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# Sustainable Improvements in Upland Agricultural Productivity and Incomes in Timor-Leste

Options for USAID Assistance

February 2006

This publication was produced for review by the United States Agency for International Development. It was prepared by Development Alternatives, Inc.



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## **ACKNOWLEDGEMENTS**

The team wishes to acknowledge the enormous support of the Small Grants Project team in setting up meetings, field visits and an auxiliary office where the team could work effectively. Special thanks go to COP Nick Hobgood and DCOP Kate Heuisler. Antonio Gusmao is much appreciated for his patience in working with us, as is Maya. Both were untiring in their support of our work.

Finally, we want to thank USAID/Timor-Leste, Mission Director Flynn Fuller and CTO Stephen Vance, for having the foresight to be deliberate about the Mission's approach to investing in the development of Timor-Leste's agriculture sector. Since this is where most Timorese derive their livelihoods and seek to secure their future, we believe that a carefully thought out approach to engaging in agriculture will reap rewards for Timor-Leste and USAID's program here, alike.

Getting to know the wonderful country and people of Timor-Leste has been a fringe benefit of this assignment.

# TABLE OF CONTENTS

## EXECUTIVE SUMMARY

### BACKGROUND

USAID/Timor-Leste seeks to make strategic investments over the next five years, consistent with its own strategic plan and the Timorese government's vision for agriculture, which will result in sustained improvements in the nutrition, incomes and livelihoods of Timor-Leste farm families. The purpose of this document is to identify promising areas of USAID assistance that will respond to these objectives, to discuss how these activities might be carried out and the likely benefit from undertaking the recommended assistance. The USAID Agricultural Options Paper has been prepared through the Small Grants Project and involved a team of specialists in different agriculture subsectors who visited Timor-Leste in two phases, first in early December 2005 and next in mid-January 2006.<sup>1</sup>

Timor-Leste is primarily an agricultural economy, where 80% of the population resides in the countryside, relying primarily on subsistence agriculture for their livelihoods. Faced with highly variable and, in parts of the north coastal areas, semi-arid conditions, farmers put a very high priority on minimizing risk rather than maximizing return. A very small market is greater reason for farmer households to undertake risk management strategies on a farm-by-farm basis. Main crops are selected and grown for their ability to withstand drought and variable rainfall and other crops are kept in order to ensure against catastrophe and provide additional calories during the "hungry periods" just preceding harvest. Combined with foraging livestock that are generally expected to care for themselves, upland, rain-fed agriculture in Timor-Leste is a low-input, low-output system of shifting cultivation that is reaching its limits.

The Timorese annual population growth, estimated at as much as 4.7 percent, is one of the highest in the world, and the pressure growing population is putting on the natural resource base is extreme. Shifting cultivation is generally unproductive when population density exceeds 50 persons per square kilometer; a number of Timor-Leste's upland districts have passed this limit, and the damage is clear to see.

The government of Timor-Leste, along with donors, is aware of the need to increase the productivity of agriculture since increased productivity in agriculture translates directly into improved farm household incomes and overall economic growth. The government's vision, as articulated in the National Development Plan is, in a nutshell, to provide the policy and regulatory environment for market-led growth in agriculture. The Ministry of Agriculture, Forestry and Fisheries Policy and Strategic Framework and Sector Investment Plan structure the vision into programs.

Helping Timor-Leste improve the productivity and incomes of its farm families will require that the donors move away from a welfare mentality to a partnership one that favors providing assistance to individuals and communities that show initiative and entrepreneurship. Donors must face the reality that development is rarely an even process. Some people and communities are more entrepreneurial and organized in their efforts to improve their lives. These are the groups that must be helped since they will drive the Timorese economy and ensure jobs and a market for

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<sup>1</sup> The team included livestock expert, John Leake (2<sup>nd</sup> phase), horticultural expert, Merle Menegay (1<sup>st</sup> and 2<sup>nd</sup> phases), food crops and agribusiness expert, David Neubert (1<sup>st</sup> and 2<sup>nd</sup> phases), agroforestry expert, Syed Tahir Qadri (2<sup>nd</sup> phase), agricultural and rural credit expert, John Jepsen (2<sup>nd</sup> phase), led by Jerry Martin in the first phase and David Tardif-Douglin in the second phase. Antonio Gusmao of the Small Grants Project provided the on-the-ground knowledge and organizational skill that was so beneficial to the work of the team.

the rest of their countrymen. The approach should be unabashedly market-led; rhetoric aside, no country has reduced poverty without encouraging and enabling economic growth.

USAID and a number of other donors and international NGOs are engaged in the agriculture sector. They are largely attempting to make the transition from a “seeds and tools” immediate post-conflict-like assistance to a more sustainable model of assistance that supports existing initiative. The recommendations of this study focus on this transition and emphasize assistance that reinforces market-led incentives for increased productivity, incomes and farm household well-being.

## **OPTIONS FOR USAID INVESTMENTS IN AGRICULTURE**

As USAID considers the wide array of possible types of assistance it could provide to Timor-Leste farm households, a key concern is to make sure investments are made in those that are most likely to have a rapid, noticeable and sustained impact on the incomes and well-being of the largest number of Timorese farmers. This suggests that improvements in agricultural productivity and production of key crops are a crucial element; yields are low by international and regional standards, and falling. It also suggests an integrated livestock feeding and agroforestry program to ensure increased incomes, improvements in protein intake for many farm households, and improvement of the resource base. Of course, it also suggests involvement in steps to improve the market and better link active and latent surplus production from the country side to urban demand. These are the kinds of investments we recommend.

## **INCREASING THE PRODUCTIVITY AND PRODUCTION OF STAPLE FOOD CROPS**

### **Problems and Constraints**

Productivity of the major staple upland food crops of maize, cassava, beans and sweet potatoes is not just lagging behind regional and international comparators, it is declining. This is for at least three main reasons: (1) The departure of the Indonesians ended the provision of subsidized fertilizer, (2) the degeneration of the main varieties in use in Timor-Leste has left the system with less productive varieties, and (3) Population and market pressures have pushed shifting agriculture onto less fertile soil, often land that should not be cultivated at all.

Timor-Leste’s farmers have not employed agricultural technologies and practices that would allow for a more stable food supply, reduce the risk of food insecurity and create a food surplus sufficient to fuel the growth of down-stream agricultural industries such as commercial livestock operations.

Much of the farmland devoted to food crop production is located on hillsides and is farmed using a traditional “slash and burn” production system. This has resulted in significant environmental damage through high levels of soil erosion resulting in declining soil fertility levels. The degradation of soil resources (on hillsides and in valleys) has led to a trend of flat, or in some cases, declining yields. Under the current farming system, the soil is being mined (with no attempt to replace soil nutrients removed by the crop) and in many cases, soil is simply being permanently lost to erosion.

### **Proposed Interventions**

In the food crops sector, there are three specific options that can be implemented to improve caloric food security, improve household nutrition, create excess supply for down-stream value added markets and develop markets for agricultural inputs. Additionally, the food crop options include activities that are specifically tailored to address gender issues within the context of fruit and vegetable production, family health and nutrition and agribusiness/ marketing. The three activities under the Food Crops options include:

- **Mass Media Communications** uses radio as a vehicle to deliver information to farmers on improved production practices, technologies, markets, nutrition, government policy and regulations. Subject areas may include crops, livestock, agro-forestry, agribusiness, etc. *Approximate cost: 825,000 USD over five years (annual cost of 165,000 USD).*

### Recommendation # 1: Mass Media Communications

Time	5 years	per year	total
<b>Labor</b>		\$125,000	\$625,000
<b>Equipment</b>		\$4,000	\$20,000
<b>Office Supplies</b>		\$4,000	\$20,000
<b>Communication + Programs</b>		\$20,000	\$100,000
<b>Transport</b>		\$12,000	\$60,000
<b>Total</b>		<b>\$165,000</b>	<b>\$825,000</b>
<i>Beneficiaries*:</i>			<b>377,000</b>
<i>Cost per beneficiary:</i>			<b>\$2.19</b> [\$0.44/year]

\* 65% target population = 63% of total population with access to radio

- **Integrated Farming Systems** uses an in-village participatory/ demonstration approach to training farmers in improved agricultural practices, technologies, markets and farming as a business. The activity also integrates livestock, horticulture and agro-forestry elements to take a broad approach to food security and market development. *Approximate cost: 9.26 million USD over five years (annual cost of 1.85 million USD).*

### Recommendation # 2: Integrated Farming Systems

Time	5 years	per year	total
<b>Labor</b>		\$1,120,000	\$ 5,600,000
<b>Equipment</b>		\$ 240,000	\$ 1,200,000
<b>Office Supplies</b>		\$ 160,000	\$ 800,000
<b>Communication + Programs</b>		\$ 140,000	\$ 700,000
<b>Transport</b>		\$ 192,000	\$ 960,000
<b>Total</b>		<b>\$1,852,000</b>	<b>\$ 9,260,000</b>
<i>Beneficiaries*:</i>			<b>\$ 32,486</b>
<i>Cost per beneficiary:</i>			<b>\$ 285.05</b> [\$57/year]

\* 6912 households with 4.7 people per household

- **Agribusiness Markets Training For Women**, this option provides technical, marketing and business skills training to women shop owners/ operators and market traders in the area of selling crop inputs and farm outputs. At the same time, it also provides training to women through community groups, in small-scale horticultural production and family health. *Approximate cost: 88,000 USD (annual cost of 17,600 USD)*

### Recommendation # 3: Agribusiness Markets Training For Women

<b>Time</b>	<b>5 years</b>	<b>per year</b>	<b>total</b>
<b>Labor</b>		\$ 8,000	\$ 40,000
<b>Equipment</b>		\$ 4,000	\$ 20,000
<b>Office Supplies</b>		\$ 800	\$ 4,000
<b>Communication + Programs</b>		\$ 800	\$ 4,000
<b>Transport</b>		\$ 4,000	\$ 20,000
<b>Total</b>		<b>\$ 17,600</b>	<b>\$ 88,000</b>
<i>Beneficiaries*:</i>			<b>480</b>
<i>Cost per beneficiary:</i>			<b>\$ 183.33</b> [\$36.60/year]

\*96 women per year

#### Total for all 3 subcomponents (1 + 2 + 3) :

<b>Time</b>	<b>5 years</b>	<b>per year</b>	<b>total</b>
<b>Labor</b>		\$1,253,000	\$ 6,265,000
<b>Equipment</b>		\$ 248,000	\$ 1,240,000
<b>Office Supplies</b>		\$ 164,800	\$ 824,000
<b>Communication + Programs</b>		\$ 160,800	\$ 804,000
<b>Transport</b>		\$ 208,000	\$ 1,040,000
<b>Total</b>		<b>\$2,034,600</b>	<b>\$ 10,173,000</b>
<i>Beneficiaries:</i>			<b>409,966</b>
<i>Cost per beneficiary:</i>			<b>\$ 24.81</b> [\$4.96/year]

### INCORPORATING AGROFORESTRY INTO A CONSERVING AND INCOME-ENHANCING AGRICULTURE

#### Problems and Constraints

With growing pressure on the land, farmers are bringing increasing hectares of steep and highly erodible upland soils under an increasingly intensive shifting cultivation. This type of cultivation can be productive under low frequency rotations typical of low-density subsistence agriculture. With increasing populations and a growing market orientation, it is, however, unsustainable. The problem is that farmers will only truly realize that it is unsustainable when it is too late and the soils have lost their nutrients and the land has eroded. Finding market “pulls,” demand for products of farming systems that actually conserve the soil, is an important objective of our agroforestry recommendations.

Farmers will only make investments in soil-conserving structures, plants and practices if the additional cost in terms of family labor or payment for seedlings is more than compensated for by increased income. They will also need to be sure that whatever improvements they make to land they are farming will accrue to them; that they will have security of tenure. We have designed the agroforestry options to be promoted in conjunction, primarily, with the livestock options, which will be primary users of fodder from hedgerows and other erosion control trees and shrubs such as *Leucaena*. The livestock fattening we propose will, for example, use *Leucaena* leaves taken from hedgerows, shade trees and other soil-stabilizing investments, to fatten cattle, sheep and goats for export. We expect, as does National Cooperatives Business Association (NCBA)/ Cooperativa Cafe Timor (CCT), that the premium these fattened animals will receive will be a powerful incentive for farmers to plant *Leucaena* and other soil-conserving and soil-improving leguminous tree and shrub species. We propose working with communities and the government on policies

and regulations that will strengthen farm families' security of tenure on the lands they farm and, we hope, improve.

### Proposed Interventions

**Sedentarization of shifting cultivation.** To address the problem of unsustainable shifting cultivation, and prevent its expansion in fragile uplands, the practice needs to be sedentarized and converted into a sustainable and stable system through incorporation of trees and conservation farming practices. Based on various models tried and tested and observed during the field visits, the following conservation oriented agroforestry systems and associated interventions are proposed: (i) Alley-cropping and contour hedgerows; (ii) Silvopastoral agroforestry; (iii) Windbreaks and Shelterbelts; (iv) Live fences-border plantations; (v) Home gardens; (vi) Community Woodlots for Fodder, Fuelwood and Timber; and (vii) Multipurpose Production Nurseries. *Approximate cost: 2.625 million USD over five years (annual cost of 525,000 USD).*

#### Recommendation #4: Supporting Sedentarization of Shifting Cultivation

Time	5 yrs	annual	total
<b>Labor</b> ( Not including labor provided by participant farmers)		\$ 75,000	\$ 375,000
<b>Equipment</b>		\$ 100,000	\$ 500,000
<b>Supplies</b>		\$ 90,000	\$ 450,000
<b>Communication + Programs</b>		\$ 200,000	\$ 1,000,000
<b>Transport</b>		\$ 60,000	\$ 300,000
<b>Total</b>		<b>\$ 525,000</b>	<b>\$ 2,625,000</b>
<i>Beneficiaries: (2 Ha/5 member household)</i>			<b>77,500</b>
<i>Cost per beneficiary:</i>			<b>\$ 33.87</b> [\$6.8/year]

**Rejuvenation, rehabilitation and appropriate management of coffee estates.** Of the available area of about 50,000 ha under coffee in immediate need for rehabilitation and rejuvenation, it is proposed that the Project undertake an area of 5,000 ha in the first phase with the purpose of converting the aging and degrading coffee plantations as well as the areas degraded due to shifting cultivation into well managed productive coffee plantations. Under this component, the Project would provide technical assistance, seeds and seedlings, and hand tools to the participating farmers. While there are a large number of shade tree species being planted and tried under various agroclimatic conditions, it would be best to go with the species that are demonstrably appropriate and provide the right amount of shade to the coffee crop. The cost of the sub-component including technical assistance is estimated at **635,000 USD**. *Approximate cost: 635,000 USD over five years (annual cost of 127,000 USD)*

#### Recommendation # 5: Rejuvenation, Rehabilitation and appropriate management of coffee estates

Time	5 yrs	annual	total
<b>Labor</b> ( Not including labor provided by participant farmers)		\$ 100,000	\$ 500,000
<b>Equipment</b>		\$ 10,000	\$ 50,000
<b>Supplies</b>		\$ 2,000	\$ 10,000
<b>Communication + Programs</b>		\$ 10,000	\$ 50,000
<b>Transport</b>		\$ 5,000	\$ 25,000
<b>Total</b>		<b>\$ 127,000</b>	<b>\$ 635,000</b>

Beneficiaries: (2 Ha/5 member household)

12,500

Cost per beneficiary:

\$ 50.80 [\$10.16/year]

**Policy reform to address potential land tenure conflicts.** Appropriate policies and legislation, rules and regulations would be necessary prerequisite and provide incentives for conservation oriented farming, sedentarization of shifting cultivation, adoption of conservation farming and various agroforestry models as the means to arrest declining soil fertility and enhance production of food crops, forage, fuelwood, and small timber. Establishment of homestead woodlots and tree plantations would also require similar incentives. While certain actions in this context have already been initiated by the Land and Property Department of the Ministry of Justice, it would be necessary to maintain the pace of reforms and not only finalize all land use and land management policies and legislation but promulgate associated rules and regulations together with appropriate interventions for capacity building of the concerned institutions to implement and enforce such rules and regulations. *Approximate cost: 150,000 USD over six months.*

### Recommendation # 6: Policy reform to address potential land tenure conflicts

Time	6 mo	total
<b>Labor</b> ( Not including labor provided by participant farmers)	\$ 150,000	\$ 150,000
<b>Equipment</b>	\$ -	
<b>Office Supplies</b>	\$ -	
<b>Communication + Programs</b>	\$ -	
<b>Transport</b>	\$ -	
<b>Total</b>	<b>\$ 150,000</b>	<b>\$ 150,000</b>
<i>Beneficiaries: would include the beneficiaries of Recommendation 4 +5</i>		<b>90,000</b>
<i>Cost per beneficiary:</i>		<b>\$ 1.67</b>

### Total for 3 Agroforestry components (4 + 5 + 6)

Time	5 yrs	annual	total
<b>Labor</b> ( Not including labor provided by participant farmers)	\$ 205,000	\$ 1,025,000	
<b>Equipment</b>	\$ 110,000	\$ 550,000	
<b>Office Supplies</b>	\$ 92,000	\$ 460,000	
<b>Communication + Programs</b>	\$ 210,000	\$ 1,050,000	
<b>Transport</b>	\$ 65,000	\$ 325,000	
<b>Total</b>	<b>\$ 682,000</b>	<b>\$ 3,410,000</b>	
<i>Beneficiaries: (2 Ha/5 member household)</i>			<b>90,000</b>
<i>Cost per beneficiary:(Average)</i>		<b>\$ 37.89</b>	<b>[\$7.58/year]</b>

## LIVESTOCK AS SOURCES OF INCOME AND COMPONENTS OF A VIRTUOUS SOIL CONSERVATION CYCLE

### Problems and Constraints

All but the poorest Timorese farm households have some livestock, mostly pigs and chickens, but also some goats and sheep. The better-off households also have Bali cattle and water buffalo. These are important stores of wealth and sources of prestige and income generation for the owning households. Livestock can also be an integral part of the farming system by serving as

recycler of crop-related waste products and providing nutrients to the soil in the form of manure. Farm families rarely actively manage their livestock raising, preferring the labor-saving approach of allowing farm animals to forage on their land and on communal land. In order to make the investments in time and effort necessary to more tightly tie livestock into a productive and stable permanent cultivation, farmers need a market pull, a price premium for fattened livestock that demonstrates the gains to be obtained from the greater effort involved in feeding and stabulating livestock. We recommend activities similar to those being undertaken by NCBA/CCT to develop the market for fattened livestock (primarily cattle, goats and sheep). This includes arrangements with interested farm families to fatten livestock under contract using *Leucaena* cut from trees or shrubs used to stabilize eroded and erodable sloping land.

### Proposed Interventions

**Support to Livestock Marketing.** Developing and demonstrating a market for hand fed animals is the best way to induce a fundamental and critically-needed move away from shifting cultivation to intensification of the farming system. Using hedgerow legumes as feed will immediately improve food security and incomes of farm families. In the longer term it will reduce soil erosion and improve the quality of farm land enabling it to be cultivated under a more intensive system. Successful alley cropping in other regions will result when the income from more intensively raised animals, fed on high protein fodder from hedgerows, is seen to far exceed the costs associated with this system as compared to shifting cultivation.

The immediate objective of this activity is to establish in the mind of farmers, entrepreneurs and financiers that a consistent, good and reliable market exists for cattle, buffalo, goats and sheep of export weight, or in the case of goats and sheep, perhaps frozen meat and offal.

The strategy is to provide inputs to offset the risk of innovation and reduce entry costs of entrepreneur, and to prove to all participants in the market that there is profit to be made in the short and long term.

The elements of a program to achieve this include:

- Helping an entrepreneurial company or enterprise set up and finance a contract livestock fattening and marketing system operating in each area of the project;
- Technical assistance in South East Asian livestock fattening and marketing systems to support the enterprise and work with donors and financiers;
- Technical assistance to facilitate linkages between the entrepreneur and the provision of animal health, vaccine and quarantine and immigration and other official services;
- Material assistance to produce animal feed for shipment;
- Accurate cost accounting and evaluation of market options including goat and sheep meat;
- Close cooperation with finance providers to facilitate the introduction of direct livestock credit if possible before the end of the five-year program period.

*Approximate cost: 3.03 million USD over five years (annual cost of 606,000 USD).*

### Recommendation #7: Support to Livestock Marketing

Time	5 yrs	annual	total
<b>Labor</b>		\$261,000	\$1,305,000
<b>Equipment</b>		\$200,000	\$1,000,000
<b>Supplies</b>		\$ 80,000	\$ 400,000
<b>Communication + Programs</b>		\$ 30,000	\$ 150,000
<b>Transport</b>		\$ 35,000	\$ 175,000
<b>Total</b>		<b>\$606,000</b>	<b>\$3,030,000</b>
<i>Beneficiaries*:</i>			<b>2,400</b>
<i>Cost per beneficiary:</i>			<b>\$ 1,262.50</b> [\$252.60/year/household]

\*Cattle = Year 3:200, Y4:400, Y5: 800 (one head per producer); Goats = Y3:500, Y4:1500, Y5:3,000 (5 head per producer)

### Improving Livestock Nutrition.

The immediate objective of this proposed activity is to improve farm household food security by providing farmers with the means to produce additional high protein animal feed for ruminant livestock fattening. This has the twin benefit of increasing income in the short run and supporting sustainable intensive agriculture over the longer term.

To help farmers start this virtuous cycle of growing and maintaining contoured hedgerows, feeding the fodder from the hedgerows, to tie up the animals to fatten them, and selling the fattened livestock for a premium over un-fattened livestock, an initial project input is necessary. This involves providing seedlings and seeds and, especially, providing incentives for farmers to plant high protein shrubs and trees on a contour cash income and other benefits that come with fattening livestock in this environment.

The strategy upon which this activity is based is to provide a linking set of incentives for each participant that will ensure that each will undertake the expected activities pending demonstration of the system benefits to all.

There are two aspects of this component: First, there is a nursery activity that will provide seedlings, covered under the Agro forestry component. Second, we recommend an activity that facilitates farmer planting of leguminous shrubs and trees suitable for livestock feed in hedgerows or in fallow flat lands.

The elements of this recommended activity include:

- Facilitating linkages between cattle buyers and farmers interested in participating in planting high protein shrubs for feeding to livestock;
- Ensuring access of participating farmers to animal health facilities;
- Study tours for officials and farmers to see intensive use of *Leucaena* in West Timor and Flores so they can appreciate the potential system benefits from the perspective of farmers in a similar environment;
- Support for farmer trials to demonstrate the technology for intensive use of the forage (or mulch) in hedgerows in steep country to inhibit erosion and in alleys or otherwise in flat area;
- Support for farmer trials to develop high protein forage based rations for beef, milk, and small stock production in relevant areas.

*Approximate cost: 597,000 USD over five years (annual cost of 119,400 USD)*

### Recommendation # 8: Improving Livestock Nutrition

<b>Time</b>	<b>5 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$ 51,000	\$ 255,000
<b>Equipment</b>		\$ 20,000	\$ 100,000
<b>Supplies</b>		\$ 2,400	\$ 12,000
<b>Communication + Programs</b>		\$ 30,000	\$ 150,000
<b>Transport</b>		\$ 16,000	\$ 80,000
<b>Total</b>		<b>\$119,400</b>	<b>\$ 597,000</b>
<i>Beneficiaries*:</i>			<b>3,740</b>
<i>Cost per beneficiary:</i>			<b>\$ 159.63</b> [\$32/year/household]

\*3,740 hectares = one household per hectare

**Total for 2 Livestock components (7 + 8)**

<b>Time</b>	<b>5 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$312,000	\$1,560,000
<b>Equipment</b>		\$220,000	\$1,100,000
<b>Office Supplies</b>		\$ 82,400	\$ 412,000
<b>Communication + Programs</b>		\$ 60,000	\$ 300,000
<b>Transport</b>		\$ 51,000	\$ 255,000
<b>Total</b>		<b>\$725,400</b>	<b>\$3,627,000</b>
<i>Beneficiaries*:</i>			<b>6,140</b>
<i>Cost per beneficiary:</i>			<b>\$ 590.72</b> [118.20/year/household]

\*Combination of above options

**HORTICULTURE AND MARKETS: IMPROVING INCOMES THROUGH BETTER MARKET LINKAGES****Problems and Constraints**

With the departure of the Indonesians in 1999, Timor-Leste's marketing system collapsed. Indonesian traders had been providing the link between the countryside and towns, selling inputs and consumer items to farmers and buying their surplus production for sale to towns. Since Indonesian traders have left, very few Timorese traders have stepped in to fill the gap. Farmers are still bringing surplus production to market, mostly surplus from household vegetable gardens and fruit trees, but the reach of the market, in the absence of specialized traders, is limited. Many farmers are too far away to reach the demand centers of Dili, Baucau, Maliana and other towns and population centers. When highly perishable horticultural products do get to these markets, farmer-sellers are confronted with sub-optimal marketplace conditions that raise transactions costs and render the sales relatively unprofitable.

Because of these market infrastructure weaknesses, we recommend that USAID provide assistance to rebuilding a network of periodic rural markets and support the World Bank's Agriculture Rehabilitation Project (ARP) III market rehabilitation project by providing site selection and market management advice.

**Proposed Interventions**

In order to re-establish food markets in Timor-Leste we recommend that USAID support an inter-related set of marketing interventions to accelerate the formation of a uniquely Timorese style of agricultural marketing system for a wide range of vegetable, fruit, meat, wood, feed/fodder, spice and related commodities. In other words, conceptualize, plan, and implement a catalytic marketing program for marketplace transformation, rural presence of traders, cold chain formation for high-end products, and access to appropriate technology information. This vegetable and fruit, market-led strategy could be replicated in other sectors as built on participatory involvement of stakeholders, mentoring training of new traders, "software" approach to marketplace transformation, and technology transfer from basic to advanced levels.

Recommendations include:

- **Transformation of wholesale and retail marketplaces** in main urban areas through the "software" approach to market facility development.

*Approximate cost: 600,000 USD for three years (annual cost of 200,000 USD).*

**Recommendation #9: Organize, manage, monitor and gradually expand a network of periodic rural assembly markets**

<b>Time</b>	<b>3 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$133,333	\$ 400,000
<b>Equipment</b>		\$ 10,000	\$ 30,000
<b>Supplies</b>		\$ 1,667	\$ 5,000
<b>Communication + Programs</b>		\$ 16,667	\$ 50,000
<b>Transport</b>		\$ 38,333	\$ 115,000
<b>Total</b>		<b>\$200,000</b>	<b>\$ 600,000</b>
<i>Beneficiaries*:</i>			<b>3,100</b>
<i>Cost per beneficiary:</i>			<b>\$ 193.55</b> [\$64.67/year]

\*Year 1: 300, Year 2: 800, Year 3: 2,000

- **Establishment and expansion of a rural network of private sector sponsored, periodic markets**

*Approximate cost: 700,000USD for three years (annual cost of 230,000 USD).*

**Recommendation # 10: improving market organization in urban areas**

<b>Time</b>	<b>3 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$200,000	\$ 600,000
<b>Equipment</b>			
<b>Supplies</b>		\$ 8,333	\$ 25,000
<b>Communication + Programs</b>		\$ 8,333	\$ 25,000
<b>Transport</b>		\$ 16,667	\$ 50,000
<b>Total</b>		<b>\$233,333</b>	<b>\$ 700,000</b>
<i>Beneficiaries*:</i>			<b>600</b>
<i>Cost per beneficiary:</i>			<b>\$ 1,166.67</b> [\$388.89/year]

\*Market vendors (primarily women retailers) after 3 years

- **Formation of a cold chain**, initially servicing the domestic market before being linked to export market opportunities

*Approximate cost: 1.8 million USD for four years (annual cost of 450,000 USD).*

**Recommendation # 11: Develop cold chain for export opportunities**

<b>Time</b>	<b>4 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$367,500	\$1,470,000
<b>Equipment</b>		\$ 40,000	\$ 160,000
<b>Supplies</b>		\$ 3,750	\$ 15,000
<b>Communication + Programs</b>		\$ 1,250	\$ 5,000
<b>Transport</b>		\$ 37,500	\$ 150,000
<b>Total</b>		<b>\$450,000</b>	<b>\$1,800,000</b>
<i>Beneficiaries*:</i>			<b>800</b>
<i>Cost per beneficiary:</i>			<b>\$ 2,250.00</b> [\$562.5/year]

\*Vegetable growers after 4 years

To achieve these objectives the proposed activities will need to:

- 1) Stimulate and guide a market-led transition from subsistence agriculture with occasional sales of surplus vegetables from gardens to small scale commercial cultivation of vegetables on small plots as part of an integrated farming system and as an alternative to small scale, coffee-based upland agriculture.
- 2) Transform the present chaotic marketing situation through tangible improvements to retail marketplace locations, low cost and low maintenance facilities, trained and skilled management staff, and an array of basic services needed by traders and consumers. (facilitate market stability, growth, and transparency at the **demand level**)
- 3) Facilitate and guide the emergence of a dynamic set of rural traders as operating in periodic markets for the full range of local farm commodities. (formation of effective and sustainable **marketing channels**)
- 4) Underwrite an accelerated formation of a sustainable domestic cold chain for fresh foods and promote its linkage to foreign buyers in the import cold chains of Australia, Indonesia, and Singapore. (link emerging local supply capabilities to **export demand opportunities**)

#### **Total for 3 Horticultural and Markets components (9 + 10 + 11)**

<b>Time</b>	5 yrs	annual	total
<b>Labor</b>		\$700,833	\$2,470,000
<b>Equipment</b>		\$ 50,000	\$ 190,000
<b>Office Supplies</b>		\$ 13,750	\$ 45,000
<b>Communication + Programs</b>		\$ 26,250	\$ 80,000
<b>Transport</b>		\$ 92,500	\$ 315,000
<b>Total</b>		<b>\$883,333</b>	<b>\$3,100,000</b>
<i>Beneficiaries:</i>			<b>4,500</b>
<i>Cost per beneficiary:</i>			<b>\$ 688.89</b> [\$137.80/year]

## **INFUSING CREDIT INTO THE AGRICULTURAL AND RURAL ECONOMY**

### **Problems and Constraints**

In Timor-Leste, the institutional supply (i.e. commercial banks, MFIs, NGOs, and credit cooperatives) covers only a small portion of potential demand from all sectors (i.e. agriculture and non-agriculture) and flat agricultural value chains restrict the typical extension of credit among value chain players. However, it is not possible to accurately assess the volume of credit supplied by financial institutions in Timor-Leste to the agricultural sector due to the unsophisticated MIS systems. Nonetheless, it is clear that access to financial services in the agricultural sector, particularly credit, is generally low in volume and non-existent in many areas.

However, although eighty percent of Timor-Leste's population resides in rural areas, few farm households produce marketable surplus of agricultural goods; subsistence agriculture is the dominant economic activity and source of income. Furthermore, agriculture is a high risk, low-return activity in Timor-Leste due to extremely variable rainfall. Thus, farmers engage in lower-risk activities – cultivating a large variety of field crops and horticultural products, as well as raising livestock – which result in low returns. Lastly, agricultural value chains are relatively flat, with limited activity or presence of trader, processors, distributors, and exporters. Therefore, it appears that the pool of potentially bankable agribusiness entities is limited.

## Rationale for Proposed Interventions

A market-based mentality has not emerged in Timor-Leste. Indonesian economic policies did not demand efficiency or effectiveness of markets and years of post-conflict development assistance has led to an expectation of subsidy and handouts. The mentality particularly affects the agricultural sector, which has benefited from free agricultural technology, inputs, technical assistance, and 'credit'. While there is certainly a lack of financial services available to agricultural entities, there is an even larger lack of bankability among them.

Donors, government ministries, and agricultural entities (mainly producer groups and cooperatives) comment on a significant supply constraint. However, financial institutions are not convinced of a bankable agricultural market. Further, direct credit interventions supported by donors, such as the Community Empowerment Project and GTZ direct credit schemes, have had limited results and not produced a sustainable market mechanism to continue similar lending.

Thus, key suppliers, demanders, and enabling environment players continually suffer from an ineffective approach to increase the sustainable provision of financial services that benefit the agricultural sector. In the end, financial institutions are loath to enter the market, government and donor projects contemplate supply-led interventions, and demanders of agricultural credit receive misrepresentations of credit and a poor credit culture prevails.

## Proposed Interventions

### Ag Finance Option One: Strengthen agricultural producers' and agribusiness' basic financial skills, business planning, and understanding of credit

Ag Finance Option One focuses on providing training to agricultural entities on basic financial skills, business planning, and understanding of credit. It will be broadly implemented, but will have particular focus on regions and subsectors of project emphasis.

*Approximate cost: 365,000 USD for five years (annual cost of 73,000USD as an add-on to an existing program ) If implemented as a stand alone project, the estimated cost is represented in the budget below .*

### Recommendation # 12: Strengthen basic financial skills, business planning, and understanding of credit for farmers and small agribusiness operators

Time	5 yrs	annual	total
<b>Labor</b>		\$ 161,092	\$ 805,462
<b>Equipment</b>		\$ 1,000	\$ 5,000
<b>Supplies</b>		\$ 1,000	\$ 5,000
<b>Communication + Programs</b>		\$ 3,000	\$ 15,000
<b>Transport</b>		\$ 8,600	\$ 43,000
<b>Total</b>		<b>\$ 174,692</b>	<b>\$ 873,462</b>

*Beneficiaries\*:* 1,500

*Cost per beneficiary:* \$ 582.31 [\$116.40/year]

\*# of people trained through small farmer groups, market gatherings, and organized workshops after three years

### Ag finance Option Two: Increase supply of financial services to the agricultural sector and introduce and increase agricultural finance product options

The activities under Ag Finance Option Two remove or reduce barriers that hinder supply-side market innovation. The project implementer should focus activities on the key suppliers of financial services to agricultural activities and businesses - commercial banks, non-bank financial institutions, as well as members of the value chain - to increase financial flows in and to the agricultural sector.

Approximate cost: 1,150,000 USD for five years as an add-on to an existing program. If implemented as a stand alone project, the estimated cost is represented in the budget below.

**Recommendation #13: Increase supply of financial services to the agricultural sector and introduce and increase agricultural finance product options**

<b>Time</b>	<b>5 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$ 267,400	\$ 1,337,000
<b>Equipment</b>		\$ 3,600	\$ 18,000
<b>Supplies</b>		\$ 3,000	\$ 15,000
<b>Communication + Programs</b>		\$ 40,000	\$ 200,000
<b>Transport</b>		\$ 20,000	\$ 100,000
<b>Total</b>		<b>\$ 334,000</b>	<b>\$ 1,670,000</b>

*Beneficiaries\**: **15,000**

*Cost per beneficiary*: **\$ 111.33** [\$22.20/year]

\* indirect beneficiary measurement - measured by increase in microfinance and ag-business finance clients

**Ag Finance Option Three: Strengthen and promote the agricultural finance dialogue**

Ag Finance Option Three promotes more effective and streamlined dialogue and planning around rural and agricultural finance. Focus should be placed on creating and sustaining an effective dialogue among suppliers and demanders (i.e. producer groups/cooperatives) of financial services, as well as key members of the enabling environment, including government officials, BPA, and AMFITIL representatives. The dialogue should focus on creating a common vision for agricultural finance, with thoughtful consideration to constraints and opportunities. Dialogue should promote information sharing, but focus on defining and sequencing supply, demand, and enabling environment initiatives that decrease the barriers to extending agricultural financial services.

Approximate cost: 285,000 USD for five years as an add-on to an existing program. If implemented as a stand alone project, the estimated cost is represented in the budget below.

**Recommendation #14: Strengthen and promote the agricultural finance dialogue**

<b>Time</b>	<b>6 mo</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$ 143,800	\$ 719,000
<b>Equipment</b>		\$ 2,000	\$ 10,000
<b>Office Supplies</b>		\$ 1,000	\$ 5,000
<b>Communication + Programs</b>		\$ 9,500	\$ 47,500
<b>Transport</b>		\$ 4,000	\$ 20,000
<b>Total</b>		<b>\$ 160,300</b>	<b>\$ 801,500</b>

*Beneficiaries\**: **15,000**

*Cost per beneficiary*: **\$ 53.43**

\* indirect beneficiary measurement - measured through increase in microfinance and ag-business finance clients

### **Total for 3 Agricultural and Rural Finance components (12 + 13 + 14)**

<b>Time</b>	5 yrs	annual	total
<b>Labor</b>		\$ 572,292	\$ 2,861,462
<b>Equipment</b>		\$ 6,600	\$ 33,000
<b>Office Supplies</b>		\$ 5,000	\$ 25,000
<b>Communication + Programs</b>		\$ 52,500	\$ 262,500
<b>Transport</b>		\$ 32,600	\$ 163,000
<b>Total</b>		<b>\$ 668,992</b>	<b>\$ 3,344,962</b>
<i>Beneficiaries:</i>			<b>31,500</b>
<i>Cost per beneficiary:</i>			<b>\$ 106.19</b> [\$21.20/year]

### **OTHER CROSS-CUTTING IMPROVEMENTS TO THE AGRICULTURAL AND RURAL ECONOMY**

#### **Problems and Constraints**

Timor-Leste students, agricultural advisors, and educated farmers are operating in an information-poor environment for various reasons. Relatively poor access to mass media, low internet penetration, and language policy all contribute to this predicament and its implications for technology transfer. Thus, it is important to establish an ARTISC with a comprehensive set of information services within one organization, institution, or project.

#### **Proposed Interventions**

The presence of information in one place reduces search time, heightens awareness of alternative ways to solve prevailing or expected problems, generates interest among entrepreneurs when setting up small agribusinesses, and reduces learning costs associated with the trial and error method, thereby benefiting a very wide range of clientele.

A responsive clearinghouse for agriculture and related technology information is fundamental to many information needs, especially given the rapidly changing environment of an emerging nation.

The proposed intervention is the formation of an ARTISC, which would provide:

- An institutional memory of lessons learned in the applications of different technologies and introductions of various crops, animals, trees, and fish within the past few year;
- Capacity to access information on a wide range of traditional/established, agricultural technologies from world wide sources;
- Ability to identify local resource persons with skills in applying those technologies under local, complex social-cultural situations as well as a venue for exchanging information with professional visitors;
- Creating awareness and interest from abroad regarding promising opportunities regarding Timor Leste's agricultural diversity, progress, and investment opportunities.

*Approximate cost: 450,000 USD for three years (annual cost of 150,000 USD).*

**Recommendation # 15: agriculture and related technologies information services center (artisC)**

<b>Time</b>	<b>3 yrs</b>	<b>annual</b>	<b>total</b>
<b>Labor</b>		\$100,000	\$300,000
<b>Equipment</b>		\$ 33,333	\$100,000
<b>Supplies</b>		\$ 6,667	\$ 20,000
<b>Communication + Programs</b>		\$ 3,333	\$ 10,000
<b>Transport</b>		\$ 6,667	\$ 20,000
<b>Total</b>		<b>\$150,000</b>	<b>\$450,000</b>
<i>Beneficiaries*:</i>			<b>11,700</b>
<i>Cost per beneficiary:</i>			<b>\$ 38.46</b> [\$12.82/year]

\*15 visitors per day = 3,900 per year

# 1. BACKGROUND

## A. OBJECTIVE AND PURPOSE

USAID/Timor-Leste seeks to make strategic investments over the next ten years that will result in sustained improvements in the nutrition, incomes and livelihoods of Timor-Leste farm families. These investments must be consistent with USAID's "Strategic Plan for Timor-Leste: A New Nation Moving Forward (2005-2009)," specifically the Economic Growth Strategic Objective (SO 1): Accelerated Economic Growth. They must mesh well with Timor-Leste's National Development Plan (NDP) and with the Ministry of Agriculture, Forestry and Fisheries' (MAFF) Policy and Strategic Framework as well as the MAFF Sector Investment Program (SIP). To increase the probability that USAID's investments will achieve their desired impact, they will also need to be designed taking into account the special needs of a new nation gradually coming out of the trauma of occupation and conflict. Among other realities within this environment, a mind-set change from welfare assistance to market-based economic development assistance will need to be made on the part of both farm households as well as providers of agricultural development assistance.

The purpose of this document is to identify promising areas for USAID assistance, which will respond to the objectives spelled out above. It is, further, to explain how the identified assistance might best be made and why it is reasonable to believe that the proposed options will lead to sustained improvements in the nutrition, incomes and livelihoods of Timor-Leste farm families and, by extension, the growth and development of Timor-Leste.

The USAID Agricultural Options Paper has been prepared through the Small Grants Program (SGP) and involved a team of specialists in different agriculture subsectors who visited Timor-Leste in two phases, first in early December 2005 and next in mid-January 2006.<sup>2</sup> The team hopes that the options presented below will provide a good starting point from which USAID can develop and package a set of high impact activities.

## B. STATE OF THE AGRICULTURAL AND RURAL SECTOR

Timor-Leste is an agricultural economy. Despite the oil-based revenues that will soon be changing the structure of its economy in the short to medium term, it is through improvements in agricultural productivity and incomes that economic growth and improvements in incomes and well-being will be most directly affected.

Eighty percent of Timor-Leste's population of 925,000 resides in rural areas where subsistence agriculture is the dominant economic activity and source of income. Only small amounts of farm families' production are put on the market. This is probably more because of the lack of market "pull" than supply "push." It is clear that with more labor and other inputs into the average household's farming "enterprise" more marketable surplus could be produced. However, under the current conditions of shifting agriculture, this would come at the cost of increased soil erosion and land degradation.

Timor-Leste agriculture, at least in the upland areas, is sliding into a low-input, low-output cycle that in some areas looks like resource mining. Shifting, maize-based cultivation represents the

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<sup>2</sup> The team included livestock expert, John Leake (2<sup>nd</sup> phase), horticultural expert, Merle Menegay (1<sup>st</sup> and 2<sup>nd</sup> phases), food crops and agribusiness expert, David Neubert (1<sup>st</sup> and 2<sup>nd</sup> phases), agroforestry expert, Syed Tahir Qadri (2<sup>nd</sup> phase), led by Jerry Martin in the first phase and David Tardif-Douglin in the second phase. Antonio Gusmao of the Small Grants Project, provided the on-the-ground knowledge and organizational skill that was so beneficial to the work of the team.

predominant agriculture technology employed by farmers relying on rain-fed agriculture. Shifting cultivation no longer makes sense for farmers in most parts of the country, especially the often steeply sloping upland areas where pressure on resources is rapidly intensifying. Consequently, the resource base is eroding at a frightening pace, topsoil is being lost and fallow or rest period are not enough to recharge the fertility of farm lands. There are, however, upland areas such as in the Lepo, Uduai area, in Bobonaro district, Bobonaro subdistrict, where this does not appear to be the case, where centuries of investments in stone terracing have resulted in what looks like a sustainable system.<sup>3</sup>

Agriculture in Timor-Leste is a high-risk enterprise because of the exceeding variability of rainfall across the country. Consequently, without much of a market to help mitigate the impact of crop failure, farmers are obliged to establish their own household- and, to some extent, community-level risk-management or coping systems. At the household level, this involves crop diversification, with all households growing a bit of a relatively large number of field crops, horticultural products and livestock.

Judging by the poor state of the roads in parts of the highland areas, farm households appear to be quite isolated from urban markets as well as other markets. They are obviously not autarkic, but because transaction costs, especially transportation costs, are high, not all products are able to move from surplus to deficit areas.

### **C. TIMOR-LESTE'S VISION FOR AGRICULTURE**

The Timor-Leste government's vision for the nation's future in agriculture is articulated in the National Development Plan (NDP) and the MAFF Policy and Strategic Framework. The NDP envisions an agriculture and rural sector that is integrated into the urban and international demand centers, "...because there will be good roads, transport, electricity and communication in the towns and villages." It envisions growing production (and productivity) and employment in agriculture and rural enterprises. And, it seeks to ensure sustainable development, which encourages management of the natural resource base.

In supporting the development of the agriculture and rural sector, the MAFF Policy and Strategic Framework identifies the principles it will adhere to:

- Government should be an enabler and facilitator of agricultural and natural resource development rather than decision maker;
- Focus public resources on the provision of public goods and minimize direct government involvement in production;
- Favor cost-recovery mechanisms to enhance sustainability of services that accrue to individuals;
- Encourage better acceptance and greater durability of participatory processes.

### **D. HOW TO ACHIEVE THE VISION**

Achieving this vision will require tapping the private sector and ensuring the efficient provision of public services in agriculture. It will also require a macroeconomic (especially an exchange rate regime vis-à-vis key trading partners and global export competitors)<sup>4</sup> system that supports the

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<sup>3</sup> During our trip through this area, the agroforestry and natural resources management specialist pointed out that the streams in this area ran clearer than the silt-filled streams we had passed earlier in the trip, in areas of marked shifting cultivation.

<sup>4</sup> Given the current "dollarization" of the economy, Timor-Leste has no control over its foreign exchange regime, which will fluctuate as the US dollar strengthens and weakens against the currencies of Timor-Leste's main actual competitors in key exports. Timor-Leste will have to decide whether the dollar,

production and export of tradables. Neutralizing the revenues from petroleum and gas so they do not cause domestic inflation and thereby reduce the competitiveness of Timor-Leste tradables on the world market is going to be a very important challenge, and one whose success will affect the competitiveness of Timor-Leste's farm products. The "oil curse" and "Dutch Disease" both describe the effect on non-oil sectors of an economy in countries where large oil revenues have not been neutralized, and the development of other parts of the economy has stagnated. In the short run, achieving this vision for agriculture will require careful deliberative preparation and implementation of projects by donors in collaboration, of course, with the Ministry of Agriculture. Donors will have to avoid the well-meaning welfare programs of an earlier stage in Timor-Leste's rebuilding. These programs ultimately reduce effort and accountability, the pillars of economic development and sustainable wealth creation.

Timor-Leste farmers need an infusion of new information; they need new technologies for improved production and to cope with the realities of changing (and growing) pressure on their resource base. They need market-based incentives to conserve. Projects aimed at the development of the agriculture sector and improvements in farm household incomes must favor market-led approaches in order to be sustainable.

Timor-Leste will have to push for trade facilitation with its neighbors to allow ready entry of farm (especially livestock) exports in which the country has a comparative advantage. Ultimately, this will have to be done in the context of WTO and regional trade arrangements such as ASEAN.

## **E. WHAT DONORS ARE DOING**

According to MAFF's Sector Investment Plan, donors spent 66 million USD on agriculture programs between 2000 and 2004 which substituted, to a large extent, for the very small sums allocated to agriculture in the government's CFET (Consolidated Trust Fund for East Timor) (2.1 percent, or approximately 1.6 million USD). The United States has been, largely through its support of the coffee industry rehabilitation, the single most important supporter of agricultural development in Timor-Leste, followed by the multi-donor TFET (Trust Fund for East Timor), Japan, the European Union and Australia. The next tier includes Germany, FAO, and Portugal. The European Union, through its large support for the ARPIII (Agriculture Rehabilitation Project III) project is substantially increasing its funding of agriculture projects.

The primary vehicle through which most donors are providing farm production assistance is the Trust Fund for Timor-Leste, administered by the World Bank and the Asian Development Bank. The series of TFET Agriculture Rehabilitation Projects<sup>5</sup> (ARP I, II, and III) have spent approximately 17.8 million USD on assistance to farm households and the physical and social infrastructure meant to support their livelihoods. The 6.8 million USD Agriculture Rehabilitation Project (ARP), which ran from August 2000 to September 2002, focused on (1) the restoration of lost or destroyed agricultural assets -- buffalo, Bali cattle, poultry and farm implements; (2) rehabilitation of community irrigation structures and rural roads; and (3) pilot farmer-owned agriculture service centers. The 8 million USD ARP II (December 2001 to June 2005) aimed to (1) help strengthen the ability of poor farming communities in seven districts to improve natural resource management; (2) continue the rehabilitation of community irrigation schemes; and (3) varied services to farm households, including information and animal health services. The 3 million USD ARP III, which is ongoing and began in March 2004, focuses on building the capacity of the Ministry of Agriculture, Forestry and Fisheries to support development of the agriculture and rural sector.

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whose value fluctuates based on factors unrelated to Timor-Leste's balance of payments and relative competitiveness, best supports what will need to be an export-oriented monetary regime.

<sup>5</sup> The TFET is not the sole funding vehicle for ARP III. The European Union funds ARP through TFET but also independently (3 million USD through TFET and 6.7 million Euro independently) Government funding for ARP III amounts to 1.5 million USD through CFET.

In addition to the TFET's ARP activities, its Small Enterprise Projects (SEP) have also engaged in activities supportive of development of agriculture, namely strengthening of land and property administration and rehabilitation of market places in key urban areas.

Other important donors are the European Union, an important contributor to TFET and ARPIII, and the United Nations Development Program (UNDP)/United Nations Office for Project Services (UNOPS).

In terms of interesting, cutting edge or direct farm-level impact assistance, a joint project by GTZ, NCBA/CCT, World Vision, CARE, and the Portuguese Agriculture Mission to create forestry and agroforestry nurseries and seedling distribution projects in Aileu and Ermera stand out and have provided the team with the most likely models from which to develop our own recommendations.

USAID agriculture, agribusiness and land law activities are important parts of overall donor assistance to improving the nutrition and incomes of farm households. Requiring particular notice is the land law program. Helping the government sort out competing claims on agricultural land is crucial to achieving a situation in which farmers will make the investments they must in their land to render it more productive and more able to support their families' immediate and future needs. Studies by Michigan State University on similarly challenging upland agriculture in Rwanda suggest that security of land tenure is a *sine qua non* for investments in the resource base that sustains agriculture and livestock enterprises.

Donors operating in the agriculture sector admit that they need to shift from an immediate post-crisis, welfare mindset in the assistance they are providing, to assistance approaches that seek sustainable improvements in farm family nutrition and income relying on market signals and the creativity, hard work and effort of farmers and farm communities themselves.

Consequently, market-oriented solutions are increasingly being sought, and agriculture policy and the institutional set up necessary for its implementation is being given greater attention. Improved infrastructure such as markets and rural roads, are another focus of this changed development assistance attitude. It is based on the twin realizations that Timorese will respond to incentives just like people in other parts of the world will, and it is ultimately only through the efforts of Timorese individuals and households that their food security can be assured over the medium to long-term.

## **F. GAPS AND OPPORTUNITIES**

The primary consideration during field trips and meetings the team had with donors and agriculture project staff was to identify opportunities either in terms of gaps in coverage or opportunities for scaling up activities that appeared to be having an impact.

Many of the gaps and opportunities relate to helping move agricultural assistance to a development rather than a post-conflict stage of assistance. Timor-Leste has moved away from an immediate post-conflict, post-crisis programming environment and careful thought must be made about moving in new directions rather than simply rebuilding what existed where it existed. This holds in numerous interventions across all sectors. For agriculture, some immediate areas where this is true include rehabilitation of large-scale irrigation where, because seasonal rivers move around, the schemes were never very effective. Similarly, marketplace rehabilitation in major towns such as Dili needs to take into account changes in settlement patterns and likely shopping habits that have occurred since the markets slated for rehabilitation were built. Without such careful deliberation, rehabilitated markets risk not providing the public service that is sorely needed to effectively bring buyer and seller together and thereby link rural and urban economies and raise agricultural and rural household incomes.

## 2. OPTIONS FOR USAID INVESTMENTS IN AGRICULTURE

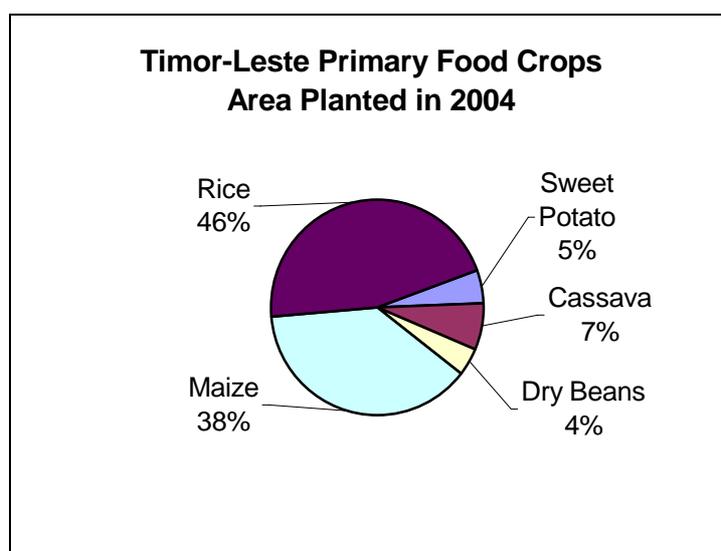
### A. STAPLE FOOD CROPS

Maize is the primary source of carbohydrates for Timorese farm families, especially upland farmers, despite a general preference for rice. It is followed by rice, cassava and beans (see Figure A.1, right). Maize most likely first arrived to Timor-Leste aboard Portuguese sailing ships not long after the first colonial settlement was established in 1642. Today most maize varieties produced in Timor-Leste are the flint type. Flint varieties are hard and therefore the seed absorbs less water than dent varieties (95% of all maize varieties used in the USA are hybrid dents). These characteristics make flint more resistant to insect damage and fungal infections than the more commonly used dent varieties. The flint varieties used in Timor-Leste are open pollinated (OP). This allows the seed to be saved and used as seed in the next cropping season, whereas hybrid varieties, although generally more productive than OP's, cannot be saved for use as seed material as its progeny does not breed true (produce plants similar to the parents).

During the 1980's the Indonesia Ministry of Agriculture released several new semi-dent OP varieties for use in Timor-Leste. Among these new materials were the Kalinga (1980 release) and Arjuna (1985 release). Both varieties are reported to have a yield potential of six MT/ha.

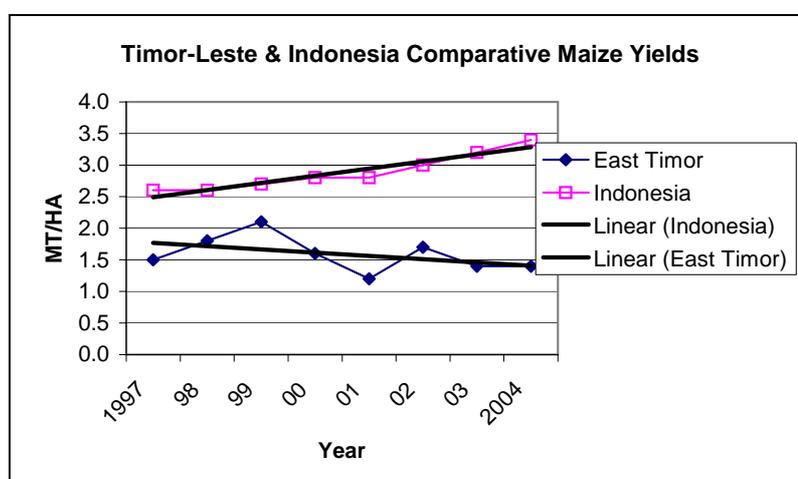
Over time, Timor-Leste's maize yields have been declining (see Figure A.2, right), due mostly to the continued loss of soil fertility and erosion of the gene pool through genetic drift. In neighboring Indonesia, maize yields have significantly increased over the same period, due mainly to improved genetics and better use of fertilizer. To reverse Timor-Leste's trend of declining maize yields farmers need to focus on improving cultural practices that enhance soil fertility and utilize improved plant genetic materials.

**Figure A.1: Timor-Leste Primary Food Crops**



Source: FAOSTATA

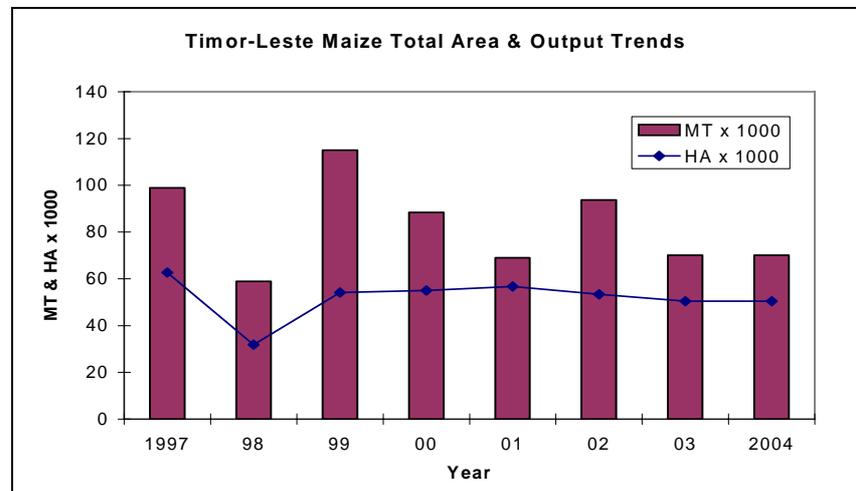
**Figure A.2: Timor-Leste and Indonesia Comparative Maize Yields**



Source: FAOSTATA

Many observers have pointed out that Timor-Leste farmers do not have the market incentives to increase maize output (see Figure A.3, below). Over the past 40 years, the global growth in intensive livestock farming has led to a massive increase in demand for feed grain. World maize output during this period increased more than three fold (from 205 MMT in 1961 to 640 MMT in 2003). It is estimated that about 80% of this increase was due to yield improvements in genetics and cultural practices and 20% due to an increase in area planted. As Timor-Leste has a very limited commercial livestock sector, it has not developed a market for grains that would promote increased maize production by farmers.

**Figure A.3: Timor-Leste Maize Total Area and Output Trends**



Source: FAOSTATA

With no market to drive Timor-Leste’s demand for maize, farmers have focused on subsistence agricultural production, providing enough calories to meet household demand. As long as household demand is being met, there is limited incentive to adopt new cultural practices that may result in increased yields (since there is a limited market for surplus production sales). In some communities, this may explain why (to date) there has been limited success in introducing new technologies and practices to Timor-Leste’s farmers.<sup>6</sup>

The mean farm in Timor-Leste has about 0.8 ha of cultivated farmland. At an average yield of 1400 kg per of maize per ha, the farmer will gross 1120 kg of grain. After storage losses and setting aside 70 kgs for next season’s planting, the family will have 938 kg of maize<sup>7</sup>. The typical household of five persons requires 920 kg of maize annually. This leaves a surplus of only 18 kg or about 9 days of carryover stocks. If anything changes (the household supply and demand balance during the growing season, late or uneven rainfall, unusually high populations of crop pest or pathogens, poor seed germination rates or an unexpected addition to the household) the family could easily fall into a caloric deficit situation.

When there is not enough rainfall to grow maize, sorghum is the best grain alternative. Farmers in Kansas, USA (using sorghum hybrids, no-till practices and no irrigation) report yields of nine MT/ha with 300-400 mm of rainfall. The new sorghum hybrids have equal feed value as grain corn for beef, pork and poultry. Currently, sorghum is not part of the typical Timor-Leste diet, however it is reported that sorghum arrived (and was used) on the island before maize. In the future sorghum may be best used as a food security crop in villages with a history of drought and as a livestock feed. Given its low water requirements, it can be incorporated into a dryland cropping system, providing a level income and food security to the grower. The issues in using

<sup>6</sup> For additional information regarding household maize supply and demand, please see Table A.2 in the Appendix.

<sup>7</sup> Based on Oxfam AUS draft report “Maize Production and Storage in Timor-Leste” November 2004 and FAOSTAT data”.

sorghum in Timor-Leste for livestock may be (like maize) relate more to post-harvest storage than the actual crop production.

Beans are another important food security crop for both their carbohydrate value as well as their protein content. The crop can be fed to livestock and its thick vegetative growth habit makes it a good plant for controlling soil erosion.

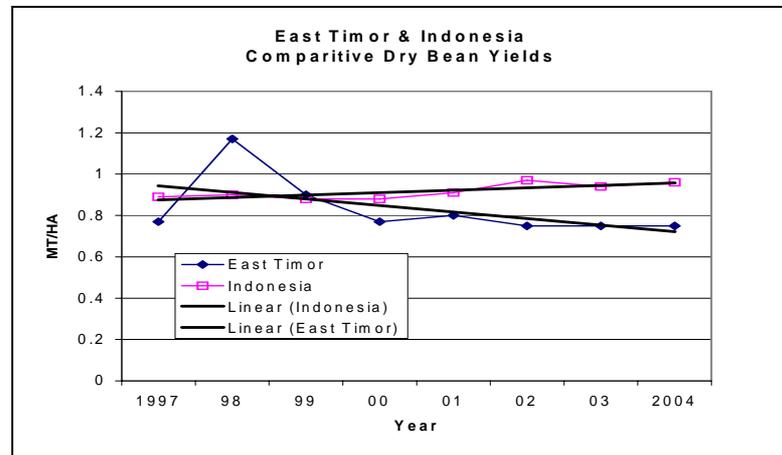
The bean also removes atmospheric nitrogen and fixes it into a form used by plants through a symbiotic relationship with specific soil bacterium. If the correct species of bacteria are present in the soil, some beans can produce (fix) up to 70 kg of N per ha.

Dry bean yields in Timor-Leste have averaged about 830 kg per ha between the period from 1997 through 2004 (Figure A.4). During this period bean yields were trending down with the exception of 1998 when yields peaked at nearly 1,200 kg per ha. While Timor-Leste bean yields have been flat or declining, Indonesia yields have trended slightly upwards over the same period. With an average reported yield of 916 kg per ha, Indonesian farmers are about 10% more efficient at bean production than their Timor-Leste counterparts.

Dry beans are in demand throughout Timor-Leste. Most village and city markets contain a variety of beans for sale. A can<sup>8</sup> holding about 300 grams of dry beans typically sells for about 0.25 USD

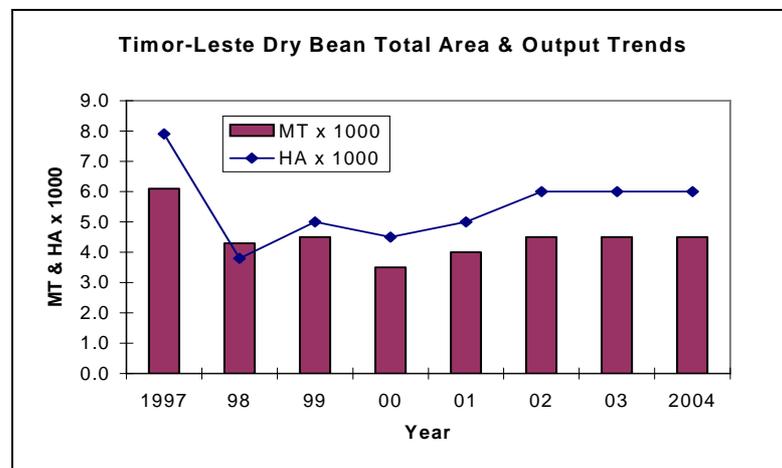
(about 0.83 USD per kg). This is well above world price, which normally runs between 0.48 USD to 0.79 USD per kg, bagged, CIF port, U.S. West Coast<sup>9</sup>. Soybeans, FOB, Midwest warehouse are less expensive, usually selling within a range of (+/-) 0.23 to 0.27 USD per kg.

**Figure A.4: Timor-Leste and Indonesia: Comparative Dry Bean Yields**



**Source: FAOSTATA**

**Figure A.5: Timor-Leste Dry Bean Total Area and Output Trends**



**Source: FAOSTATA**

<sup>8</sup> Dry bean are often sold by volume, sellers typically use an empty soup can to measure the unit sales volume.

<sup>9</sup> Price range includes dry bean varieties such as pinks, reds, black-eyes (cow peas), pintos, baby limas, etc.

Annual dry bean production is about 23 kg per household. This is a small figure but it is realistic since most beans are planted as an inter-crop between maize and not in a stand-alone field.<sup>10</sup>

Timor-Leste's farmers have not employed agricultural technologies and practices that would allow for a more stable food supply, reduce the risk of food insecurity and create a food surplus sufficient to fuel the growth of down-stream agricultural industries such as commercial livestock operations.

Much of the farmland devoted to food crop production is located on hillsides and is farmed using a traditional "slash and burn" production system. This has resulted in significant environmental damage through high levels of soil erosion resulting in declining soil fertility levels. The degradation of soil resources (on hillsides and in valleys) has led to a trend of flat, or in some cases, declining yields. Under the current farming system, the soil is being mined (with no attempt to replace soil nutrients removed by the crop) and in many cases, soil is simply being permanently lost to erosion.

The following sections of this document will discuss intervention options that can be employed to reverse these trends by improving agricultural production practices and assisting farmers to adopt new technologies. By adopting improved agriculture practices and technologies, farmers can create excess supply, which can be fed into down-stream value added agribusinesses such as livestock production for domestic and export markets.

In the food crops sector, there are three specific options that can be implemented to improve caloric food security, improve household nutrition, create excess supply for down-stream value added markets and develop markets for agricultural inputs. Additionally, the food crop options include activities that are specifically tailored to address gender issues within the context of fruit and vegetable production, family health and nutrition and agribusiness/marketing. The three activities under the Food Crops options include:

- Mass Media Communications uses radio as a vehicle to deliver information to farmers on improved production practices, technologies, markets, nutrition, government policy and regulations. Subject areas may include crops, livestock, agroforestry, agribusiness, etc<sup>11</sup>.
- Integrated Farming Systems uses an in-village participatory/ demonstration approach to training farmers in improved agricultural practices, technologies, markets and farming as a business. The activity also integrates livestock, horticulture and agroforestry elements to take a broad approach to food security and market development.
- Agribusiness Markets Training For Women provides technical, marketing and business skills training to women shop owners/ operators and market traders in the area of selling crop inputs and farm outputs. At the same time, it also provides training to women through community groups, in small-scale horticultural production and family health.

## **1. RECOMMENDATION # 1: MASS MEDIA COMMUNICATIONS**

### ***a) Activity Description***

This option is intended to provide a broad-reaching and rapid response to the constraints facing Timor-Leste's agricultural sector. The activity will work with Timor-Leste's 18 community radio

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<sup>10</sup> For additional information regarding comparative staple crop yields, please see Figures A.6 and A.7 in the Appendix.

<sup>11</sup> The Mass Media Communications activity is shown in the Preliminary Budget, noted in Section 7.2 of this document, as an embedded cost with its own line item. This subcomponent may also employ print media in its implementation.

stations (5 in the Dili market and 13 in rural districts) to broadcast agriculture news and agricultural information/ education. The radio stations in Timor-Leste have very limited available programming so finding a time slot to run the agriculture show should not be an issue. Production facilities are available in Dili at the Timor-Leste Media Development Center (TLMDC). The Community Radio Station Association of Timor-Leste, non-profit organization, can assist in distribution of programs. It's expected that local stations will charge an airing fee of about 50 USD per show.

This option would create 17 radio shows (episodes) a year. Each show could contain 20-30 minutes of programming and cover one specific topic plus several regular featured segments.

The regular feature segments may include:

- A summary of local markets' wholesale and retail prices from the Dili and Baucau markets for rice, maize, beans, live animals, etc.;
- Export market information from the customs service and/or tax authority on the volume and value of agricultural goods exported, for example cattle shipped to Indonesia<sup>12</sup>;
- World market price(s) and volume(s) information for coffee and other export crops. This should include information on production trends in other regions (i.e.: Latin America);
- Short and long-term weather forecast for agricultural producers. The basic updated forecast information can be taken off the web free for inclusion in the show;
- A weekly or bi-weekly interview (Q&A) with local or foreign agribusiness operators, government officials within the ministries and elected officials.

The special topic feature segments may include a more in-depth discussion of topics such as:

- What are the differences between maize varieties and how do you select the best one for your farm? How should you select seed to save for next season's crop?
- What are the nutritional needs of your crops? How do you improve soil fertility? What is soil erosion and how do you control it?
- What is the best way to harvest and store grains? What are the different storage technologies available and what are their costs?
- Animal health: what do I do if all my chickens die? What is bird flu? Where do I go for help and how do I protect my family from this and other livestock pathogens<sup>13</sup>?
- What is the best way to fatten cattle? How do you make livestock feeds and store silage for use in the dry season?
- What are animal parasites? How do you know when your livestock has parasites and what can I do to control parasites?
- How do markets work? How is price set? What is the world market? What is profit and how do you know if you can make a profit when you sell goods?
- What is the new government land law about? What is a land leasing? What are user's rights? What is a land title, why is it needed and how does one get it?

The above are just a few special topics and regular features that can be included in the broadcast. To increase coverage, each show could be repeated 3 times annually (once every 4 months). The shows can also be translated into different languages to maximize the coverage and understanding of the topics being discussed.

Since market information has a very short shelf life, this part of the radio show will need to be constantly updated. This can be done by editing in the new market information segments each time the show is rebroadcast. The "regular feature" segment, which may include weather

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<sup>12</sup> The activity could also provide Kupang, & Surabaya, Indonesian market price information via radio or SMS

<sup>13</sup> For example: tuberculosis from cattle, flu from pigs and chickens, pertussis from pigs and dogs, falciparum malaria from bird (chickens) and a wide variety of parasites common to humans and farm animals.

(forecast and historical data), local market prices, trade volume and world market prices and market outlook, can be grouped at the beginning or end of the show so that it can be quickly edited and updated.

### ***b) Linkages***

The Mass Media Communication option would link with a wide variety of agricultural sub sectors. It could draw information and resources from internal USAID partner projects, as well as from government and the donor community at large. In this way, the activity could cover a wide variety of topics relevant to the rural community. It would collaborate with and strengthen the MAFF's own radio program, focusing on aspects of USAID's agricultural development program.

### ***c) Implementation Arrangements***

USAID can implement the Mass Media Communication activity in two ways including:

- Use a USAID-funded project (either new or existing) to contract an agricultural media consultant to create the show. The consultant can also work with local counterparts and the radio stations to negotiate airtime and airing frequency. The consulting contract could be renewed annually for as long as USAID wanted to continue with this activity;
- Subcontract a mass media consulting firm (under a new or existing project) to create the show. This activity would most likely not require a full-time contract employee. As in the case above, the subcontractor can work with local counterparts and the radio stations to negotiate airtime (slot) and airing frequency.

### ***d) Timeframe***

The Mass Media Communications activity should be implemented as soon as possible (as soon as activity funds are disbursed). Part of the objective of the activity is to raise awareness among the farmers, agricultural traders and district agricultural officers. Once this process starts, it will make it easier for in-field follow-up activities, undertaken by USAID partners, to take root as both the client farmers and the agriculture project implementer will begin to have a better understanding of each other and the issues they are dealing with.

After one year of operations, USAID should undertake a media market study (evaluation). If the radio show is reaching its intended audience, then funding should continue. If ratings are low or the message is not clearly understood by the target audience, then USAID should have the opportunity to reduce or drop activity funding in favor of other activities. To facilitate the evaluation process, USAID should commission a baseline survey before the shows are aired.

### ***e) Costs & Benefits***

The most cost effective way to implement this option is by employing a short-term agricultural media consultant as part of a larger agriculture project. The media consultant could be employed 120 days a year to develop the shows. The consultant would be assisted by one full-time local project staff. It is estimated that the cost for this level of effort (LOE) (including the media consultant, local staff, travel, etc.) would be about 165,000 USD annually or 825,000 USD over the 5-year project life cycle. We assume that since the radio stations are short of content, they will be willing to broadcast the show at no additional cost to USAID but could seek commercial sponsors to cover airing costs. Costs for the Mass Media Communications activity are included in Table A.1, on the next page.

Assuming that about 63% of Timor-Leste's total population (589,000 people) has regular access to radio broadcast media and about 65% of these listeners (377,000 persons) make up the relevant target audience, then the annual cost of delivery would be about 0.44 USD per listener per year.

**Table A.1: Preliminary Conceptual Budget  
Integrated Farming Systems, Mass Media Communication &  
Agribusiness Market Training For Women**

Costs	Number of Units	Unit Cost/Yr	Annual Cost	5 Year Cost
Expat Managers	2	300,000	600,000	3,000,000
Short-Term - TA (LOE days)	200	1,350	270,000	1,350,000
Chief Admisistrator FSN 11	1	12,262	12,262	61,310
Local Program Mgt., FSN 9	4	10,203	40,812	204,060
Accountant., FSN 9	1	10,203	10,203	51,015
Agr. Mkt. for Women, FSN 8	1	8,220	8,220	41,100
Computer Tech, FSN 8	1	8,220	8,220	41,100
Village Technical Staff, FSN 6	24	5,130	123,120	615,600
Agr. Mkt. for Women, FSN 6	1	5,130	5,130	25,650
Secretary, FSN 4	1	3,798	3,798	18,990
Drivers FSN 3	3	3,111	9,333	46,665
Office Startup - Fixed Cost		75,000	0	75,000
Office Supplies	1	7,200	7,200	36,000
Office Rent	1	36,000	36,000	180,000
Utilities	1	12,000	12,000	60,000
Home Office Admin. (US)		160,000	160,000	800,000
Car - Fixed Cost	4	30,000	0	120,000
Car - Operations	4	6,200	24,800	124,000
Motor Bikes - Fixed Cost	24	2,000	0	48,000
Motor Bikes - Operation	24	1,240	29,760	148,800
Radio Show	1	165,000	165,000	825,000
Training Materials	24	6,000	144,000	720,000
Small Grants - Agribusiness	24	5,000	120,000	600,000
Workshops & Travel	24	6,400	153,600	768,000
<b>Total Costs</b>			<b>1,943,458</b>	<b>9,960,290</b>

Beneficiaries Table	Households Added Annually	Cumulative Households	Individual Beneficiaries per Households Cumulative
Client Households per Village	16		
Villages/ Field Tech.*	4		
Year 1, Households	768	768	3,610
Year 2 "	1,536	2,304	10,829
Year 3 "	1,536	3,840	18,048
Year 4 "	1,536	5,376	25,267
Year 5 "	1,536	6,912	32,486
<b>Beneficiaries Unit Cost</b>			
Unit Cost per Household, USD		1,441	
Unit Cost per Individual Beneficiary, USD			307

\*Each field technician will cover 4 villages per year and work with 16 farmers in each village. Each year each field technician will add 4 more villages. In year 1 the number of households is reduced to allow time for project startup and staff training.

## 2. RECOMMENDATION # 2: INTEGRATED FARMING SYSTEMS

### *a) Activity Description*

The Integrated Farming Systems option takes a multi-disciplinary approach to delivering TA to farmers and private sector agribusinesses. There are three components to this activity, which include:

#### **On-Farm Productivity Activities**

- In-village demonstration and training in improved/integrated crop production, livestock production, fruit and agroforestry farming systems;
- Demonstration and training in post-harvest handling and storage;
- Training (for women) in horticulture, nutrition and family health.

#### **Resource Conservation Activities**

- Training and demonstration in hillside agricultural/agroforestry systems;
- Farmer training in soil conservation and soil/crop fertility management;
- Private tree nursery establishment and training (see Agroforestry section for details).

#### **Agribusiness Training and Development Activities**

- Training in “farming as a business” focused on record-keeping, basic farm calculations, agribusiness decision making, planning;
- Crop post-harvest handling - value addition and marketing training (may include SMS price information system);
- Small agribusiness matching-grants for adoption of new technology, developing of new markets and new products.

Activities under each of the above components may incorporate programs described in the livestock, agroforestry, and horticulture and markets section of this document. In this way, all the components will be incorporated under a central activity, providing an integrated approach and an economy of scale.

**The On-Farm Productivity Activities** subcomponent’s primary focus will be on in-village demonstrations and training. This will include providing agricultural extension services for both low and high value crops, livestock and agroforestry. The project will deliver training through farmer groups, which may be organized after consultation (for example) with the village elders, NGOs, district or subdistrict crop, livestock or agroforestry officers. The activity can focus on integrated methods to increase food crop and livestock production, as well as post harvest loss reduction. Training should also focus on improved maize and bean cultural practices, small-scale silage production using in-ground storage systems, as well as improved household maize storage systems<sup>14</sup>.

Another subcomponent of the On-Farm Productivity activity is horticultural training for women. This activity will train groups of women organized through local water users groups, schools, NGOs, churches and other community organizations. The activity will focus training on small-scale horticultural production methods, understanding and improving family nutrition and family health. This activity will only cover villages with sufficient irrigation or water supply to produce small-scale household vegetable plots. We recommend that this activity be concentrated in upland areas.

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<sup>14</sup> FAO/WFP in 2003 reported that maize storage losses in Timor-Leste could be 34%. This appears high and may be correlated with the use of improved dent maize varieties that are more susceptible to post-harvest fungal and insect damage than traditional flint (hard) varieties.

**The Resource Conservation** subcomponent will focus training and demonstration on hillside farming systems, integrating agroforestry with food crop and fodder production to protect soil resources and increase productivity. The activity may promote, for example, bean cover crops to reduce erosion and improve soil fertility, and promote elephant grass and grass/legume pasture mixes in the context of a conservation farming system. The activity may include cultural practices training for farmers in the establishment and care of lumber species, coffee shade trees, fodder tree and fruit tree production, etc., as well as annual food crops (maize, beans and tubers, etc.).

The Resource Conservation subcomponent can work with village level entrepreneurs to develop small-scale commercial tree nurseries, described in detail in the Agroforestry section of this paper. The project can provide training in tree production and business skills, as well as small matching grants to assist in business startup.

**The Agribusiness Training and Development** subcomponent's primary focus will be to provide farmers with the skills necessary for them to operate their farms using basic business principles. The training package/approach has been successfully employed in many developing countries including Indonesia, Angola, Zambia, Uganda, etc. This training provides farmers with basic skills in record keeping, budgets, tracking costs and calculating profit and loss.

Marketing skills development can be an important part of the Agribusiness Training and Development subcomponent. The activity will work with individual entrepreneurs and village farmer groups to improve marketing skills and strengthen market analytical skills using different sources of market information (including the project radio show and market updates via SMS or radio).

The market training activity can also develop a nationwide SMS price information system using the local cell phone network. This would involve the collection of daily market price information for basic food crops and live animals at the Dili central market. This information could then be posted as a text message accessible to anyone with a cell phone by dialing into a specific number, or the information could be pushed out to a cell phone user database, again in a SMS (text message) format. The message would convey basic market information such as date (1-8-06), location (Dili), product (white maize), unit, (35 kg bag), and price (8.50 USD). By linking with other projects such as USAID/Indonesia's Agribusiness High Value Commodity Market and Support Activity (AMARTA) or the Indonesian Enterprise and Agriculture Development Activity (SENADA), the SMS system could also include price information for products in key Indonesian markets such Kupang, West Timor.

The small agribusiness matching-grants for adoption of new technology, developing of new markets and new products can also be included under the Agribusiness Training and Development subcomponent. One example of this type of activity may include providing beekeeping/ honey collectors with training and market development TA. The training focus can include bee management/ honey production skills (including the use of reusable hives based on technology used in East Africa). TA can also train beekeepers in honey processing/packing/marketing and basic business skills. The long-term objective can be to develop organic honey brand(s) for export to Europe, Japan and other markets. Honey is a high value, long-shelf life product that can be promoted in the organic market segment as a wild tropical forest product.

### ***b) Linkages***

The project can employ non-government technical staff to provide training "in the village" and collaborate with MAFF field staff. In addition, the project may work with other donor organizations such as the Portuguese demonstration farm and nursery, the Israeli tree nursery and/or the NCBA agroforestry activity to produce seedlings, train staff and farmers and manage logistical issues. The Seeds of Life Project will be an important long-term technical partner, as

they may become the primary source of improved seed varieties for food crops. Elements of the set of Agroforestry recommendations presented below could be incorporated in this project.

The World Bank and MAFF have trained 256 APS's (village livestock workers) throughout Timor-Leste. Each APS's has completed a six-week intensive workshop on livestock management. The APS's are daily contract workers who have assisted MAFF with livestock vaccinations. They are natural candidates for field staff technical positions or short-term staff if livestock is included in an Integrated Farming Systems program.

### ***c) Implementation Arrangements***

The Integrated Farming Systems activity can be implemented with a staff consisting of two expatriate managers with professional backgrounds in crop science/vegetable crops, agroforestry or agribusiness. Senior management will be supported by 200 days of short-term technical consulting LOE annually. The professional management team will also include four local staff. These individual program managers may include recent graduates of the local agriculture university. Each program manager can work with six Village Technicians (VTs). There can be 24 VTs, each working with four villages consisting of 16 farmers per village. Based on this formula, the project will be actively working with 1,536 households at any given time.

Each year the VTs will add an additional four villages to their portfolio, upon which they will give primary emphasis without, of course, neglecting villages they have already supported. Villages from the "class of 2007," for example, will be encouraged to take part in providing training in 2008 and 2009 as a way of enhancing their learning by helping with the training. The project may also periodically use the APS's to support project field activities. The project will have worked in 432 villages, in a broad geographic area, by the time it ends.

To ensure quality of services provided to the farmers, the project can pay a bonus to VTs and program managers based on the number and quality of their demo-activities/extension work, as well as adoption rates of new technologies and agricultural practices by farmers. This system has been used in East Africa with considerable success.<sup>15</sup>

The project's TA focus may evolve over time with changes in farmer skill levels and needs. Given this dynamic, USAID needs to give project management the flexibility to add or remove specific extension services, activities and focus areas over the life cycle of the project.

### ***d) Timeframe***

The budget and beneficiary table (see Table A.1, page 21) shows that in project year one, the Integrated Farming Systems activity will work with 768 households, each year after that the project will add an additional 1,536 households to its workplan. Because of project start-up, we expect that there will be a smaller number of client households in the first year. Start-up will include identification of target areas and populations, a baseline survey (for M&E), local staff recruiting and staff training.

We recommend that the Integrated Farming Systems activity (phase I) should run for the five-year period from mid 2006 through mid 2011.

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<sup>15</sup> USAID funded, Uganda, IDEA Project, (+/-) 1993-2002.

### e) Costs & Benefits

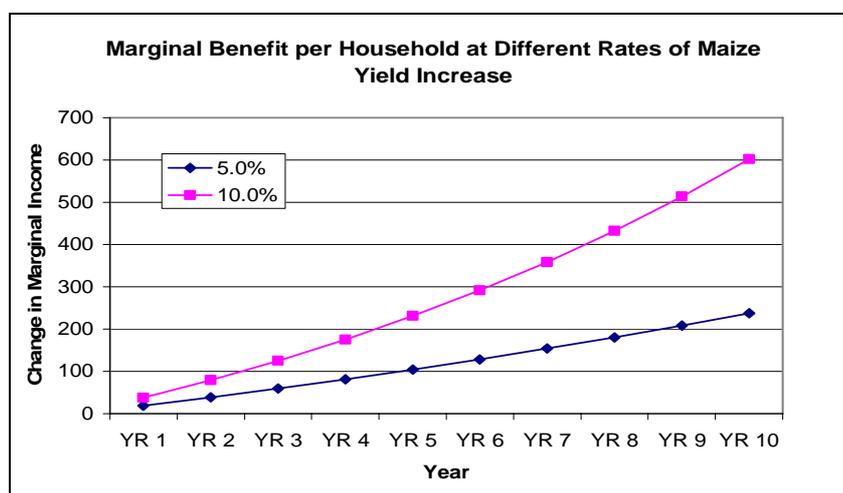
An August 2004 market survey prepared by CARE International found that about 29% of farmers said they sold maize in 2003. Most of these farmers only sold small volumes (estimated by CARE to be about 100 kg/ household) to meet family cash needs. Numbers of farmers selling maize was greatest in Suai (74%) and Maliana (42%) districts.

Aggregate retail maize market value is about 1.38 million USD annually.<sup>16</sup> The farm gate value would be significantly below the Dili retail value. If it is assumed there is a 25% price differential between Dili retail and farmgate price, the aggregate maize market value at the farmgate would be 1.03 million USD annually. There are no maize imports to Timor-Leste so the maize competition is not an issue as it is in the rice market.

Given the small size of the current maize market, it would be difficult to justify USAID investment in the Food Crops Option on expanding the maize market alone. USAID needs to consider the benefits of any funded activity in the context of soil resource conservation, reduced rates of forest loss, enhanced food security and better family health because of dietary improvements. These are all significant factors in the long-term growth and security of Timor-Leste's economy.

Figure 8 (right) examines the marginal increase in income from improvement in maize yield as the result of USAID project activities at different rates of change (5% and 10% annually). Figure 8 only includes increased income from

**Figure 8: Benefit Per Household at Different Rates of Maize Yield Increase**



maize yields and does not include benefits from increases in other household revenue streams such as livestock and fuelwood sales. Figure 8 illustrates a marginal change in revenues over a 10-year period. As USAID is considering a 5-year investment, we note that the marginal benefit per household in year 5 is 104 USD at a 5% annual increase in yield and 231 USD at a 10% increase in yield.

Table 1 (page 21) examines the estimated costs involved in developing the Integrated Farming Systems activity. The table notes that total cost will be about 9.9 million USD over five years. During this time, the project will work with 6,912 households. Assuming 4.7 people per household, the activity would have affected 32,486 total beneficiaries over the project lifecycle at a cost of 307 USD per beneficiary. This is a flexible budget and can be scaled up or down in relation to target outputs and available funds.

Total cost of this recommendation for five years: 9.9 million USD.

<sup>16</sup> Assuming that there are about 177,000 farm households in Timor-Leste and 29% of them sell maize (51,330 households); if each household sold 100 kg of maize annually, the total market volume would be 5133 MT; at a mean Dili retail price of 0.270 USD per kg (270 USD/MT).

### **3. RECOMMENDATION # 3: AGRIBUSINESS MARKETS TRAINING FOR WOMEN**

#### ***a) Activity Description***

Women play a key role in Timor-Leste's markets. Most permanent shops are staffed by women and most sellers in village and city markets are women. Organizations involved in grassroots community development such as CARE International claim that women control the budget in most households. CARE, GTZ and Oxfam have also found that working with women groups is generally more productive than working with groups that include men. Based on this, we recommend that USAID work with women to spur the development of the agricultural input and output markets.

This activity will train women who are retail shop owners, operators and market traders. We recommend that women who complete the training program be provided with a one-time credit of small packages of vegetable seed, maize seed and fertilizer, which they can sell in their retail shops or periodic market. The training will cover a wide variety of information including:

- Input purchasing (where to buy seed and fertilizer and how to store them);
- Types and uses of fertilizer;
- Vegetable and maize crop variety, selection, growth habits, and cultural practices;
- Repacking, and labeling (including legal requirement if applicable);
- Basic business skills in recordkeeping, bookkeeping, profit and loss calculation, etc.;
- Gender specific training, in family health, diet and nutrition.

Given the largely subsistence nature of agriculture in Timor-Leste, there is very little effective demand for agricultural inputs. To stimulate demand and be more responsive to the small units at which most farmers would probably buy inputs, the Agribusiness Markets Training for Women Program will sell only small packages of seed and fertilizer, typically in retail units appropriate for a small household garden. A 5-10 kg bag of urea, for example, would be suitable for a 10m x 10m garden (depending on the crop and plant population). By selling urea for 0.25 per kg, a shop could make a profit (world price for urea in 50 kg bags is about 0.18 USD/kg, and rising due to increases in natural gas prices). A 5 kg bag would sell for 1.25 USD, which is affordable. Seed sales could use the same strategy; pack good quality seed in small units and sell for home garden use.

The above-mentioned On-Farm Productivity activity includes horticultural training for women, which will stimulate interest in home-garden vegetable production. Participants in that activity will form the initial core market for the women shopkeepers who will be trained under this recommended activity.

#### ***b) Linkages***

The Agribusiness Markets Training for Women component can be embedded into the Food Crops Options - Integrated Farming Systems component or be implemented as a stand-alone activity. For management efficiency and cost effectiveness, the costs for the Agribusiness Markets Training for Women are included in the Integrated Farming Systems component (see Table A.1, page 21).

The Agribusiness Markets Training for Women can draw its technical expertise from the larger Integrated Farming Systems activity, but hire female field staff to work with the market women. This activity also complements the On-Farm Productivity Activities - Training for women in horticulture, nutrition and family health. In some cases, the training activities of the subcomponent activities will overlap and mutually reinforce. The Agribusiness Markets Training

for Women will require additional training in business skills, markets, and bookkeeping that will not be taught to the On-Farm Productivity Activities - Training for women.

### ***c) Implementation Arrangements***

This recommended activity can be implemented within the larger Integrated Farming Systems component by assigning responsibility for the Agribusiness Markets Training for Women activity to dedicated staff positions. For example, this activity could employ two fulltime female staff members to identify client groups and create/deliver training activities. The same staff members (activity manager and assistant manager<sup>17</sup>) should collaborate with the Integrated Farming Systems program managers and village technical staff to deliver training to women involved in the On-Farm Productivity -Training for women in horticulture, nutrition and family health activity.

This activity is likely to draw from a wide geographic area. Trainees will need to have a number of prerequisite skills including: basic literacy, numeracy, selling experience and the ability to travel within Timor-Leste. Finding women with this skill set and the ability to travel may be difficult. National coverage should ultimately be considered, with those areas with greatest market activity and greatest potential being given priority at the beginning.

### ***d) Timeframe***

This component should be considered as a component that runs through the full five-year funding lifecycle of the Food Crops Option. It will follow the same timetable as the Integrated Farming Systems component. With this structure, the Market Training for Women activity will be dependent on the Integrated Farming Systems component for their supply of technical backstopping. The two activities will share budgetary overhead line items such as office, vehicles and administrative staff. If there were timing issues (for example if the Integrated Farming Systems component had come to an end but USAID wanted to extend the Agribusiness Markets Training For Women component), USAID could move the Markets Training for Women component to be housed under a different but pre-existing activity rather than set up an independent management structure to implement the activity.

### ***e) Costs and Benefits***

Table A.1 (see page 21) shows an 8,000 USD annual line item titled “Agr. Mkt. for Women Staff”, this funding can be used to employ two individuals to implement the Agribusiness Markets Training for Women activity. The activity should be able to provide training to 10 to 12 women per group. The activity can work with eight groups per year (for six months each). The activity will train 80 – 96 women annually. The direct labor cost of the training will be between 83 USD and 100 USD per trainee year. Travel, training and materials costs will be 100 USD per trainee per year.

Total cost of this activity will be 17,600 USD per year at 183 USD per trainee, assuming 96 women are trained annually.

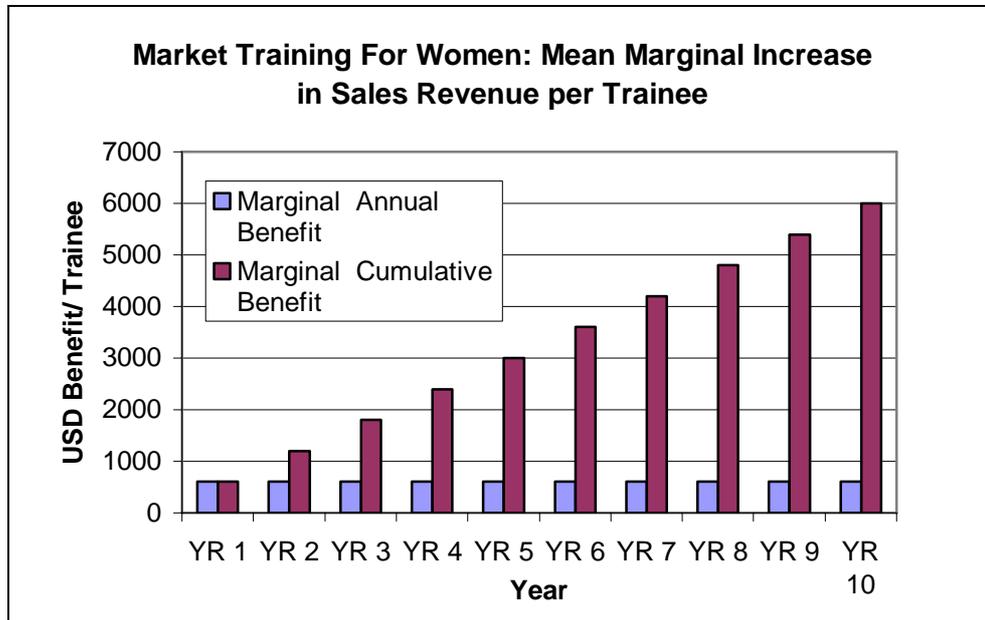
Figure 9 (next page) demonstrates the annual and cumulative benefit per trainee because of market training assuming an estimated increase in monthly sales revenue of 50 USD. The graphic illustrates that five years after receiving training an individual women shop owner/operator or

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<sup>17</sup> The manager should hold a university degree and the assistant manager should have post high school education. Both staff members can receive implementation backstopping from project technical staff.

market trader would have earned an additional 3,000 USD in sales revenue as a result of training which cost about 183 USD.

**Figure 9: Market Training: Mean Marginal Increase in Sales Revenue Per Trainee**



## B. AGROFORESTRY

Deforestation in Timor-Leste is rapidly destroying the agriculture resource base upon which much of the Timorese population depends. It is a consequence of uncontrolled logging, clearing of new and unsuitable agricultural lands and intensification of shifting cultivation (clearing of new land for every new planting season) with reduced fallow periods. While the population of Timor-Leste is not very high, there are certain districts where the population pressure exceeds 100/km<sup>2</sup> and it is in these areas, which include Dili, Ermera, and Liquica, where this increase in population pressure leads to deforestation and severe erosion.

Discussions with representatives of various government agencies, non-government organizations (NGOs), donor organizations and visits to various field sites in Dili, Aileu, Ermera, Cova Lima, Bobonaro, Ainaro, and Liquica districts in west of the country confirmed that the country faces serious problems of deforestation and accelerated erosion along steep hillsides, landslides along major highways, and severe silting of rivers and streams. Deforestation is a prominent factor in the watershed management in the country. Most literature on the natural conditions in Timor-Leste identifies deforestation as a serious problem that appears to have been going on for a long time. Primary agents of deforestation are illegal logging of commercial trees for timber and fuelwood, lopping for fuelwood and fodder, overgrazing by livestock, and unsustainable shifting cultivation.

Given the severe impact of accelerated erosion on crop productivity in the uplands there is an urgent need for reforestation in the denuded hillsides on forest land as well as on community lands for production of fuelwood, fodder, and timber, associated with promotion of conservation and conservation-oriented farming practices.

Shifting cultivation is an agricultural system widely used in many areas of Timor-Leste, and is possibly at present the most widespread agricultural production system. The main characteristic of the system is the rotation of fields in a cycle of cropping and fallowing. Shifting cultivation can be sustainable in areas with low population densities where fallow periods are sufficiently long for the vegetation to rejuvenate itself. However, the system becomes nonviable as population densities or market pressures increase. Then, shifting cultivation, by necessity on a shorter rotation, results in a decline in soil fertility and a net loss in productivity. Farming communities in many areas need to change from shifting cultivation to something more stable and sustainable. We recommend that this be done through incorporation of trees and conservation farming practices including various forms of agroforestry. In this context, various 'best practices' that enable farmers to meet household food and cash needs, deal effectively with climate and market risks, and have a positive impact on environmental outcomes provide viable alternatives.

Timor-Leste's coffee estates are in disarray because of inappropriate management and over maturity of plantations and disease infestation in shade trees. Despite being Timor-Leste's leading export commodity only 45,000 hectares of the 56,000-hectare estate is harvestable, yielding annual revenue of 4.8 million USD (2002). Most of the estate is not well managed, yet an estimated 25,000 farm families derive a substantial portion of their income from the crop while another 15,000 depend on it for a small portion of their income. Thus an estimated 200,000 people rely on the crop for most or a portion of their livelihood.

Virtually no investments are being made on coffee plantations. Coffee is simply harvested by local communities or individual farmers depending on ownership structures. The coffee is then sold to various intermediaries including CCT. Coffee trees and their shade trees are old and need to be rejuvenated. The coffee shade trees, *Paraserianthes falcataria*, which are subject to fungal diseases and vulnerable to wind damage, are also old, dying and falling onto the coffee trees below. The openings thus created result in a decline in the quality and quantity of coffee produced, and replacement of the coffee estate by maize.

There is an obvious need for instituting appropriate management processes including rehabilitation of coffee estates. In this context, the government needs to address the ambiguity of

land and tree tenure, which constrains investments in the development and management of coffee estates. It would therefore be necessary to replace unproductive, over-mature, dying and diseased shade trees by more robust species of a large number of available species as well as rejuvenation of over-mature coffee bushes to ensure long-term sustainability of the coffee estates and continued production of high quality coffee, so important for economy of the country.

**Traditional Law and Land Tenure Conflicts** are a potential obstacle to practice of appropriate land management, even though opinions differ among various natural resources management experts on the subject. In most rural areas, traditional system *Tara Bandu* still has significant relevance for natural resources management. While the *Tara Bandu* system has been reinstalled in certain areas, conflicts over land tenure, especially with respect to the right to cultivate land or over grazing rights are said to be common. Potential for land tenure conflicts may be most serious in areas in transition between traditional systems (often based on some form of collective ownership) and “modern” systems (based on individual ownership). The question of the possible property rights claimed by Indonesians or other groups that left the country in 1999 further complicates this picture. Under the circumstances, ambiguity in policies and legislation regarding tree and land tenure does not provide any incentive to farmers to adopt better farming practices and conservation-oriented farming since that would require longer-term investments. Security of tenure would facilitate availability of credit to pay for such investments required, especially for the resource poor subsistence farmers.

Appropriate policies and legislation, and associated rules and regulations would be a prerequisite for -oriented farming and sedentarization of shifting cultivation through various forms of agroforestry. This would help address soil fertility decline and promote enhanced production of food crops, forage, fuelwood, and small timber as an integral part of the farming system. An enabling policy environment would also provide similar incentives in the establishment of homestead and community woodlots and tree plantations.

Concerted action to ensure appropriate management of the land and forest resources is crucial to reduce the adverse consequences on local communities in the uplands, in the lowland rice-growing areas, as well as in urban areas.

Timor-Leste’s topography, dominated by the central mountain range of Ramelau, with about 44% of the country with slopes of more than 40%, increases vulnerability of the land base to accelerated erosion and negative environmental consequences, especially in areas with sparse vegetation to hold the soil mantle together. The situation is exacerbated by the existence of unstable hillsides, intense rainfall over short periods, and a long dry season in most of the country. An important aspect of rainfall pattern is the fact that much rain comes in torrential downpours. Maximum daily rainfall has been recorded at 275 mm in Dili, 398 mm in Lospalos, 217 mm in Suai, and 267 mm in Lolotoi. Hard torrential rain causes a high degree of surface runoff, and increased risk of soil erosion.

These problems emanate from absence of appropriate land use including unsustainable shifting cultivation practices, and deforestation, which appear to be resulting from lack of inputs and incentives to undertake appropriate land management and conservation-oriented land use practices. In USAID’s objectives in enhancing agricultural productivity: (i) increase in rural household income; (ii) create jobs in the agriculture and agribusiness sector; (iii) promote agricultural exports; (iv) promote food crop production and marketing; and (v) build up rural non-farm enterprises through value added activities, adoption of appropriate land use practices would be critical. Where people have realized that the costs of inaction can be serious and life threatening, conservation-oriented farming (mixed cropping, contour tillage, check damming, and rubble-masonry stone walls to hold the contour terraces and facilitate farming) and efforts to ensure effective watershed protection (evidenced by the quality of water in the rivers and streams in the area) have been instituted. Such practices of integrated watershed management including agroforestry and conservation-oriented farming, described below, will particularly benefit the

poorest segments of the population, as these groups normally are relegated to the most marginal lands and the most risk-prone areas subject to accelerated erosion and consequent degradation.

## **1. RECOMMENDATION #4: SUPPORTING SEDENTARIZATION OF SHIFTING CULTIVATION**

### *a. Description*

To address the problem of unsustainable shifting cultivation, and prevent its expansion in fragile uplands, the practice needs to be sedentarized and converted into a sustainable and stable system through incorporation of trees and conservation farming practices. In this context, it is important to recognize that there would be a need for incentives in the form of increased productivity and marketable surplus for the farmers to participate. It is likely that given an enabling policy environment and security of tenure, the farmers would adopt sedentary agriculture and conservation-oriented farming, which would result in increased fertility and enhanced production. In all of the following interventions, the Project would provide seedlings, technical assistance, and hand tools to the participating households. The inputs are being subsidized because every intervention would serve as an on-farm demonstration. Based on various models tried and tested and observed during the field visits, the following conservation-oriented agroforestry systems and associated interventions are proposed: (i) Alley-cropping and contour hedgerows; (ii) Silvo-pastoral agroforestry; (iii) Windbreaks and shelterbelts; (iv) Live fences-border plantations; (v) Homegardens; (vi) Community woodlots for fodder, fuelwood and timber; and (vii) Multipurpose production nurseries.

*Alley cropping and contour hedgerows.* Alley cropping is proposed as the primary means to improve nutrient levels of the severely degraded soils on steep slopes (40-60 percent slope), arrest accelerated erosion and improve crop yields. Under the alley cropping system, alleys of nitrogen fixing trees (NFTs) or other fast-growing plants such as *Leucaena leucocephala*, *Sesbania grandiflora*, *Sesbania sesban*, *Calliandra calothyrsus*, and others, depending upon agroclimatic conditions, in various combinations would be planted with crops in between. The NFT alleys will be managed to provide a readily available on-site source of animal fodder, leafy organic to improve soil productivity and act as mulch to reduce evaporation losses during the dry season. It will also provide the much-needed fuelwood. Planting of leguminous crops grown between the alleys would ensure sustained levels of nutrients ensuring higher yields of both trees and crops.

On steep slopes which are currently under shifting cultivation or have already been severely eroded, hedgerows of soil binding multipurpose tree/shrub species will be planted along the contour, creating contour hedgerows. This practice of vegetative contour barriers, or densely planted hedgerows oriented on contour would serve as a viable vegetative means for reducing erosion instead of terracing, which is quite expensive and beyond the reach of ordinary subsistence farmers. Crops, as stated above, would be grown along the slopes between the hedgerows. Against a potentially available area of 100,000 ha, it is proposed that during the first phase, alley cropping and contour hedgerows be carried out over an area of 5,000 ha, targeting 2,500 households, each with an area of not exceeding 2 ha.

*Silvo-pastoral agroforestry.* Under this system of agroforestry, trees will be integrated with pasture forage and livestock production. To ensure optimal levels of production of wood (timber and fuelwood) and fodder, the trees would be spaced to allow growth of healthy forage species between the trees. The trees would regularly be pruned to provide adequate space for the healthy growth of forage species as well as to provide tree fodder for livestock. Against a potentially available area of about 20,000 ha, it is proposed that during the first phase, silvo-pastoral agroforestry be carried out over 2,000 ha, targeting 1,000 households, each with an area depending on the number of livestock and availability of land. An area of 2 ha per household is

proposed. Exact design, species choice and management regime would be dictated by the agroclimatic conditions at the site. A list of potentially suitable species is given in Appendix 1.

*Windbreaks and shelterbelts.* Windbreaks and/or shelterbelts are rows of vegetation, usually trees and shrubs, strategically placed to protect an area from wind damage. A windbreak slows the wind that enters the protected area. In areas subject to severe winds such as Viqueque, Same, Ainaro, and Suai area of Timor-Leste, wind breaks once established would reduce stress on crops and prevent damage, conserve moisture, and provide additional nitrogen (in the case of leguminous trees). This would result in improved crops yields. Exact design, choice of species, spacing, and alignment would depend on the sites, since the design would be dictated by site-specific agroclimatic conditions. A list of potentially suitable species is given in Appendix 1. During the first phase, only 200 km. of windbreaks would be established in these areas, assuming an average farm size of two ha per household protected by windbreaks, with 25% of the total rural households opting for wind breaks/shelterbelts.

*Live fences-border plantations agroforestry.* The use of live fences is common in Timor-Leste, but there is significant scope for improvement. While the primary purpose of live fences is the control the movement of animals and people, these can be designed to provide fuelwood, fodder, and serve as windbreaks. One can establish live fences by using coppice pollards of easy-to-root species at a spacing of not more than 50 cm. Should the species not reproduce vegetatively, one may plant nursery-raised saplings. The exact design, species choice and management regime would be dictated by the agroclimatic conditions at the site, once the sites have been selected.

We propose that during the first phase, only 1,000 km. of live fences be established, assuming an average farm size of 2 ha per household protected by windbreaks, with 100% of the total rural households opting for windbreaks/shelterbelts.

*Homegardens.* Homegardens are diverse multistrata systems that include fruit, fodder, and timber trees, shrubs, vines and herbaceous plants, managed by the household for fruits, vegetables, herbal medicine, firewood for household consumption and building materials. We propose that this system of tree planting in homegardens be encouraged especially in the uplands to help accelerate the transition from erosion-prone farming practices to conservation farming and tree planting. The system would be encouraged by making available seedlings and technical guidance. Our proposed target for home garden support is 10,000 households, covering an area of about 1,000 ha. The project would provide seedlings, technical assistance, and tools.

*Woodlots for fodder, fuelwood, and timber.* Woodlot plantations require intensive management but provide substantial medium and long-term benefit to participating farmers. Woodlots established for forage and fuelwood tend to be managed on short rotation whereas where the objective of management is timber production, the rotation may be as long as 8-10 years for fast growing species and 20-25 years for long rotation species. The Project would provide technical assistance, seeds and seedlings, and hand tools to the participating households. We propose establishing woodlots with multiple objectives of production of fodder to provide immediate income, fuelwood to provide intermediate income from thinning, and high quality timber from long rotation species such as Teak and Mahogany. Sandalwood should also be included in areas where it will grow well. While the choice of species and spacing would be dictated by agroclimatic conditions prevailing at the site, the usual spacing for fast growing intensively managed woodlots may be as low as 1m x 1m.

*Multipurpose Production Nurseries.* Tree production nurseries should be established near potential plantation sites. These nurseries will include fast growing multipurpose tree species as medium to long rotation timber species (teak, mahogany, sandalwood, and white teak). The beneficiaries will establish the nurseries with initial financial and technical assistance from USAID, and will be maintained and operated by them directly. We propose that women and schoolchildren establish, operate and maintain these nurseries, which will serve as a source of additional family income. The Project would provide technical assistance, seeds, and hand tools to

the participating households and schools. Choice of species would be dictated by demand in the locality for fuelwood, fodder, fruit and ornamental trees.

The production nursery component would include:

- credit for production facilities;
- initial stock of seedlings or seeds;
- training in the production and use of the species;
- initial contract to buy seedlings for further distribution with continuation dependent on successful establishment by initial farmer recipients.

The project would assure producers a reasonable price for the seedlings subject to acceptable standards and quality.

There is a significant potential for establishment of tree nurseries, one in every participating village, each with a production potential of 25,000 seedlings, with 10% reserved for teak and mahogany. The seedlings will be sold to the farmers undertaking agroforestry with assistance from the Project at prices determined in consultation with the project staff and market conditions.

### ***b. Linkages***

This proposed activity is directly linked to livestock production since it will produce forage and fodder for livestock in addition to generation of additional income that may be used in the procurement of additional heads of cattle or other forms of livestock. It is also linked to crop production since the success of the interventions would result in enhancement of crop productivity, thereby increasing crop yields and marketable surplus and increasing diversity species. By producing more fuelwood, it would reduce the time women spend to collect fuelwood, and thereby they would have more time available for tending to livestock, attending to crop production chores, and marketing the produce. The project will provide seedlings to farmers participating in the agroforestry programs once they have prepared the area. Furthermore, the farmers will be offered livestock for fattening (under a fattening contract) upon establishment of the hedgerows.

### ***c. Implementation arrangements***<sup>18</sup>

We recommend taking a fully participatory approach to implementation of Agroforestry alley-cropping, contour hedgerows, Silvo-pastoral agroforestry, Windbreaks and shelterbelts, Live Fences and establishment of associated nurseries. In consultation with the community leadership and under the *Tara Bandu* system, we propose allocating two hectares of land currently under shifting cultivation to each household. Various agroforestry models, discussed earlier, would provide a range of planting options, and land uses will depend on the participants' choices.

*Choice of species* and spacing would depend upon the agroclimatic conditions, slope of the land, and nature of soil. The project will provide technical assistance in the selection and management of each species. Individual participants must be able to choose from within an extensive range of species and a range of recommended (but not mandatory) planting strategies, in order to find systems that match their land capabilities, production capabilities, risk strategy and interests.

*For Windbreaks, shelterbelts and live fences*, fuelwood, timber as well as fruit bearing species will be planted as desired by the participants. Fruit trees will account for 10% of the total species and they will be planted after every 20 meter. Along the narrow roads (feeder roads) fruit trees with wide crown cover like mango, jackfruit will be avoided, but species such as palms, which have little negative impact on crop field will be preferred.

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<sup>18</sup> Details of Implementation Arrangements for the Project as a whole are given in Table B.2 (in annex).

For the *Homegardens*, fodder species, soil improving green manure species and fuelwood will be encouraged. We recommend fruit trees such as jackfruit, mango, lemon, and guava. Other trees or plants suited to shade, providing horticultural/fruit output, or giving quick returns are recommended: pineapple, banana, papaya, turmeric, ginger, and bamboo.

*Seed Supply and Nursery Production:* Procurement of good quality seed may be a constraint for the production of adequate numbers of certain species. It is important for the technical assistance staff to plan for seed collection. Participating community groups will raise the seedlings, receiving technical assistance from the Project.

*Community woodlots for fodder, fuelwood and timber:* The technical assistance provided by the project will be responsible for advising participants on the appropriate range of species and silvicultural treatments for use in each location. The participating individuals or communities will make the final decision on their preferred methodology in consultation with project advisors.

*Establishment:* We recommend a spacing of 2 x 2 meters for woodlot planting, which will result in 2,500 saplings per hectare. The project should strongly insist on planting being done by the participants themselves. This will provide the sense of ownership necessary for the activity to succeed. To ensure a good stand, project staff should encourage replacement planting at the beginning of the following rainy season if initial survival is below 85%.

*Management:* The short rotation crops such as *Leucaena spp.*, *Calliandra spp.*, *Sesbania spp.*, and the like will be grown on a 7-year rotation with intermediate thinings in year 4 to reduce the stocking by half i.e. to 1,250 and provide an intermediate income. Long rotation crops such as teak and mahogany would be planted at 4x4 meter spacing, between the fast growing tree species. These will be managed on a rotation of 40 years and thinned at 20 and 30 years age.

#### ***d. Timeframe***

We recommend implementing the project over a period of five years. The project should focus on mobilization of technical staff (including volunteers), identification and selection of participating communities, and participating households, and production of seedlings in village/school nurseries in the first year. Over the next four years, the project would focus on implementation of the recommended agroforestry interventions and establishment of community based woodlots.

#### ***e. Costs and Benefits***

*Costs.* The per ha costs associated with sedentarization of shifting cultivation will depend on agroclimatic conditions of the area, which will determine the choice of species, manner of seedling production, costs of seeds, and land preparation. The average costs of establishment has been estimated at 200 USD per ha, thereby amounting to a total of 2.325 USD million, assuming that the labor would be provided by the participating households. Details are provided in Table B.1. (See next page.)

**Table B.1: Annual Benefits to Participating Households due to Increase in Annual Production**

Intervention	Annual Benefits to Participating Households due to Increase in Annual Production (Farm size 1 ha) in USD <sup>19</sup>				
	Year 1	Year 2	Year 3	Year 4	Year 5
Alley-cropping and contour hedgerows	335	348	360	373	373
Windbreaks/ Shelterbelts	378	407	436	447	469
Live Fences	103	105	108	108	108
Homegardens/ Household	90	90	90	90	90
Community Woodlots	100-550	100-550	100-550	100-550	100-550

The nature and magnitude of direct benefits will depend on the choice of species and the site at which the systems are established. Nitrogen-fixing trees can provide shade, wind shelter, living fence, improved fallow, improved pasture and a wide range of other benefits that will increase farm household well-being. Also important are incremental changes in the agricultural crops in agroforestry systems as the means to sedentarization of shifting cultivation. Benefits are summarized below.

*Benefits.* In the absence of specific information for each model and each site, it is obviously difficult to estimate the quantifiable benefits accurately. Favorable effects on soil temperature and moisture conservation have also been reported. Various studies have shown the following results: (i) the soil showed significant increase in total nitrogen and an increase in potassium; (ii) soil pH also improved, becoming more neutral; (iii) crop growth showed a trend of faster growth and larger stem diameter for mulched trees over the unmulched trees; and (iv) the hedgerows yielded 20,000 lbs. of mulch per acre per year, or about 300 lbs. of mulch per crop tree per year. In addition to many other minor nutrients were provided as well, including small quantities of boron, magnesium, iron, and zinc.

A study conducted in the Kerala state of India has revealed that annual returns from agroforestry from one acre (0.405 ha) ranged from 598 USD to 786 USD as compared to original returns of 56 USD to 60 USD. Similar results have been obtained in the Philippines where average annual income of 398 USD per ha was obtained by farmers adopting sloping land agriculture technologies (SALT) in Bansalan areas. Another SALT study has demonstrated a reduction in annual soil loss from 194.3 tons per hectare to 3.4 tons per hectare over a 6-year period.

Community woodlots are expected to yield 5-20m<sup>3</sup> of timber per ha annually (depending on the species), with fuelwood availability beginning in the year 3 and 5 through thinning, and final yield in year 7. In addition, fodder would be available on a regular basis as long as farmers plant multipurpose species. Based on estimates by various researchers and experts on the subject, and information obtained locally, we expect the following benefits for each participating household (assuming 1 ha farm size). See Table B.1 (above) for details.

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<sup>19</sup> These figures and calculations are based on very rough field data estimates and not on scientific information, except where quoted.

## **2. RECOMMENDATION # 5: REJUVENATION, REHABILITATION AND APPROPRIATE MANAGEMENT OF COFFEE ESTATES**

### ***a. Description***

There is an obvious need for instituting appropriate management including rehabilitation of coffee estates. It would therefore be necessary to replace unproductive, over-mature, dieing and diseased shade trees by more robust species of a large number of available species (significant choice is available) as well as rejuvenation of over-mature coffee bushes to ensure long-term sustainability of the coffee estates and continued production of high quality coffee, so important for the economy.

Of the available area of about 50,000 ha under coffee in immediate need for rehabilitation and rejuvenation, we recommend that the Project undertake an area of 5,000 ha in the first phase with the purpose of converting the aging and degrading coffee plantations as well as the areas degraded due to shifting cultivation into well-managed productive coffee plantations. As demonstrated under various interventions undertaken by CCT, these plantations would address the potential threat of total destruction of the shade trees (*Paraserianthes falcataria*) with adverse impacts on coffee production while at the same time rejuvenating the existing coffee plantations. Under this component, the Project would provide technical assistance, seeds and seedlings, and hand tools to the participating farmers.

While there are a large number of shade tree species being planted and tried under various agroclimatic conditions, it would be best to go with the species that are demonstrably appropriate and provide the right amount of shade to the coffee crop. Some of these tried and tested species include *Casuarina equisetifolia*, *Acacia spp.*, *Leucaena spp.*, *Samanea saman*.

### ***b. Linkages***

The component is directly linked to crop husbandry in terms of enhanced production of coffee of exportable quality, and to effective protection of the watershed. If nothing is done to rejuvenate the coffee estates, coffee producers are going to experience increased erosion, landslides, soil degradation, and adverse social environmental impacts. This will also affect the economy, given coffee's importance. Effective shade tree and coffee plantations cover on the landscape would also have an impact on reduction of erosion and aesthetics and ecotourism potential.

### ***c. Implementation arrangements***

Rejuvenation of coffee agroforestry systems involves replacement of over mature shade trees by a range of available species, and replacement of ageing coffee bushes with young and robust plants. In this case, as in the case of agroforestry and community woodlots, we recommend a fully participatory approach. In consultation with the community leadership and coffee growers who have usufruct or proprietary rights on the estates, guaranteed under the *Tara Bandu* system, each group would be replant shade trees and coffee trees under technical assistance provided by the Project. Choice of shade tree species and spacing would depend upon the agroclimatic conditions, slope of the land, and nature of soil. Technical assistance would be provided in selection of species and appropriate management modality. Multipurpose tree nurseries established by the Project at village/school level would be the source of planting material. Labor for planting would be provided by the participants.

#### *d. Timeframe*

This component of the Project would be provided assistance for implementation for the first five years. Thereafter, the participants, having observed the benefits, would be able to carry on the activities on their own, with the support and guidance of CCT or similar other marketing organization. The first year would be devoted to mobilization of technical staff including volunteers, identification and selection of participating coffee growers, and production of seedlings in village/school nurseries. Field implementation would be phased over the next 4 years and thereafter.

#### *e. Costs and Benefits*

Costs associated with this subcomponent include costs of technical experts, volunteers, hand tools, seedling production and planting. Assuming the labor to be provided by participating coffee growers, the total costs of this intervention is estimated at 635,000 USD.

The benefits of the shade trees and coffee rejuvenation option include:

- enhanced and effective protection by ensuring adequate shade by replanted shade trees of appropriate species;
- an estimated 100% increase in productivity of coffee plantations;
- low risk on account of low probability of damage by winds, cyclones, or typhoons;
- enhanced soil surface protection, positive impact on soil biota (Enhanced population density of earthworms), improved soil physical properties, reduced runoff and erosion;
- increased soil organic carbon and magnesium.

### **3. RECOMMENDATION # 6: POLICY REFORM TO ADDRESS POTENTIAL LAND TENURE CONFLICTS**

#### *a. Description*

Clarified land use and land tenure policies, laws and regulations are prerequisites to substantial investments in agricultural land the world over. The investments that are needed to stabilize Timor-Leste's agricultural resource base will require important investments on the part of farmers and farm communities, not to mention the government. These will require that the government, in consultation with affected parties, constantly review existing laws, rules and regulations that affect security of land tenure. Conservation-oriented farming, sedentarization of shifting cultivation, and other soil conserving labor-intensive investments will be made by individual farm families without reservation once they know they will have exclusive inter-generational rights to the results of their investments.

Agroforestry investments and establishment of homestead woodlots and tree plantations will also require the incentives that will result from clear tenure. We recommend that appropriate legal recognition be afforded to the traditional land law *Tara Bandu* by formalizing and promulgating the required policies, legislation, rules and regulation. Security of tenure would facilitate availability of credit to pay for investments required for adoption of such practices. Moreover, such policies and legislation would address competing claims and conflicts causing land degradation.

#### *b. Linkages*

Getting land use policies and security of land tenure right will facilitate the investments that are recommended elsewhere in the Agroforestry section. Maintenance of forest cover through

adoption of appropriate land management practices in the uplands, adoption of suitable agroforestry practices and integrated watershed management would be essential elements in ensuring a stable landscape. Adoption of improved conservation farming on steep terrain would be an essential element of any strategy aimed at stabilization of upland areas, enhancement of land productivity through improved soil fertility.

### ***c. Implementation***

The Land and Property Department of the Ministry of Justice is seeking to clarify land tenure policy and we recommend providing assistance to maintain the pace of reforms. This will include finalizing land use and land management policies, legislation, and their implementing rules and regulations. It will involve capacity building for effective implementation and enforcement of the land use and land management legislation.

We recommend giving priority to recognition of the traditional law, *Tara Bandu*, with the project supporting the Land and Property Department through the services of a specialist and land tenure for as much as six months. USAID assistance will focus on working with village (suco) and community leaders to standardize rules and procedures of the *Tara Bandu* system.

***d. Timeframe for Implementation.*** Six months for land tenure research documentation and implementation to begin thereafter.

### ***e. Costs and Benefits***

The main costs of this recommended activity are associated with six months of an international expert and local support to the Land and Property Department. We estimate the cost of this activity if part of a larger project to be about 150,000 USD. Benefits, while not readily quantifiable, would accrue to the society as a whole and be reflected in the form of enhanced investments in agriculture, forestry, agroforestry systems, livestock production and processing, and enhancement of ecotourism resulting from a stable landscape and clean water in the streams and rivers.

***The total estimated cost of the recommended agroforestry options -- (i) agroforestry including community woodlots, and nurseries; (ii) shade-tree/coffee rejuvenation; and (iii) policy reform is 3.421 million USD. Details are provided in Table B.2. (See next page.)***

**Table B.2: Physical Dimensions and Cost Estimates (Short- to Medium-Term)**

AGROFORESTRY COMPONENT						
Physical Dimensions and Cost Estimates						
<i>SHORT- to MEDIUM-TERM (5 YEAR TIMEFRAME) INTERVENTIONS</i>						
Intervention Model	Physical Targets (Outputs)			Cost Estimates		
	Units	Potential	Target	Cost/Unit (USD)	Total Cost (USD)	
<b>Cost for establishment of Demonstration Plots, Extension, and Hand Tools</b>						
<b>Sedentarization of Shifting Cultivation</b>						
Ø Alley-cropping and contour hedgerows	Ha	100,000	5,000	1/	200	1,000,000
Ø Silvopastoral agroforestry:	Ha	20,000	2,000	1/	150	300,000
Ø Windbreaks and Shelterbelts	KM	2,000	200	1/	100	20,000
Ø Live fences-border plantations	KM	5,000	1,000	1/	60	60,000
Ø Homegardens	HH	200,000	10,000	1/	30	300,000
Ø Community Woodlots for Fodder, Fuelwood and Timber	Ha	200,000	2,000	1/	120	240,000
Ø Multipurpose Production Nurseries	NO.	400	100	1/	300	30,000
<b>Sub-Total</b>						<b>1,950,000</b>
<b>Rejuvenation, Rehabilitation and appropriate management of coffee estates:</b>	Ha	50,000	5,000	1/	100	500,000
<b>Sub-Total</b>						<b>500,000</b>
<b>Technical Support &amp; Assistance</b>						
<b>Sedentarization of Shifting Cultivation</b>						
Technical Assistance (Short Term Experts)	PMs	NA	3		25,000	75,000
Technical Support (Long Term Experts)	PMs	NA	12		20,000	240,000
Technical Support (Long Term Volunteers)	PMs	NA	60		1,000	60,000
<b>Sub-Total</b>						<b>375,000</b>
<b>Rejuvenation, Rehabilitation and appropriate management of coffee estates:</b>						
Technical Assistance (Short Term Experts)	PMs	NA	3		25,000	75,000
Technical Support (Long Term Volunteers)	PMs	NA	60		1,000	60,000
<b>Sub-Total</b>						<b>135,000</b>
<b>Policy reform to address land tenure conflicts:</b>						
Technical Assistance (Short Term Experts)	PMs	NA	6		25,000	150,000
<b>Sub-Total</b>						<b>150,000</b>
Contingencies (Price and Physical, estimated at 10%)						<b>311,000</b>
<b>TOTAL COST (USD)</b>						<b>3,421,000</b>

1/ Labor to be provided by participating households 2/ Includes cost of seeds and seedling production

#### 4. OTHER POSSIBLE INTERVENTIONS

##### a. Reforestation of Degraded Forests

Maintenance of the natural forest cover through the practice of natural forest management, reforestation of degraded areas, and establishment of protected areas are elements necessary for effective and integrated watershed management. Along with adoption of suitable agroforestry systems that may facilitate continued and improved production on hillsides, reforestation of degraded forests is critical to the maintenance and stability of the unstable uplands in Timor-Leste. The replacement of multi-species natural forests with forest plantations may increase timber and fuelwood production. However, it negatively affects the access to non-timber forest products, and is detrimental to the diversity of wild animals and plants. It will be necessary to develop community-based reforestation programs in Timor-Leste. The programs will have multiple aims, such as restoration of mixed production forests for timber and non-timber forest products, creation of plantation forests for timber (teak, sandalwood, etc.), plantations for fuelwood production, and restoration of forest to protect steep watersheds, water sources, and social infrastructure including roads and irrigation systems. Moreover, reforestation would also provide additional sources of fuelwood, fodder, timber, and non-timber forest products and restore biodiversity.

Of the over 200,000 ha of forests in a degraded state, we recommend that the Project take up an area of 20,000 ha for direct seeding and 5,000 ha for establishment of plantations. The Project would provide technical assistance, and support in the procurement of seedlings and establishment of nurseries for raising the planting stock. As stated earlier, the exact design and the choice of species would depend on the agroclimatic conditions of the area.

#### ***b. Establishment of Permanent Forest Estate, Inventory and Forest Management***

The September 2005 draft of the Sector Investment Program (SIP) for Agriculture, Fisheries, and Forestry, states that forest management, watershed management, biodiversity conservation, or conservation of protected areas should not be undertaken in the absence of comprehensive information on the extent, type and condition of forest resources of the country. The SIP reiterates the need for production of fuelwood and timber from forest areas suitable for commercial forestry and conservation of forest areas for conservation and watershed protection. Moreover, ownership of forested land is often in dispute as it may be owned by State, by private individuals or communally owned. The SIP has further pointed to the likelihood of the largest proportion of forests being communally owned, and hence the need for clear definition of land tenure and a clear policy vis-à-vis the rights and responsibilities of local communities in forest management. In absence of such clarity of tenure rights, not only the definition of forest estate would be difficult, but it would constrain its classification into various management regimes, such as commercial forests, conservation forests for biodiversity conservation, protection forests for watershed protection, communal forests for community based management, etc.

A national forest inventory is required for establishment of a firm basis for management of various forest types and categories. The inventory would provide a comprehensive picture of the extent and condition of each forest type. This would be accomplished using the existing satellite imagery coupled with extensive ground truthing to establish the exact nature and magnitude of forests and establish a permanent forest estate in the country.

In the context of establishing a permanent estate, it would be important to address the policies and legislation pertaining to rights of ownership and tenure. Promulgation of appropriate policies and legislation pertaining to forested land and establishment of clear tenure arrangements would be a necessary requirement before any effort is made in undertaking a national forest inventory or initiation of appropriate forest management practices for various forest categories.

It would also be important to note that all activities regarding the national forest inventory and establishment and management of national forest estate would require an institution with adequate capacity to undertake the inventory, mapping, demarcation and delineation and development of management prescriptions for various categories of forests, and the application, enforcement and monitoring of various prescriptions.

The National Directorate of Coffee and Forestry (NDCF) has the overall responsibility for community forestry, watershed management, forest protection, plantation forestry, protected natural areas, and other aspects of forestry development. NDCF is expected to make a major contribution to combating deforestation and forest degradation by initiating, in close cooperation with other sections of the Ministry of Agriculture, Fisheries, and Forestry (MAFF), a series of integrated programs that will closely involve rural communities. As proposed in the FAO 2005 draft document, the goal of the forestry sector is “sustainable management of forest resources and watersheds to provide environmental, social and economic benefits to the people of Timor-Leste.” The policy objective is “effective protection of the ecological integrity and biological composition of not less than 70% of the area of forests by 2020 in order to facilitate sustainable forest management, the preservation and maintenance of their ecological, social and economic values especially for sustainable livelihoods and the economic development of communities, the reduction of poverty, and the benefit of the nation.” Given the fact that the department responsible for management of forests and delivery of policy objectives is rather thin, with only about 26

wardens in 13 districts, there would be a significant need for capacity building and training, not only at the national level but at the field level as well. During the period of transition until the institutional capacity is in a position to take up the challenges effectively, there would be a need for external technical assistance and on-the-job training. Therefore, institutional capacity building of the National Directorate of Forests and its field level offices must be an integral part of the exercise. In this context, the Project would provide technical support, materials, training and assistance in carrying out the fieldwork.

The estimated cost of ‘Other Interventions’ as described above is 4.74 million USD, including contingencies.

**The overall cost of the proposed forestry/agroforestry interventions as proposed is estimated as follows:**

- A. Agroforestry including community woodlots, and nurseries; (ii) shade-tree/coffee rejuvenation; and (iii) policy reform is estimated at 3.421 million USD; and**
- B. Other Interventions including Reforestation and Establishment of PFE, Inventory and Forest Management: 4.74 million USD (see Table B.3, below).**

**Table B.3: Physical Dimensions and Cost Estimates (Longer-Term Interventions)**

**AGROFORESTRY COMPONENT**  
Physical Dimensions and Cost Estimates  
**LONG-TERM INTERVENTIONS**

Intervention Model	Physical Targets (Outputs)			Cost Estimates	
	Units	Potential	Target	Cost/Unit (USD)	Total Cost (USD)
<b>Cost for establishment of Demonstration Plots, Extension, and Hand Tools</b>					
Reforestation of Degraded Forests through direct seeding		100,000	20,000	2/ 50	1,000,000
Reforestation of Degraded Forests through planting	Ha	100,000	5,000	2/ 200	1,000,000
<b>Sub-Total</b>					<b>2,000,000</b>
<b>Technical Support &amp; Assistance</b>					
<b>Reforestation of Degraded Forest</b>					
Technical Assistance (Short Term Experts)	PMs	NA	4	25,000	100,000
Technical Support (Long Term Experts)	PMs	NA	12	20,000	240,000
<b>Sub-Total</b>					<b>340,000</b>
<b>Establishment of Permanent Forest Estate, Inventory and Forest Management</b>					
Technical Assistance (Short Term Experts)	PMs	NA	12	25,000	300,000
Technical Support (Long Term Experts)	PMs	NA	24	20,000	480,000
Capacity Building					
Equipment & Materials	LS	NA	1	100,000	150,000
Training	LS	NA	1	100,000	130,000
Fieldwork	LS	NA	1	1,000,000	1,000,000
<b>Sub-Total</b>					<b>2,060,000</b>
Contingencies (10%)					340,000
<b>TOTAL COST (USD)</b>					<b>4,740,000</b>

## C. LIVESTOCK

The livestock sector in Timor-Leste is typical of subsistence and swidden farming areas of much of South and South East Asia. Animals form an integral part of the farm system, they live on crop and human by-products and provide in return a range of social and economic benefits depending on the species and local cropping patterns. The well-being of farm households depends on the performance of this farming system as a whole. It is a symbiotic, low risk, low input, low unit productivity system in which the success of one part is intrinsically connected to the others. Livestock are usually the most important source of cash but the social and prestige benefits to the farm family are also valued highly. Increasing numbers of large livestock increases manure and draft power, which in turn increases the potential for crop production. Increased crop production, in turn, increases production of crop by-products for livestock feed. Loss of large livestock reverses the process and greatly reduces the farmer's ability to make discretionary cash investments and withstand dry seasons. Although animal feeding is predominantly through scavenging, all classes of animals are sometimes hand fed when farmers feel such attention is warranted for immediate output. Some examples of this include hand feeding horses being used in transport or cattle held for slaughter. Farmers are aware of the technology of mixing high protein legumes and crop residue (stalks, etc.) for a more balanced diet and have adopted it under fattening programs in the Indonesian period and more recently under the USAID sponsored Café Coopertiva Timor (CCT) project.

Livestock numbers in Timor-Leste are reported to have dropped drastically in 1999 and have since recovered, although figures prior to 1999 are not available<sup>20</sup>. Table C.1 (below) shows a sharp increase in livestock numbers from 1999 to 2001. Some of this increase in officially reported numbers may be the result of animals being brought out of hiding. Growth has been at a slower pace since 2001, indicating the rapid recovery period for most livestock is over, though it apparently continues for goats. Adjusting these figures to large animal units, at five small ruminants to one large animal, indicates that grazing pressure is overwhelmingly from large ruminants with goats being more prominent in the low hills and plains.

**Table C.1: Estimated Population of Livestock in Timor-Leste**

		Beef Cattle	Dairy Cattle	Water Buffalo	Goats	Sheep	Horses	Pigs	Chickens	Broilers	Ducks
1999	Total	96,662	30	48,451	131,025	20,391	20,396	239,124	350,422	-	-
2001	Total	162,358	80	103,723	45,158	79,379	23,728	338,837	670,927	-	-
2004	Total	173,873	59	112,381	379,907	120,572	46,841	120,572	605,967	9,208	17,413

Source: Ministry of Agriculture, Forestry & Fisheries

<sup>20</sup> Livestock Development in East Timor (Timor-Leste), Cesar J. da Cruz in Agriculture: New directions for a new nation East Timor (Timor-Leste). Australian Centre for International Agricultural Research (ACIAR) proceedings No 113 Canberra 2003 pp 11- 16.

There is a perception that large ruminants are focused in the eastern districts and small stock in the farming areas in the centre and west. The data, however, suggest that over one third of large ruminants exist in two districts in the west, Bobonaro in the western uplands and Covalima in the south western plains. Natural grass lands are more prominent in the east, with almost half, (96,041 ha) out of the total of 206,227 ha located there. The southern coastal plain, including Covalima in the west, constitute an important and distinctive livestock area with significant potential for increased production from introduced legumes, or as irrigated farming develops. These natural pasture areas are good breeding areas for large ruminants while the more agricultural areas in the west and central districts are more suited to animal fattening through hand feeding of tethered animals. These same west and central uplands include substantial steep erosion-prone areas that would benefit from more planting of shrubs and trees in contours, which provide protein rich forage.

Small stock are bartered or sold in local markets while ruminants are more often handled by traveling traders who may travel as far away as Dili or through the West Timor border. Transaction costs with these traders are high. Credit for livestock is not utilized if available. Family lending or community exchange is the way most farmers obtain starter animals, with natural increase and favorable nutrition conditions the normal pathway to wealth in numbers.

Under the traditional low input, low risk, multipurpose farming system, existing in most of Timor-Leste, farmers do not specialize<sup>21</sup> to improve the productivity of part of the system if it jeopardizes other parts. For example, separating animals from the rest of the farm environment to improve disease control and enable hand feeding to produce fatter animals for sale actually increases risk to the system as a whole as the market for fat animals is uncertain in timing. Consequently, the benefit may not be obtained while other benefits, such as draft power may be reduced and all that is certain is that the workload increases. As implied, this risk-averse approach to farming affects most possible changes in farming practices.

Experience in West Timor and elsewhere in S.E. Asia, however, suggests that providing a reliable market for livestock is sufficient motive for specialization, perhaps because it builds on a strong motive to increase livestock numbers for social reasons. In these particular cases, it provides additional benefits to the system as a whole. In West Timor the specialization included the introduction of high protein *Leucaena Spp.* and other leguminous deep rooted shrubs and trees into the fallow or along contours, originally to provide weed and erosion control and mulch or ash for crops with cattle feed being a byproduct. The system grew slowly until the Government introduced a cattle fattening contract system in the 1970's after which it grew rapidly and resulted in a trebling of livestock exports, substantial improvements in crop yields and very substantially reduced erosion<sup>22</sup>.

These plants protect soils against erosion, enable terraces to form and also enrich the soil with nutrients transferred from the subsoil by their deep roots and through nitrogen fixation. Although significant areas of leguminous shrubs and trees now exist in Timor-Leste, outside of projects, few hedgerows have been established, and even fewer have been linked to livestock fattening. The necessary market does not exist and the technology has not yet been successfully transferred. For successful transfer, farmers need to see substantial benefit from planting and using the hedgerow plants, and this requires time. This was achieved in West Timor through strict regulation by local traditional community leaders with clear authority; in Timor-Leste this will

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<sup>21</sup> There are specialized livestock producers, particularly involved in cattle breeding in grass lands and buffaloes kept for puddling rice but these are low input and have evolved to support the farm system rather than constituting new industries.

<sup>22</sup> A good discussion of the prospects for this appears in "The role of *Leucaena* in swidden cropping and livestock production in Nusa Tenggara Timur Province Indonesia. Colin Piggin in Agriculture: New directions for a new nation East Timor(Timor Leste) Australian Centre for International Agricultural Research (ACIAR) proceedings No 113 Canberra 2003 pp-115- 129.

need to occur by supporting farmers during the hedgerow legume introduction phase and while the markets are being demonstrated. Helping to ensure that farmers have secure rights to use the hedgerow-improved land would also provide additional incentive to invest in such a change in farming practice that promises far reaching impacts on productivity, income and land protection.

“Demonstrating the market” will mean showing that animals produced (fattened) according to proven standards suited to the market will be purchased at a premium, and proving to entrepreneurs and financiers that those animals can be produced on a scale sufficient to warrant continuing the trade on a commercial basis<sup>23</sup>. Timor-Leste has a comparative advantage in small and large ruminant livestock production in S.E. Asia, due to its low population density and extensive grass lands. Small-scale exports have probably always taken place, including destinations as distant as Hong Kong and Maçao, and still occur on a small scale across the border to West Timor. But these have never been large or regular enough to stimulate specialization. Furthermore, trade links have recently been disrupted. A significant ‘export’ market exists between West Timor and Java based to a significant extent on animals fattened under a contract cattle fattening system, discussed above, that clearly is also possible for Timor-Leste.

Investing to build exports through West Timor is justified in the short-term, until turnover warrants direct shipping elsewhere. However, as there are national boundaries to traverse in order to access this market, it may be necessary to demonstrate the trade to other terminal markets such as Manila or West Malaysia. Showing the main Java and rest-of-Indonesia export market that Timor-Leste has other export alternatives will likely improve access and net returns from the Indonesian market while retaining options for expansion. Initially, it is likely that the cattle exporter will need to finance selected farmers into cattle fattening, as CCT is doing at present but, over time, credit for farmers to purchase their own livestock for fattening will become an important input. In the meantime but credit suppliers and farmers alike will require time to gain experience handling livestock credit.

Export quality livestock are most reliably produced by hand feeding. The key development step is to help farmers understand that the fodder from leguminous hedgerows can profitably be fed to livestock and that the hedgerows combined with additional manure from the livestock can improve crop yields. This typically takes many years, but the process could be very significantly advanced during a five-year project, building as we could on the CCT efforts of the last two years.

Hand feeding of goats for fattening could also have a double positive effect on farm family income. Free-ranging goats are a significant grazing burden on crops and trees in low hill and plains areas. Enclosing them or restricting their movement as part of a hand feeding system would reduce their destructive impact and, with an established premium market for fattened goats, farmers would derive greater income from restraining them from free grazing for much of the time. Establishing a market to warrant hand feeding may require the provision of a small, portable and demountable abattoir, if live exports on a significant scale are shown to involve unacceptable losses.

There is little potential to establish export markets for pigs or chickens as a comparative advantage for these does not exist and, in the case of chickens, avian flu is making this market very unpredictable. Urban centers in Timor-Leste will, however, provide ever greater demand for pig and chicken meat and for milk from specialized cattle, goats and buffaloes as incomes rise. If farmers can be shown that feeds utilizing leguminous shrubs as an important ingredient are effective in preparing pigs and chickens for urban markets, it will provide an incentive to plant legume hedgerows in more places. Rabbits are another animal that might provide good income from legumes as they are the most efficient converter of all farm animals of cellulose to useful products, something Chinese farmers have known for a long time.

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<sup>23</sup> Cafe Cooperativa Timor (CCT) has begun this process with support from USAID in 2005.

Animal health risks increase with more intensive production, and activities to contract fatten animals will require more attention to both epidemic and endemic disease. The Government, with the support of the Agricultural Rehabilitation Project (ARP I, II and III) has improved animal health services for all animals, which includes free vaccine for the killing diseases of Hemorrhagic Septicemia, Hog Cholera and Newcastle disease and a system of livestock officers who can provide vaccines, treatments and advice for chronic disease for a fee. These services are apparent in village areas but further incentives in the form of contracts for service would improve effectiveness both income generation through fattening and food security through small stock production.

## **1. RECOMMENDATION #7: SUPPORT TO LIVESTOCK MARKETING**

### ***a. Description***

Developing and demonstrating a market for hand fed animals is the best way to induce a fundamental and critically-needed move away from shifting cultivation to intensification of the farming system. Using hedgerow legumes as feed will immediately improve food security and incomes of farm families. In the longer term it will reduce soil erosion and improve the quality of farm land enabling it to be cultivated under a more intensive system. Successful alley cropping in other regions will result when the income from more intensively raised animals, fed on high protein fodder from hedgerows, is seen to far exceed the costs associated with this system as compared to shifting cultivation.

The immediate objective of this activity is to establish in the mind of farmers, entrepreneurs and financiers that a consistent, good and reliable market exists for cattle, buffalo, goats and sheep of export weight, or in the case of goats and sheep, perhaps frozen meat and offal.

The strategy is to provide inputs to offset the risk of innovation and reduce entry costs of entrepreneur, and to prove to all participants in the market that there is profit to be made in the short and long-term.

The elements of a program to achieve this include:

- Technical assistance for entrepreneurial company or enterprise to set up and finance a contract livestock fattening and marketing system operating in each area of the project;
- Technical assistance in South East Asian livestock fattening and marketing systems to support the enterprise and work with donors and financiers;
- Technical assistance to facilitate linkages between the entrepreneur and the provision of animal health, vaccine and quarantine and immigration and other official services,
- Material assistance to produce animal feed for shipment;
- Accurate cost accounting and evaluation of market options including goat and sheep meat;
- Close cooperation with finance providers to facilitate the introduction of direct livestock credit if possible before the end of the five-year program period.

The steps required include:

- Advertising the program, including the inputs USAID is prepared to provide and outputs expected from the entrepreneur;
- Calling a tender for interested and qualified livestock exporters. Qualified institutions would include existing businesses with assets and experience in trade and logistics that are prepared to commit resources (not excluding CCT or other donor supported enterprises);
- Accessing and developing an area on which to assemble livestock and produce hay;
- Arranging and documenting cattle fattening contracts including access to finance;

- Buying, assembling and delivering cattle<sup>24</sup> at 150- 200 kg for fattening<sup>25</sup>;
- Taking delivery and marketing livestock live to Java by sea to Surabaya and truck to Jakarta (or Manila if official or other problems emerge in either of the preferred markets).

The inputs to be provided by USAID would include;

- Full time technical assistance and transport for 3.5 years, short-term veterinary and nutrition technical assistance for one year in 4 trips;
- Study tours to West Timor and Java for enterprise staff and officials;
- Ship charter Dili – Java (or Manila or West Malaysia), two trips for 200- 500 head and goats, assistance would take the form of a prepayment for the charter or freight secured by a lien on livestock proceeds;
- Equipment and seeds to establish hay fields for animal feed in quarantine and by sea to markets;
- A revolving fund (or access to SME finance) of 50,000 USD in year 3 rising to 250,000 USD in year 5.

### ***b. Linkages***

This subcomponent is linked to the Livestock Nutrition subcomponent through the cooperating livestock exporter by providing animals and a contract to buy them at a minimum weight to farmers who plant fodder shrubs and trees on contour. Access to livestock and the contract to fatten them will serve as the incentive for farmers to invest in planting and tending legumes for feed. The benefit to the livestock merchant from reinforcing this linkage is its impact on the regular supply of livestock for sale. The enterprise would need to retain the right to procure animals elsewhere and would have discretion on which farmers they would contract to minimize their risk of losing their animals.

The subcomponent would maintain links with the Government animal health services, both through the cooperating livestock exporter and through the Integrated Systems Farming component's village technical service.

The subcomponent would maintain links with sources of finance who may wish to investigate livestock credit to facilitate its introduction when possible.

### ***c. Implementation arrangements***

The sub component would be managed separately from the Livestock Nutrition subcomponent to emphasize the commercial and arms length nature of the enterprise. To ensure effective implementation, a managing agent with staff experienced in livestock trading in S.E Asia is recommended. This activity is designed to be implemented over a five-year pilot period to ensure a long enough demonstration period, after which time it would become an unsubsidized activity of the entrepreneur merchant with which the project had been working. At the end of the third year, we recommend a project review to determine what is working and what needs to be strengthened. If, for example the live export of goat and sheep meat is problematic, which is a

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<sup>24</sup> Supplies of feeder cattle may be limited at this stage as restocking is still occurring following 1999, this might be assisted by providing vaccinations for reproductive diseases such as Brucellosis and by experiments to introduce legumes able to survive in open grass lands such as Siratro and Stylothansis.

<sup>25</sup> Consideration might be given to importing 9 month old steers from the Northern Territory of Australia for this purpose if local supplies are insufficient; fat animals from this source now enter the terminal markets in Manila, so the cost basis may be acceptable.

possibility; we recommend an assessment of the feasibility of providing a small stock abattoir to prepare goat and sheep meat for export. Goat meat enjoys a fast growing market internationally.

All parties to the project, including management of the Livestock Nutrition component, USAID and other stakeholders, should have annual operational planning meetings in which participants review progress during the year, establish targets for the upcoming year, and determine if there are elements of the activity that need to be restructured or new elements to be added to strengthen the activity. It is critical that an activity like this have good records of the costs and benefits as well as the management challenges.

**d. Timeframe**

The promotion, advertising and contractual arrangements would be completed in year one, arranging contracts with farmers for fattening feeder stock procurement would be undertaken in year 2, exports in year 3 and scaled up over the following two years (see Table C.2, below).

**Table C.2: Livestock Marketing Subcomponent Schedule**

Activity	Year 1	Year 2	Year 3	Year 4	Year 5
Inception, promotion, contractual phase	-----				
Fattening contracts, initial feeder procurement		-----			
Initial export marketing trials			-----		
Midterm review and increasing turnover				-----	
Increase turnover & possible small stock abattoir					-----

**e. Costs and benefits of the investment**

*Costs.* Possible subcomponent costs are estimated in Table C.3 (next page). They only include USAID grant contributions, not in-kind contributions of farmers or the in-kind and cash inputs by the cooperating livestock exporter.

Estimated costs for this component are 3.4 million USD over five years.

**Table C.3: Cost Estimates for Livestock Marketing Subcomponent**

	Year 1	Year 2	Year 3	Year 4	Year 5
Equipment and seeds for a hay meadow; tractor, plough, hay baler trailer, 2 4x4 pickups, seeds and fertilizer	300,000	100,000			
Net Subsidy for Ship Hire	0	0	50,000	50,000	50,000
Long-term technical assistance 3.5 years (gap between year 4 and 5)	150,000	300,000	300,000	150,000	150,000
Long-term domestic technical assistance (FNS 9)	10,500	10,500	10,500	10,500	10,500
Short-term technical assistance	40,500	40,500	40,500	40,500	40,500
Study tours	30,000	30,000	30,000	30,000	30,000
Revolving fund (or access to SME credit to livestock merchant) increments	0	0	50,000	100,000	100,000
Operating costs for vehicles and tractor etc	25,000	25,000	25,000	25,000	25,000
Small stock abattoir (if warranted)	0	0	0	1,000,000	0
Totals	3,380,000	556,000	506,000	506,000	1,406,000

*Benefits.* Participating farm families will benefit in two very important ways from this activity. Their incomes will increase in the near term from payment for the animals they fatten in the year following successful establishment of hedgerows (year 3 of the project), and in the longer term they will benefit from increases in crop yields due in part to additional manure and mulch. This will facilitate increased investment in items such as education and housing. It also improves food security (reducing household risk) and the nutrition of the family.

Livestock fattening contracts beginning in year two would extend over 4-6 months of each year in which approximately 100 kgs of live weight would be put on at about 1.00 USD per kilo. This weight gain would be shared 85% by the farmer and 15% by the cooperating livestock exporter providing the cattle and contract (modeled on the Indonesian paron system already understood in some districts). Participating households would also, on average improve crop yields by about 5-10% per annum due to a range of reasons including manure and mulch. This rate of increase would continue from its present low base for at least as long as they continue to feed and fatten their livestock.

The benefits to the cooperating livestock exporter derive from greatly increased turnover and higher average weights improving both gross income and margins. The benefits include a more predictable business. Currently, the trade is dominated by small traders with low turnover (30-50 per shipment each of animals averaging 250 – 300 kg). Success on the part of the cooperating livestock exporter will enable turnoff in shipments of 200- 500 animals at the much more profitable weight of 300-350 kg. This will earn a premium from abattoirs as the meat yields of local cattle and buffaloes are considered optimal at about 350kg (or 400 kg for buffaloes). Benefits to the economy as a whole will come from increased total exports, from a present low figure estimated not to exceed 1,000 head to many thousands at higher weights, perhaps growing

at 10%- 20% per annum, and leveling off after 10 years to a 5%-10% increase per annum in live weight. Goat weights would start at 20 kg and finish at 35 kg in 2-3 months.

The package for cattle fattening per complying farmer would be 1 large ruminant or 4 or five goats. The objective would be to have 200 cattle under contract in year 3, 400 in year 4 and 800 in year 5.

Goat fattening targets would be 500 goats in year 3, 1500 goats in year 4 and 3,000 goats in year 5.

The guiding principles in setting targets would be capacity of the personnel and farmers involved and the numbers that would fill a ship for marketing trials.

## **2. RECOMMENDATION # 8: IMPROVING LIVESTOCK NUTRITION**

### ***a. Description***

The immediate objective of this proposed activity is to improve farm household food security by providing farmers with the means to produce additional high protein animal feed for ruminant livestock fattening. This has the twin benefit of increasing income in the short run and supporting sustainable intensive agriculture over the longer term.

An initial project input is necessary in order to help farmers start this virtuous cycle of growing and maintaining contoured hedgerows, feeding the fodder from the hedgerows, tying up the animals to fatten them, and selling the fattened livestock for a premium over un-fattened livestock. This involves providing seedlings and seeds and providing incentives for farmers to plant high protein shrubs and trees on a contour cash income and other benefits that come with fattening livestock in this environment.

The strategy upon which this activity is based is to provide a linking set of incentives for each participant that will ensure that each will undertake the expected activities pending demonstration of the system benefits to all.

There are two aspects of this component:

i) First, there is a nursery activity, covered under the Agroforestry component, which will provide seedlings. Seedling production through nurseries is a known technology in most districts of Timor-Leste but support would be needed to induce nursery operators to produce seedlings best suited to project purposes – animal feeding soil enrichment and erosion control. The most important project support for this part of the activity will be the initial contract from the project to buy seedlings from nursery operators for distribution to farmers. The continuation of supply contracts to any nurseries will be determined by the extent to which farmers are able to successfully establish the trees they receive from the nursery. By making further orders of seedlings conditioned on farmer success, nursery operators should have a powerful incentive to engage in technology extension to farmers, which should help ensure successful establishment of the fodder-producing contour hedgerows we are recommending.

ii) Second, we recommend an activity that facilitates farmer planting of leguminous shrubs and trees suitable for livestock feed in hedgerows or in fallow flat lands. The budget for this is also included in the Agroforestry component, which will focus on establishing contours for a range of purposes and will supply the technical expertise to make the necessary land use decisions and provide advice to farmers. Planting leguminous shrubs and trees on a contour to fatten livestock for sale requires significant additional effort, persistence and some new skills on the part of farmers. Farmers now have some idea of feeding cattle but will need technical assistance in a host of areas including ration formulation and cost-benefit analysis. Farmers, who are generally conservative, will need encouragement and demonstration of a clear price incentive if they are to

persist until the system benefits and cash income are shown to be reliable and the technology can be considered to have been transferred. Since animal health is a serious risk in such an undertaking, it will be important to ensure access to necessary health services, possibly under contract.

The elements of this recommended activity include:

- Facilitating linkages between cattle buyers and farmers interested in participating in planting high protein shrubs for feeding to livestock;
- Ensuring access of participating farmers to animal health facilities;
- Study tours for officials and farmers to see intensive use of *Leucaena* in West Timor and Flores so they can appreciate the potential system benefits from the perspective of farmers in a similar environment;
- Support for farmer trials to demonstrate the technology for intensive use of the forage (or mulch) in hedgerows in steep country to inhibit erosion and in alleys or otherwise in flat area;
- Support for farmer trials to develop high protein forage based rations for beef, milk, and small stock production in relevant areas.

USAID inputs can include:

- Short-term assistance to farmers in animal husbandry related to ration formulation and animal husbandry for all species including chickens and pigs and where relevant milking buffalo, cattle, and goats and other experimental stock such as rabbits, pigeons ducks etc; 15 months in 10 trips over 5 years with the initial input in year one;
- Long-term local technical assistance in animal husbandry to help village technicians set up demonstration plots, ensure legume distribution and manage planting activities in coordination with the Marketing subcomponent to suit commercial success as well as land suitability;
- Funding to support feeding demonstrations for small stock and imports such as rabbits and milking animals based on crossing imported breeds with local goats;
- Funding to support study tours to relevant nearby areas including Amarasi, Flores and Java in Indonesia.

### ***b. Linkages***

This subcomponent is tightly integrated with the Agroforestry component. It will rely heavily on the Agroforestry component for obtaining the right types of seedlings and for explaining to farmers the value and approach to establishing leguminous shrubs and trees on contours. An important part of this preparation - discussed in greater detail in the Agroforestry section - will be the establishment of land use rights for farmers who invest in hedgerow development. These land use rights should be taken at least to the level where the village head and community have acknowledged, in writing, in the operational plan that the farmer has undisputed rights to use the land on which he will be making the labor intensive investments that are part of this activity.

This subcomponent is also integrally linked with the livestock marketing subcomponent, which will be the source of cattle for fattening and the contracts under which fattening will be done. The subcomponent is also closely linked to the Integrated Farming Systems Component, which will provide the village technicians to demonstrate the benefits of this system and who will ensure the necessary contact with animal health services and livestock buyers.

### ***c. Implementation arrangements***

This subcomponent will form an integrated technology package, along with the Integrated Farming Systems component and the Agroforestry component. The technical assistance and other inputs proposed under this component will be provided, for the most part, within the framework of the Integrated Farming Systems village technical services. Specialist technical assistance will

be necessary to provide an animal production focus to training under the integrated farming systems component so farmers can produce animals fat enough to be saleable in export markets.

**d. Timeframe**

The time frame of this component is linked to the need to undertake social preparation and the need to provide feed for animals to be produced for livestock marketing activities (see Table C.4, below).

**Table C.4: Livestock Nutrition Subcomponent Schedule**

Activity	Year 1	Year 2	Year 3	Year 4	Year 5
Inception, promotion and nursery contractual phase	-----				
Planting initial livestock fattening areas		-----			
Initial livestock fattening activities, cattle and goats			-----		
Replication and increase in other areas				-----	-----

**e. Costs and benefits of the investment**

*Costs.* Project costs relate to strengthening the livestock husbandry focus and capacity of village technicians to be provided through the recommended Integrated Farming Systems activity. A rapid transfer of technology will ensure that farmers can plant their leguminous shrubs in time for cattle to be contracted fattened and sold starting in the third year, by which time farmers will have received training in and demonstration of good feeding habits and appropriate rations for a range of animals and situations. They will also have had a chance to secure links with animal health and vaccination services.

We expect the costs of this activity to be approximately 600,000 USD for five years (see Table C.5, below).

**Table C.5: Cost Estimates For Livestock Marketing Subcomponent**

	Year 1	Year 2	Year 3	Year 4	Year 5
Short-term international technical assistance in animal husbandry, nutrition and health 15 months in 10 trips over 5 years	40,500	40,500	40,500	40,500	40,500
Long-term local technical assistance (SN9)	10,500	10,500	10,500	10,500	10,500
Equipment scales, feed mixing 2x 4x4 pickup, ingredients, exotic animals for cross breeding trials	16,000	30,000	16,000	25,000	25,000
Study tours	30,000	30,000	30,000	30,000	30,000
Operating costs 2x4x4 communications	16,000	16,000	16,000	16,000	16,000
Totals	597,000	113,000	127,000	113,000	122,000

*Benefits.* Participating farm families will benefit in three very important ways from this activity. First, they will have a secure source of nutritious animal feed that does not compete with farm fields for human food. Second, they will have more and better quality feed for small stock such as chickens and pigs, which will add to their wealth, cash income, savings and protein supply, currently a major gap in farm household food nutrition. Thirdly, there is likely to be a community and social benefit from evening out the distribution of cattle. Farmers who would not otherwise have had the credit to purchase cattle are likely to be able to buy them because of the contract fattening. In Amarasi in West Timor, it was estimated that in 1949 there were 500 cattle, owned by less than 1% of the population. By 1974, 13,000 head were owned by 100% of the population (quoted in Piggan ACIAR 2003 pp 119). This was directly attributed to the existence of the cattle fattening contracts available to any farmers who grew sufficient feed, irrespective of capital resources.

Production varies with rainfall and soil type, but experience in West Timor (quoted in Piggan ACIAR 2003 pp119) indicates that farmers are able to produce enough highly nutritious feed to fatten three Bali cattle from 1- 1.3 ha of Leucaena or equivalent, and that another 0.6 to 1 ha is used for cropping at system maturity. For this farmers need to be able to cut 15-20 kg per (30-40% Dry Matter (DM)) per head, of about 30- 40 % legume, in order to gain about 0.5 to 0.7 kg live weight per day average increase. That is, farmers feeding 3 head are able to cut about 100 kg per day of feed from 1 ha of 100% leucaena at maturity. Leucaena grown in hedgerows carry about half this number with a significant variation in production between the wet season at 25- 30 kgs of leaf per day, and the end of the dry season, 1-1.5 kg per day. Weight gains of above 1 kg per day are possible with sufficient good feed and water but 0.7 kg is a fair figure for budgeting.

**Table C.7: Livestock Sub Components- Benefits and Beneficiaries**

	Area ***	Carrying capacity in year 3 after planting	Liveweight sales Year 3	Liveweight sales Year 4	Liveweight sales Year 5
	Ha	Head	\$	\$	\$
From Agro forestry targets					
Hedgerows alley cropping and contour hedgerows 20% of each ha is legume contour *	1,000	3,000	101,745	203,490	305,235
Silvopastoral agroforestry (20% of each Ha)	500	1,500	50,873	101,745	152,618
Wind breaks and shelterbelts (5 km /1 Ha)	40	120	4,070	8,140	12,209
Live fences-border plantations (5 km /1 Ha)	200	600	20,349	40,698	61,047
Home gardens * (5 km /1 Ha) assumed to be all goats	2,000	30,000	114,750	229,500	344,250
Sub totals (year 5 is full production per ha and continues	3,740		291,786	583,573	875,359
Benefits to Cooperating Livestock Exporter ****			401,635	803,271	1,204,906
<b>Notes:</b>					
* Farm yield increases over 80% of Agroforestry target areas, see integrated Farming System Component					
** Weight gain of 126 kg per head of cattle and is shared 15% to Livestock exporter 85% to farmer, losses 5%, (10% for goats), assumes all legumes attract cattle fattening contracts of 1 head per ha in year (5 goats) 1 rising to 3 (15 goats) in year 3 of legume establishment and that 25% of target hedgerows are established in each year from year 2. Goats gain 15kg Liveweight in three, three month cycles, at 5 per ha in year 1 rising to 15 per ha in year three of legume					
*** Area in ha planted equates to farm family beneficiaries					
**** Benefits to livestock exporter include price increase per kg of 20% FOB for animals exceeding 300kg					
<b>Risks:</b> i) that this number of feeder cattle at 220 kg each is not available, ii) that hedgerow planting is not successful in all areas planted, iii) that vaccination for epidemic disease is not effective					

## D. HORTICULTURE AND MARKETS

The “scorched earth” policy of the withdrawing Indonesian army and militia in 1999 resulted in extensive damage to the domestic food market infrastructure and the exodus of the Indonesian trading community that linked farmers to domestic and foreign markets. With this vacuum came the complete breakdown of the Indonesian-style organized marketing system. While not perfect, the old system did effectively link the producing countryside to markets. In order to return to such a market and improve upon it, sustained and practical assistance is needed. Ideally, the assistance will help support the emergence of an agricultural marketing system for rural-based food and other commodities run by Timorese.

In order to re-establish food markets in Timor-Leste we recommend that USAID support an inter-related set of marketing interventions to accelerate the formation of a uniquely Timorese style of agricultural marketing systems for a wide range of vegetable, fruit, meat, wood, feed/fodder, spice and related commodities. In other words, conceptualize, plan, and implement a catalytic marketing program for marketplace transformation, rural presence of traders, cold chain formation for high-end products, and access to appropriate technology information. This market-led vegetable and fruit strategy could be replicated in other sectors as it is built on participatory involvement of stakeholders, mentoring training of new traders, "software" approach to marketplace transformation, and technology transfer from basic to advanced levels.

Our recommendations include:

- Transformation of wholesale and retail marketplaces in main urban areas through the "software" approach to market facility development;
- Establishment and expansion of a rural network of private sector sponsored, periodic markets;
- Formation of a cold chain, initially servicing the domestic market before being linked to export market opportunities;
- Establishment of an Agricultural and Related Technology Information Services Center (ARTISC) as cross cutting source of critical and timely information, especially for the community of international volunteers, such as Peace Corps Volunteers, and government personnel.

To achieve these objectives the proposed activities will need to:

- 1) Stimulate and guide a market-led transition from subsistence agriculture with occasional sales of surplus vegetables from gardens to small scale commercial cultivation of vegetables on small plots as part of an integrated farming system, and as an alternative to small scale, coffee-based upland agriculture.
- 2) Transform the present chaotic marketing situation through tangible improvements to retail marketplace locations, low-cost and low-maintenance facilities, trained and skilled management staff, and an array of basic services needed by traders and consumers.
- 3) Facilitate and guide the gradual emergence of a dynamic set of rural traders as operating in periodic markets for the full range of local farm commodities.
- 4) Underwrite an accelerated formation of a sustainable domestic cold chain for fresh foods and promote its linkage to foreign buyers in the import cold chains of Australia, Indonesia, and Singapore.
- 5) Establish, expand, and refine the full set of timely, technology information services to the agribusiness entrepreneurs, academic staff, graduate students, public officials, international volunteer corps, NGOs, and other professionals.

## **1. RECOMMENDATION #9: ORGANIZE, MANAGE, MONITOR AND GRADUALLY EXPAND A NETWORK OF PERIODIC RURAL ASSEMBLY MARKETS**

### *a. Description*

Based on interviews with staff members from UNDP, FAO, donors, and international NGOs, as well as written reports, the principal problem for farmers is the absence of rural buyers to whom farmers could regularly sell their products.

One indicator of this problem is the proliferation of vegetable and fruit stands along the mountain roads leading to urban areas. Lack of a market has discouraged farmers from planting surpluses of food crops, sharply reduced access to alternative forms of cash income and encouraged farmers to increase the cutting and sale of fuelwood along roads.

The absence of buyers in rural areas, price uncertainty resulting from non-standard units of measurement (i.e., "bundle, pile, or unit") mixed price/commodity signals sent from chaotic retail markets, high transportation costs, and deteriorating mountain road conditions are contributing to market failures and an inability of markets to coordinate production and distribution. Since each farmer tends to produce such small volumes and transportation costs are high, there is little incentive to grow additional surpluses.

One medium scale trader explained that whenever he tried to send his truck to buy from farmers in the rural areas, the farmers had no idea he was coming and thus rarely had commodities ready to sell. He stated that if he could find a way to alert farmers of his arrivals, he would send his truck more frequently.

Thus, there seems to be a clear role for setting up organized, weekly, periodic markets, which would make the market, bringing traders (with trucks and money) and farmers (with surplus production) together on pre-arranged days and times at accessible open spaces. This is a common practice in interior locations of several South East Asian countries.

The objective of this recommendation is to help establish rural or small town assembly places and to arrange for traders with trucks and farmers with various commodities to meet during early morning hours before the heat of the day to buy, sell and transport a full range of commodities.

The presence of a dynamic and well-positioned rural marketing network stimulates local production in response to market opportunities. Whenever farmers are aware of accessible market outlets or the impending presence of buyers, they generate surpluses in order to earn extra cash income.

So far, the sites and structures of rehabilitated rural market facilities have had retailing of consumer goods in mind. These markets have not been rehabilitated with rural assembly of small amounts of produce from large numbers of farmers in mind. That is the missing link for the rural market.

The main steps for this intervention include:

- Consultations with a representative number of active traders regarding priority sites, season and site expectations as well as agreements to arrive with their trucks, adequate cash to buy goods, and intention to buy a wide range of local commodities;
- Negotiations with local communities or individuals on the details of site selection, payments to compensate the land owner/user for site use, and any costs associated with site clean-up or maintenance;
- Vigorous local information campaign to inform local agricultural NGOs or cooperatives and about the availability of this service, and consultations regarding the types of commodities which are best to supply;
- A two to three-person coordination team, to monitor all activities and settle disputes or misunderstandings during trading hours. Otherwise, this set of activities would be treated as a private sector initiative with minimum interference.

The main participants in this activity are the project set-up team, traders from the outside trading community, local officials, and as many local farmers as possible. Members of NGOs and cooperatives that are active within the area under consideration should also be invited to observe and/or assist their growers to bring commodities to this market day.

### ***b) Linkages***

The improved performance of rural assembly markets will help ensure the success of each of the other recommended activities in this paper. The buying and selling of surpluses, as grown by local farmers, in periodic markets will be highly location and season specific. The initial site preferences of the participating traders will determine what commodities are most likely to be bought from local farmers.

As farmers find markets for their horticultural products, they are likely to make the investments anticipated in the Agroforestry section. Those investments benefits will impact on vegetable and fruit tree production/harvesting in the highland, especially those related to degradation of mountain roads through which ever increasing volumes of horticultural commodities will be shipped to domestic and, later, foreign markets.

The emergence of a strong livestock sector in the highlands provides a high quality source of fertilizer for horticultural crops. Livestock can be fed horticultural by-products, such as cabbage leaves and tops of various plants, and fodder scrubs required to create additional living fences to keep them from the vegetable plots. Likewise, the improved performance of urban retail marketplaces that sell fresh foods should encourage higher consumption of safe meat products.

The food crops program is closely inter-related to the horticultural sector when promoting home gardens and household fruit trees as both a source of nutrition for the family and as source of cash from surpluses. Likewise, certain legumes in rotation with vegetable crops would improve soil quality and productivity of vegetables.

An efficient and effective market network of rural periodic markets would not only facilitate the assembly of vegetables and fruits, but also provide an opportunity for farmers to sell seasonal excesses of food crops in one season and purchase either imports or surpluses from other locations during local deficit periods.

### ***c. Implementation Arrangements***

The implementation team will need to do considerable background information collection, and analysis. It will have to discover former old members of the agricultural trading community, identify several active current traders, and determine how to provide incentives and motivation for the emergence of a new class of promising young traders.

The Baucau area is reputed nationally for its entrepreneurial spirit. One indicator is the number of roadside stands in which a wide array of tree seedlings and other commodities for sale to those driving in that area.

The basic approach to this intervention involves:

- Determine and evaluate alternative ways to establish the periodic markets through interactions with a traders, site related local officials and/or land owners, and farmer communities, including NGOs or others active within the selected areas;
- Select a cadre of traders and then form and evaluate a list of promising prospective sites as located to the East, South and West of Dili, before prioritizing and deciding on the first 3 sites;
- Establish the pilot sites and begin weekly marketing activities.

Project management will assign one of the team members the additional responsibility of maintaining a daily Process Documentation Record, which will allow the Team Leader to refine and modify the site establishment techniques through the documentation of problems and successes. Then, with each subsequent activity, the team will improve the way they set-up periodic markets.

*Evaluate merits and benefits/costs of Periodic Market Approach.*

1) From a *demand perspective*, conduct consultative discussions with as many individual traders/truck operators as possible within the Dili area regarding:

- pitfalls and merits of setting-up specific times and places in which to buy and sell from farmers in rural areas;
- listing and ranking of promising crops and other commodities;
- listing and ranking of suitable locations (Delphi approach);
- suggested types of collaboration/cooperation needed from the traders and farmers;
- expectations from their active participation;
- practical suggestions on how to organize and manage such as arrangement.

2) From a *supply perspective*, develop a site selection checklist and relate it to the initial listing of preferred locations, and then canvas those locations in order to prioritize sites where growers are most likely and interested to generate surpluses for sale. The canvassing would involve meeting with community leaders, local agribusinesses and respected farmers to explore the merits of this type of market intervention from their perspective. Key questions to answer would include the types of commodities available, most preferred times, 3 - 4 potential open spaces in area, access to the road even in adverse weather, potential costs associated with such as site, and expected types and sources of local support;

*Plan/Schedule the implementation*

3) Select 2 – 4 locations which can be reached on sequential days *per loop*, thus if a truck is only partially loaded at one site with less perishable goods, it can proceed to the next site on the following day to top-off the load and return to Dili without wasting fuel returning with only a partial load;

4) Design system, confirm roles, confirm presence of promising crops per target locations, and prepare to trial test for the first two months of periodic market site visits. These need to occur during the anticipated harvest periods of the key crops within each location. In other words, the periodic marketing team will complete this planning and preparation process several *months* in advance of the first round, so that the farmers may have adequate time to prepare, harvest or collect the anticipated surpluses;

5) Conduct an awareness dissemination campaign within those areas in order to inform as many farmers as possible of this anticipated periodic market strategy; and

6) Prepare the physical sites/fields in terms of mowing weeds, graveling potholes, and otherwise insuring easy access and users' rights to that space during the proper timing.

*Trial Test:*

7) Prepare and accompany the marketing facilitation team who will conduct the initial rounds and evaluate any necessary modifications or improvements; and

8) Continue to monitor progress, and if successful, begin the preparations of the next set of sites, especially thinking in strategic terms relative to the major pivotal markets.

*Manpower*

The planning consultations and information gathering activities for the formation of the rural periodic market network will require a unique form of marketing team composition. Given

limited background, training, and experience in Timor-Leste with marketing system development, an expatriate agricultural marketing systems specialist would initially lead the team.

His/her responsibilities will include the tutoring of his counterpart(s), especially regarding the "why" for each type of activity and interpretation of local situations. Likewise, this person will provide the hands-on training of 3 periodic marketing staff. Consultations with and inclusion of a young trader on the team will provide the link to the local trading community and practical points regarding "who is who" with the trading community.

*The team could be composed of:*

(1) Team leader, an experienced expatriate agricultural marketing systems consultant whose role will diminish as Timorese counterparts gain experience, expertise and confidence;

(2) skilled local counterparts as apprentices who will later take over the leadership position;

(3-4) young men, especially one from each of the initial project sites, thus they should embody some insights into local language/dialect and trading customs; and

(2) younger traveling traders with previous experiences buying agricultural commodities from rural areas, as the source of practical ideas and alerts to likely pitfalls in dealing in the various locations.

#### ***d. Timeframe***

The planning, trial testing, and replication at additional sites within the network of periodic markets is gradual, season-based, and initially programmed for 3 - 4 phases. Many of the details will be dependent on the procurement requirements of the particular traders involved in the planning and implementation period for each phase.

For example, during phase one, if the traders' preferred requirements are harvested in June, then the initial pilot periodic market sites need to be fully functioning within that period. From initial information, one pilot site would be to the East of Dili (near Baucau), to the South (Aileu), and to the West (upland Liquica). With that geographical distribution, the team can begin to estimate an expected time frame, level of difficulty, types of incentives and support required, and performance expectations. In some cases, the sites would be established, in operation, and tested by late in this dry season or early wet season.

The exact month of local implementation depends on the local harvest periods for horticultural crops in those locations. The 2 – 3 subsequent phases would be referenced to the outcomes, interest generated, and demand for rural marketing services as expressed from other promising locations.

#### ***e. Costs and Benefits***

*Costs.* The bulk of the costs for these activities will be comprised of expatriate and local staff as well as substantial travel-related costs. Project staff will have to spend a substantial amount of time in the field identifying prospective traders, surplus areas, and locations to hold the periodic markets. The project team will have to expend a great deal of time developing working relationships with existing traders and advising and training trading techniques to younger ones.

Estimated costs over a three-year implementation are likely to be around 600,000 USD.

*Benefits.* The benefit of this activity will be in increasing the marketing options to farmers in the areas of project operation and improving returns to sales (since transactions costs for selling farm produce should drop). Improving the marketing networks will improve the price signaling to

farmers, which will provide them better guidance about which crops are more profitable to plant/harvest by season and location.

If this arrangement proves as beneficial to traders as anticipated, beyond reducing their search time and risk of not finding adequate commodities, more and more traders should arrive over time at a given periodic markets. The larger the number of buyer, the more competition and the higher the competitive buying price, especially when the additional amount will complete a given truck load.

The M&E activities for this activity will determine and document the pattern of participation within the initial sites. Likewise, it will be proposed that one team member be responsible for a formal "Process Documentation" procedure. In this way, the establishment of each successive site will be better than the former site.

For the first year, the number of beneficiary households will likely number in the hundreds. Once the network becomes firmly established and farmers and traders become confident in its durability, beneficiary numbers will increase to the thousands.

## **2. RECOMMENDATION # 10: IMPROVING MARKET ORGANIZATION IN URBAN AREAS**

### *a. Description*

With the withdrawal of Indonesian traders, urban Timor-Leste marketplaces have been left disorganized and in decay. This has resulted in a chaotic trading situation characterized by damaged, deteriorating, unhygienic, and poorly located retail market facilities, and the absence of marketplace management. These make marketing a high cost, high-risk exercise, especially for those involved in horticulture trade. High transaction costs in the markets means high costs to consumers and a more limited reach on the part of the traders into surplus production areas.

The main component of our domestic marketing strategy is the transformation of wholesale/retail marketplaces to provide rural buyers an efficient place to sell the products they collect.

In 2001, the World Bank's SEP II program commissioned the estimation of the costs to rehabilitate retail marketplaces throughout the country, including the four large retail marketplaces in Dili--Comoro, Becora, Taibisse, and Metinaro markets. In 2002, Mercado Lama Market, the central market during Indonesian occupation, was closed and converted into an Expo Center. Most traders were dispersed to the Comoro and Taibisse marketplaces, but kept returning to the Mercado Lama Market area. The conditions in which traders sell in the vicinity of the Mercado Lama Market are poor.

Agricultural marketing systems gradually emerge, expand or contract through a trial and error learning process by the growing trading community. For horticultural crops, the outcome is the emergence of an integrated, hierarchical marketing network, which sends daily production/harvest signals from wholesale markets to key production locations. The largest traders within the wholesale markets influence the coordination of supply with changing demand requirements as based on their long experience and skill.

Unfortunately, in Timor-Leste that process has been disrupted. Now is the time to begin practical, well-informed marketplace transformation activities in the main urban marketplaces. This will result in more transparent forms of demand, standard weights and measures, available price information, and lower marketing cost, which by ultimately reducing the costs of transactions, benefit consumers and growers.

The proposed interventions will facilitate the emergence of appropriately located, economically constructed and well-managed market infrastructure, consistent presence or access to rural assemblers and urban wholesalers, and all weather roads on which perishable goods can be safely transported. Given those pre-conditions for efficient and effective market performance, farmers throughout the country will be stimulated to increase the cultivation/harvest/sale of productive crops, tree products, and livestock in order to earn additional cash income and have a well balanced diet, especially from fresh vegetables and fruits.

The *marketplace transformation* strategy has two main components:

- Advise and work with urban authorities through an interagency committee to plan, implement, and manage the provision of food retailing marketplace services for all urban consumers, including near term marketplace projects within reach of concentrated populations;
- Combine the basic "software" skills and insights of this project with the SEP II "hardware" rehabilitation mandate, i.e., physical facility construction or rehabilitation, on a pilot basis for the transformation of the Taibesse marketplace.

These transformation efforts and activities will also contribute to the capacity-building goal of the relevant institutions, agencies, and university departments that we recommend should be directly involved in this effort.

Marketplace transformation and development requires that careful thought be given to the placement of marketplace infrastructure. It should be put where consumers can readily reach and where traders can reach and operate relatively easily. Deliberate consideration of the needs of traders and consumers rather than simply the convenience of the city government or the state are what is needed to develop a market infrastructure that will efficiently support the market function.

Part of meeting the needs of consumers and traders is that the physical structures should be "light" in nature. The heavy, Indonesian-style marketplace structures are not as well suited as lighter, open-air structures, for example.

Market facilities will require parking space and good access roads, a systematic arrangement of retailers by commodities, layout favoring retailing and consumer-friendly shopping, strategic entry and exit gates, bright lighting, toilet facilities, access to drinking water, incentives to promote transaction transparency, refurbishment of stalls, shops, and offices, and friendly/efficient management as well as security services at key urban marketplaces.

For a marketplace transformation strategy to achieve these results, a combination of software planning/preparation services and hardware construction is required. The software element involves participatory techniques for active participation by all stakeholders in determining what improvements should be prioritized and how the market should be managed. This activity will be responsible for providing the software component and other services to reduce transactions costs - weighing devices, better packaging practices, training in improved commodity care to extend shelf life, and a market information system.

### ***b. Linkages***

The improved performance of retail marketplaces benefits not only the vegetable and fruit sectors but all other fresh food sectors whose products are sold within those facilities. Thus, there are many forms of inter-relationships with the forestry, livestock, and food crop sectors, as defined by this project.

This activity will be linked very closely to the World Bank's SEP II program, and for it to be successful, the project staff will have to gain the confidence of their World Bank and Timorese government counterparts.

### ***c. Implementation Arrangements***

How this activity is implemented will depend on the involvement of other agencies and institutions as well as the SEP II program. We recommend an inter-agency steering committee that includes the relevant urban planning authority and administrative units.

We recommend that USAID develop an agreement, possibly a Memorandum of Understanding, with the SEP II program in order to collaborate as closely as procurement rules will allow to ensure that SEP II facility construction USAID software services mesh.

The Taibisse marketplace in eastern Dili should be the first pilot site. It consists of a series of stalls and shops arranged in several rows on top of the cement foundation slabs of the demolished, former army barracks. This array of stall, stands, and shops does not have the heavy Indonesian style, which will allow transformation to be done more quickly, at lower costs, and in a uniquely Timorese style.

Taibisse has no apparent organization or planned arrangement of sales outlets. It covers a very large area, including the bus depot located at the back of the market. Since the bus depot serves people traveling to and from the mountain areas to the south and east of Dili, it receives a substantial volume of fruits and vegetables and serves consumers arriving from those areas.

The marketplace transformation activity should be implemented at the same time as the activity supporting rehabilitation of periodic markets in the countryside. This will facilitate feedback from truckers and rural assemblers to be incorporated into an overall plan.

There will need to be a close working relationship between this team and the SEP II engineers as well as several consultations with the urban planners and administrators of Dili.

### ***d. Timeframe***

Given the urgent spending deadline imposed on the SEP II program for marketplace rehabilitation, it is important to develop this software component for the pilot site as soon as possible. In the first weeks, the initial set of explanations and agreements between this USAID activity and SEP II personnel will provide the foundation for a combined presentation to the inter-agency committee, whose composition will either be determined in the design or project proposal phase.

Within the next four weeks, a public forum and site visit should be conducted within the marketplace with the leaders of the trading community. This is when the activity team will explain the vision for the project and the roles and expectations for all the stakeholders.

Following the public forum, the team will collect information about the marketplace layout, number and type of retailers, number of consumers, perspectives of consumers and retailers using the market and any suggestions for improvements in the structure or services provided.

### ***e. Costs and Benefits***

***Costs.*** The primary costs for this set of activities will be personnel, especially the expatriate agricultural marketing systems consultant. Local professional staff will also constitute an important cost of this activity. The cost of providing a team to work alongside the SEP II program on the rehabilitation of the four principal Dili markets will be approximately 700,000 USD.

***Benefits.*** Several hundred permanent and casual women retailers who live and work in squalor at these marketplaces will realize the immediate direct benefits of the market rehabilitation and transformation activity. Currently retailers, men and women alike, have to endure very difficult

conditions in the market. There is little clean drinking water available, lack of access to working toilets in the market and, as a result, women retailers eat and drink very little during the day. Working in more hygienic environment will be a secondary benefit to women retailers.

The disorganized markets in Dili present an impediment to the expansion of demand for the produce of the Timorese interior. Consequently, support to Dili marketplace rehabilitation will benefit farm households with the venues to put surplus production on the market. Better organized terminal markets linked with an improved network of periodic markets, should reduce transactions costs and send signals to producers regarding what is most profitable.

### **3. RECOMMENDATION # 11: DEVELOP COLD CHAIN FOR EXPORT OPPORTUNITIES**

#### *a. Description*

Chinese and local traders are developing a cold chain in Dili for perishable food commodities, such as, meats, fish, fruits, or vegetables. This cold chain is based on imported perishables of chilled and frozen goods and relies on refrigerator vans for transportation and short-term storage. There are not enough refrigerated trucks in Dili to develop a cold chain for perishable products available in the interior.

Because of the absence of a full cold chain into the interior for horticultural and other perishable products, any high quality/value, perishable fruits and vegetable, meat products, and special fish sold in the supermarkets or purchased by the better restaurants needs to be imported rather than grown and marketed locally. Whenever growers in the highlands produce such perishable vegetable commodities they must be rapidly transported, sold and used, usually within a couple of days or, for the most perishable items, hours.

A Cold Chain System is an entirely new, challenging agribusiness technology and organization for Timor-Leste. A viable, sustainable, and replicable Cold Chain System will extend the shelf life of perishable vegetables transported from the central mountains of Timor-Leste to Dili, enabling them to be stored for a week or two, and gradually be distributed to supermarkets, high-end restaurants, and other consumers.

We recommend that USAID help to foster the development of a cold chain as a way to expand the market for domestically produced horticultural and other perishable products.

The Cold Chain activity will require some preconditions. It will take some substantial up-front investments on the part of USAID in an area where one might expect the private sector to invest. But, USAID has played this catalytic role in other industries and sectors, and the rationale for doing so in the Timorese cold chain is compelling. With the collapse of market links to the interior, imported products have become easier to bring to Dili. Few local traders will make the expenditure under existing price differentials to develop the domestic cold chain.

Another precondition is that transportation links from the highland production areas to Dili cannot regularly be disrupted from landslides during the rainy seasons. Extended stoppage of the shipments would break supply agreements with buyers and disrupt payments to growers. One way to lessen that possibility is to support a small-scale effort by NGOs and local groups to hire a truck and crew to keep the drainage channels open along the mountain portions of the road. This stopgap measure provides the Public Works Department (PWD) and road rehabilitation with time needed to complete their planned road rehabilitation programs. Another would be to establish an alert system that would allow project participants to dispatch spare trucks to places where the road has been washed out or blocked by landslides. Laborers hired in the area would help transfer the perishable shipment from the blocked truck to the back-up truck, which could then continue to Dili.

Once the cold chain system is established, the domestic and nearby foreign market will require at least three main stages and a few years before becoming sustainable. We provide suggestions for the initiation of the first stage. We also identify the risks facing the successful establishment of the system along with ways to mitigate those risks.

### ***b. Linkages***

The establishment stage will require a moderate sized trial plot on which to experiment with production and marketing approaches such as seasonal and location-specific cultivation practices and alternative types of handling and shipping practices.

The future highland cultivation of high value vegetables by hillside farmers will benefit from linkages to improvements in the forestry sector, particularly in terms of effective windbreaks, hedgerows for contour cultivation, and living hedges to prevent animals from entering vegetable and fruit fields. Meanwhile, the livestock sector would become a local source of waste products that would become part of the composting/fertilizing regime. Certain legumes and fodder shrubs could also be a part of the protection against wind damage as well as food for the livestock.

Training to women market retailers will provide the cold chain with a better clientele on the terminal urban market side.

Once a proven and replicable cold chain has been created for the horticultural sector, it can be adapted to accommodate meat and fish products.

### ***c. Implementing Arrangements***

The following are our recommendations for the three progressive stages required for successfully implementing the cold chain experiment to service promising export markets.

The three critical stages of cold chain development include:

1. *Start-up.* Start-up is focused on preparing, enclosing, and cultivating the trial plot site, applying proven cultivation practices for a wide range of crops, packing and cold house operations recommended for each type of commodity, and setting-up regular shipping arrangements that are responsive to domestic market demand opportunities;
2. *Supply expansion.* Supply expansion includes identifying, testing, recruiting, organizing, training, and contracting "clusters of farmers" in surrounding areas in order to scale-up the entire operation. Following this, one would begin a series of trial tests for a range of export options to two or more foreign markets, possibly Darwin, Surabaya, Jakarta, and Singapore. Supplies from the contracted farmers would supply domestic market demand while those from the trial plot will be used for trial exports;
3. *Cold chain growth/sustainability.* This stage focuses on promoting the replication of this form of agribusiness for three to five new enterprises, supporting the training of the new cold chain operators' staff, and sharing shipping arrangements. The participating private entrepreneurs would take over this fully operating enterprise at the completion of the second stage. In that way, this emerging group of independent enterprises can consistently fill a set of small chillers and/or 20' reefers destined to priority foreign markets.

The "start-up stage" will be the most costly and challenging because of the attendant uncertainties. It should be implemented in the following suggested phases:

***Phase one*** → Form a Cold Chain Consortium (CCC) and complete a series of practical marketing enquiries or studies, including verbal agreements to deliver the types and quantities of vegetables supermarkets expect to need after a couple of months;

**Phase two** → Prepare, organize the trial plot, and begin operations, including trial plantings of a wide range of crops under varied cultivation regimes until full operational capacity is reached;

**Phase three** → Set up and organize the packing and cold house operations, including ice-making capability, and begin a practical training program for sorters, cleaners, and packers;

**Phase four** → Arrange a reliable and redundant transportation system that can ensure shipment in the event of failure with the primary system. Begin daily shipments to supermarkets, as identified in the first phase. Substandard quality or inappropriate sized vegetables can be sold at wet markets or supplied to small, low-end restaurants. Since low-end restaurants tend to cook their vegetables, appearance is not as important and discounts will be lower than with more up-scale consumers.

The Cold Chain Consortium (CCC) is at the core of this strategy. It is useful in order to ensure harmonious assistance and to access and share a wealth of foreign expertise and local experiences. The CCC could consist of existing market and business development projects and local entrepreneurs with experience and interests in the agricultural sector. Perhaps a local NGO could later join the CCC if it was shown to have had an effective working relationship with promising clusters of farmers.

As example of possible implementing partners of the cold chain system, the USAID Private Sector Development Program (DSP) and Winrock International, a USAID Small Grants Program grantee, have different expertise and each could take the lead in different aspects of the start-up stage. The role of DSP would be to identify, measure, and arrange to supply needed domestic market requirements. This would include identifying the types, quality and volumes of vegetables initially to be grown and sold through the Cold Chain to Dili and neighboring towns, such as Baucau. It would require careful attention to scheduling production to fit seasonal markets and supermarket requirements.

Together with the local entrepreneur, Winrock could provide production technology and hands-on training, and could be responsible for getting the trial plot set-up, made fully operational, and regularly supplying requirements as arranged via the DSP. We expect substantial Timorese consultations, involvement and effort in the development of the cold chain.

The Small Grants Program could help ensure the supply of the remaining tools, equipment, seed material and inputs.

#### ***d. Timeframe***

When and over what period this activity should be undertaken is highly dependent on the nature and degree of effort as well as the occurrence of unanticipated weather conditions or unforeseen events. A conservative estimate is that it would take two years for the “set-up stage” and another two years to expand the contract farming system successfully to "clusters" of interested and skilled farmers. During the period of organizing farmers, providing practical training, and negotiating contractual agreements at the production level, there would be several types of marketing trials to link the domestic cold chain with export cold chains to markets in Australia, Singapore and Indonesia.

By the end of the fourth year, both the domestic cold chain and its links with export cold chains should be operational and replicated by a few other Timorese agribusinesses.

#### ***e. Costs and Benefits***

**Costs.** The primary costs for this set of activities will be personnel, particularly expatriate consultants and full-time local professional staff.

The initial set-up stage will cost approximately 800,000 USD. The expansion stage will cost approximately 1 million USD. Total expected costs for the four-year activity will be 1.8 million USD.

*Benefits.* The benefits from this activity will accrue in several ways. The first will be the increase in sales of locally grown high quality vegetables and fruits. The number of farmers who will be integrated into the cold chain will gradually reach the hundreds as export volume increases. If, as we expect, the profitability of the domestic cold chain can be demonstrated, other traders will replicate the USAID trial cold chain activity, adding to overall sales and the number of beneficiaries. Cold chains provide substantial multiplier employment effects, including employment opportunities for loaders and unloaders, truck drivers, packing house labor, cultivation and harvesting labor, providers of packing materials, and input sales of seed, fertilizer and pesticides. The ultimate beneficiary group for a cold chain serving Dili and other urban areas as well as the export market, will be farm households in the cool highlands, where temperate climate fruits and vegetables can be grown.

## E. AGRICULTURAL FINANCE

*Market Demand.* The recent Financial Services Sector Assessment<sup>26</sup> estimated that a maximum of 434,575 East Timorese (roughly 45% of the country's population) would like access to financial services<sup>27</sup>. The estimate includes 275,300 economically active poor people, who can benefit from microfinance services. The estimated minimum market is comprised of 58,575 households, of which eighty percent are in rural areas.

The assessment does not define in what economic activities the estimated markets lie. More specifically, the study does not provide clarity on the estimated number of agricultural-based individuals, households, and businesses that demand financial services. Although eighty percent of Timor-Leste's population resides in rural areas, few farm households produce marketable surplus of agricultural goods; subsistence agriculture is the dominant economic activity and source of income. Furthermore, agricultural is a high risk, low-return activity in Timor-Leste due to extremely variable rainfall. Thus, farmers engage in lower-risk activities – cultivating a large variety of field crops and horticultural products, as well as raising livestock – which result in low returns. Lastly, agricultural value chains are relatively flat, with limited activity or presence of trader, processors, distributors, and exporters. Therefore, it appears that the pool of potentially bankable agribusiness entities is limited.

To properly analyze the state of agricultural finance in Timor-Leste, it is useful to compare the agricultural financial flows in Timor-Leste to those typically found elsewhere. Figure E.1 depicts the general financial flows one expects to see in a functioning agricultural sector. A key point to note is that financial services customers can also be suppliers. In fact, 'value chain finance' tends to be more active and available than institutional sources of finance. In contrast, Figure E.2 illustrates the general flow of agricultural finance in Timor-Leste. (Figures appear on next two pages.)

*Market Supply.* In Timor-Leste, the institutional supply (i.e. commercial banks, MFIs, NGOs, and credit cooperatives) covers only a small portion of potential demand from all sectors (i.e. agriculture and non-agriculture) and flat agricultural value chains restrict the typical extension of credit among value chain players. However, it is not possible to accurately assess the volume of credit supplied by financial institutions in Timor-Leste to the agricultural sector due to the unsophisticated Management Information Systems (MIS). Nonetheless, it is clear that access to financial services in the agricultural sector, particularly credit, is generally low in volume and non-existent in many areas.

As of September 2005, the total financial institution outreach of credit was:

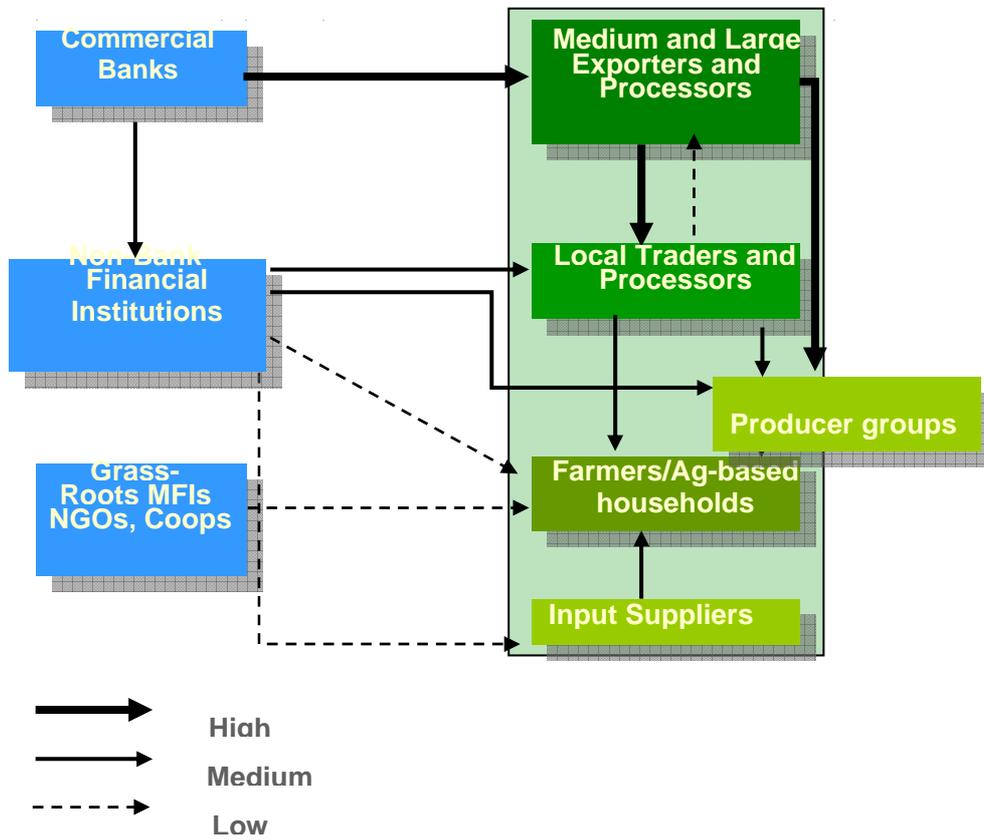
	Number of Borrowers	Loans Outstanding (\$)
<b>Subtotal Commercial Banks</b>	<b>10,960</b>	<b>70,609,000</b>
<b>Subtotal Specialized MFIs</b>	<b>27,699</b>	<b>2,880,007</b>
<b>Subtotal Non-specialized NGOs</b>	<b>7,506</b>	<b>562,339</b>

As of September 2005 – Provisional, does not include Credit Cooperatives

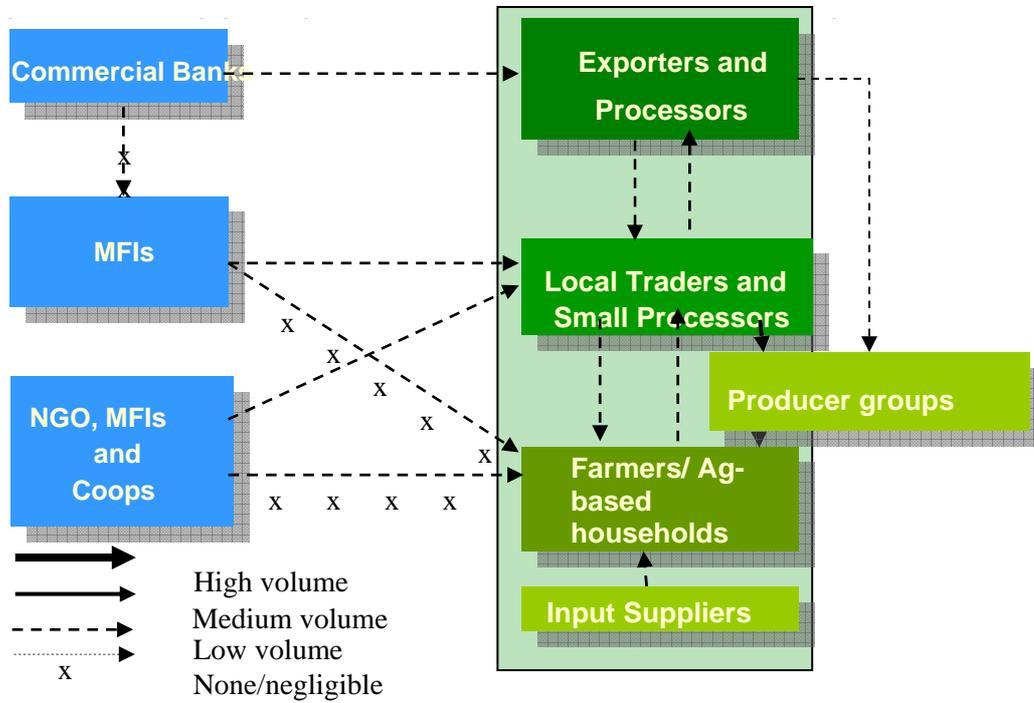
<sup>26</sup> Ibid.

<sup>27</sup> It is assumed that this refers only to credit.

Figure E.1: Typical Agricultural Financial Flows



**Figure E.2: Agricultural Financial Flows in Timor-Leste**



While the geographic coverage of the financial service providers spans eleven of the thirteen districts in Timor-Leste, the client coverage in each district, with exception of Dili, is unsubstantial at one to twenty percent of the total potential market.<sup>28</sup>

The institutional supply of financial services in Timor-Leste is provided by:

- Three foreign-owned, commercial banks;
- Four specialized microfinance institutions (MFIs);
- Eight non-financially specialized NGOs;
- Several savings and credit cooperatives.

The providers serve core market segments;

- Commercial banks serve local and international business concerns, as well as salary-based individuals. Average loan size outstanding ranges from USD 6,600-94,100;
- Specialized MFIs and the non-specialized NGOs serve the entrepreneurial poor. The average loans size is USD 92 among the MFIs.

*Commercial Banks.* The commercial banks operating in Timor-Leste are branches of foreign owned banks – Australia New Zealand Bank (ANZ) of Australia, Bank Mandiri of Indonesia, and Caixa Geral do Depositos (CGD) of Portugal. Commercial credit to private enterprises has increased considerably since the second quarter of 2003. From June 2003 to October 2004, credit outstanding jumped from 9 million USD to 75 million USD.<sup>29</sup> The significant increase is largely attributable to CGD's lending activities, which represent nearly 85 percent of overall commercial credit activities.

According to Bank and Payments Authority (BPA) data, the main sectors receiving commercial credit as of June 2004 were construction, trade, and finance, and to a lesser extent industry, transport, and communication. The commercial banks are not actively pursuing credit opportunities in the agricultural sector; however, there are a few noteworthy credit transactions, including CGD's 30,000 USD loan to a candlenut processing plant, Bank Mandiri's financing of the coffee processor and exporter Timor Global and Bank Mandiri's 75,000 USD line of credit to a microfinance institution to increase loan funds for on-lending to rural women. Nevertheless, the financial institutions did not lend to these entities without significant donor and government support or heavy collateral arrangements. Furthermore, the banks do not have the wherewithal (i.e. insufficient appetite for risk and institutional capacity) to actively increase lending to the agricultural or microfinance sectors.

*Microfinance Institutions.* Four specialized microfinance institutions provide the largest share of microfinance: Institucao de Microfinancas de Timor-Leste (IMfTL), Moris Rasik, Oportunidade de Timor Lorosa'e (OTL), and Tuba Rei Metin. In addition, several non-specialized NGOs and a few credit cooperatives provide financial services to Timor-Leste's enterprising poor.

The MIS systems of specialized MFIs are generally weak, and therefore cannot provide exact data on the sectoral break-up of their portfolios. In general, MFIs serve small market traders and have extremely limited agricultural finance activities. There is anecdotal evidence that negligible portions of MFI portfolios are in ag-processing and small agricultural-business activities. However, microfinance credit portfolios outside of Dili are heavily concentrated in vegetable market traders and/or provided to members (particularly women) of agricultural based households.

Specialized MFIs have attempted to provide products that are more tailored to agricultural producers. OTL piloted a cattle-fattening product in Liquicia whereby farmers were provided the cattle and were expected to pay back principal and interest once the cow was sold. OTL's initial

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<sup>28</sup> Private Sector Development – Sector Investment Plan, 2005

<sup>29</sup> Ibid. Figure include the credit activities of IMfTL, which only has a partial banking license.

trial suffered from low market prices for the fattened cattle, which made it difficult for farmers to repay once the cattle was sold. IMfTL provides some seasonal crop lending. However, IMfTL has not been able to demonstrate an effective approach to or an ability to collect on seasonal crop lending – with roughly 25% delinquency rates (30 days overdue).

*Non-Specialized NGOs and Credit Cooperatives.* Non-specialized NGOs and credit cooperatives are the most active in providing credit to or designing lending structures for farmers, albeit on an extremely limited scale. In the short-term, credit unions are a questionable mechanism for the provision of financial services due to limited operational capacity and funds. Further, the Credit Union Federation (Fundasaun Hanai Malu) is linked to the Ministry of Development and Environment, which raises doubts about credit unions' ability to establish a market-based approach to the provision of financial services. Non-specialized NGOs typically provide credit services that respond to the needs of its constituent groups. However, the schemes are usually poorly managed and include heavy subsidies.

Agricultural cooperatives have also developed quasi-credit schemes. CCT, a secondary organic coffee cooperative, provides two head of cattle to farm households for fattening. The farmers receive seventy percent of the net proceeds of the sale of the cow after one year. Similarly, Loka Dali, a multi-purpose NGO, created a livestock revolving fund where livestock –sheep, pigs or chickens– are provided to community groups for raising and sale, as long as the equivalent number and gender of livestock is returned after several years for the benefit of other groups. The livestock programs, while innovative and responsive to the basic capacity of the farmer households, have not been replicable on a large scale. First, the livestock are provided to the farmers at heavily subsidized rates or with significant donor funding. Second, the implementation of the program is hindered by high levels of livestock death (either from poor maintenance or by use in traditional ceremonies or celebratory events) and difficulty in enforcing contracts. However, CCT is encouraged by the success of a similar program in West Timor and would like to increase its program in Timor-Leste.

*Enabling Environment.* The Banking and Payments Authority (BPA) functions as the central bank, and regulates and supervises the commercial banks, including IMfTL. The BPA does not supervise cooperatives or MFIs, but has expressed interest in supervising MFIs in the future. For the time being, the Association for Microfinance in Timor-Leste (AMFITIL) and BPA are in agreement that formal regulation of the microfinance industry is premature. Laws and regulation on land rights, immovable/movable collateral, and enforcement of commercial contracts are not defined. The latter also suffers from the lack of sufficient court or arbitration options. Finally, there is a dearth of technical assistance, training, and auditing/accounting providers for financial institutions in Timor-Leste.

## **1. RECOMMENDATION # 12: STRENGTHEN BASIC FINANCIAL SKILLS, BUSINESS PLANNING, AND UNDERSTANDING OF CREDIT FOR FARMERS AND SMALL AGRIBUSINESS OPERATORS**

### **a) Activity Description**

A market-based mentality has not emerged in Timor-Leste. Indonesian economic policies did not demand efficiency or effectiveness of markets, and years of post-conflict development assistance has led to an expectation of subsidy and handouts. The mentality particularly affects the agricultural sector, which has benefited from free agricultural technology, inputs, technical assistance, and 'credit'. While there is certainly a lack of financial services available to agricultural entities, there is an even larger lack of bankability among them. Ag Finance Option One focuses on providing training to agricultural entities on basic financial skills, business

planning, and understanding of credit. It will be broadly implemented, but will have particular focus on regions and subsectors of project emphasis.

## **b) Linkages**

Ag Finance Option One has the best overall linkage to the agricultural option activities directed at agricultural producers, processors, and traders; particularly that focus on identifying market demand and/or promotion of nontraditional crop (assuming an export market) and improved agricultural techniques/productivity. Furthermore, Ag Finance Option One activities should be closely linked to the supply-side efforts described in Ag Finance Option Two.

In addition, Ag Finance Option One has linkages to other donor and government programs such as the ILO/UNDP Skills Training for Gainful Employment Programme (STAGE), GoTL Department of Development and Department of Labor Business and Employment Centers, and GoTL MAFF Agricultural Service Centers. It will also leverage educational materials created and trainers trained under ANZ's financial literacy program.

## **c) Implementation Arrangements**

The implementing partner should:

- Utilize the Mass Media Communications Option as a vehicle to deliver information to the wider rural audience, particularly agricultural producers, on the importance of credit repayment, basic financial techniques (e.g. documenting revenues and costs), as well as information on local availability of training and business services. Messages should be basic and akin to public service announcements;
- Leverage the Integrated Farming Systems Option as a forum to train agricultural producers in basic financial management and documentation;
- Make use of the Agribusiness Markets Training For Women Option to provide basic financial management and documentation skills, as well as how to manage and repay loans;
- Assists in the establishment of the Agricultural and Related Technologies Information Services Center (ARTIS) Option to provide access to business planning, accounting, and financing information;
- Ensure that the GoTL Employment, Business, and Agricultural Service centers are aware of, receive, and are trained on any materials produced under Option One;
- Train credit staff of partner-MFIs on any materials produced under Option One.

## **d) Timeframe**

The roll-out of financial and business literacy education and information campaigns should start at the beginning of project activities and run through the life of the project.

## **e) Costs & Benefits**

The estimated cost of this option over five years is 365,000 USD.<sup>30</sup>

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<sup>30</sup> This cost and those of the other agriculture finance options are costs directly associated with the options mentioned, assuming that they are part of a larger project. We estimate other project management costs to be 1,550,000 USD over five years.

Performance indicators of Option One interventions include:

- Increased agricultural MSME (Micro, Small and Medium Enterprises) creditworthiness, strengthened value chain relationships/transparency;
- Increase in number of agricultural MSMEs able to obtain new loans.

## **2. RECOMMENDATION #13: INCREASE SUPPLY OF FINANCIAL SERVICES TO THE AGRICULTURAL SECTOR AND INTRODUCE AND INCREASE AGRICULTURAL FINANCE PRODUCT OPTIONS**

### **a) Activity Description**

The activities under Option Two remove or reduce barriers that hinder supply-side market innovation. The project implementer should focus activities on the key suppliers of financial services to agricultural activities and businesses - commercial banks, non-bank financial institutions, as well as members of the value chain - to increase financial flows in and to the agricultural sector.

### **b) Linkages**

Activities under this option have the largest linkage to the microfinance programming under DSP and grant activity under SGP, as well as other financial sector programs. If feasible, Option Two also links to finance suggestions/needs of the other agricultural programming options such as credit for production of nursery facilities, financing for a contract livestock fattening and marketing system, and facilitation of livestock credit.

### **c) Implementation Arrangements**

*Commercial banks.* Encourage expansion of commercial banking services - credit and savings – directed at MSMEs, as well as MFIs.

Suggested interventions include:

- Credit enhancements/guarantees and associated TA can be structured with committed commercial banks that:
  - Promote private sector lending to MSMEs, including agribusiness and MFIs;
  - Build lending capacity and potential for sustained activity within the financial institution.

USAID's Development Credit Authority (DCA) credit guarantee mechanisms may be an option. However, a waiver would need to be given to structure a DCA guarantee with sovereign lending institutions (Bank Mandiri and CDG are government owned). ANZ, while an eligible bank, does not appear to have institutional interest in expanding lending in Timor-Leste, especially not to agribusinesses and other MSMEs.

The project may determine that the financial institutions are not interested in the terms of a DCA credit guarantee, or that there is not an eligible commercial bank in Timor-Leste. GTZ has expressed interest in exploring a multi-donor supported credit guarantee mechanism to stimulate commercial bank lending to underserved sectors. A multi-donor guarantee mechanism would involve a dialogue and eventual agreement on the intentions of and appropriate structure for a guarantee, but can be an alternative option to a DCA guarantee.

Technical assistance should complement a guarantee to ensure that the partner financial institution(s) utilizes the guarantee and builds lending capacity and/or is supported in analyzing creditworthy agricultural financing projects.

- In addition to or in place of a guarantee mechanism, an LTTA (one year) advisor can be offered to a commercial bank (most likely CGD, Bank Mandiri, or IMfTL) to focus on agribusiness lending and wholesale lending to microfinance institutions. The advisor would focus on operations efficiency, client service, staff training, etc.

*Microfinance Institutions.* Encourage expansion of current lending, particularly to agricultural traders, and of product offerings focused on agricultural MSMEs and households. Suggested intervention:

- Determine individual financial institution technical assistance plans with a subset of the specialized microfinance institutions (most likely Moris Rasik, IMfTL, and OTL) focused on market research and new product development – all aimed to strengthen sustainable provision of financial products and services to agricultural MSMEs such as: ag-based household loans, agricultural cyclical loans, and leasing. The pilot and roll-out phases of any new product would have to consider the existing capacity deficiency in the MFIs. Significant training to MFI staff would be required

*Value Chain Finance Interventions.* Suggested interventions:

- Perform value chain financial flow mapping on several value chains and/or in several sub-districts. See Table E.1 (next two pages) for a sample scope of work. Financial flow mapping documents the current financial flows for specific agricultural value chains in regions of specific interest. The maps will be useful to inform the implementing partner of financing options (whether monetized or in-kind) that are available and/or where there are specific constraints to be addressed. The information documented during the mapping can also feed into the supply interventions considered with commercial banks and MFIs.
- Value chain mapping allows for the identification of individual structured credit options where cash flows are identified and loan repayment is based on controlled sales proceeds. Structured finance arrangements can be designed at all levels and be provided through all supplier types. For example, if a farmer borrows money to purchase a cow for fattening, the farmer and the cattle supplier acknowledge that sale proceeds go through the lender. A similar structure could be developed with horticulture producers and grocery stores. That implementing partner can also structure financing between value chain members through trader credit or outgrower schemes. USAID has supported structured finance around the world, including for coffee producers and processors under the USAID Haiti Hillside Agriculture Project, and dairy producer and processors under the USAID Croatia ACE project.

**Table E.1 Scope of Work: Value Chain Financial Mapping**

<p><b>Name of Deliverable:</b></p>	<p><i>Rural Financial Services Study</i></p>
<p><b>Description of and Rationale for Research Topic:</b></p>	<p>A major constraint to rural enterprise development and to achieving significant growth in critical subsectors in Timor-Leste is the lack of financial services tailored to the needs of the industry and the firms, micro-to medium, operating in it. Recent research conducted by the World Bank indicates that the overwhelming bulk of financial services delivered to the rural poor are provided by informal providers, private sector firms supplying inputs or purchasing products from smaller firms. Banks and MFIs play an important but far from the dominant role in rural financial service delivery (Kula, Pearce, 2002).</p> <p>The study should obtain the following:</p> <ol style="list-style-type: none"> <li>1) Information from key participants in and suppliers to the value chain regarding services that they currently receive, services they provide, and services that they would be willing to pay for if offered. The consultant will query key participants and suppliers about services offered by financial institutions and by other participants and service providers in the value chain.</li> <li>2) An understanding from the perspective of financial institutions as to the problems they face in delivering financial services in rural areas. Both internal and external factors need to be investigated. Internal factors could be a lack of operating efficiencies to be able to deliver financial services in a profitable manner, poor client management skills, inefficient technologies and systems, lack of training by staff to be able to adequately assess risks and/or a lack of market driven products. External factors could be clients limited financial control capabilities, limitations on collateral provisions, actual market values not representing actual capital cost or replacement values, limited viable long term business' and/or deficiencies in the judiciary system.</li> <li>3) An understanding from the non-traditional suppliers, what types of credit or loan programs they offer, why they offer these programs, are they successful etc.</li> <li>4) From both sources, the study should obtain information as to what programs are currently available, how much demand exists for these programs, what are the constraints of these programs and what programs are needed.</li> <li>5) All types of products should be brought up for discussion including both debt (i.e. loan) and equity (i.e. venture capital).</li> </ol> <p>The consultant in collaboration with mission technical staff, and the Chief of Party will identify the value chains for the analysis.</p>
<p><b>Description of Research</b></p>	<p>Using the value chain as the unit of analysis, the consultant will systematically interview participants and service providers at all levels of</p>

<p><b>Methodology:</b></p>	<p>the value chain from input supply through final markets for selected products. Analyzing financial service needs at all levels of the value chain will provide information on the degree to which lack of services or poor service quality impedes growth throughout the sector including but not limited to rural small scale producers.</p> <p>The consultant will conduct an assessment of the range of financial services critical to growth and expansion of agricultural subsectors. This assessment will include services already provided by formal sector financial institutions and non-financial institutions financing the sector. The assessment will inventory and evaluate existing services and identify critical service gaps.</p> <p>The consultant will use the financial product as the unit of measurement and the value chain as the unit of analysis. Using the financial product as the unit of measurement means that the consultant will first identify financial products and services critical to growth in the selected subsectors. S/he will then recommend institutional options for the delivery of those services. These options will give priority to existing institutions. Recommendations to create a new institution can be made if and when it can be established that current institutions are and will continue to be unable to meet the demand for services.</p>
<p><b>Proposed LOE:</b></p>	<p><b>Lead Consultant, 13 days total:</b> 11 days in the field, 2 days to draft report</p> <p><b>Accompanying STTA, 22 days total</b></p>
<p><b>Intermediate products specified:</b></p>	<p>The written report will provide a profile of rural finance as to where the main areas of concern lie in relation to bringing additional rural finance to businesses in rural areas. These conclusions should bring out the problems including chain or ripple effects brought upon rural finance because of other factors outside the immediate constraints linked to the difficulties in rural finance availability. It should also provide a critical analysis and an opinion as to where intervention needs to occur to provide additional rural finance.</p>
<p><b>Secondary products specified:</b></p>	<p><b>Financing for Growth:</b> lays out the case for integration of BDS and financial services as a precondition for significant enterprise growth and will identify a range of financial services that contribute to both enterprise and sector growth linked to other business services. Stakeholder participants in value chains other than commercial financial institutions offer many if not most of these. Case studies will summarize approaches to increasing MSME access to financial services including contractor and input finance, lease financing, grain warehouse receipting and rural and ag. financial institutions.</p>

#### **d) Timeframe**

*Commercial bank interventions:* Engaging and negotiating with a financial institution partner requires time. Therefore, it is suggested that the DCA is presented to the commercial banks at the beginning of project activities. However, the structuring of a DCA credit guarantee might not occur until later in the project lifecycle. Starting early in the project also allows sufficient time to negotiate with other donors if a multi-donor guarantee is pursued. If opted, the LTTA advisor should start no sooner than the second year of the project, which allows sufficient time to engage and negotiate intended outcomes with an interested commercial bank partner.

*Microfinance institution interventions:* While microfinance institutions should be engaged from the beginning of the project, new product development realistically will not occur until the beginning of the third year of the project. Specific targets set by the microfinance activities of the DSP program should be achieved before moving forward with intense new product design initiatives. However, the project implementer can hold workshops and trainings with MFI partners on basic agricultural lending concepts and potential products during the first two years.

*Value chain interventions:* Value chain mapping should be done in the second year of the project – or after specific sectors/regions for implementation of the agricultural options are defined. Financing arrangements should be identified and facilitated during the life of the project.

#### **e) Costs & Benefits**

The estimated cost of this option over five years is 1,150,000 USD.

Indicators of Option Two interventions include:

- Increase in number of financial instruments available to different sizes and types of agricultural individuals, households, and enterprises; and
- Increase in volume of financial services, particularly credit, to agricultural individuals, households, and enterprises.

### **3. RECOMMENDATION #14: STRENGTHEN AND PROMOTE AGRICULTURAL FINANCE DIALOGUE**

#### **a) Activity Description**

Donors, government ministries, and agricultural entities (mainly producer groups and cooperatives) all commented on a significant supply constraint. However, financial institutions are not convinced of a bankable agricultural market. Further, direct credit interventions supported by donors, such as the Community Empowerment Project and GTZ direct credit schemes, have had limited results and not produced a sustainable market mechanism to continue similar lending.

Thus, key suppliers, demanders and enabling environment actors continually suffer from an ineffective approach to increasing the sustainable provision of financial services that benefit the agricultural sector. In the end, financial institutions are loath to enter the market, government and donor projects only contemplate supply-led interventions, and demanders of agricultural credit receive misrepresentations of credit and a poor credit culture prevails.

It is imperative to the success of agricultural finance in Timor-Leste that there is more effective and streamlined dialogue and planning around rural and agricultural finance. Therefore, the implementing partner should focus on creating and sustaining an effective dialogue among suppliers and demanders (i.e. producer groups/cooperatives) of financial services, as well as key members of the enabling environment, including government officials, BPA, and AMFITIL representatives.

The dialogue should focus on creating a concrete plan for agricultural finance, with thoughtful consideration to constraints and opportunities. Dialogue should promote information sharing, but focus on defining and sequencing supply, demand, and enabling environment initiatives that decrease the barriers to extending agricultural financial services. For example, Ag Finance Option Three could allow for diverse support of demand-driven market assessment activities (e.g. market demand assessment for leasing) to inform and define next steps for the market response to various agricultural finance options.

#### **b) Linkages**

The agricultural finance dialogue has linkages with the DSP project's microfinance and agribusiness activities. The dialogue also has linkages to USAID's overarching strategy on Rural and Agricultural Finance (RAF) defined by the Office of Microenterprise Development and Office of Agriculture.

UNDP/UNCDF is contemplating inclusive financial sector programming. The status of the program is on hold until there is a clearer funding commitment from cooperating agencies. USAID could consider obligating some of its funds to a multi-donor facility, such as the one suggested by UNDP/UNCDF. The facility would act as a central repository of technical assistance sources, ensure subsidization is minimal, and assure that best practices are followed. A similar facility was created to streamline microfinance sector programming in Afghanistan under the Microfinance Investment Support Facility for Afghanistan (MISFA).

#### **c) Implementation Arrangements**

The dialogue can commence with the USAID Rural and Agricultural Stakeholder Workshop designed by the Office of Microenterprise Development and the Office of Agriculture. The workshop is designed to be modified to respond to the country context; covering the general system (actors, factors, history, and policy) of rural and agricultural finance and presenting feasible intervention options. In addition, the workshop acts as a planning session to define a series of follow-on activities and key next steps.

The implementing partner should create an effective system for follow-on communication and activities that continue through the life of the project. The communication system maintains active dialogue, ensures follow-on activities and next steps are implemented, and disseminates key information and best practice information.

#### **d) Timeframe**

The implementing partner should organize and present the initial stakeholder workshop in the first year of project activity and continue to promote planning and dialogue among the members throughout the life of the project.

#### **e) Costs & Benefits**

The stakeholder workshops and communication will create streamlined dialogue surrounding agricultural finance in Timor-Leste, which will lead to agricultural finance responses that are in the best interest of supply, demand, and government concerns.

The estimated cost of this option over five years is 285,000 USD.

## **F. OTHER CROSS-CUTTING OPTIONS**

### **1. RECOMMENDATION # 15: AGRICULTURE AND RELATED TECHNOLOGIES INFORMATION SERVICES CENTER (ARTISC)**

#### ***a. Description***

Timor-Leste students, agricultural advisors, and educated farmers are operating in an information-poor environment for various reasons. Relatively poor access to mass media, low internet penetration, and language policy all contribute to this predicament and its implications for technology transfer. Thus, it is important to establish an Agriculture and Related Technologies Information Services Center (ARTISC) with a comprehensive set of information services within one organization, institution, or project.

The presence of information in one place reduces search time, heightens awareness of alternative ways to solve prevailing or expected problems, generates interest among entrepreneurs when setting up small agribusinesses, and reduces learning costs associated with the trial and error method, thereby benefiting a very wide range of clientele.

A responsive clearinghouse for agriculture and related technology information is fundamental to many information needs, especially given the rapidly changing environment of an emerging nation.

The proposed intervention is the formation of an ARTISC, which would provide:

- An institutional memory of lessons learned in the applications of different technologies, and familiarization with various crops, animals, trees, and fish introduced within the past few years;
- Capacity to access information on a wide range of established agricultural technologies from world wide sources;
- Ability to identify local resource persons with skills in applying those technologies under complex local socio-cultural situations, and a venue for exchanging information with professional visitors;
- Greater awareness and interest from abroad regarding promising opportunities regarding Timor-Leste's agricultural diversity, progress, and investment opportunities.

ARTISC not only provides access to information on technologies but also on ways to promote its understanding, adoption, and transfer. For instance, agricultural education and extension services involve teaching, transferring and/or promoting "appropriate technology." Those institutions should have the ability to align the requirements of specific agricultural problems and local situations with corresponding levels of technology.

In the near term, when students and emerging agribusiness farmers have outgrown simple technologies, information at an intermediate or more advanced level should be available in order to keep pace with local growth and respond to better opportunities in the near term. For instance, one example could be the replacement of simple bamboo pipes in the uplands to deliver water to several house gardens, given the success and expansion of the Cold Chain plots. At that time, the water delivery system may need to be upgraded whether with plastic pipe, pump-set based and/or sprinkler system in order to service year round water requirements for high value vegetable cultivation on a commercial scale.

#### ***b. Implementation Arrangements***

ARTISC will require leadership with an open mind, flexible attitude, and wide breadth of field experiences in order to understand distinct local requirements and to search for information on appropriate technologies, which match the varied local conditions, farmer expectations, and each community's ways of doing things.

Since ARTISC provides both a "proactive" program and a "responsive capability", the leadership of a skilled professional with an extensive network of appropriate technology organizations will be required at the set-up stage. Likewise, given language issues and frequent interactions with a range of clientele, local staff need fluency in multiple languages, including English, Indonesian, Portuguese and Tetum. A computer software person may need flexible working hours because of the role as a bridge between ARTISC and internet users arriving after office hours.

ARTISC activities are arranged as a proactive program and responsive services for those working directly or indirectly for the improvement of the agriculture, forestry, livestock, and fishery sectors in Timor-Leste. Each year, the proactive program will be realigned.

The preferred institutional home for ARTISC would be an existing, private sector entity that is efficient and has a record of accomplishment of "getting things done." Other criteria for an institutional partner would be qualified staff and a demonstrated commitment to monitor performance. It should be open longer hours, such as from 8 AM to 8 PM, in order to services those arriving after normal office hours. If possible, it should be associated with an educational institution, thus providing the additional advantage of responding to on-going teaching/research information requirements. One initial candidate worth evaluating is the Dili Institute for Technology.

The proactive program includes:

- 1) Annual activity agenda in close collaboration with 3 - 4 on-going development agencies/organizations. For instance, in consultations with the Peace Corps and other international volunteer programs, decide a scheduled backstopping program that could include: a) referrals to local specialists for ad hoc problem areas and b) acquisition and preparation of relevant information materials on technology problems encountered;
- 2) Mentor Linkage Service (MLS) for young professionals from the university and entrepreneurs with language capabilities. The topics could include a critical, longer-term problem to solve, such as starting a new enterprise or accessing improved packing technologies, or teaching a new agricultural subject. ARTISC's problem solving collaboration could include its identifying, introducing, and arranging e-mail communications with a retired professional with the required experiences, qualifications, and interests to serve as a technical advisor in that field or problem area. Various groups outside of Timor-Leste would readily agree to join this arrangement; (NOTE: the MLS would gradually grow in collaboration with professional organizations/institutions in a wide range of other countries as confirmed by this consultant. Dili Institute of Technology is looking at adapting a similar program for business incubators, which concentrates on a mentoring system for local businesspeople but does not focus solely on agricultural practices.)
- 3) "How to" publications, such as technical manuals, guidelines, and extension leaflets, would be acquired, reproduced, and sold at production costs. ARTISC would arrange at least 3 – 5 such publications/year through agreements with outside organizations and/or businesses;
- 4) Multi-language dictionary sheets would be drafted in the form of a small pamphlet. For example, a dictionary of key terms for the livestock sector would be in English with the corresponding terms in Portuguese, Tetun, and Indonesian would be cited. There would be definitions and illustrations for each term on the backside;
- 5) ARTISC could develop a website in order to post information that would be pertinent to those interested in investing in Timorese agriculture, forestry, fishery, and livestock sectors, as well as professionals skilled in development interventions. However, this would require additional expertise and resources. Responsive services include:
  - a) Technology information materials/services in response to *specific requests* in either verbal or written forms. Given space, resources, and demand from clientele, the ARTISC

would provide access to a range of internet services from public access to two computer stations;

b) Advisory backstopping for a variety of training-the-trainers activities, especially as sponsored and supported by on-going projects. These would be evaluated on a case-by-case basis. Likewise, it should be able to identify and engage the services of professional trainers for more specialized topics or problem areas; and

c) Q & A Forum conducted on a range of timely technology topics with visiting, short-term professionals. ARTISC would identify, promote and arrange for a 1-2 hour forum near the middle of the professionals' visits or consulting assignments, consultations, and/or missions. In other words, in close consultation with donor organizations, agribusiness companies and government departments, ARTISC would identify potential candidates (consultants, experienced staff, and/or members of missions), advertise their strengths, inform an interested audience, such as locals from educational institutions, agribusinesses, and government agency staff, and arrange for this session at a large venue on an ad-hoc basis.

Project facilities will require a large house with enough space to accommodate:

a) substantial amounts of written materials within 2 – 3 separate reading/research rooms,

b) separate room with two computers accessible to clientele for internet searches (fee basis),

c) large empty room for internal training classes and/or space to draft, prepare and compile publication materials,

d) large separate room for the administration, operations staff and computer software person, and

e) front room for meeting the clientele, allocating holding boxes in which to hold belongings of those visiting (avoid materials getting lost in brief cases, backpacks, etc.), and discussing ways in which ARTISC can assist their information requirements.

ARTISC needs at least 3 new computers with reliable internet connections, especially with links to foreign university libraries, technology institutions, and CGIAR (Consultative Group on International Agricultural Research) centers. Users' fees for the 2 clientele computers would be slightly higher than the prevailing internet café rates in order to avoid adversely affecting those private enterprises and to discourage their use for personal communications. Each computer should be replaced every 2 years with newer, more powerful units to accommodate changes in computer and internet technology as well as anticipated increases in demand for additional services.

### ***c. Timeframe***

The initial project cycle would be for three years with a potential extension for two additional years based on its record of accomplishment, main accomplishments, and nature of clientele interest. Given the unpredictability of the future, the current emphasis is to focus on solving current and emerging agricultural problems while laying the basis for future opportunities. In fact, if Timor Leste-undergoes a period of very rapid economic growth, alternative mechanisms for technology information acquisition, sharing, and presentation may evolve, perhaps within the government sector or a private firm.

ARTISC will be implemented in phases. The set-up phase will require about one year and the subsequent consolidation and expansion phases would be planned and organized around the usage

of the proactive program and responsive services. Flexibility is required to handle the uncertainty regarding the level of responsive services requested.

Regarding the sustainability issue, at least two critical points can be raised:

- 1) can ARTISC generate part of its own revenue to cover operating costs?
- 2) if internet access expands substantially in educational institutions and government departments, will this particular form of information center become redundant?

#### ***d. Costs and Benefits***

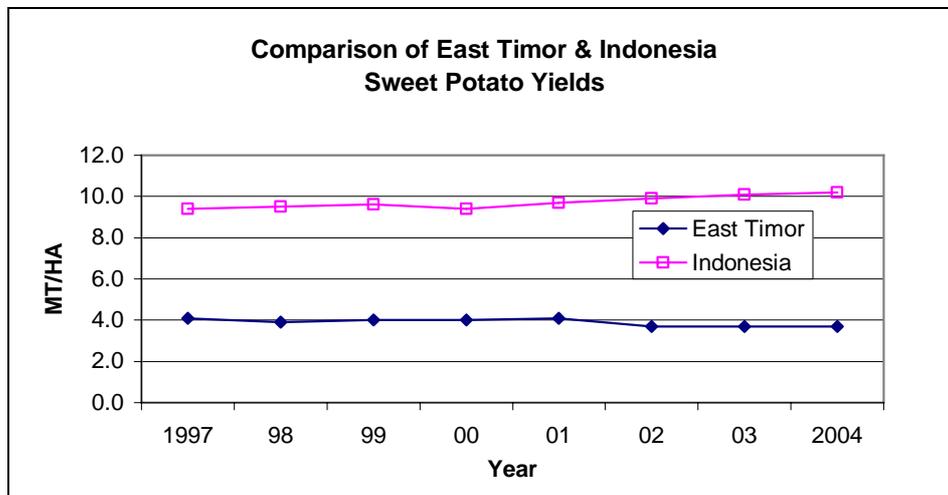
*Costs.* The costs of ARTISC for a three-year period will be approximately 450,000 USD.

*Benefits.* The ARTISC will contribute to and accelerate the pace at which appropriate technology is accessed, widely disseminated, and used within the Timor-Leste environment. Other institutions, projects, and development programs will be responsible for adapting those appropriate technologies to the physical, socio-economic and cultural environment.

Thus, ARTISC's success will be dependent on its staff and leadership being proactive in forming close working relationships among the agribusiness community, donor agencies, government departments, academic community, and other technology information users. Consequently, the beneficiaries, both directly and indirectly, should reach the thousands within the first couple of years. In fact, the emerging cadre of Timorese professionals and NGO staff will immediately benefit from the activities of ARTISC.

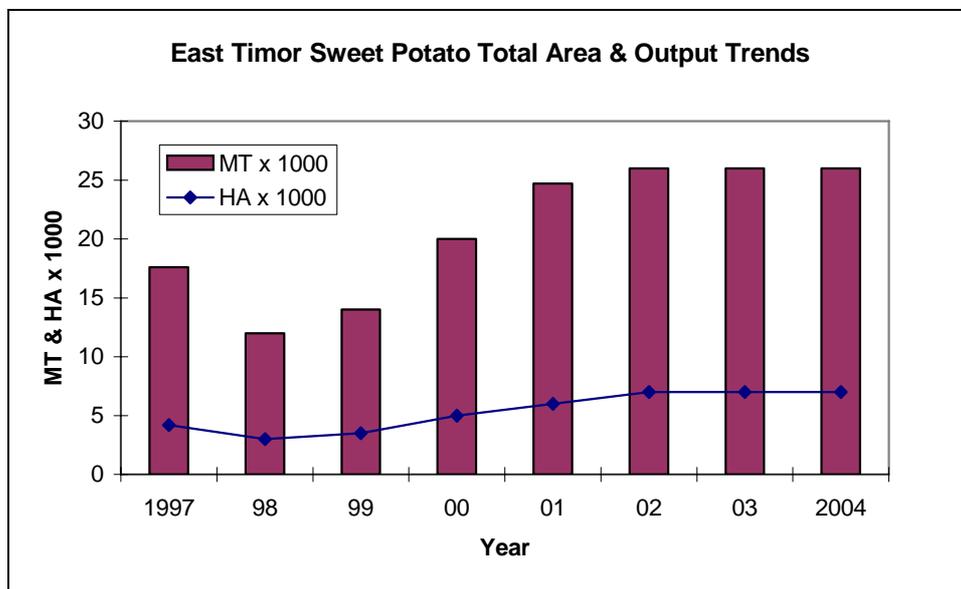
## ANNEX: ADDITIONAL FIGURES AND TABLES

Figure A.6: Comparison of East Timor (Timor-Leste) and Indonesian Sweet Potato Yields



Source: FAOSTATA

Figure A.7: East Timor (Timor-Leste) Sweet Potato Total Area and Output Trends



Source: FAOSTATA

**Table A.2: Timor-Leste Household Maize Supply & Demand**

<b>Demand - Gross Household</b>	
One person - total daily Kcal demand	2,100 Kcal
Percent of total Kcal demand made up by maize (carbohydrates)	80%
Total Kcal from maize/ person /day - required	1,680 Kcal
Total kg of maize/ person /day - required	0.42 kg
Mean household size	5 persons
Total kg of maize/ household /day - required (excluding losses)	2.1 kg
<b>Demand - After Losses</b>	
Kcals energy in 1 kg of maize	4,000 kcals
Loss of maize Kcals from milling & cooking	20% *
Total maize kg required / household / day after cooking losses	2.52 kg
Annual kg of maize required per household (before storage losses)	920 kg
<b>Supply - Gross On-Farm Maize Yield</b>	
Mean yield per maize ha (Best Case Scenario)	1,400 kg
Mean farm size in Timor-Leste (ha)	0.80 ha
Gross maize yield from household plot	1,120 kg
<b>Supply - After Storage &amp; Seed Set Aside Losses</b>	
Post-harvest storage loss %	10%
Post-harvest storage loss kg	112 kg
Maize remaining after storage losses	1,008 kg
Seed set aside for next crop (enough for 1 extra replanting)	70 kg
Maize remaining after seed set aside	938 kg
<b>Household Maize Balance</b>	
Maize Supply, kg	938 kg
Maize Demand, kg	920 kg
Maize surplus or deficit (-), kg	18 kg
Maize surplus or deficit (-), days	9 days
Maize surplus or deficit (-), months	0.3 months

\* Some reports put processing and cooking loss at over 30%, however given the processing method used in Timor-Leste, a lower loss figure is used.

**Timor-Leste Population, Area and Population Density by District, 2001 and 2004.**

District	Population		Area sq km.	Population/sq km.	
	2001	2004		2001	2004
Aileu	31,826	36,889	729	43.7	50.6
Ainaro	45,092	53,629	797	56.6	67.3
Baucau	101,517	104,571	1,494	67.9	70.0
Bobonara	69,932	82,385	1,368	51.1	60.2
Covalima	49,234	55,941	1,226	40.2	45.6
Dili	120,474	167,777	372	323.9	451.0
Ermera	88,415	103,169	746	118.5	138.3
Lautem	53,466	57,453	1,702	31.4	33.8
Liquica	45,575	55,058	543	83.9	101.4
Manufahi	38,616	44,235	1,325	29.1	33.4
Manatuto	35,445	38,580	1,706	20.8	22.6
Oecussi	45,042	58,521	815	55.3	71.8
Viqueque	62,704	66,434	1,781	35.2	37.3
Timor-Leste	787,338	924,642	14,604	53.9	63.3

Source: Districts of Timor-Leste, Statoids, 14H<http://www.statoids.com/utl.html>, and FAO 2004.

## **List of Persons Met and Interviewed - Agriculture**

### **Government of Timor-Leste:**

- Mr. Francisco Tilman De Sá Benevides, Vice Minister for Coffee and Forestry, Ministry of Agriculture, Forestry and Fisheries
- Mr. Adelino P do Rego, Director of Agribusiness, Ministry of Agriculture, Forestry and Fisheries
- Mr. Peter Jarvis, Agribusiness Advisor, Ministry of Agriculture, Forestry and Fisheries
- Mr. Bonifácio Correia, Chief, Section for Informal Sector and Self-Employment (also chairperson of Federation of Credit Unions of Timor-Leste)
- Mr. José Maria da Costa, Interim Director, Ministério de Trabalho e Reincorporação Comunitária
- Ms. Jolanda Buter, Vocational Training Expert, Ministério de Trabalho e Reincorporação Comunitária
- Mr. Helder Neves, Donor Coordinator, Ministry of Agriculture, Forestry and Fisheries
- Dr. Steve Dunn, Livestock Specialist, Ministry of Agriculture, Forestry and Fisheries
- Mr. Elmo Driling, Forestry Advisor, Ministry of Agriculture, Forestry and Fisheries
- Mr. Octávio da Costa Monteiro de Almeida, Director of Policy and Planning, Ministry of Agriculture, Forestry and Fisheries
- Mr. Mário Nunes, Director of Forestry, Ministry of Agriculture, Forestry and Fisheries
- Mr. Acacio Guterres and Mr. Jaime Campos, Directorate of Fisheries, Ministry of Agriculture, Forestry and Fisheries
- Mr. Deolindo da Silva, Director of Agriculture and Livestock, Ministry of Agriculture, Forestry and Fisheries
- Ms. Georgina de Mello, Advisor, Trade and Investment Timor-Leste
- Mr. Alex Daley, MAFF Advisor
- Mr. Pedro De Sousa Xavier, Director of Land and Property Unit, Ministry of Justice
- Mr. Wine D.Langeraar, National Mapping Adviser, Land and Property Unit, Ministry of Justice
- Eg. Olávio da Costa, District Administrator of Lautem
- Eg. Carlos Ximenes, Director of Environmental Services, Office of Secretary of State for Environmental Coordination

### **Northern Territory, Australia:**

- Mr. Mike Gallagher, NT Representative

### **Commercial Banks:**

- Mr. Eddy R. Sinulingga, General Manager, PT Bank Mandiri
- Dr. Correia Pinto, Director, Banco Nacional Ultramarino (BNU)

Mr. Teófilo Fonseca, Deputy General Manager, Caixa Geral do Depósitos (CGD)

Mr. Peter Boutcher, General Manager, ANZ Bank

**Finance Companies:**

M. Augusto, Pacific Holdings Ltd. (Western Union)

Mr. R. Lynn Ogden, Vice President & Cooperative Secretary, Aurora Financial

**Microfinance Institutions:**

Mr. David Winspear, Advisor, Opportunity for Timor Lorosa'e

Mr. Horacio Mendes, Acting Director, Opportunity for Timor Lorosa'e

Ms. Aúrea Guterres, HOTFILMA

Mr. Ângelo Soares, Director, TUBA RAI METIN

Mr. Luís Berebuti, Director, LANAMONA

Mr. Bonifácio Correia, Fundação Hanai Malu

Mr. António Jerónimo, Fundação Loke Dalan

Mr. Ildefonso da Costa Guterres, Director, Hamahun Feto Timor (HAFOTI)

Mr. Sérgio M. do Espírito Santo, General Manager, Instituição de Microfinanças de Timor-Leste (IMFTL)

Ms. Marcella Willis, Microfinance Program Manager, Catholic Relief Services

Ms. Helen Todd, Executive Director, Moris Rasik

**Cooperatives:**

Mr. Shane McCarthy, Cooperative Agribusiness Advisor, Cooperativa Café Timor (CCT)

Mr. David Boyce, NCBA Enterprise Development Adviser, Cooperativa Café Timor

Mr. Oscar Hernandez, NCBA Financial Advisor, CCT

Mr. Germinino Amaral dos Reis, Chairman, União Cooperativa Café Timor (UCCT)

**International/Local NGO:**

Mr. António Victor, Program Analysis Poverty Reduction & Community Development Unit, UNDP Timor-Leste

Ms. Alessandra Casazza, Deputy Chief / Senior Program Officer Poverty Reduction & Community Development, UNDP Timor-Leste

Mr. Butch C. Batilong, National Director, Habitat for Humanity

Mr. Isidoro Viana da Costa, Program Manager, Christian Children's Fund, Timor-Leste

Mr. Mark Anthony Dasco, Program Consultant Development Cooperation, Christian Children's Fund, Timor-Leste

Mr. Domingos Sávio de Sousa, Micro Credit Manager, Timor Aid

Ms. Rosália Madeira, Program Coordinator, Timor Aid

Ms. Katherine Pondo, Catholic Relief Services

Ms. Jill Salmon, CARE International

Mr. Chris Walsh, World Vision

Mr. Edwin Urresta, COP, Land Law Program, Associate of Rural Development Inc.

Mr. Mr. Abel Boavida and Mr. Jose Jaquelino, Committee Members of NGO Hametin Agricultura Sustentável Timor Lorosa'e (HASATIL)

Mr. Gilman dos Santos, Director of Fundação Ema Mata Dalan Ba Progresso (ETADEP)

Mr. Frank Elvey, OXFAM Australia

Mr. Chana Oaspakornkul, Director of FAO, Timor-Leste

Mr. F.E.Dewald, WINROCK

Mr. Saturnino Maia, NGO HASATIL

Mr. Fransisco da Silva, Timor-Leste Media Development Center

Mr. Michael Jones, University of Hawaii

Mr. Augusto Junior, Christian Children's Fund Timor-Leste

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Mr. Guther Khol, Team Leader, GTZ Rural Development

Ms. Brigitte Podborny, GTZ Rural Development

Dr. Ron Black, Chief of Party, USAID Dezenolve Setór Privadu

Ms. Milissa Day, Financial Services Advisor, USAID/DAI Dezenolve Setór Privadu

Mr. Kurt Koomen, Agribusiness/Cooperatives Services Advisor, USAID/DAI Dezenolve Setór Privadu

Mr. Lendell Foan, Deputy Chief of Party and Commercial Services Advisor, USAID/DAI Dezenolve Setór Privadu

Mr. Rui Manuel Hanjam and Ms. Johana Johannson, Development Specialist, the World Bank

Mr. João Fernandes, Program Officer, Australian Agency for International Development

Ms. Amber Davidson, Program Manager, Australian Agency for International Development

Mr. Rob William, ACIAR, Fini ba Moris, University of Timor-Leste

Mr. John Steel, Agriculture Rehabilitation Project (ARP)

Mr. Stephen Vance, Senior Economic Development Advisor, USAID Timor-Leste  
Ms. Ângela Rodrigues, Economic Growth Program Management Specialist, USAID Timor-Leste  
Mr. Guglielmo Colombo, Head of Europe Union  
Mr. António Lemos, Programa de Apoio ao Desenvolvimento Rural em Timor-Leste (PADRTL)  
Aileu  
Mr. António Pires, PADRTL, Dili  
Mr. Pedro Mesquita, PADRTL, Ermera  
Mr. Flynn Fuller, Mission Director, USAID Timor-Leste  
Mr. Gene Ward, Peace Corps Director  
Mr. António de Saavedra Termes. Project Coordinator Cooperação Agrícola Portuguesa  
Mr. Nick Hobgood, USAID Small Grants Program  
Ms. Kate Heuisler, USAID Small Grants Program  
Mr. Antonio Gusmao, USAID Small Grants Program  
Mr. Helder Lopes, USAID Small Grants Program

#### **Private Sector**

Mr. Ricardo Cardoso Nheu, President of Câmara do Comércio e Indústria Timor-Leste (CCI)  
Mr. Jaime Dos Santos, General Secretary of Câmara do Comércio e Indústria Timor-Leste (CCI)  
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Timor Lorosa'e  
Mr. Rui Castro, General Director of CAIMALELOQUI  
Mr. Josep Wan, a businessman in Dili  
Mr. Bill Tanjito, Timor Global  
Mr. Shakib Awam, Duty Free Shop  
Mr. Gerson Alves, Dili Institute of Technology  
Padre Elizio Lucateli, Fatumaca School Baucau  
Padre Manuel Ximenes, Fuiloro School, Lautem  
Padre António Transfiguração SDB, Director of Provincial Salesian schools  
Dr Eduardo Serrão, Animal Husbandry Lecturer, Universidade Nacional Timor Lorosa'e  
Mr. Pedro Ricardo, Dili Port Supervisor, PERKINS Shipping Group  
Mr. Frans Gunawan, Trader/Davinci Shop, Audian, Dili  
Mr Rudy Djuang, Trader/Tuscany Shop, Fatuhada, Audian, Kuluhun, Dili

## **List of Persons Met and Interviewed – Agricultural Finance**

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Mr. Peter Jarvis, Agribusiness Advisor, Ministry of Agriculture, Forestry and Fisheries

### **Commercial Banks:**

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Dr. Correia Pinto, Director, Banco Ultramarino (BNU)

Mr. Peter Boucher, General Manager, ANZ Bank

### **Finance Companies:**

Mr. Alfredo de Jesus, Pacific Holdings Ltd. (Western Union)

Mr. R. Lynn Ogden, Vice President & Cooperative Secretary, Aurora Financial

### **Microfinance Institutions (specialized and non-specialized):**

Mr. David Winspear, Advisor, Opportunity for Timor Lorosa'e

Mr. Orazio Mendes, Acting Director, Opportunity for Timor Lorosa'e

Mr. Ângelo Soares, Dili Branch Manager, Tuba Rai Metin

Ms. Marcella Willis, Microfinance Program Manager, Catholic Relief Services/Tuba Rai Metin

Mr. Sérgio M. do Espirito Santo, General Manager, Instituição de Microfinanças de Timor-Leste (IMFTL)

Ms. Helen Todd, Executive Director, Moris Rasik

Ms. Aúrea Guterres, Halibur Oan Timor Fo Liman ba Malu (HOTFILMA)

Mr. Luís Berebuti, Director, Lakon Nakukun Mosu Naroman (LANAMONA)

Mr. António Jerônimo, Fundação Loke Dalan

Mr. Ildefonso da Costa Guterres, Director, Hamahun Feto Timor (HAFOTI)

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Mr. Shane McCarthy, Cooperative Agribusiness Advisor, Cooperativa Café Timor (CCT)

Mr. Sam Filiacci, NCBA Advisor, Cooperativa Café Timor

**International/Local NGOs:**

Mr. Butch C. Batilong, National Director, Habitat for Humanity

Mr. Isidoro Viana da Costa, Program Manager, Christian Children's Fund, Timor-Leste

Mr. Augusto Junior, Christian Children's Fund, Timor-Leste

Mr. Mark Anthony Dasco, Program Consultant Development Cooperation, Christian Children's Fund, Timor-Leste

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Mr. António Victor, Program Analysis Poverty Reduction & Community Development Unit, UNDP Timor-Leste

Mr. Rui Hanjan, Social Development Specialist, World Bank

Ms. Johanna Johansson, Senior Development Specialist, World Bank

Ms. Milissa Day, Financial Services Advisor, USAID/DAI Dezenvolve Setór Privadu

Mr. Lendell Foan, Deputy Chief of Party and Commercial Services Advisor, USAID/DAI Dezenvolve Setór Privadu

Mr. Kurt Koomen, Agribusiness/Cooperatives Services Advisor, USAID/DAI Dezenvolve Setór Privadu

Mr. Nick Hobgood, USAID Small Grants Program

Ms. Kate Heuisler, USAID Small Grants Program

Ms. Sildonia Sarmiento, USAID Small Grants Program

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Ms. Nandra Turton, Assistant Manager International, Perkins Shipping Group

Mr. Peter G. Harrison, Principal, Above Capricorn Technologies, Ag. & Environmental Consultants

**University:**

Ms. Tania Paul, Vet, Program Leader, Charles Darwin University

**Australian Government:**

Ms. Emma Watkins, Vet, Australian Quarantine and Inspection Services [AQIS]

Mr. Murray Cooper, Asst. Director, AustralAsia Trade Route, Dept. of Chief Minister, Northern Territory Government

Mr. Rod Gobbey, Executive Director, Primary Industry Group, Dept. of Primary Industry, Fisheries, and Mines, Northern Territory Government

Mr. Quentin Kilian, Asst. Director, International Trade, Dept. of Chief Minister, Northern Territory Government

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