for Ernest Engel, German statistician, 1857

- "Poverty Eradication Program Not Helping Poor", (B. Nurbianto, JP: June 17, 2005)
- "Rp. 30.6 billion (US$ 3.2 million) Allotted to Curb Malnutrition" (JP: June 18, 2005)
- "City to Provide Food for Poor Children" (JP: June 18, 2005)
- "NTT acknowledges Malnutrition Problem", (JP:June 20, 2005)
- "Malnutrition Caused by … Failure in Food Security Policy" (JP: June 20, 2005)
- "Malnutrition – It's the Economy, Not Health, Sir" (Endy M. Bayuni, JP:June 22, 2005)
- "Funds Promised to Fight Malnutrition" $8.7 million (R. Witular, JP:June 22, 2005)

By the year 2005, the government, with assistance from AusAID began to map and identify the location of the malnutrition problem. Map 5 below shows the result of one of the first attempts in the new millennium to locate child malnutrition down to the level of sub-district (kecamatan) in the Nusa Tenggara islands. The greatest problem was on the island of Timor.

Map 5: Underweight Children Under Five Years of Age in the Nusa Tenggara islands in 2002, by Sub-district



Source: Coordinating Ministry for People's Welfare, World Food Program, BPS, AusAID, "Nutritional Map of Indonesia: Small Area Estimation of Nutritional Status in Indonesia, May 2006, wfp246494.pdf, (data sources and dates: 2002 SUSENAS, 2000 Population Census)

By 2005 the malnutrition situation in NTT had become dire; about 29% of all children under age 5 were malnourished (weight-for-age). The central government asked the World Food Programme (WFP) to begin public food distribution in the form of various food-for-work schemes involving payment in kind (grain, not cash) for soil rehabilitation, constructing infrastructure, water harvesting, and nutritional rehabilitation (school meals, distribution of fortified biscuits). The World Food Programme had left Indonesia in 1998. In about 2001 the central government began to ask WFP to return. But in the turmoil of East Timor's secession from Indonesia, 3 UN workers were assassinated in September 2000 in the border town of Atambua. Because of that, no UN agency was permitted to operate in West Timor from 2000 to 2005. WFP re-opened its office in Kupang only in 2005 after the West Timor security situation along the border with East Timor had returned to normal, and only then with high security measures. Japan was the major donor assisting NTT through WFP.[14]

There are three common measures of malnutrition (UNICEF, 2007): height-for-age (this shows stunting, a symptom of chronic, year-round inadequate calorie/protein intake), weight-for-height (which shows wasting or acute short-term or seasonal lack of nutrition (WFP, 2013) and weight-for-age (the simplest measure: weigh the babies).

In NTT province, recent data (GoI, 2008) have indicated the prevalence of children 0-59 months with:

- growth retardation or stunting was of 46.7% (low height-for-age)
- while the prevalence of children with a low weight-for-age (underweight) was 33.6%
- and low weight-for-height/length (wasting) was 20.0% respectively.

Source: FAO, UNICEF and WFP (2010c)

Indonesia's health system normally only measures weight-for-age, and only for children under the age of five. This makes it impossible to determine what form of malnutrition is taking place.

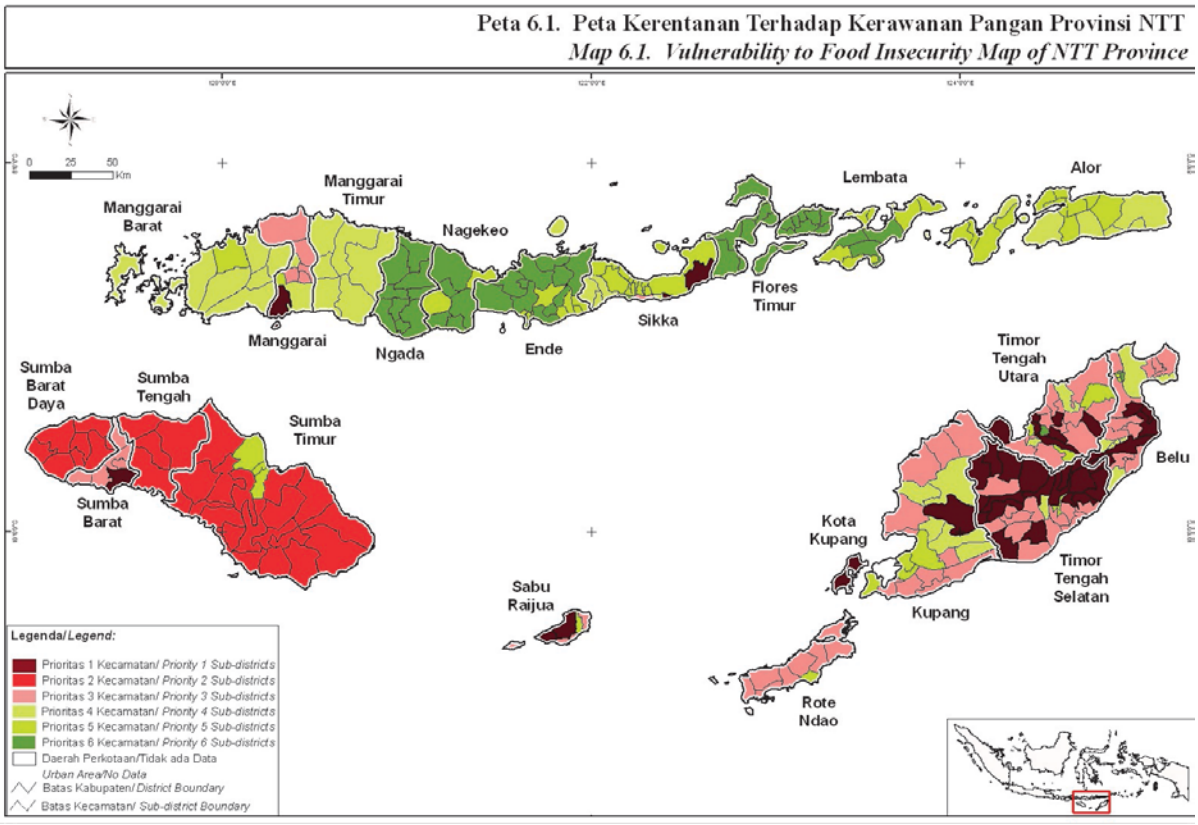
Beginning in 2005, the WFP undertook its own nutritional survey of children under age 5 measuring not only weight, age, but also height (WFP 2005). The malnutrition detected was

[14] Masanobu Horie, World Food Program, personal communication

mostly stunting (measured by height-for-age) rather than wasting (measured by weight for height).

The WFP also began to assist in resuming the mapping of where the malnutrition is taking place. Below is the most recent map (2013) showing the locations of most serious concern.

Map 6: WFP's Most Recent Food Insecurity Map of East Nusa Tenggara



Source: World Food Programme, Indonesia, East Nusa Tenggara Profile, January 2013, WFP cartographer Dedi Junadi

YMTM'S APPROACH TO SOLVING THE POVERTY PROBLEM

There were four main actions or elements to solving the poverty problem. Each had a different time horizon, and this proved to be the reason for success according to our evaluation. When taken together they proved to be a potent mixed cocktail. The four elements can be classified as two short-term actions, one medium-term technology change and one long-term method. Clearly planting trees and harvesting timber and non-timber products are long-term approaches. The poor cannot wait that long; they discount the future

heavily. Short term actions must show results within a few weeks or months, and yet must involve very little investment by the farming community.

Short term solutions: credit unions for debt reduction; joint marketing for farm output

There were two short-term actions developed. The first action was to help relieve the burden of debt by assisting groups to form small saving-lending credit unions, to avoid the high interest charged on payday type loans by money lenders. The second approach was to help farmers to obtain higher prices by joint marketing in large volumes, in town, rather than selling to itinerant collection traders at the farm gate.

Credit unions for debt reduction

Money-lending and the never ending indebtedness it causes remain mostly un-studied in Indonesia. The *modus operandi* is close to loan-sharking. Money-lenders or *Rentenirs,* using the Indonesian term, operate not only at local markets among traders but also in village areas. Since the lender actively comes to the customers there are no complicated procedures to apply for a loan. The loan can be as little as Rp.100,000 (about US $10).

In different parts of Indonesia such lenders are called *Bank Pelecit* (Squeeze-Dry Bank), *Bank Selamat Pagi* (Good-Morning Bank), *Bank Rontok* (Knock-on-Door Bank), *Bank Subuh* (Sunrise Bank) and *Bank Berjalan* (Walking Bank). The borrower does not go to the bank. The lender comes to the borrower, usually at sunrise. Payment is collected daily by the staff. The grace period is one day. When the poor are forced to borrow from this kind of institution, they face horrific interest rates. Interest rates charged by different financial institutions are presented in Table 1.

Money-lenders as institutions are secretive; few have offices or are in any way registered. Little is known about the money-lenders – size, number, number of clients – but every Indonesian knows where to locate a money-lender to whom they could turn for an immediate loan with no collateral or other guarantee. According to reports provided by YMTM field implementers, the most pervasive loan-sharking operation in Nagakeo on the island of

Flores (and other parts of NTT) is operated by the Cooperative of the Armed Forces of Indonesia (*Koperasi Pegawai Angkatan Bersenjata Republik Indonesia,* or *KopABRI*). We could not confirm this allegation in the field (could not locate their office). It is a very serious allegation. Formerly I believed the extremely high interest rates in rural Indonesia (up to 360% per year, see Table 1 below) to be the highest in the world, but no more. Indonesia's Knock-on-Door Bank rates have been overtaken by payday lending in the United Kingdom with annual interest rates as high as 3000%.

Table 1: Annual Interest Rates for Micro Loans, By Type of Loan and Type of Institution

	Working Capital, median rate	**Investment, median rate**	**Other purposes, median rate**
Large formal banks	19%	20%	20%
BPR banks	32%	36%	30%
Non-Bank Micro-Finance Institutions	24%	24%	24%
Money-lenders, *Bank Selamat Pagi* to small shops (fixed, unregistered establishments) at 5% to 10% interest/month			60% to 120%
Money-lenders to individuals, households, at 20% to 30% interest/month			240% to 360%

Sources: Large Banks, Bank Perkreditan Raykat (People's Credit Banks), Non-Bank Micro Finance Institutions (but not loan sharks): Asia Foundation (pages 60, 61, Tables 4-5 and 4-6.)[15]

For Money-lenders: key informants surveyed by the author

YMTM encouraged farmer groups of up to 50 households to form small savings and lending associations, strictly following the Grameen principles developed by Bangladesh's Muhammad Yunus as early as 1976. Members save small amounts regularly (and at the time of sale of an animal) and then lend to each other at various interest rates, commonly 2%, 3% or 5% per month, according to the group's decision. These interest rates may seem high to us, but in fact are much lower than the alternative source of loan funds: the money-lending, loan-sharking *Rentenir* operations as seen above.

During our first review in 2008 we found that seven new groups had been set up with 314 members. The groups had raised AUD (Australian dollars) $1,500 in capital. It is surprising how quickly a capital fund can accumulate. One saving-lending group, set up eight years earlier with assistance by YMTM, had accumulated a capital fund of more than AUD $15,000. The sum became so large that the group found they needed to legally register themselves as a cooperative with the district government Cooperatives Service, and to open a bank account. This group had initially tried to charge each other 5%/month, but when that was found that to be unsustainable; they reduced the interest rate to 2% per month.

To measure the effectiveness of a savings-lending association it is not necessary to know how the borrowed funds were invested (e.g. setting up a small shop, starting a sewing operation, buying agricultural inputs) and what the costs and returns in those activities might be. This would make the unnecessary assumption that funds borrowed were in fact invested in productive activities. Very often, group members used the funds borrowed to finance unexpected spikes in consumption rather than investment, especially for medical treatment in the case of sudden illness or lumpy annual school fees that had to be paid. It is only necessary to know that lent funds were repaid with interest, with low or zero rates of default or repayment arrears, i.e. that the group's capital fund grows rather than declines. Appendix Table 1 shows how a small saving-lending group of 50 members can grow rapidly, while charging borrowing members interest at 3% per month. Each member makes an initial deposit of less than US$1.00. By saving a miniscule amount each month (less than US$0.10) plus a small deposit (US$2.22) each time a goat or cow is sold, say twice a year, the fund can grow to the level of almost 300 million Rupiah (US$26,600) in just 10 years.

The real relevance of forming small savings and lending associations is not so much in the capital fund assembled. The true "return on investment" is interest saved by avoiding the money-lender. As an academic exercise, in the bottom half of Appendix Table 1, we calculated the rate of return from not having to borrow the same amounts at 30%/month. The rates of return to using a credit union were astronomically large: 971% (for a group

where members charge each other interest at 3%/month). Avoiding the money-lender is a key instrument in poverty reduction in the Nusa Tenggara islands.

By the time of our second review in 2010, YMTM had raised its target for saving-lending group formation upward to 25; this was more than met (27 groups formed, 2,119 members of whom 1,073 are women). Altogether the participants had assembled $54,600 in capital, an almost 50 fold increase in less than two years! By 2010, two of the saving-lending groups had grown so large that they have formally registered themselves as cooperatives and opened bank accounts.

Joint marketing for farm outputs

The second short term measure that proved effective was joint marketing, meaning bulking up enough of a farm product to fill a truck, and then finding a higher price offer. Indonesian farmers have long been the target of colluding itinerant collection traders who buy directly at the farm gate in small quantities. These traders agree not to compete but instead to offer farmers a uniform low price. This is a simple form of monopsony (single, non-competitive buyer buying from producing farmers – the mirror image of monopoly, a single seller), described and analysed as early as 1975 in the rubber trade in Thailand (Stifel, 1975).

Monopsony buying power (forcing farmers to sell their surpluses only through favoured channels), was created by executive order and regulation, and was used extensively in the 1990s by the children and cronies of former President Suharto in the cases of oranges from Kalimantan, cloves and cocoa from eastern islands, and fresh tea leaves in West Java (Montgomery, 2002). During the 1997-98 Asian financial crisis, at the insistence of the IMF, government finally took measures to dismantle such government-enforced, regulation-supported monopsonies.

The means which YMTM found to solve the monopsony problem of collection-trader farm-gate price collusion was for farmer leaders to go into neighbouring towns and negotiate higher prices for bulk sales (truckload, 2-4 tons) directly with larger assembly traders. This

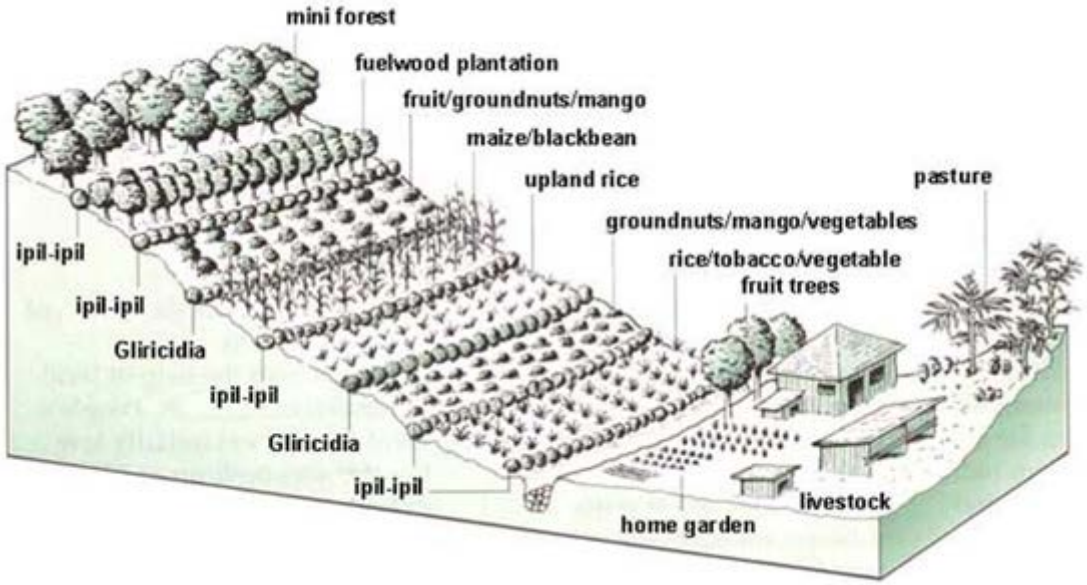
helped raise prices received by between 5% and 10%. Marketed sales of tamarind, candlenuts, peanuts, cashews, and maize between 2007 and 2010 totalled more than 600 tons, generating a total of US $240,000 (UNDP, 2012). While this may seem to be a large number it is only $48 per household. They would have received 5-10% less without joint marketing.

The first two short-term measures provided immediate, tangible relief to the problems of poverty and indebtedness. But they did not resolve the problem of inadequate on-farm production of food (or other products that could be sold to buy food). We turn to medium- and long-term strategies promoted by YMTM which directly addressed this problem.

Medium term (3-6 months): introducing soil and water conserving, slope stabilising contour planting systems such as SALT in steeply sloping fields;

The contour system introduced to address the issue of low on-farm income and low food crop production is called Sloping Agricultural Land Technology or SALT. Before the introduction of SALT, farmers found it necessary to shift to a new upland plot every year, requiring considerable amount of land clearance and burning. A typical farmer would own (or lay claim to) five different plots, farming each for just one year, returning to the first plot in year six, a short fallow of only five years.

The SALT system was developed and popularised throughout first the Philippines and the rest of Asia not by agricultural scientists but instead by missionaries at the Baptist Rural Life Centre in southern Mindanao in the 1970s (Tacio, 1993). Many sources have made available sketches showing examples of SALT based contour systems. Below is just one such sketch:



The free information exchange website, www.agrowingagriculture.org made available the schematic above.

A step by step guide on how to develop and install a contour system with possible planting variations has been produced by the Asia Rural Life Development Foundation[16] in Chiang Mai Thailand, a branch of the Mindanao Baptist group.

In North Central district on Timor where YMTM works, the SALT contour system is commonly known as *Kebun Tetap* (fixed garden). Elsewhere in Indonesia it is often called *Budidaya Lorong* (contour culture). Farmers dig gullies level parallel with the contour of the land. These gullies or ditches slow the movement of water down a hillside, reducing rapid run-off and loss of top soil. The material excavated is heaped on the downhill lip in a mound and strengthened by planting various legume bushes or grasses on the gully's lip. The sloping land is also enriched with generous applications of farmyard manure and organic manure placed in holes.

The edges of the contour run-off ditches are reinforced with short multi-purpose legume bushes, many of which have been introduced from their centre of domestication in Central America. The legumes are used for livestock feed; some are multi-purpose. Common choices of legume bush in Indonesia are *Leucaena leucocephala*, (*Lamtoro gung* in

[16] http://www.scribd.com/doc/20585238/Sloping-Agricultural-Land-Technology-SALT-Farming-System

Indonesian, or *Ipil-Ipil* in the Philippines*); Gliricidia sepium*, (*Gamal* in Indonesian); *Sesbania grandiflora* (*Turi* in Indonesian); *Flemingia macrophylla* (In Indonesian: *Apa-apa* or *Pok-kepokan*). At higher, wetter elevations the red-flowered *Calliandra calothyrsus* can substitute for any of the above. The choice of legume bush depends upon what additional local uses can be made (e.g. livestock fodder, living fences to separate cattle / goats from crops, wind-breaks, shade for other plants such as young coffee or cocoa trees, traditional medicines for diarrhoea or even as vegetables for human consumption - as in the case of *Sesbania* whose leaves, flowers and bean pods can all be eaten). Each of these short legume bushes is nitrogen-fixing and therefore enriches the soil, improving food crop yields. Further information on the species mentioned above is available on the International Legume Database and Information Service (ILDIS) web site set up by the University of Reading, UK. Gutteridge and Shelton (1998) also discuss the use of these legumes in contour systems. The Nairobi based World Agroforestry Centre's data base also presents information on a number of soil conserving and improving legume shrubs such as Calliandra[17].

In the alleys between the contour drains, various food and non-food crops are planted, the choice depending upon the slope. Common choices for food crops include maize, squash, beans such as cowpea (*kacang turis*) and yard long bean (*kacang nasi*), usually intercropped.

As early as 1930, a simple legume-tree based contour system called Alley Cropping had been introduced, particularly on NTT's Flores Island according to Scheewe (2000) and Metzner (1976). Unlike SALT, Alley Cropping involves no contour ditches, instead only the close planting of parallel rows along contour lines of the fast growing legume bushes, in particular *Lamtoro (Leucaena* spp) every 1 metre increase in elevation up the hill. This successful early introduction on Flores was supported strongly by the Catholic church. From there, variant agro-forestry strategies involving copious plantings of *Lamtoro* legume bushes were tried on Timor Island, but succeeded only in the Amarasi (Metzner 1983, Jones 1983),

[17] http://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=410

region, close to the capital, Kupang; during the period from 1925 to 1951, Amarasi was under the leadership of a strong local rajah or king, Hendrik Arnold Koroh. Rulings by such traditional local leaders, strongly supported by the church, enforced adoption. Those who failed to comply faced fines or even jail sentences according to Scheewe. Attempts elsewhere on Timor (other than Amarasi) to introduce contour systems such as Alley Cropping met with frustrating failure.

That YMTM was able to successfully introduce SALT in North Central Timor was due to an innovative approach. YMTM took a group of reluctant North Timor farmers not to Amarasi but across to Flores Island to see the various contour systems for themselves. They returned convinced and adopted. SALT involves a greater initial investment of labour (but not cash inputs) than the simpler Alley Cropping because of the need for establishing contour lines and digging run-off ditches on the contours.

Longer term: Introducing agro-forestry (many species) with multiple products (fruit, firewood, timber, sap/resin, leaves) as part of the SALT contour system

YMTM introduced an agro-forestry variant of the usual SALT contour system. Rather than immediately adopting permanent cropping, agro-forestry SALT is gradually introduced during one final cycle of shifting cultivation, but on a 15 year rotation. This variant included plantings of various kinds of fruit, nut and timber trees. In the agro-forestry SALT variant introduced, after the soil conserving contour ditches have been dug and legumes planted, seedlings of trees and other perennial crops are planted at the same time as planting upland food crops, (maize, squash, pigeon pea, yard long beans and peanuts). The most popular were nut and timber tree species: cashew nuts (Orwa et al, 2009)[18] – a native of Brazil, mahogany[19] – originally from South/Central America, candlenuts – a native species of Indonesia,[20] and

[18] *Jambu mede* in Indonesian, *Anacardium occidentale.* located on http://www.worldagroforestry.org/treedb2/AFTPDFS/Anacardium_occidentale.pdf

[19] *Mahoni* in Indonesian*, Swietenia macrophylla.* http://www.worldagroforestry.org/treedb2/AFTPDFS/Swietenia_macrophylla.pdf

[20] *Kemiri* in Indonesian; Latin:*Aeurites moluccana* http://www.worldagroforestry.org/treedb2/AFTPDFS/Aleurites_moluccana.pdf

pineapple[21] as a perennial plant. While these four perennials proved to be the most popular species (but only one is native to Indonesia), a total of 33 different tree species were chosen by individual farmers (UNDP, 2012). Other trees selected included true teak[22] which is native to Indonesia, "white teak" [23] or *Gmelina,* (this tree, a native of mainland SE Asia but not Indonesia, is not a teak at all. It is called a kind of "teak" because its leaf resembles the shape of teak leaves).

While most of the trees selected by the farmers were fairly short term to maturity, a number of trees planted were quite long term (>30 years) native species that had almost disappeared from the region including a local fan palm (the forest *Lontar Utan*[24]) and sandalwood trees, *Santalum album*[25].

Large numbers of sandalwood seedlings were planted: 13,400, increasing the standing stock for NTT by 23%. For decades sandalwood had been severely depleted on the island of Timor after a series of disastrous local government policies: in 1986, the provincial government claimed ownership in of all sandalwood trees no matter where found, whether growing on private land or government forest land. As Marks (2002) shows, the number of older mature sandalwood trees declined precipitately in the province from 172,000 in 1988 to only 59,000 by 1997, shortly before the fall of Suharto. The planting of more than 13,000 sandalwood trees by YMTM's cooperating farmers added considerably to the depleted stock.

Tree seedlings were inter-sown with the food crops immediately upon opening a plot for contour farming. After about three years the trees begin to shade out the food crops so the farmer moves to the next plot. In the evaluation (see below) it was the tree species planted which really made incomes increase.

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[21] Indonesian: *nanas*, Latin: *Ananas comosus*, Levang and Foresta (1991)
[22] Indonesian: *jati,* Latin: *Tectona grandis*
http://www.worldagroforestry.org/treedb2/AFTPDFS/Tectona_grandis.pdf
[23] Trade names: yemane,gumhar; Latin: *Gmelina arborea*
http://www.worldagroforestry.org/treedb2/AFTPDFS/Gmelina_arborea.pdf
[24] Indonesian: *lontar utan or pucuk,* Latin: *Corypha Gebanga,* Levang and Foresta (1991)
[25] Indonesian: *cendana,* Latin: *Santalum album*
http://www.worldagroforestry.org/treedb2/AFTPDFS/Santalum_album.pdf

A SIMPLE ECONOMIC EVALUATION OF THE AGRO-FORESTRY SALT TECHNOLOGY

To evaluate the impact of introducing medium term soil conserving contour food crop systems combined with long term tree species, a simple discounted cash flow benefit-cost model was constructed in the field together with NGO implementers and participating farmers. The model built is a financial evaluation, at existing market or financial prices farmers faced.

We chose not to undertake an economic evaluation where shadow prices/economic prices reflecting opportunity costs would need to be calculated. The use of shadow prices would have better reflected the costs and returns to society as a whole. Shadow prices attempt to eliminate the impact of economic distortions that depress output prices and inflate input prices. The most common distortions encountered are local monopolies, monopsonies and other barriers to trade such as taxes, both legal and illegal. Shadow prices would also attempt to incorporate non-market environmental benefits or costs that mostly accrue to people in other locations (reduced erosion, siltation, rapid run-off, fire/smoke etc. as above). Our interest was not to capture the entire economic and environmental benefits and costs to the world at large, but rather to reflect the private costs and benefits facing the farm family, to examine their decision making in the distorted world in which they live.

The model, presented in Appendix Table 2 calculates incremental benefits and costs, as experienced by YMTM's participating farmers. A model farmer is assumed to control 1.5 hectares, split into five equal plots of 0.3 ha. For farmers who do not participate in the project (the "without"" case), the farmer must shift each year, setting fire to, and clearing a new field in order to plant maize, squash and two common beans.

In the "with" project case, there is an initial investment in soil and water conservation measures of Rp 600,000 ($53), but this is in kind (labour), not cash. It is the participants' estimate of the value of family labour time invested in contouring, digging parallel ditches, locating seeds, planting seedlings, digging manure holes, and collecting and transporting farm-yard manure to the field. Farmers have tried a bewildering number of different

intercrops in their fields. To simplify the calculations we assumed the following common planting model:

- In the first plot, opened in year 1, the modelled farmer planted cashew and pineapple in addition to food crops. Food crop yields decreased over a 3 year period as the trees began to shade them out. By year 4 food crop production is not possible. Production of cashew and pineapple increases gradually and reaches its maximum only after ten years.
- The next plot was opened in year 3, and food crops were inter-planted with mahogany seedlings. The mahogany was allowed to grow for 12 years and is harvested in year 15.
- A third plot, opened in year 5, was inter-planted to candlenuts as well as food crops. Candlenut production increases gradually, taking about 15 years to reach maximum yield.
- It was assumed that the final two plots, opened in years 7 and 9 were devoted entirely to continuous food cropping, with no fruit, nut or timber trees. We were told this was a common pattern.

The switch from slash-and-burn annually to continuous cropping takes a full cycle of about 15 years. At the end of this period the farm family continues to harvest cashew with pineapple in the first plot, mahogany on a sustainable basis on their second plot, and candlenuts on the third plot. To discount future values back to their present values we use a discount factor of 12%.

Among the food crops, yields improve for squash as a result of abundant use of manure, but not for maize or beans. The price of maize improves because of joint marketing in volume.

Results of the evaluation

In physical production terms, the introduction of SALT was impressive. Vinsen was quoted (Sastriani, 2011) as saying: “Their productivity increased from 1.7 tons of corn

(maize) per hectare per year to 2.3 tons," he said. "Peanut yields have also gone up from 0.9 tons per hectare per year to 2.3 tons. These numbers are quite shocking for others because NTT has long been considered barren, so to even reach two tons per hectare is just amazing. ... As a result, the area's food security — measured in the length of time the community could survive on stored produce alone — went from eight months to 11".

The estimated increase in income or return from abandoning slash-and-burn and switching to the contour system is very positive. Only in the first year is there a slight decrease in income to the modelled farm family when comparing the "with project" to the "without project" cases. But after that, annual incomes increase rapidly to become many multiples of current farm income. Current annual farm income for farmers not adopting the new system (the "without project" case) is estimated at just Rp 875,000 or US$78 per year from a 0.3 ha plot of land. For farmers adopting (the "with project" case), annual income increases to an average of Rp3.9 million or US$353. The internal rate of return for switching cropping pattern toward soil and water conservation is 169%. This is exceptionally high and attractive.

For a typical (modelled) farm family, the undiscounted value of all incremental income earned over the 15 year transition period is Rp59.6 million (US$5,300) or more than $353 per year. The discounted net present value of the incremental income stream over 15 years is Rp14.4 million (US$1,300). If all 5,000+ households experience the same increases, the result would be a total of Rp73.3 billion (US$6.5 million) using the net present value concept.

UNCOUNTED BENEFITS OF ADOPTING THE SOIL CONSERVING UPLAND SYSTEM

On-site, stabilising slopes helps to reduces erosion and to increase the recharge of aquifers which store groundwater. Off-site, stabilising slopes leads to less burning/smoke, less flooding, increased carbon sequestration, less siltation of waterways in the lowlands, more continuous flow from spings, and more reliable base flow of rivers at lower elevations. We concentrate on the uncounted benefit of reducing erosion.

Reduction in soil erosion

According to an FAO sponsored review conducted by W.A. Laquihon and M.V. Pagbilao (1998), the SALT system was very effective in controlling soil erosion. They found there was almost 58 times more erosion in the non-SALT system than in the SALT treatment. The annual rate of soil loss from the SALT system was 3.4 t/ha compared to non-SALT land (about 200 tons/ha/yr). The loss of top- under SALT is well within the tolerable limits for soil loss. Palmer (1991) suggested that acceptable soil loss limits for the tropics were within the range 10-12 t/ha/year.

Erosion rates would be much lower under dense forest, 0.5 tons/ha per year (LTS, 1997), but are much higher under shifting cultivation (100 tons/ha/year) or upland market vegetable gardens (150 tons per year on steep slopes with no conservation, bare soil surfaces, and cultivation several times/yr).

THE CAST OF CHARACTERS: IS YMTM ALONE IN ITS EFFORTS?

This non-governmental organisation was established in 1996. Since the beginning, the main focus has been on community development, especially in relation to arid land farming. Over 530 farmer groups have been formed involving 5,300 households in 40 villages. About 42% of participants are women. The farmer groups are assisted by 49 YMTM staff, of which 42 live full time in the villages, which is one key to their success. As of 2009, 6 of the 40 villages had become independent, requiring no more assistance. Another 8 are in the process of graduating. The US based Ashoka Foundation provide a biography of Vinsensius Nurak on their site: https://www.ashoka.org/fellow/vinsensius-nurak. One factor that made Vinsen and his YMTM colleagues different from other NGOs is that Vinsen is himself the son of a Timor farmer, and is also a graduate with a degree in agriculture from the local university in Kupang.

Are they (YMTM) alone in encouraging villagers to plant economically useful trees? Indonesia has a wealth of NGOs active in various forestry, agro-forestry or upland

agricultural issues. SMERU Research Institute[26] maintains a database of NGOs in Indonesia and lists 2,898 organisations which have been in contact with them. Of these, nationwide, a total of 300 declared themselves as active in the field of "natural resource management"; 110 as focussing on "agriculture". A total of 143 identify themselves as working on "forestry" issues and 79 as working on "social forestry".

Most NGOs working on forestry issues are working to slow the rate of deforestation and to encourage the establishment of property rights for people living in or near forests. The effort to decrease deforestation is meeting with little or indeed no success. Monica di Gregorio presents an overview of the recent history Indonesian set NGOs working on forest tenure and access issues (di Gregorio, 2006). It is available on-line at Indiana University's Digital Library of the Commons.

Agro-forestry planting of new trees has met with much more success than efforts to reduce deforestation of remaining natural forest in Indonesia. There has been international leadership and support for such plantings. In 2006 the late Wangari Maathai called upon the world to plant an enormous number of new trees: one billion each year. The UN Environmental Program and the World Agroforestry Centre accepted the challenge and initiated a global effort called the One Billion Tree Campaign[27].

Box 1: The Need for The One Billion Tree Campaign according to UNEP:

"To make up for the loss of trees in the past decade, we would need to plant 130 million hectares (or 1.3 million km2), an area as large as Peru. Covering the equivalent of 130 million hectares would entail planting approximately 14 billion trees every year for 10 consecutive years. This would require each person to plant and care for at least two seedlings a year. In one year, an average tree inhales 12 kilograms (26 pounds) of CO2 and exhales enough oxygen for a family of four for a year. One hectare of trees can absorb 6 tonnes of carbon dioxide a year."

[26] http://www.smeru.or.id/ngolist.php?keyword=&province=all&sector=all&keyword2=&btnsearch=Cari
[27] http://www.unep.org/newscentre/default.aspx?DocumentID=2661&ArticleID=8978

The global problem according to the UNEP is summarised in Box 1[28]. The initial goal was for the world to plant one billion new trees each year. In fact the billionth tree was planted by November 2007. At the latest reporting (Sept 2014)[29] almost thirteen billion trees had been planted by national and local governments, communities, schools, corporations and other organisations in 193 countries including Indonesia. By 2012, China led the list by having planted 2.8 billion trees[30] followed by India (2.1 billion) and Ethiopia (1.6 billion). Indonesia does not figure in the top ten countries. At the latest count, slightly more than 100 million trees had been planted and reported to the UNEP's campaign, but of these 86 million were planted by the Ministry of Forestry (reported in 2008) and another 14 million by women's groups under the supervision of the First Lady of Indonesia (also reported in the year 2008). YMTM's record of more than 8.5 million trees planted is not reported in the Billion Tree records – many Indonesian NGOs and citizens remain unaware of this world wide effort. YMTM's achievement would be the third highest number for Indonesia after the two government programmes mentioned above. One catholic priest in Manggarai on Flores Island has worked with his followers to plant 3 million trees of various kinds.[31] His would be the number 4 highest number of trees planted for Indonesia.

In December 2011 the Billion Tree Campaign was formally turned over to a German children's foundation, Plant-for-the-Planet[32] and has frankly foundered after that move. The leader is now a boy who was only age 13 at the time of turnover. Why this successful and remarkable achievement was turned over to a child by the UNEP remains an unanswered question.

[28] http://www.plant-for-the-planet-billiontreecampaign.org/billiontreecampaign/FactsFigures/FastFacts/index.asp

[29] http://www.plant-for-the-planet-billiontreecampaign.org/Getinvolved/SeeLatest.aspx

[30] http://en.wikipedia.org/wiki/Billion_Tree_Campaign#Roll_of_Honour_top_10_countries

[31] http://www.thejakartapost.com/news/2011/09/30/three-million-trees-manggarai-raya.html

[32] http://int.plant-for-the-planet.org/btc_planted.aspx

CONCLUSIONS

Rural Indonesians such as the farmers in TTU district of NTT province will plant trees but only when certain conditions have been met. As YMTM have shown, tree planting must be just one prong of a multi-pronged approach to poverty reduction. The element of time of is important; trees take a relatively long time to maturity. Even fruit trees and fast-growing timber species take several years before an income stream begins to flow. The poor of rural NTT have more pressing problems that must be solved first. The highest priority problem is solving their problem of debt to money-lenders. This is followed by low farm-gate prices, the result of collusion among collection traders. Once these have been overcome by now familiar methods, the focus can turn to a gradual, phased introduction of SALT sustainable contour cultivation on steeply sloping agricultural land. The introduction of tree planting forms part of an agro-forestry SALT model, a variant of the classic contour system.

Did this approach to poverty reduction succeed? There is no clearer confirmation of this than the fact that, although the budget provided by AusAID was only enough to reach 1,000 households, more than 5,300 joined the project, asking for no assistance with inputs beyond advice and guidance. There has been no report of malnutrition in the participants' villages since 2010.

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Appendix Table 1: Credit Union (savings-loan group, *Kelompok Simpan Pinjam*) Charging 3% interest per month

Thousand Rp per US $ 11.27
Thousand Rp/Australian $ 10.85

1.1 Farm Market and Credit Groups

Input Data

Farmer's savings:	**1,000**	**Rp/HH**		**each HH**	**50**	**HH as members**
Deposit to join :			**10**	**or** **$0.89**	**$44.39**	
Required savings each month :			**1**	**or** **$0.09**	**$4.44**	
Voluntary savings (e.g. twice a year, harvest or sale goat, cow)			**25**	**or** **$2.22**	**$110.96**	
Interest at	**3%**	**per month**		Converted to US Dollars		

In Thousand Rupiah

													After 10 years:
	Month	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***	***120***
Loan Fund at beginning of period:			550	617	685	756	2,078	2,191	2,306	2,425	2,548	3,925	4,092	290,980
Joining Fee		500												
Required monthly savings		50	50	50	50	50	50	50	50	50	50	50	50	50
Voluntary Additional Deposits [twice/yr]						1,250					1,250			
Interest paid			17	18	21	23	62	66	69	73	76	118	123	8,729
Loan Fund available [stock concept]		550	617	685	756	2,078	2,191	2,306	2,425	2,548	3,925	4,092	4,265	299,759
	US dollars	$49	$55	$61	$67	$184	$194	$205	$215	$226	$348	$363	$379	**$26,610**
Investment	**Totals over 120 months (undiscounted)**													
Farmer Equity	**31,500**	550	50	50	50	1,300	50	50	50	50	1,300	50	50	50
Interest Income	**268,259**	0	17	18	21	23	62	66	69	73	76	118	123	8,729
Farmer Share	**299,759**	550	67	68	71	1,323	112	116	119	123	1,376	168	173	8,779
Summary by Year		***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***		
Farmer's Equity		550	3,050	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100		
Interest Income			665	2,289	4,583	7,855	12,519	19,169	28,650	42,168	61,441	88,920		
Farmer Share		550	3,715	5,389	7,683	10,955	15,619	22,269	31,750	45,268	64,541	92,020		
FIRR of Interest on Equity invested	**92%**	-550	-2,385	-811	1,483	4,755	9,419	16,069	25,550	39,068	58,341	85,820		

Appendix Table 1.2 Comparison with Borrowing from Money Lender at high interest rate per month

Net interest saving compared money lender at				**30%**			**per month**							
	Month:	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***	***120***
Savings:	2,414,333	0	149	166	185	204	561	591	623	655	688	1,060	1,105	78,565
Annual Summary:	***Year***	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***		
Net interest saving			5,987	20,601	41,251	70,693	112,670	172,519	257,850	379,511	552,970	800,282		
FIRR of Equity and Retained Interest Saved	**971%**	**-550**	**3,602**	**19,790**	**42,735**	**75,448**	**122,089**	**188,588**	**283,400**	**418,578**	**611,311**	**886,102**		
		-$49	$320	$1,757	$3,794	$6,698	$10,838	$16,741	$25,158	$37,157	$54,266	$78,660		
NPV Interest Saving (discounted at 12%)		Rp	974,384		$86,497	US $								
No. Savings Groups	15	Rp	15	million	$1.30	million US $								

Appendix
Table 2:

Soil and Water Conservation / Agro-forestry Model, Contour Farming
Assumptions:

2.1 Without Project			
Number of Plots of Land per household			5
Size / plot (ha)			0.3
Total farm size (ha)			1.5
PHYSICAL PRODUCTION:			
Intercrop (*tumpang sari)* Food Crops (100% of 0.3 ha)			
Maize (jagung)			
kg			300
Squash (labu) fruit			11
Squash shoots (pucuk) /bunch			14
Beans (kacang nasi) kg			21
Beans (kacang turis) kg			28
Note: *kacang turis* = cowpea			
kacang nasi -= yard long bean			
PRICES/UNIT (harga2)			
Maize (jagung)		Rp/kg	2,000
Squash gourds (labu)		Rp/piece	1,500
Squash shoots (ikat pucuk)		Rp/kg	1,000
Beans (kacang nasi)		Rp/kg	5,000
Beans (kacang turis)		Rp/kg	5,000
GROSS REVENUES:			
Without Project revenues Rp / 0.3 ha plot			
Food Crop Plot			
Maize kg	600,000		
Squash (labu) fruit	16,500		
Squash shoots (ikat pucuk)	14,000		
Beans (kacang nasi) kg	105,000		
Beans (kacang turis) kg	140,000		
Total "Without" Rev./plot	**875,500**		

2.2 With Project

Number of Plots of Land per household			5
Size per plot (ha)			0.3
Total farm size (ha)			1.5
PRODUCTION:			
Food Crops: 80% Intercrop (*tumpang sari) and 20% Peanuts* (of 0.3 ha)			
Maize (jagung) kg	[80% of area]		288
Squash (labu) fruit	[80% of area]		30
Squash shoots (ikat pucuk)	[80% of area]		114
Beans (kacang nasi) kg	[80% of area]		17
Beans (kacang turis) kg	[80% of area]		22
Peanut (kacang tanah) stand-alone kg	[20% of area]		22
Tree Crops (*Tanaman keras*)	No trees	prod/tree	prod, units
Plot A: Cashew by yr 10 kg rises to max:	42	4.3	181
pineapple, fruit	333	0.7	233
Plot B: Mahagony, stumpage, tree yr12	125	1	125
Plot C: Candlenut (kemiri) by yr 15 rising to max:	23	20	460
PRICES/UNIT (harga2)			
Maize (joint marketing)	Rp/kg		***2500***
Squash gourds (labu)	piece		1,500
Squash shoots (ikat pucuk)	bunch		1,000
Beans (kacang nasi)	Rp/kg		5,000
Beans (kacang turis)	Rp/kg		5,000
Peanut (kacang tanah)	Rp/kg		10,000
A Cashew (mete)	Rp/kg		6,500
A Pineapple	Rp/fruit		2,000
B Mahogony (per tree, stumpage)	Rp/stem		200,000
C Candlenut (Kemiri)	Rp/kg		9,000
Additional (incremental) First Year Inputs	Rp/ha		Rp/plot
Contours, ditches [labour]	1,500,000		450,000
Holes, manure 1mx1m	500,000		150,000
			600,000

GROSS REVENUES:	
With Project revenues: Rp / 0.3 ha plot	
Maize (joint marketing)	720,000
Squash gourds (labu)	44,400
Squash shoots (ikat pucuk)	113,600
Beans (kacang nasi)	84,000
Beans (kacang turis)	112,000
Peanut (kacang tanah)	222,000
Sub-Total "With" Rev./ 0.3 ha plot	1,296,000
Tree Crops [Max Revenue, at maturity. Rp /0.3 ha plot]:	
Cashew with pineapple yr 10	1,640,100
Mahogony yr12	25,000,000
Candlenut (Kemiri) yr 15	4,140,000

2.3 INCREMENTAL NET BENEFITS

(Thousand Rp per plot on shifting basis. 5 plots of 0.3 ha: A, B, C, D, E): Panel 2.2 minus Panel 2.1: in thousand Rp.

	Year:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Panel 1: Without Project																
A		876					876					876				
B			876					876					876			
C				876					876					876		
D					876					876					876	
E						876					876					876
	Total "Without Project":	876	876	876	876	876	876	876	876	876	876	876	876	876	876	876
Panel 2: With Project	Year:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
A	Food [100%, 80%, 60%: shading]	1,296	1,037	778												
	Invest contours, ditches	**-600**														
	tree (cashew+pineapple)				**82**	**164**	**328**	**820**	**984**	**1,312**	**1,640**	**1,640**	**1,640**	**1,640**	**1,640**	**1,640**
B	Food [100%, 80%, 60%: shading]			1,296	1,037	778										
	Investment contours, ditches			**-600**												
	tree (mahogony)															**25,000**
C	Food [100%, 80%, 60%: shading]					1,296	1,037	778								
	Investment contours, ditches					**-600**										
	tree (candlenut / *kemiri*)										**276**	**690**	**1,035**	**1,380**	**1,656**	**2,070**
D	Foodcrops, continuously (no tree crop)							1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296	1,296
	Investment contours, ditches							**-600**								
E	Food crops, continuously (no tree crop)									1,296	1,296	1,296	1,296	1,296	1,296	1,296
	Investment contours, ditches									**-600**						
	Total "With Project":	696	1,037	1,474	1,119	1,638	1,365	2,294	2,280	3,304	4,508	4,922	5,267	5,612	5,888	31,302
Incremental Benefit / HH		**-180**	**161**	**598**	**243**	**762**	**489**	**1,418**	**1,405**	**2,429**	**3,633**	**4,047**	**4,392**	**4,737**	**5,013**	**30,427**
[= +with - without]		-$16	$14	$53	$22	$68	$43	$126	$125	$216	$322	$359	$390	$420	$445	$2,701

2.4 Summary of Net Incremental Benefits, undiscounted and discounted at 12% / year

In Rupiah

	Without Project	With Project
Undiscounted Sums/HH over 15 years	13,132,500	59,572,525
	$1,166	$5,288
Annual Average	875,500	3,971,502
	$78	$353

Exchange rate:

Rp / US $
11,265

Sum / HH undiscounted	**Rp**	**59,572,525**
Net Present Value Inc Ben / HH [d.f. 12%]	**Rp**	**14,443,679**
	= US $	***$1,282***
Internal Rate of Return		**169%**
No Households (HH) at evaluation		5,073
No HH, If number of adopters (75%)		3,805
No. HH, If number of adopters (50%)		2,537

	Rp Total	US $
NPV Total [if 100% adopt]	**73,272,783,134**	**$6,504,464**
NPV Total [if 75% adopt]	**54,954,587,350**	**$4,878,348**
NPV Total [if 50% adopt]	**36,636,391,567**	**$3,252,232**

Net Present Value for each component 0.3 ha plot, Rupiah

	NPV	
Plot A	cashew+pineapple	4,509,047
Plot B	NPV mahogony	4,844,248
Plot C	NPV candlenut	1,680,720
Plot D	NPV foodcrops	2,175,832
Plot E	NPV foodcrops	1,233,833
	total NPV:	14,443,679

ENDNOTE

[i] The MDG goals and their targets clearly enunciate quantitatively and qualitatively verifiable targets for reducing income and non-income dimensions of poverty. Progress on achieving the MDGs is used to monitor the strategy's impact. In summary, these are the goals and the specific targets:

Goal 1: Eradicate extreme poverty and hunger

Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day

Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2: Achieve universal primary education

Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3: Promote gender equality and empower women

Target 4: Eliminate gender disparity in primary and secondary education, preferably by 2005; in all levels of education, no later than 2015

Goal 4: Reduce child mortality

Target 5: Reduce by two thirds, between 1990 and 2015, the under-5 mortality rate

Goal 5: Improve maternal health

Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

Goal 6: Combat HIV/AIDs, malaria, and other diseases

Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7: Ensure environmental sustainability

Target 9: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

Target 10: Halve by 2015 the proportion of people without sustainable access to safe drinking water

Target 11: Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers

Goal 8: Develop a global partnership for development

Target 12: Develop further an open, rules-based, predictable, non-discriminatory trading and financial system

Target 13: Address the special needs of the least developed countries (includes tariff- and quota-free access for exports, enhanced program of debt relief for and cancellation of official bilateral debt, and more generous official development assistance for countries committed to poverty reduction)

Target 14: Address the special needs of landlocked countries and small island developing states

Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Target 16: Develop and implement strategies for decent and productive work for youth

Target 17: In cooperation with pharmaceutical companies, provide access to affordable essential drugs

Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communication technologies