Conservation Farming on Sloping Lands:
Summary and Highlights from a Roving Workshop
Misamis Oriental Province, Mindanao, Philippines
November 1-8, 1998

Cao Bang Province, northern Vietnam

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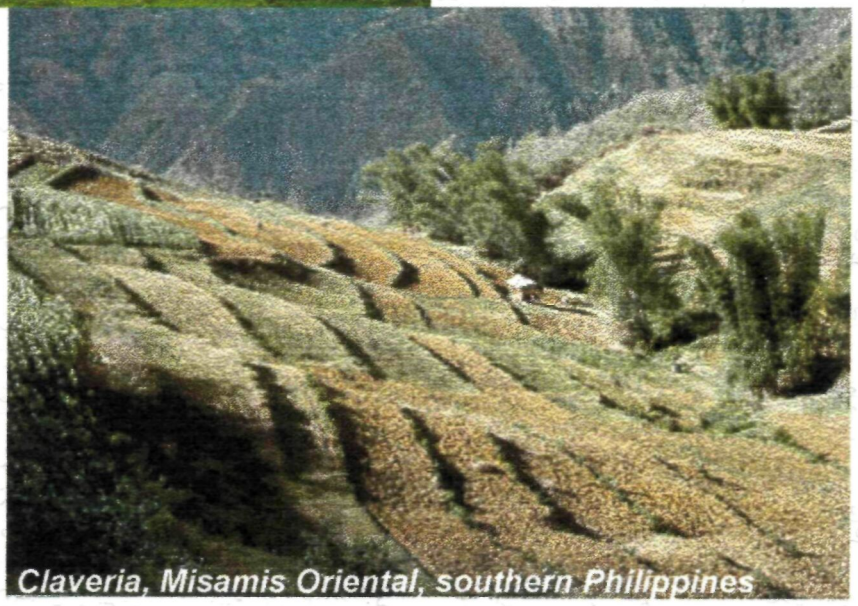

Claveria, Misamis Oriental, southern Philippines

Vietnam Agroforestry Capacity-Building (VACB) Project

ICRAF

Sida

What is VACB?

The initial phase of the Vietnam Agroforestry Capacity-Building (VACB) Project is being funded by the Swedish International Development Cooperation Agency (Sida) from May 1998 to December 1999. VACB enables the International Centre for Research in Agroforestry (ICRAF) to collaborate with many Vietnamese institutions on a number of capacity-building and research activities related to agroforestry and alternatives to slash-and-burn (ASB) agriculture.

The first VACB planning workshop was held 31 July-1 August 1998 in Hanoi with some 30 Vietnamese and international organizations and projects who are potential collaborators. From this and other consultations emerged 7 areas of collaboration, drawing upon ongoing ICRAF programs, projects and activities in:

- *Information dissemination*
- *Training in agroforestry and ASB*
- *Policy development for sustainable upland systems*
- *Indigenous fallow management*
- *Conservation farming on sloping lands*
- *Tree domestication and germplasm dissemination*
- *Modeling of complex agroecosystems*

Coordination and backstopping of VACB activities are provided by the ICRAF-Philippines Office in Los Banos and the VACB Project Office at the Vietnam Agricultural Science Institute (VASI) in Hanoi.

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Summary

With support from the Sida-funded Vietnam Agroforestry Capacity-Building (VACB) Project, ICRAF-Philippines invited 14 Vietnamese scientists, educators and managers to participate in a ***Roving Workshop on Conservation Farming on Sloping Lands*** during November 1-8, 1998 in northern Mindanao, Philippines. The Vietnamese group represented 13 institutions—ministries, provincial departments, national research institutes and universities—from different parts of the country.

During the workshop, the Vietnamese joined ICRAF colleagues from the Philippines, Indonesia, Kenya and Malawi, and interacted with key Philippine colleagues actively engaged in conservation farming research and dissemination work. (Please see *Annexes 1, 2 and 3* for the workshop program, list of participants and participant profiles, respectively.)

The group visited conservation farming sites in Claveria, Mindanao to gain new knowledge on technical and institutional innovations jointly developed and supported by farmers, local government units and ICRAF.

Papers and case studies on various aspects of conservation farming on sloping lands in Vietnam were presented during the workshop (summaries of the papers are in *Annex 4).* The group also had the opportunity to do some brainstorming and planning on conservation farming research, training and dissemination activities that could be supported by the VACB project in Vietnam in 1999.

Getting Started

On November 2nd, the group traveled from Manila to Cagayan de Oro, provincial capital of Misamis Oriental, northern Mindanao. As an icebreaking exercise, each participant had an opportunity to interview someone coming from another country, and then introduced him/her to the entire group.

Following the cross-introductions, **Delia Catacutan,** ICRAF-Lantapan NRM Specialist, facilitated the leveling of expectations. During this time, the participants were encouraged to write down what they expected to get out of the roving workshop. From among the many expectations the participants expressed, there were four major points:

> To acquire new knowledge and/or technologies regarding conservation farming;

> To learn more about technology transfer from farmer to scientist and vice-versa;

> To develop a framework and strategy for conservation farming research and development for Vietnam; and

> To set-up a firm network and working plan for VACB in 1999 with regard to conservation farming activities.

The objectives and procedures of the workshop were then explained by **Chun Lai,** VACB Coordinator based at ICRAF-Philippines, focusing on three elements:

> Visit Claveria conservation farming sites to gain new knowledge and insights on technical and institutional innovations;

> Present overview and case study papers on conservation farming aspects in Vietnam; and

> Plan conservation farming research, training and dissemination activities to be supported by VACB in 1999 in Vietnam.

The participants were urged to keep the following in mind during the field visits to Claveria:

> Importance of social factors as well as technical and institutional innovations;

> Similarities/differences between the Philippine and Vietnamese conservation farming situations;

> How new knowledge gained from field may be tested/applied back in Vietnam; and

> Please take good notes for the field learning synthesis session at the end of the workshop.

Next, **Agustin Mercado,** ICRAF-Claveria Site Coordinator, provided a briefing on the sites that the group would visit the following two days. He also prepared an excellent set of field site notes for the participants (see *Annex* 5).

Roving for Knowledge—In the Field

November 3rd and 4th were the most exhausting but exciting days for the whole group. These days were spent out on field visits to: ICRAF's on-farm experimental sites for conservation farming and timber-based agroforestry systems; various Landcare groups; the Misamis Oriental State College of Agriculture and Technology (MOSCAT); and the ICRAF-Claveria office on the MOSCAT campus.

Interacting with Claveria Farmers

The group visited the Tunggol, Mahayhay, Luna Purok 4 and Lanise Landcare groups within the municipality of Claveria, Misamis Oriental Province (see Figure 1 for location). Planned visits to the Laculac and Sta. Cruz Landcare groups were unfortunately cancelled due to inclement weather and impassable roads. Highlights in the field included:

> interacting with farmers to see and discuss how they evolved from simple NVS to a range of perennial cash crops (e.g., timber trees, fruit trees, pineapple, coffee, tomatoes) and forage grasses

> visiting communal and individual tree nurseries and exploring how they can be effective vehicles for training, extension and profit discussing with farmers and local officials about the role of local government units (LGUs) in supporting conservation farming and Landcare groups

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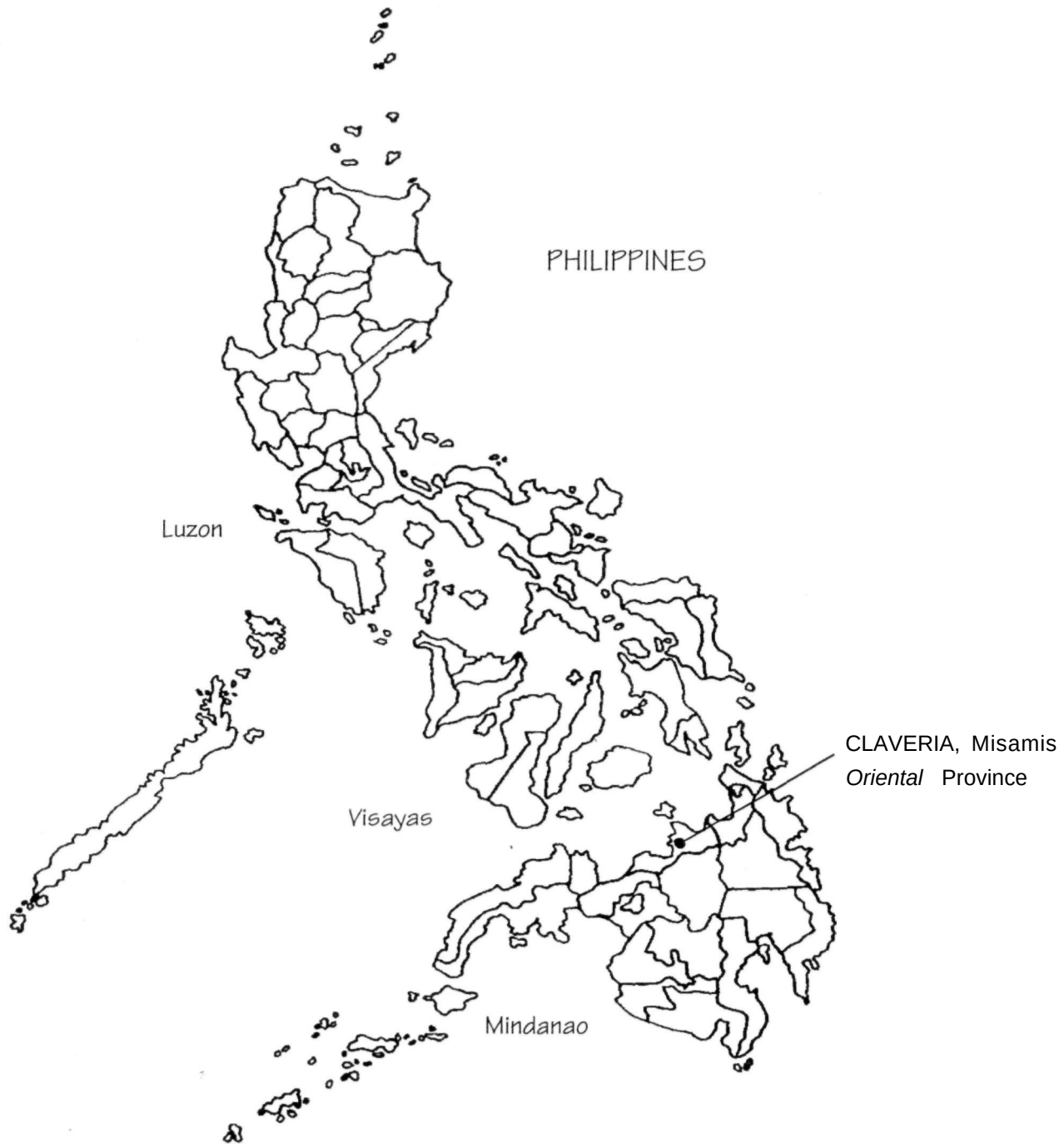

Figure 1. Location of Claveria, Misamis Oriental Province

During the farm and site visits, the participants were able to interact directly with the farmers and Landcare members from Claveria, and gather information on how they adopt and practice different methods of conservation farming on sloping lands. Particularly useful were the interactions with **Marcelino Patindol,** President of the Claveria Landcare Association (CLCA), who generously shared with the group his rich experiences, wealth of knowledge and excellent sense of humor!

The Landcare Approach

In northern Mindanao, conservation farming on sloping lands focuses on soil and water conservation practices that form the foundation for productive agroforestry systems. Examples of these practices include the use of natural vegetative strips (NVS), contour hedgerows, terraces, and green manure and cover crops. Integration of economic grasses, forages, food crops and perennials (trees and shrubs) provide short- and long-term benefits for farmers. Evolution of a range of technical and institutional innovations by farmers, researchers, extension workers and local government has led to successful, inexpensive and rapid adoption of conservation farming by farmers in many areas.

ICRAF has been instrumental in helping to develop a farmer-led approach to technology development and dissemination, which has resulted in an unexpected boost in farmer adoption of soil conservation technologies and agroforestry practices in Claveria. The key institutional innovation for effective conservation farming technology dissemination is the Landcare approach: a process that is led by farmers and community groups, with political and financial support by local government and technical backstopping from ICRAF.

In 1996, ICRAF began to support Landcare dissemination activities in Claveria as a direct response to farmers' request. The technical and institutional innovations jointly developed led to the formation of the Claveria Landcare Association (CLCA), which was formally registered as a people's organization (PO) in September 1997. CLCA has proven to be an effective, largely voluntary mechanism to promote and support conservation farming based on the establishment of NVS. By the end of 1998, 59 Landcare groups were operational within 19 *barangays* (villages) in Claveria. Most of these Landcare groups are based in the *purok* or *sitio* (sub-village), where farmers can interact with each other more frequently. A *sitio* has 30 to 60 farming families.

These Landcare groups have successfully extended conservation farming based on NVS to about 2,000 farmers, and established 205 communal and individual nurseries that produce hundreds of thousands of fruit and timber tree seedlings for planting on the NVS or along farm boundaries. CLCA also helped to get funding for 75 draft animals for dispersal to Landcare members who needed carabaos (water buffaloes).

The greatest success of Landcare is in changing the mindset of farmers, policymakers, local government units, and landowners about how to use the land and protect the environment. It is not simply about the total length of NVS laid out, the number of nurseries established, the number of seedlings planted, or the number of Landcare members. The Landcare movement is renovating the minds, attitudes, and practices of the farmers, policymakers, and local government officials on using the land to meet their current needs while conserving resources for future generations.

There are now farmers who voluntarily share their time and efforts. There are also policymakers who urge farmers to adopt conservation farming practices, and support these efforts by allocating local government funds and enacting local ordinances. These are the important success indicators of the Landcare approach that enable local people to conceive, initiate and implement plans and programs that will lead to the adoption of profitable and resource-conserving technologies.

Decentralization and devolution of natural resource management to the grassroots level enables local governments to allocate resources and provide policy support to complement farmer- and community-led efforts to conserve resources for sustained production and use. The Landcare approach provides:

> a vehicle for interested farmer to learn, adopt and share knowledge about new technologies that can earn more money and conserve natural resources;

> a forum for the community to respond to issues that they see as important;

> a mechanism for local governments to support; and

> a network for ensuring that ideas and initiatives are shared and disseminated.

Landcare is emerging as a dynamic approach that can empower local governments and communities to effectively and inexpensively disseminate conservation farming and agroforestry practices. The experiences and lessons learned in Claveria provide a strong basis to scale-up to the regional and national levels, and to scale-out to other municipalities.

Scaling-out to Malitbog

Judith Saguinhon, Municipal Agricultural Officer of Malitbog, Bukidnon Province, a municipality adjacent to Claveria, participated in the roving workshop. She shared her experiences on the methods and technologies of conservation farming in Malitbog, and how the Landcare approach is being initiated there, with the help of ICRAF-Claveria. She also mentioned the importance of collaboration and cooperation among farmers, people's organizations, local government units and international organization such as ICRAF in promoting conservation farming.

MOSCAT

At MOSCAT, the group met with **Juan Nagtalon,** President, and **Hermenegildo Sitoy,** Agroforestry Instructor. They provided a briefing about the college and its conservation farming research and extension activities.

Of particular interest to the Vietnamese group were MOSCAT's "ladderized" agroforestry curriculum—in which students have the option of either becoming agroforestry practitioners after two years of study and field practicum or continuing their BS degree program. There were also discussions about the College's outreach function, through community-based training and projects such as ASPECTS.

Enrolment and interest of students in agroforestry and related fields remain high at MOSCAT, in fact beyond their current absorptive capacity. These days, government job opportunities are scarce. Therefore, to encourage entrepreneurial initiatives, MOSCAT helps to facilitate loans to support the students' field practicum work. And the College is trying to lobby for the provision of loans to graduates who wish to develop agroforestry enterprises.

Field Wrap-Up Discussions

The wrap-up discussions regarding the site visits were held at the ICRAF-Claveria office on the MOSCAT campus. Lively discussions ensued on whether the Landcare model could be replicated in Vietnam. The Vietnamese group felt that the organizational aspects of CLCA were not applicable to the conditions in their countries. However, they appreciated the underlying principles and approach of Landcare and thought those were generally applicable to the Vietnamese situation—particularly the emphasis on generating voluntary contributions from farmers to promote conservation farming.

Vietnamese colleagues were most interested in questions such as: the genesis of Landcare in Claveria, whether it was indigenous or imported, the criteria for choosing farmer members, subsidies and inputs provided to farmers, and what benefits are realized by Landcare members. Marcelino Patindol and ICRAF colleagues provided their answers and perspectives to all the probing questions.

There was also considerable discussion on the various technologies that were seen in the field. In the past, many Vietnamese colleagues were exposed to the sloping agricultural land technologies (SALT) developed in the Philippines, and SALT variants have been tested in Vietnam. The group felt that NVS-based systems could be a viable alternate to test and adapt in different agroecological zones of Vietnam, especially where labor availability is a constraining factor.

Conservation Farming in Vietnam

From November 5th to mid-morning of November 7th, the group shifted from the field to the hotel meeting room in Cagayan de Oro.

Among the major highlights were the presentations by the Vietnamese participants on November 5th. A rich array of Vietnamese experiences in conservation farming on sloping lands were presented through 2 overview papers and 10 case studies (see Figure 2 for case study locations).

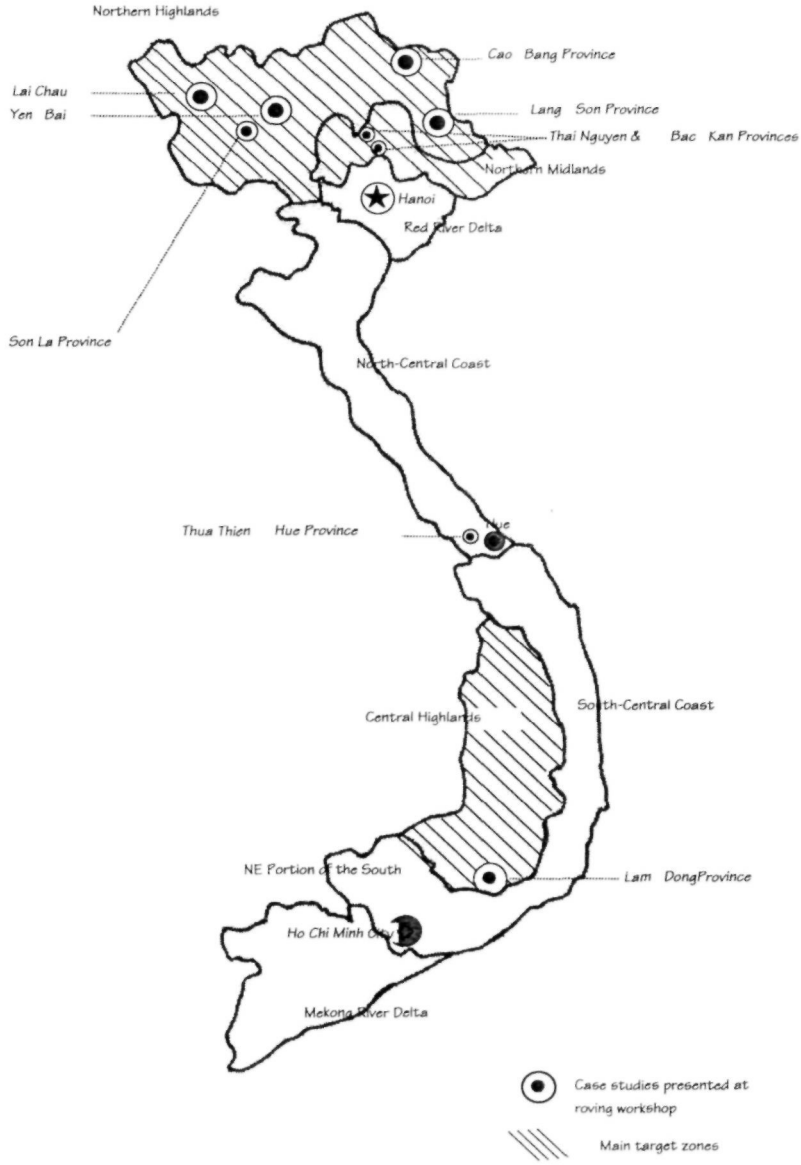

Figure 2. **Main Agro-ecological Zones for VACB Conservation Farming Activities and Locations of Case Studies Presented**

In the Vietnam context, conservation farming is viewed as farming systems that incorporate suitable combinations of crops (forest, agricultural, medicinal and pastoral) in order to use natural resources more efficiently with appropriate technologies, thereby increasing both farmers' income and environmental protection. As 73 percent of the country is classified as sloping lands, conservation farming is critical to sustainable agricultural development and natural resource management.

There are 7 major agroecological zones in Vietnam (see Figure 2), determined by topography, soils and climate, with the following distribution from north to south:

Zone	Million ha
1. Northern highlands/midlands	10.2
2. Red River delta	1.2
3. North-central coast	5.2
4. South-central coast	7.5
5. Central highlands	5.6
6. NE portion of the South	2.4
7. Mekong River delta	4.0

The two agroecological zones of highest priority for conservation farming are the northern highlands/midlands and the central highlands. In the northern mountainous region, the population density is about 120 people per square kilometer and the forest cover is only 9 percent. An estimated 60 percent of the lands within this zone suffer from soil degradation as a result of deforestation and shifting cultivation, with annual soil loss rates reaching 100 to 150 tons per hectare. Similar situation and problems are found in the central highlands zone.

The forest cover in Vietnam had been drastically reduced from 43 percent of the total area in 1945 to about 20% in 1997. Vietnam's cultivated land per capita of 0.1 ha is among the lowest in the world. The cropping intensity exceeds 140 percent, and the general agricultural production is nearing the potential ceiling of 14-15 tons/ha/year. Poverty is still pervasive in the mountainous areas, where many ethnic minorities reside. Given this set of conditions, the development and dissemination of appropriate conservation farming systems on sloping lands in the northern and central highlands is urgently needed.

To date, various conservation farming practices have been developed by farmers and researchers in different parts of Vietnam. Some of these practices were highlighted in the case studies presented during the roving workshop, including the following:

> terracing in valley bottoms and adjacent foothills, and mini-terracing on more stony and sloping lands (up to 60 degrees slope)

> testing and adapting various sloping agricultural land technologies (SALT) originally developed in the Philippines

> using forage cover crops—mainly legumes—in fallows, or intercropping/relay planting them with food crops, e.g., pigeon pea *(Cajanus cajan)*

> introducing controlled grazing or stall-feeding by growing fast-growing forage plants for cut-and-carry

> planting multipurpose trees and/or shrubs in various agroforestry arrangements , e.g., cinnamon *(Cinnamomum cassia)*

The Vietnamese group emphasized the importance of indigenous knowledge in developing appropriate and sustainable conservation farming practices. For example, the intercropping of cinnamon with agricultural crops in the uplands of Yen Bai Province has been successfully developed by the Dzao ethnic group.

Synthesizing What Was Learned

November 6th began with an open forum session, facilitated by **Dennis Garrity,** ICRAF-SEA Regional Coordinator, to discuss and synthesize new knowledge and insights gained from the field visits and interactions among participants. Sustaining local organizations became one of the central themes of discussion. Participants from Vietnam and the Philippines exchanged ideas and experiences on how to support local organizations in conservation farming initiatives. Key points raised included the following:

> To strengthen local organizations, members should work together as much as possible, and also participate in social activities to build the spirit of camaraderie. Issues relevant to the group—such as conservation farming—as well as government policies should be discussed to keep members informed. This serves as a process of information dissemination.

> Terms of reference of the local organization should be clearly identified and articulated in order to attract more members as well as support and funding from donors.

> The enthusiasm of members should be kept high to sustain the organization, otherwise problems of sustainability may arise.

> There should also be support coming from the government—national down to the local authorities—to better sustain people's organizations. The support may be financial and/or political in nature.

> The organization should also have good relationships with other existing local, national or international partner organizations.

Moreover, the synthesis discussions addressed the queries of the Vietnamese participants on how the Claveria Landcare Association operates, and how it can be best adapted to Vietnamese conditions. The group focused on the question of which existing Vietnamese grassroots organizations to tap, or, if there is a need to create new organizations to serve purposes similar to that of the CLCA.

There was considerable discussion on the technology transfer process, with these key points raised:

> Linkages among NGOs, POs and GOs should be developed to support and empower existing organizations that may be tapped to promote conservation farming and Landcare in Vietnam.

> When transferring technologies, researchers, scientists and extension workers should have knowledge about the cultural differences of ethnic minority groups living in the community. They should also establish good working relationships with community leaders in order to support the technology adaptation process.

> Farmers, when adapting a technology, should give attention to the ecological, social and economic aspects.

Working Groups

Later that morning, the participants were divided into four working groups, based on their institutions and interests, which focused on the following topics:

1. Conservation farming research needs in Vietnam;
2. Conservation farming training needs in Vietnam;
3. Conservation farming management/extension needs; and'
4. Landcare development needs in the Philippines.

Identifying Needs and Actions

Outputs and proposed action plans of the working groups were presented on the last morning of the workshop (November 7th) before the group returned to Manila.

Group 1. Conservation Farming Research Needs in Vietnam
The group proposed secondary information collection and action research in 1998-1999 on the following:

1. Obtain secondary information on:

> Indigenous and improved technologies on conservation farming

- Impacts of previous and ongoing research projects on agroforestry and conservation farming

2. *Conduct transect surveys in selected agroecological zones:*

   - With the participation of ICRAF and institutions in the VACB network

3. *Design and evaluate conservation farming models such as:*

   - SALT-3
   - Agroforestry for shortening the fallow period without deterioration of soil fertility, e.g., *Tithonia, Eupatorium*
   - Introduce conservation farming technologies, e.g., natural vegetative strips (NVS)
   - Identify a site in each of the seven agroecological zones, and develop two models at each site; scale of each model ~2ha

4. *In the northern highlands/midlands and north-central coast zones, investigate the following:*

   - Transformation of fallow land into permanent cultivation of pastures /cover crops as an alternative to slash-and-burn in Cho Don, Bac Can
   - Application of suitable cropping patterns to shorten fallow periods in the uplands of Son La
   - Design of models involving forest trees and fruit trees in Ba Quang, Ha Giang
   - Production model involving forest trees and field crops in Hoa Binh and Son La
   - Cinnamon and tea plantation in Yen Bai, with focus on (1) forest trees plus fruit trees; and (2) forest trees plus field crops

5. *In the south-central coast zone, conduct trials of:*

   - Hedgerows of *Sesbania rostrata,* cinnamon intercropped with peanut/ maize in Aluzi, Thua Thiem Hue

6. In the central highlands zone, develop the following models:

> Coffee and cinnamon

> Hedgerows of *Desmodium, Gliricidia, Flemingia* intercropped with fruit trees such as durian, persimmon, cinnamon

> Hedgerows plus fruit trees plus vegetables

> Coffee intercropped with field crops

7. *In the northeast portion of the south, experiment with:*

> Hedgerows of *Leucaena, Tephrosia, Gliricidia* intercropped with fruit trees such as durian, rambutan, mangosteen

> Hedgerows plus rubber plus field crops

> NVS, rubber, fruit trees intercropped with field crops

The working group also suggested activities to support the proposed research work:

> Arrange cross-visits for staff of involved institutions.

> Conduct group seminars before compiling final report.

> Seek support from other organizations, e.g., MOSTE, NGOs and international institutions.

> Set-up an ICRAF coordination office for Indochina based in Vietnam.

Group 2. Conservation Farming Training Needs in Vietnam
The group came up with the following proposed activities:

1. Organize national training workshop on the concept of conservation farming with the following objectives:

> criteria of conservation farming

> how to integrate conservation farming into subjects/curricula

> identify types of training courses on conservation farming

> target group to be involved: groups from the national level or networks

> national workshop should collaborate with academic, research, extension and other partner institutions

2. *Address human resource development needs through the following:*

> indigenous knowledge systems/gender issues: a training course with focus on methodologies and tools, including:

> case studies, documentation, and dissemination

intellectual property rights issues

participants from academic, research, extension, and related institutions, resource person(s) from ICRAF

> study tour to exchange experiences with local institutions, e.g., networking Landcare/ICRAF-Philippines with VACVINA/Farmer Associations with focus on grassroots issues (Vietnam-Philippines cross learning)

Group 3. Conservation Farming Management/Extension Needs in Vietnam

Major management and extension problems identified were:

1. *Need for better and stronger linkages between researchers, scientists and extensionists.*

2. *Need to strengthen extension network at the grassroots level—especially in term of human resources, knowledge and coordination.*

3. *Substantiate documentation on conservation farming—farmers, extensionists and scientists often lack information.*

4. *Lack of coordination among different programs and projects—coordination poor among GOs, NGOs, and LGUs.*

5. *Lack of appropriate macro policy to support conservation farming.*

To address these weaknesses, activities should be designed to:

1. *Collect, survey, analyze and evaluate successful and unsuccessful examples of conservation farming (including indigenous and improved practices).*

2. *Collect, survey, analyze and evaluate the methods and approaches of technology transfer, including the roles of extensionists, village leaders, farmers, policy makers, etc.*

3. *Document and disseminate information in various forms, e.g., videotapes, flipcharts and books.*

4. *Organize workshop to revise/evaluate the findings.*

5. *Finalize documentation and share widely.*

Group 4. Landcare-Development Needs in the Philippines

Claveria

1. *Further strengthen CLCA through regular monthly meetings; hands-on training and cross-visits, and information and education (e.g., through slide shows).*

    > There is a need to improve the process on how the meetings are being conducted; need to conduct a training of trainers.

2. *Improve access to technical and financial assistance sources:*

    > internal/local: LGUs, Human and Ecological Security program

    > external: PHILGERFUND, AECI, ACIAR, etc.

3. *Strengthen linkages with:*

    > locally represented organizations such as DOST, DENR, DA, etc.

    > national and international organizations

4. *Develop "social marketing" of Landcare to improve awareness and broaden the support base.*

Malitbog

1. *Need to develop a Federation of Landcare groups.*

2. *Need to overcome constraints to NVS and sustainable agriculture technology adoption.*

3. *Need to overcome staff limitations: recruit volunteer/students; develop new proposals*

Scaling-up within Misamis Oriental Province

1. *Identify approach and entry points.*

2. *Develop proposal.*

3. *Build up institutional collaboration with the provincial government.*

Lantapan, Bukidnon Province

1. *Scaling-up to municipal and provincial levels, in collaboration with SANREM, and with provincial and municipal LGUs.*

Scaling-up to National Level

1. *Consult with DENR, develop joint training-of-trainers activities, collaborate with DENR infield implementation.*

Enterprise Development

1. *Install/operate small sawmill in Claveria:*

   - develop business plan
   - identify manager
   - learn and comply with DENR requirements

2. *Continue draft animal dispersal program with support from PHILGERFUND and others.*

3. *Develop contract growing opportunities:*

   - for fruit trees (e.g., durian), yams and other commodities

Documentation/Information

1. *Produce videos on Landcare, conservation farming (in Cebuano and English)*

2. *Develop more "how to" brochures on conservation farming, fruit trees and timber trees.*

3. *Package sets of slides on conservation farming practices.*

What Next?

Toward a Feasible Proposal

The group agreed that the research, training and dissemination needs and actions identified and proposed by the Vietnamese working groups were comprehensive and accurate. However, it was also apparent that certain proposed actions were overly ambitious and beyond the scope of VACB support—e.g., conducting indigenous knowledge surveys, doing transects, and establishing conservation farming models in 7 agroecological zones.

There was lively discussion on the effectiveness of establishing additional models in Vietnam. Hundreds of agroforestry and conservation farming models have already been established—usually with heavy subsidies—and it is doubtful whether these models have served as effective mechanisms for technology transfer to farmers.

Chun Lai suggested that the common, priority elements articulated by the three working groups could be harmonized into one integrated proposal that could be feasibly carried out in 1999 with VACB support. The proposal could be discussed and finalized at the next VACB planning workshop, scheduled in early March 1999 in Hue.

The participants agreed with this approach, as well as the suggestion that VASI could help to coordinate the proposal development, and assist in implementing, monitoring and evaluating the conservation farming work once the proposal has been finalized and approved.

How Did We Do?

In hindsight, the roving workshop largely attained its objectives, and the participants felt that most, if not all, of their expectations were met. The field visits and interactions with farmers and Landcare partners in Claveria were invaluable in providing new knowledge and insights into the evolving technical and institutional innovations that underpin conservation farming in northern Mindanao. This, in turn, helped to generate new and fertile ideas and approaches for future conservation farming research, training and dissemination work in Vietnam.

The roving workshop also contributed to building stronger professional and personal relationships among key Vietnamese, Filipino and ICRAF colleagues, which may be one of the most sustainable and important outcomes of our time together in northern Mindanao!

Annex. 1: Workshop Program

1-2 November 1998, Sunday/Monday

TIME	ACTIVITIES	PERSON RESPONSIBLE
1 Nov	Vietnamese participants arrive in Manila via Cathay Pacific flights from Hanoi & HCMC; Transfer to Holiday Inn Hotel	G. Acaylar

2 Nov 08.00 10.00 11.30	 Transfer from hotel to airport PR 183 to Cagayan de Oro, Mindanao Arrrive in Cagayan de Oro; Transfer/check into Southwinds Hotel	 G. Acaylar
12.30	Lunch	
14.00-17.00	Ice-breaker session: • Introductions • Leveling of expectations • Workshop objectives and process Information about site visits	C.K. Lai/D. Catacutan A. Mercado
Evening	Welcome dinner	G. Acaylar

3 November 1998, Tuesday

TIME	ACTIVITIES	PERSON RESPONSIBLE
06.30	Breakfast	G. Acaylar
07.30	Depart for Claveria	C.K. Lai/G. Acaylar
08.30	Arrive Claveria • Briefing about Claveria and ICRAF research activities • Overview of the Claveria visit and expectation setting	 D.P. Garrity/A. Mercado C.K. Lai/ A. Mercado
09.00	Smallholders timber tree production system research	M. Bertomeu
(Snacks will be served while at the field)	Tunggol Landcare Group Featuring: • NVS evolved to perennial cash crops: timber trees, fruit trees, pineapple, coffee, etc. and fodder grasses, individual/household nurseries. Farmers to be visited: • Mr. Lobiano-NVS evolved to fodder grasses and mixed fruit and timber trees. • Mr. Junio-NVS evolved fodder grasses, timber and fruit trees and household nurseries. • Mr. Sudaria-NVS evolved to pineapple, fruit trees and citrus.	A. Mercado/D.P. Garrity Mr. Lobiano/ A. Mercado Mr. F. Junio/ A Mercado Mr. Sudaria
12.00	Lunch at ICRAFoffice	S. Rafinan/C. Pailagao/ G. Acaylar
13.00	Mahayhay Landcare Group Featuring: • How a sitio landcare should operate • Communal nursery • Conservation farming adoption around sitio proper	Mr. V. Matugas/ A. Mercado
16.30	Wrap-up session	A. Mercado/C.K. Lai
17.00	Trip back to Cagayan de Oro City	C.K. Lai/G. Acaylar

4 *November 1998, Wednesday*

TIME	ACTIVITIES	PERSON RESPONSIBLE
06.30	Breakfast	G. Acaylar
07.30	Depart for Claveria	C.K. Lai/G. Acaylar
08.30	Arrive Claveria • Meeting with MOSCAT President- Briefing about MOSCAT and conservation farming research and extension activities.	Dr. J. Nagtalon
09.30	Depart for upper Claveria Featuring: • Mr. Del Fiero-coffee + *E. deglupta* interplanting • Luna Purok 4 Landcare Group-tomatoes on NVS, NVS evolved to cash perennial, communal nursery • Lanise Landcare Group • Visit to Claveria "El Canyon Grande San Miguel"	A. Mercado Mr. Del Fiero/A. Mercado Mr. Gayunan/A. Mercado Mr. Ellezo/A. Mercado M. Bertomeu/A. Mercado
12.00	Lunch at ICRAF office	S. Rafinan/C. Pailagao
16.30	Wrap-up session	A. Mercado/C.K. Lai
17.00	Trip back to Cagayan de Oro City	C.K. Lai/G. Acaylar

5 November 1998, Thursday

TIME	ACTIVITIES	PERSON RESPONSIBLE
07.00	Breakfast	G. Acaylar
08.30	Workshop Opening	C.K. Lai
09.00	***Vietnamese experiences in conservation farming on sloping lands:***	
	Overviews:	*Moderator: C.K. Lai*
09.15	• Conservation farming in Vietnam: Introduction & proposed VACB activities	Mr. Ha Dinh Tuan
09.45	• Challenges and opportunities for conservation farming in Vietnam	Dr. Nguyen Van Bo
10.15	Coffee/tea break	G. Acaylar
	Case studies:	*Moderator: D.P. Garrity*
10.45	• Human resource development in conservation farming on sloping lands	Dr. Ly Van Trong/ Mr. Pham Xuan Hoan
11.15	• The impacts of community on forestry resources in Hilly and Mountainous Zone in Xuan Loc commune, Phu Lac District	Mr. Le Quang Minh
11.45	Open forum	
12.00	Lunch	G. Acaylar
	Case studies:	*Moderator: D.P. Garrity*
13.00	• The role of legumes in sustainable land use in the Northwest of Vietnam	Mr. Dinh Thanh Giang
13.30	• Traditional indigenous AF knowledge in uplands of Cao Bang province	Dr. Nguyen Thi Nuong
14.00	• Cinnamon in conservation farming at Van Yen district, Yen Bai province	Mr. Pham Xuan Hoan
14.30	Coffee/tea break	G. Acaylar
	Case studies:	*Moderator: D.P. Garrity*
15.00	• Landcare in Malitbog, Bukidnon	Engr. Judith Saguinhon
15.20	• Conservation farming in 5 MM ha Reforestation Program	Ms. Bui My Binh
15.40	• Technology transfer on conservation farming - IAS perspectives	Dr. Nguyen Tang Ton
16.00	• Indigenous knowledge in conservation farming in South Vietnam	Mr. Vo Van Thoan
16.20	• Measures for conservation farming and improvement of fertility on sloping lands in Vietnam	Mr. Nguyen Xuan Thanh
17.30	Optional excursion: shopping/sightseeing	G. Acaylar

6 November 1998, Friday

TIME	ACTIVITIES	PERSON RESPONSIBLE
07.00	Breakfast	G. Acaylar
08.30	Some findings on farming systems in the upland region of North Vietnam: The case of Chieng Pan commune, Son La province	Mr. Le Quoc Doanh
09:00	Open forum to discuss and synthesize new knowledge and insights from field visits	D.P. Garrity
10.30	Coffee/tea break	G. Acaylar
11.00	Open forum to discuss working groups on: • Conservation farming research • Education/training • Extension/dissemination	C.K. Lai
11.30	Working groups breakout: discuss and decide on facilitator/rapporteur/process	
12.00	Lunch	G. Acaylar
13.00-17.00	Working groups discuss and prepare detailed plans for conservation farming research, training and dissemination work in Vietnam to be supported by VACB up to the end of 1999	Facilitators/ rapporteurs
Evening	Farewell dinner	G. Acaylar

7-8 November 1998, Saturday/Sunday

TIME	ACTIVITIES	PERSON RESPONSIBLE
7 Nov		
07.00	Breakfast	G. Acaylar
08.30	Working groups present results for discussion	C.K. Lai
10:00	Workshop Closure	D.P. Garrity
10.30-11.00	Check-out of hotel	G. Acaylar
11.00	Transfer from hotel to airport	G. Acaylar
12.30	PR 184 to Manila	G. Acaylar
14.00	Arrive in Manila;Transfer to Holiday Inn Hotel; Reimbursements	C.K. Lai M. Caballero

8 Nov		
TBA	Transfer from hotel to airport (time to be announced)	C.K. Lai
10.50	CX 906 to Hongkong for continuing flights to Hanoi and HCMC	

Annex 2: List of Participants

Participants from Vietnam

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Annex 3: Participant Profiles

Vietnamese Participants

BUI MY BINH
Forest Officer, Forest Science Institute of Vietnam (FSIV)
Administrator, MARD International Support Group Secretariat

Ms. Binh is currently working with upland farmers whose living mainly relies on exploitation of natural resources. Part of her work is the introduction of sustainable and financially viable production alternatives to forest users, while trying to identify problems and propose possible solutions for forestry policy makers.

As a Forest officer at FSIV, her present conservation farming activities involves shortening the fallow period in swidden farming; assessment of local knowledge in slope farming; assessment of present swidden farming situation in the Central Higland; applying technology progress for restoring ecological environment in the mountainous areas of Nham Bien, Bac Giang province; and, development of technical plantation developing in Mekong River.

Ms. Binh has a BSc in Studies of Forestry from Xuan Mai Forestry College in 1993, and was an apprentice at the International Institute of Rural Reconstruction, in the Philippines in 1996 where she was stationed at the Regional Office for Asia.

DINH THANH GIANG
Researcher, Research Centre for Forest Ecology and Environment
Forest Science Institute of Vietnam

Mr. Giang is currently working on projects and research topics related to conservation farming as both researcher and fieldworker/extensionist. These activities include shortening the fallow period in swidden farming; surveying of local knowledge in slope farming; assessment of present swidden farming situation in the Tay Nguyen region; and, applying technology progress for restoring ecological environment in the mountainous are of Nham Bien, Bac Giang province.

He is also interested in activities related to identifying types of trees with multi-purpose in long-term sustainable sloping land use and on establishing experimental models on sustainable sloping land use in different regions of Vietnam.

Mr. Giang is a Silviculture Engineer on Forest Conservation graduate of the Forestry University, Vietnam in 1996.

VO VAN THOAN
Department of Social Forestry
College of Agriculture and Forestry

Mr. Thoan has a BSc in Forestry (1970) and is an instructor of the National Agricultural Institute of Saigon. He also served as Head of the Forest Inventory and Management Department from 1983-1993. He has been involved in training and research to help meet the needs of the Social Forestry Department's forestry sector and implement the Vietnam government's 327-CT program.

Mr. Thoan has a MSc in Forestry (1997). His past researches include on farm research on sustainable agoroforestry systems in the poorest village, which aims to strengthen farmers to participate in the establishment of sustainable agroforestry on the grey soil (also the white area during the war) to improve environment conditions (199-1994), and community-based resource management.

PHAM XUAN HOAN
Silviculture Faculty
Forestry University of Vietnam

Mr. Hoan is currently involved in forestry extension and social forestry activities in framework of cooperation and financial assistance by Helvetas-Switzerland; training and transfer activities related to a 5 million ha plantation programme set out by Vietnam's government and other activities in conservation farming.

He was trained on silviculture course and graduated from the Forestry University of Vietnam belonging to the Silviculture Specialization, earning him a Regular University Degree Training. Mr. Hoan also has a Master Degree Training in Silviculture Major (1996) and is now working on his PhD study.

Hoan would like to engage in conservation farming activities in Vietnam that would investigate findings of the indigenous techniques in land use by the Dzao people, and study approaches that would replace the Dzao peoples' shifting cultivation practice following a model that will be participated in by the people.

HA DINH TUAN
Staff, Research Planning and International Cooperation Department
Vietnam Agricultural Sciences Institute (VASI)

He is engaged in conservation farming and is currently the Coordinator and researcher for VASI-CIRAD Project for Agricultural Systems in Northern Mountainous Regions of Vietnam. He also worked before on sustainable mountainous agricultural systems research; indigenous forage and soil cover legumes; and, soil erosion control and soil fertility.

Mr. Tuan has a BSc in Biology, Phytopathology from Kisinhev State University, Kisinhev/Moldavia (1976) and MSc in Plant Breeding from Sydney University in Australia.

He is most interested in continuing research on sustainable ways to develop agriculture on sloping areas; collect, test and introduce suitable legumes and trees for agroforestiy in mountainous areas; and, seek different methods to increase incomes of upland farmers.

HOANG THANH TIEM
Western Highlands Agroforestry Science and Technical Institute

Mr. Tiem participated as researcher and coordinator in the following projects which are related to conservation farming: assessment of land use for coffee growing in the Western Highlands in order to prevent soil loss and risk of water shortage; cinnamon intercropping with coffee in the sloping soil in the Highlands in Yen Bai province (1995-1996); and, integrated measures and irrigation systems adopted to the shortage of water areas in coffee growing zones in the Western Highlands (1995-2000).

He has a BSc in Crop Protection from the Agroforestry University, Habana, Cuba (1982) and PhD in Coffee Breeding, from the Agroforestry University, in Ho Chi Minh City (1996)

Mr. Tiem is most interested in engaging in activities related to identifying the sustainable agroforestry system for the Ethnic people in the Western Highlands of Vietnam, in order to improve their living conditions and to protect the land losses as well as watersheds.

NGUYEN VAN BO
National Institute of Soils and Fertilizers

Mr. Bo has earned Highest Degree in 1988 from Moscow University. He is presently conducting research and demonstrations on appropriate use of upland for sustainable production, erosion monitoring, and watershed management. He is most interested in policy management and linkage between research and extension with regard conservation farming.

NGUYEN THI NUONG
Head, Department of Agriculture and Rural Development

Ms. Nuong has a PhD in Agricultural Sciences from the Vietnam Agricultural Sciences Institute. She is currently the Head of the Department of Agriculture and Rural Development of Cao Bang Province of Vietnam. She is also conducting researches on agricultural systems in the mountainous regions of Vietnam.

NGUYEN XUAN THANH
Center of Environment and Natural Resources

Mr. Thanh holds a BSc in Engineer of Agriculture and Master of Environment. His past activities related to conservation farming includes soil survey and landcare planning, soil fertility, and land evaluation. He is presently building agricultural projects and transferring Agro-Techniques to farmers.

Mr. Thanh is most interested to learn colleagues' experiences on farming system field on sloping lands to soil conservation.

LE QUOC DOANH
Head, Research Planning and International Cooperation Department
Vietnam Agricultural Sciences Institute (VASI)

Mr. Doanh's interest in conservation farming led him to the following conduct studies on the changes of farming systems on upland areas of North Vietnam, participatory projects in different development projects on Agroforestry in North Vietnam, the study of indigenous knowledge in the Upland North Vietnam, and, participatory in eco-regional researches in Red River Basin.

He holds a BSc in Study on Soil Science and Fertilization from Hanoi Agricultural University (1984), MSC in Study on Agricultural Systems from the Asian Institute of Technology in Bangkok (1992). Mr. Doanh also participated in training programs on Farming Systems organized by the International Center for Development Oriented Research in Agriculture (ICRA) in Wageringer, Netherlands.

LE QUANG MINH
Senior Lecturer Hue University of Agriculture and Forestry

Mr. Minh has been teaching in general ecology and protection environment for many years in the University of Agriculture and Forestry. He participated in some training course and workshops about Sustainable Rural Development in CRES and EWC. He enjoined as a member of Projects of Vietnam and International Cooperative Projects in Resources Management and Environment Protection field.

Mr. Minh has a BSc in Biology from Hanoi University. He is also now teaching Agricultural Ecology in Hue University of Agriculture and Forestry. He is also the head of Upland Development and Research Group (UDRG is one of the branches of CRES).

DR. LY VAN TRONG
Senior Lecturer
Head, Department of Social Forestry
Associate Director, Mountainous Resource and Environment Centre (MREC)

Dr. Trong teaches Social Forestry (diploma and certificate courses) and conducts research and extension activities in the field of integrated rural development to improve their impacts on livelihood of local community and environment.

He earned his BSc of Forestry in 1970 in the College of Forestry, Vietnam and his PhD in 1985 in Czechoslovakia at the University of Forestry and Wood Technology of Zvolen. Mr. Trong have been attending training courses on SALT in 1991 in Mindanao (Baptist Rural Life Centre) Philippines, Certificate on Community Forestry of RECOFTC, Kasetsart University, Bangkok, Thailand.

Dr. Trong also provides consultancy in ToT, Participatory Curriculum Development for some Technical School in Vietnam.

HOANG XUAN THUAN
Senior Expert
Ministry of Science and Technology and Environment (MOSTE)

Mr. Thuan's field of specialization is on Reforestation Planning. He has a PhD in Forestry.

He is currently working for the Ministry of Science and Technology and Environment (MOSTE) as a Senior Expert

NGUYEN TANG TON
Institute of Agricultural Sciences of South Vietnam

Mr. Ton has a BSc in Agronomy from Cantho University (1973), MSc and PhD in Agricultural systems from the Asian Institute of Technology in Thailand.

He currently monitors, conducts and supervises researches on agricultural technologies for sustainable agriculture in the different provinces of Vietnam.

DENNIS P. GARRITY ***UNITED STATES***
Regional Coordinator of Southeast Asia
ICRAF-Bogor

Dr. Garrity, a principal scientist, coordinates ICRAF's collaborative research and dissemination activities in Southeast Asia, which at present cover Indonesia, the Philippines, Thailand and Vietnam. His responsibilities focus on system improvement research in the humid tropics of the region to develop and evaluate agroforestry alternatives to slash-and-burn agriculture that can also reclaim abandoned alang-alang grasslands. Based in Bogor, Indonesia, he is involved in establishing the regional programme priorities. As a systems agronomist, he conducts research on the development of conservation-oriented agroforestry systems for sloping uplands in the region. He is investigating the tree-soil-crop interactions with emphasis on the management of soil fertility variation as natural terraces develop behind vegetative barriers. He is also working on the productivity of systems combining full-canopy trees and crops in smallholder agroforests.

Dr. Garrity has a BSc in Agriculture from Ohio State University, an MSc in Agronomy from the University of the Philippines Los Banos and a PhD in Crop Physiology from the University of Nebraska. In 1992 he received the MS Swaminathan Science Award in recognition of his contribution to the development of the lock-lodging system that substantially raises ratoon rice production in humid tropics, and he was the 1994 recipient of the Technology Development Award from the Federation of Philippine Crop Science Societies. He served as an agronomist/crop ecologist and head of the Agroecology Unit at IRRI in the Philippines between 1982 and 1992.

CHUNK. LAI ***UNITED STATES***
Senior Capacity-Building Specialist (Consultant)
ICRAF-Los Banos (Philippines)

Mr Lai provides programming and technical support for ICRAF's capacity-building activities in Southeast Asia, particularly in the Philippines and in Vietnam. Based at ICRAF-Philippines, he collaborates with the University of the Philippines Los Banos and other Philippine partners in the government and non-governmental sectors. He coordinates the Sida-funded Vietnam Agroforestry Capacity-Building Project, which aims to strengthen Vietnamese capacity to conduct sound agroforestry and ASB research and development. He also supports other

capacity-building efforts within the region by working closely with Programme 5 colleagues based in Bogor and Nairobi.

Mr. Lai has a BS in forestry from the University of Maine and an MF in international forestry from Yale University. He has gained over 20 years of professional experience in the USA, West and Central Africa, South Asia and Southeast Asia, primarily working on initiatives to improve agroforestry and natural resources management for the benefit of farmers.

ANDREAS BOHRINGER ***GERMANY***
Senior Scientist-Dissemination and Development
ICRAF-Nairobi

Dr. Bohringer provides leadership in disseminating agroforestry in the SADC-Zambezi Basin Project. His main task is to link agroforestry research to rural development and to accelerate its impact on the livelihood of local communities and the environment. Large portions of his work therefore relate to education, training and creation of public awareness at different stakeholder levels. He works within Programme 4.

Dr. Bohringer has a dipl. ing. Degree in International Agriculture Science/Farming Systems Economics from Kassel University in Germany, an MS degree from the Department of Agronomy and Soil Science of the University of Hawaii and a Dr. sc. Agr. Degree from Hohenheim University in Germany. He worked as an agronomist in charge of the Eastern Province of Zambia, where he also initiated agroforestry research in 1986. His doctoral research was conducted in Benin on the development of simultaneous fallow-cropping systems at benchmark village sites. Before joining ICRAF, he worked as a natural resources management and community development adviser for GTZ/CIMon Madura Island in Indonesia. He has also worked in farming systems research, natural resources management and rural development in the Philippines, Western Samoa, the Kingdom of Tonga, India, Uganda and Germany.

NOBEL MOYO ***MALAWI***
Dissemination Specialist
ICRAF-Malawi

Mr. Moyo works with the SADC-ICRAF agroforestry programme in Malawi, based in Zomba, Malawi. A Programme 4 member, he is responsible for the transfer of agroforestry technologies through governmental and non-governmental extension services to farmers for wider testing and adoption.

Mr. Moyo has a BSc in Agriculture from the University of Malawi and an MSc in Agricultural Extension from the University of Reading. He worked as an extension and training officer for a German-funded livestock project and later as an agricultural training officer with the Christian Service Committee, an NGO. In these appointments he was involved in promoting participatory extension and training approaches towards sustainable agriculture development.

STEVE FRANZEL ***UNITED STATES***
Principal Agricultural Economist
ICRAF-Nairobi

Dr. Franzel provides leadership in the design and implementation of on-farm trials aimed at social and economic evaluation and farmer assessment of improved agroforestry practices, as an integral part of ICRAF's system's improvement research. Specific analyses include the feasibility, profitability, acceptability and impact of technologies being evaluated by Programme 4 at the farm level. He is also involved in Programme 2 research to assist in setting priorities among the tree species for germplasm improvement research.

Dr. Franzel has a bachelor's degree from Cornell University and MSc and PhD degrees in Agricultural Economics from Michigan State University. He worked as an agricultural economist with the Institute of Agricultural Research in Ethiopia on secondment from the World Bank Agricultural Development Service. With Development Alternatives Incorporated, he helped plan and coordinate development projects in Niger, Haiti, Guinea, Cameroon, Jamaica, Kenya and other African countries. He provided technical assistance to national institutions conducting multidisciplinary farming-systems research with the CIMMYT office in Kenya.

AGUSTIN R. MERCADO JR ***PHILIPPINES***
Associate Research Officer
ICRAF-Claveria (Philippines)

Mr. Mercado coordinates and implements the ICRAF research programme in Claveria in the Philippines. His work focuses on improved conservation-oriented agroforestry systems for sloping lands. His current investigations focus on the management of soil fertility on the natural terraces and the development of smallholder farm forestry with short-cycle tree species. He is also involved in testing practical methods by which conservation farming technology may be diffused within and among farm communities. He is working under the Development Division.

Mr. Mercado has a BSc in Agriculture specialized in agroforestry from Bohol Agricultural College, and has earned his MSc in Environmental Management at Liceo de Cagayan University. Before joining ICRAF Mr. Mercado worked as a research assistant and site coordinator for 3 years of the IRRI acid upland rice based farming systems project in Claveria. His works include soil fertility management, upland rice cultivar evaluation and conservation farming.

MANUEL BERTOMEU ***SPAIN***
Post-Graduate Fellow
ICRAF-Claveria

Mr. Bertomeu previously worked on a community-based agroforestry farming project in Camiguin Island, from 1994-1997. Involvement in conservation farming includes fruit and timber tree-based agroforestry, contour hedgerow, dissemination and policy research. He has a BSc in Forestry Engineering and is currently working on his PhD research on timber-based agroforestry systems and is most interested in the integration of timber tree on farming systems in Vietnam.

DELIA C. CATACUTAN ***PHILIPPINES***
Natural Resource Management Planning Specialist
ICRAF-Lantapan

Ms. Catacutan has a BSc in Industrial Education, MAT in Arts, and, MSc in Development Management She provides facilitation in the extrapolation of landcare in Lantapan, Bukidnon and leadership in action-research for NRM planning approaches, institutional innovations and policy work in the NRM sector.

Philippines' Participants

JUDITH S. SAGUINHON
Municipal Agricultural Officer
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Engr. Saguinhon provides leadership role to the municipal agricultural technicians (6) in the promotion of agricultural technologies and needs of the farmers in the municipality of Malitbog which includes among others the promotion in the adoption of conservation farming. She has a BSc in Agricultural Engineering and MSc in Agricultural Technology Management

MARCELINO PATINDOL
Claveria LandCare Association
Claveria, Misamis Oriental

Mr. Patindol is a retired Philippine Army. He is at present the President of the Claveria Landcare Association and is now engaged in farming and providing leadership role to the municipal wide Landcare Association (56 Landcare groups) promoting adoption of conservation farming, adoption of agroforestry practices and training farmers on conservation farming and agroforestry practices.

Annex 4: Summaries of Vietnamese Papers

THE ROLE OF LEGUMES IN SUSTAINABLE LAND USE IN THE NORTH-WEST OF VIETNAM

Mr. Dinh Thanh Giang

Soils in the northwest suffer serious degradation because most areas are comprised mostly of high steep mountains with very low forest cover. However, these lands are advantageous to legume development because soil acidity is low, soil types is red limestone, ferralite above gabbro, and pH level of water is from 5.5 - 6.5.

Under these conditions, legumes play an important role in soil rehabilitation and protection. Specifically, legumes do the following:

> Increase level of cover and environmental protection;
> Improve soil and long term sustainable yields of cereals and food crops on paddy terraces;
> Forest-swidden rotations for conserving re-growth areas with shorter
> fallow cycles; and,
> Improve livestock grazing capability.

Experimentation with ten introduced legume species in four plots in Hao Binh and Son La, and analysis of established species and models lead to the following assessment::

> Legumes have high development potential in the northwest.
> Species like *Leucaena leucocephala and Caliandra calothyrsus* cannot develop in other hill and mountain regions, but grow very well on the soils of the northwest.
> Five recently introduced species have good prospects for development in Son La because of good growth, multiple purpose, easy propagation, and are readily accepted by farmers. These are *Leucaena leucocephala, Albizia falcataria, Cajanus cajan, Caliandra calothyrsus, Acacia holocericea and Indigofera teysmani.*

The trees mentioned above can be used for any of the following models:

> Forest-swidden rotation
> Sloping agricultural land techniques (SALT 1, SALT 2, SALT 3)
> Intercropping with corn and peanut, and soil cover for fruit orchards and industrial crops at establishment.
> Initial cover for native vegetation rehabilitation, and for fire resistance.

Conclusion

It was established that legumes should be seen as a most important type of tree in long-term sustainable sloping land use strategies in the northwest. Likewise, incorporation of several legume species into some upland development projects in the northwest is highly recommended.

CINNAMON IN CONSERVATION FARMING AT VAN YEN, YEN BAI PROVINCE OF VIETNAM

Mr. Pham Xuan Hoan

Van Yen is one of the upland districts of Yen Bai province, Northern Vietnam, where the main crops are hill rice, sweet potato, maize, manioc and some vegetables and beans. Minority groups from this area such as the Dzao and H'mong intercrop *Cinnamon cassia Blume* with other agriculture crops.

Intercropping *Cinnamon casia Blume* with agriculture crops started from the fact that Dzao's farming sites are on high slopes of 20-30 degrees. Minimum tillage was practiced for growth of agriculture crops and cinnamon. This restricted the destruction of topsoil structure in the first year, which is significant because Yen Bai is with heavy and concentrated rainfall. Likewise, agriculture crops get support from the cinnamon and rice straws annually left from harvesting and these help maintain moisture for seedlings in dry seasons and prevent weed growth.

Two possibilities happen during the stage when the cinnamon is able to stand under direct sunlight. First is the formation of a homogeneous cinnamon stand. The first way in restoring the stand after harvesting is to clear cut by harvesting cinnamon barks, after which, the site is slashed, burnt, and grown with hill rice and cinnamon seedlings are planted in the second rotation. The second way is to clear cut by harvesting cinnamon barks then the site is slashed and burned, grown with hill rice, and prepared for cinnamon coppicing.

Another method is complete fallow, in which cinnamon trees are grown together with forest tree species originating from the secondary forest. The stand will be clear-cut, burnt, sown with hill rice and cinnamon is planted in the second rotation.

Social Constraints and Discussions

From 1990 up to now, the Dzao people were allocated with land and forest for management, while the government is managing part of the forest for watershed forest management. This policy gave direct impact to the Dzao people's traditional farming customs and the changes of their farming system was brought by to two factors, where:

> The Dzao people's population is increasing day by day and forestland, which is possible for slash-and-burn for shift in cultivation, is increasing day by day as well.

> Forest and forestland ownership of each household was sponsored by the government, therefore they cannot expand their farming areas.

Conclusion

Changes of the farming custom resulted in the changing habit of using food and foodstuff, another big constraint in the Dzao culture.

Further studies comparing the three different treatments for the second rotation of the cinnamon forest, to find solutions to replace the slash and bum practice is recommended.

TECHNOLOGY TRANSFER ON CONSERVATION FARMING FROM IAS PERSPECTIVES

Dr. Nguyen Tang Ton

In the southern part of Vietnam, from Hai Van pass to the peninsula of Ca Mau, where there is about 10 million hectares of sloping lands covering 62.7% of natural land area. In recent years, there had been increasing demand for cultivated lands from people migrating from densely populated areas, while the slash-and-burn practices of ethnic communities brought about rapid deforestation and unsound management of marginal lands. These caused severe soil erosion and depleted soil nutrients after several years of cropping, especially in annual crop-based farming system.

In this regard, two technologies in conservation farming were suggested. The first of which is on agricultural technologies. Appropriate technologies for a specified location must be: suitable to ecological and socioeconomic conditions; suitable to tradition; suitable to the technical knowledge of farmers and their resources; helpful for farmers to achieve their objectives; profitable to individual farmers and the community; and, environmentally sound.

The second technology is the application of the conservation farming practice in South Vietnam, which includes: contour farming; alley cropping; hedgerow cropping; shading trees in coffee plantations; intercropping of annual crops in young perennial crop gardens; and, cover crops and pastures under trees.

Furthermore, IAS presented another methodology for technology transfer on conservation farming, where technology transferees came first. Second is technology transferees and technology transfer channels. Third is to tie up with international collaborators in technology transfer. Fourth step is technology transfer, which includes the selection of target area and farming diagnostics; planning and identification of appropriate technology; on-farm trials and verification; and, adaptation and transfer of technology into production.

The fifth step of the methodology suggested for successful technology transfer on conservation farming is contact or linkage with individuals, groups engaged with the practice and with the mass media. Sixth requirement is to give focus on: specific and appropriate technologies; sufficient farm resources; provision of credit to farmers from different sources; adequate supply of inputs; good market and marketing systems; and right policies of central and local governments.

Conclusion

IAS has found eight key measures for technology transfer on conservation farming through the cooperation of other institutions. The eight key measures are learning, trials, training, demonstration, visits, information dissemination, competition, and final evaluation and awards.

INDIGENOUS KNOWLEDGE IN CONSERVATION FARMING ON PROOF OF SOUTH VIETNAM

(Case Study. KaDo Commune, Don Duong District, Lam Dong Province)

Mr. Vo Van Thoan

KaDo commune belongs to Don Duong district, Lam Dong Province, located about 320 km from Ho Chi Minh City and 15 km from the district center. The total land area of the commune is approximately 8,100 ha, which includes forestland allocated to the Don Duong Forest Enterprise.

The main issues of concern of this typical upland commune are its risk-prone and unsustainable production system, its high dependency on forest resource, its water shortage, soil erosion, and diversity in ethnic composition, and poverty in communities. This is because most Chil households heavily depend on slash and bum systems as their means of livelihood.

Tools and methods of RRA and tropical PRA have been used to document and analyze the indigenous knowledge in conservation farming on the hill slides of the Chil people. Elders called "Gia lang" were interviewed, as well as legal and illegal migrators.

Findings of the case study were on: sustainability of swidden agriculture cultivation of Chils; sustainable use of existing swidden agriculture area; local selection of crops and varieties; forest/hill gardens; food crops based hill gardens; coffee-fruit trees based hill gardens; and, home garden.

Helping local people to intensively use their homesteads could lead to the reduction of pressure on shifting cultivation lands. Furthermore, in some fallow areas in the forest where the issues of land tenure are not clear, hill/forest gardens seem to be a good option. Encouraging farmers in improving the miir in planting fruit trees and combining them with annual food crops and industrial crops can help enhance protection values of the sites.

CONSERVATION FARMING: A New Approach in Implementing the 5 Million ha Reforestation Programme

Ms. Bui My Binh

In light of the government of Vietnam's effort to salvage their forests, promote sustainable development and biodiversity conservation, it has established the 5 million ha reforestation programme. This 12-year programme hopes to increase the forest cover of Vietnam to 43%, create employment opportunities for local people and create a source of raw materials for forest industries' domestic and export needs. Such undertakings will contribute greatly in protecting the country's soil and water resources and conserve its biodiversity. Also, these efforts will bring about better social, political and socioeconomic conditions for the people and for the country.

In order to achieve these, strict protection of the 9 million ha of existing forests, establishment of a 2 million ha of protection forest and a 3 million ha of production forests will have to be implemented. From the 2 million ha of protection forest, 1 million ha is devoted to natural regeneration and enrichment planting and the other half, to plantation in relation to Conservation Farming System. The 3 million ha of production forest, likewise, will be divided into a 2 million ha forest for timber and raw material and a million ha for perennial cash crops and fruit trees.

In the establishment of the special use and protection forests, the concept of silviculture will be applied. On the other hand, tree species of high economic value will be selected for the production forests. Improvement of land policy and enhancing land allocation to the real end users will also be given priority.

Under this context, the conservation farming approach is addressed in all 5 million ha of production forest. Conservation farming's important role will help the program achieve three (3) main end results. These results are to create short and long ten-n income for farmers and end users by agroforestry technology, mobilize the farmer's available forces to establish man-made plantation while helping the government save capital to support farming in terms of transfer and market development and to immediately secure the environment. This program approach will hopefully achieve its objectives while still making our farmers enjoy the long-term benefits of their farm-forest, the natural landscape and genetic resources. May all these remain and be continually enriched.

HUMAN RESOURCE DEVELOPMENT IN CONSERVATON FARMING ON SLOPING LANDS

Dr. Ly Van Trong & Mr. Pham Xuan Hoan

Recently, Vietnam's Central Government and decision-makers have realized the direct relationship between rural poverty and environmental degradation. Such realization has prompted acts and regulation on rural development and conservation policies to serve as the basis for integrated programmes aimed at alleviating rural poverty while conserving the natural resources.

The call for local people involvement in forest land and resource management has been answered by approaches like People-centered Agroforestry and Participatory Rural Resource Management. Such approaches may ensure long term productive benefits while conserving vital ecosystem function, species and habitats. Essentially, the development process or approach should be, as aptly phrased in Vietnam's national slogan *for the people and by the people.'*

Opportunity

Vietnam's strategy for its socioeconomic development since "Renovation Do Moi" has been generally changed from a centrally planned to market-oriented. Policy and decision making is re-oriented based on this direction, In mountainous rural areas, the reality is that social forestry farmers are gradually taking over much of the responsibility for management of the forests and forest land from State organizations. This will require a different set of skills, knowledge and attitudes to properly deal with the demands of the farmers. As a result, a number of project or programme were developed, focusing on training, research and extension to build up or promote the capacity in sustainable farming development. The demand for training and education for millions of odd farmers is now the greatest challenge of Vietnam's Social forestry.

Agroforestry system is currently advancing in Vietnam. In fact, thousands have now received training in agroforestry both in country and abroad. These opportunities for involvement in AF project implementation have facilitated experimental learning process. Such involvement has realized the importance of human resource development and institutional linkages, whether government or non-government.

Constraints

However, Vietnam lacks a sizeable and well-informed corps of people needed to facilitate integrated conservation and development. The need to develop an integrated and multidisciplinary set of skills for collaborative planning and participatory extension of appropriate and cost effective method now arises. Such skills would ensure flexible and adaptive project implementation. The limited appreciation of farmer practices, especially with respect to traditional forest management and shifting cultivation, continues to hinder the possibility of facilitating appropriate modification, culture and objectives. Farmers are often seen as ignorant and passive recipients of technologies. Extension personnel tend to work for rather than work with rural people. Such practice tends to put a gap between policy formulation and implementation. The basket of appropriate AF technologies available to Vietnamese farmers needs to be expanded and refined based on the experience and information flows among farmers. Ultimately, meeting the needs of the farmers at the grassroots level and a harmonious working relationship between them and the government is the key for human resource development.

CONSERVATION FARMING IN VIETNAM: Introduction and Proposed Vietnam Agroforestry Capacity Building (VACB) Proposed Activities

Mr. Ha Dinh Tuan

Although forest destruction is currently threatening much of Vietnam, the living standards of the people in many intensive localities have greatly improved. Even production has almost achieved its potential ceiling. Unfortunately, the same cannot be said for the people in mountainous area, where the living standards, not to mention, agricultural and rural development continue to lag behind.

Because of this, the two agro-ecological zones in the mountain regions of North and Central Highland must be given priority. The northern highlands and midlands are hilly and mountainous, occupying about 10 million ha with a population of about 12.5 million. Soil erosion is the most important constraint to agricultural development in this zone. About 60 % of the total land in this region suffer from it as a result of deforestation and shifting cultivation. Suitable form of resource management must be identified not only to facilitate the development of the two zones but also more importantly for stable development of the main agricultural produce in the lowlands of the country. The suggested approach would be integrated watershed management involving agro-forestry production, animal husbandry, forage and cover crops, various soil erosion control and soil recuperation technologies.

Primarily, our long-term goal is to make farmers in the highlands earn their living mainly from forest products. To do so, working with them in searching for sustainable methods of conservation is vital. In other words, looking for alternatives to slash and bum to produce enough food in permanent fields. The land use patterns may vary according to concrete conditions of each localities. The following technologies of land use could be a solution:

- Terracing of valley bottoms and adjacent hill foot
- Mini-terracing in stony and sloping lands
- Combination of various SALTS
- Use of forage cover which are mainly legumes
- Controlled grazing or stall-feeding by growing fast growing forage plants for cut and carry method
- Multipurpose tree culture or alley planting by suitable plant species
- Reforestation with multistorage plant populations

In trying to achieve such goal, VACB conservation farming networking with various institution in Vietnam and abroad is equally important. Likewise, activities like the VACB roving workshop in the Philippines would also contribute a lot to this endeavor.

Subjects to be discussed in this workshop include indigenous knowledge on conservation farming, government development program and agroforestiy and examples of successful and unsuccessful programs. Indigenous knowledge on conservation farming would include topics on intercropping, terrace construction, building stonewall, using grasses, crops and local legumes for hedgerows, using site specific and locally available species and in-row tillage. Government program would include Vietnam FARM Program, Program 327, coffee production program in Tay Nguyen and sugarcane planting. Successful programs like monoculture of eucalyptus and large-scale plantations of coffee in the central highlands among others would also be discussed. Technology transfer methods will also be tackled.

TRADITIONAL INDIGENOUS AGROFORESTRY KNOWLEDGE IN UPLANDS OF CAO BANG PROVINCE

Dr. Nguyen Thi Nuong

In March of 1998, the Vietnam Agricultural Science Institute (VASI), cooperated with the Cao Bang Provincial Department of Agriculture and Rural Development, the District's People Committees and the Agriculture and Rural Development Departments of Thong Nong and Trung Khanh districts to conduct two preliminary survey of Traditional Indigenous Agroforestry Knowledge (Tiak) of local Tay, Nung, H'mong and Dao communities in Cao Bang province. The following shows a part of the findings.

Knowledge on using plant residue for soil improvement

To improve soil fertility, farmers often put back plant residues (straws, stables, stem, leaves, culms, etc.) have harvested crops into the field for disintegration. Only small portions of rice straws and corn leaves or stems are used for feeds. For them this method can increase land fertility and at the same time avoid environmental pollution. Also, Cao Bang farmers do not bum plant residues for they find synthetic fertilizers as expensive. For them, this method can increase land fertility and at the same time avoid environmental pollution.

Mix Crop Cultivation and Rotation

A local legume plant known as *Dau nho nhe* or Cao Bang bean, is popularly cultivated in the province both as food and green manure cover crop. This crop can be cultivated in all the northern mountainous regions but appeared to be best adopted to Cao Bang ecological conditions. The bean has a variety of uses which include feed for cows and water buffaloes for green manure production, as vegetable and its bean is cooked as food. Despite this, the price for the bean is low and its demand is quite unstable. By improving its market and solving some technical aspect of its cultivation, it can increase the people's income.

Combined Household Economy involving gardening, fish raising animal husbandry (Models of VA C, garden +fish pond + animal house)

There are good VAC models developed in Tay and Nung communities mainly because of its advantages. Such are (1) manure of animals can be fruitfully used, (2) low labor input is required and benefits can arise all year round.

Combined Household Economy involving gardening, fish raising, animal husbandry and forestry (models of VACR, garden +fish pond + Animal house + forest)

In forest gardens of the mountainous area of Cao Bang, various tree are planted with local forest plants. This method doesn't only maintain ecological balance and biodiversity but also decreases the risk of harvest failure. It also contributes greatly to the local people's production and protect lands from soil erosion.

Experiences on Natural Forest Regeneration

Forest in the Cao Bang province has been recovered and developed using the following approaches: the regeneration of natural forest and the plantation of new single plant species. It is observed that the first approach is preferred because of its following advantages:

> the forest covering areas can be faster increased and the input required is much lower
> both biodiversity and ecological balance are maintained

Diverse products can be derived from regenerated natural forests

Indigenous knowledge on developing mixed forest gardens

Different models of mixed forest gardens have been observed in Cao Bang by growing and developing numerous species of plants. This has contributed largely to ecological balance maintenance, land protection and biodiversity preservation.

Indigenous knowledge on developing combined production system, involving both forestry and agriculture

Such production system is often developed in hill lands where forest plants are grown on natural regenerated forest on hill tops, food crops and vegetables are developed at the hill bottoms and fruit and other forest trees are planted in between.

Water transmission systems made of bamboo

Water transmission systems made of bamboo are often observed in high-altitude districts of Cao Bang. This doesn't only reduce labor force for living water collection and crop irrigation but also it reduces land erosion.

MEASURES FOR THE CONSERVATION AND THE IMPROVEMENT OF THE FERTILITY ON SLOPING LAND IN VIETNAM

Nguyen Xuan Thanh

Seventy-five percent of the total land area in Vietnam is sloping lands. For many years, highland farmers used traditional methods of shifting cultivation like deforestation, burning of vegetable covers and cultivating crops without applying mineral fertilizers or manure. These processes rapidly degrade the soil, thereby decreasing the viability of the land.

The reasons for sloping land degradation are the sloping relief and strong diversification. Water erosion also occurs in two forms: sheet erosion and gully erosion. In barren lands, soil lost due to erosion amounts to 200 tons per hectare annually; in plantation areas covered by green manure trees or crops along the contour line, 100 tons per hectare annually are lost. Surface runoff starts when rainfall intensity exceeds 0.3-mm./ minute. Observations revealed that one ton of lost soil contain 1.2- 1.5 kg. N, *1.0*- 1.5 kg. P205, 15-30 kg. K20 and large amounts of alkaline elements causing the top soil to be thin, acidic and poor in nutrients.

Measures are being done to conserve and improve the fertility of soil in sloping lands. First is by protecting the soil by preventing soil erosion. For controlling gully erosion, masonry method is introduced where rock blocks are used to construct a small dam at the end of the erosion gully. This method is very simple, cheap and could be done by the farmers themselves. While, plowing, tilling and sowing along contour lines are done to control sheet erosion. Second are the sloping land farming systems like: sloping gardens; rice terraces; intercropping; and, multiple cropping. Other measures include, intercropping grain legumes, mulching and planting green manure trees along contour lines.

Moreover, in Lang Son province, different agroforestry models to protect and improve the soil can be found where the main plants being used are: Chinese anise tree, Coffee, Tea, Japanese persimmon, Plum, Apricot and Mandarin citrus.

The Rational Models used are:

1. Model 1 (MI) : Chinese anise tree + Tea + Forest
2. Model2(M2):Coffee + Tea + Pineapple + Forest
3. Model3(M3):Apricotor Plum + Mandarin or Japanese persimmon + Forest

Generally after 4-5 years, the soils in these models have improved and nutrients have increased especially OC, total nitrogen and available potassium.

To protect and improve the soil nutrients, especially in sloping lands, the following methods should be implemented:

1. Establish farming systems for each ecology and sub-ecology zones.
2. Carry out soil surveys in agroecological zones for land evaluation and identify the degradation level to introduce suitable measure against soil erosion.
3. Select and introduce suitable agroforestry trees for each land and ecological zone.
4. Apply intensive cultivation techniques, settle cultivation of terraced field and protect soils with green cover and dry mulching layer.

SOME FINDINGS ON FARMING SYSTEMS IN THE UPLAND REGION OF NORTH VIETNAM: The Case of Chieng Pan Commune

Le Quoc Doanh

While indigenous uplanders have practiced shifting cultivation in a sustainable manner for centuries and they know multiple cropping, immigrants on the other hand, lack knowledge and skills in sustainable farming, and the increase in population has made both groups exploit more natural resources. Eight provinces with total area of 7.65 million hectares consist the northern upland of Vietnam, which was before, covered with dense forest, but now the area was cleared in order to expand agricultural lands.

There are different land use systems in this region and these are: forest; pasture; shifting cultivation; permanent cultivation: a. monoculture, b. rotated; hill gardens; home gardens; and, paddy rice.

However, the changing of land use systems in upland regions tends to decrease the forestry land area and increase the terrace area. The traditional shifting cultivation gradually transfers to nontraditional and with this, permanent cultivation areas expand and bare hills area increases.

Although agriculture in the area is self-sufficient and characterized mainly by food crop monoculture, cropping systems are still unstable eventhough improved technologies have been introduced in the area. This is because of poor cropping patterns, technology packages introduced are not strictly followed, and low input and, poor management of the farm lands, which brings about degradation of natural resources characterized mainly by increase in deforestation and soil degradation.

Farming systems continue in the context of poor infrastructure, backward cultural and social condition; worsening conditions in transportation and irrigation systems, energy supply for agriculture, daily life and'communication. In addition, the low level of farmer's knowledge, health care and social services are extremely in difficult situation, and these further contributes to the degradation of the already degraded agricultural resources.

To decrease deforestation and expand upland cultivation areas, there is a need to intensify rice on paddy field and terraced hillsides, which in doing so will improve soil fertility. Moreover, attention should also be focused on the construction of small irrigation systems and using suitable HYV's and balanced fertilization in order to further improve the farming systems in the region. Rice production should also be reduced to give way to the increase in production of upland crops such as tea, coffee and fruit trees so that food security will be provided through food crop production and cash crop production. Farming systems based on agroforestry combinations with diverse forms should also be further developed to prevent soil erosion and promote multi-plant cultivation. Expansion of models for home gardens, hill gardens and forest farms should also be developed and strengthened. Lastly, the use of optimum mineral fertilizers, lime and green manure to prolong the cultivate time in upland soil should be promoted to improve the fertility of denuded lands.

THE IMPACTS OF COMMUNITY FOREST RESOURCES IN HILLY AND MOUNTAINOUS ZONE IN XUAN LOC COMMUNE, PHU LAC DISTRICT

Le *Quang Minh*

In Vietnam, many areas have been exploited and plants & animals destroyed as in, Xuan Loc, which is a mountainous commune in Phu Lac district, located at the Southwest of Thua Thien province with a complicated topography, where the average elevation is 3040 in. and with topographical slope ranging from 5-15 degrees. Mountains and hills making narrow valleys separate it. Seven percent of natural flat lands are concentrated along springs, creeks and the rest of the lands are sloping lands. The two spring systems in Xuan Loc commune are part of the Nong and Huong rivers. These water sources supply water to Xuan Loc and to the downstream area. They influence the vegetation distribution and the distribution of residents as well. A part of Xuan Loc is in the upstream/ watershed area of the two rivers and it is also a buffer area of Bach ma National Park. Animals and vegetation are abundant in this commune. The total natural land area in Xuan Loc is 3,636 ha. ; forests occupy 3,074 ha (84.54 %) while agricultural lands occupy 142 ha. (3.90 %).

Before 1959, the whole Xuan Loc was dense forest. Human activities made the primitive forest disappear and replaced by secondary forests and bare hilly lands. During development, people have a great role in changing the environment specifically the natural forest ecology. The mountainous and hilly zones of Xuan Loc commune have changed so fast and in a short time. Forest degradation resulted from the loss of the ecological system to adjust itself and exploitation has not only affected the local people but also the adjacent zones.

This study was done to: 1) assess the impact of community on forest resources; 2) analyze the causes of forest sources degradation and 3) identify solutions to renovate the area and forest cover. The Participatory Rural Appraisal and Rapid Rural Appraisal methods were used for the study.

Results revealed that the causes of forest degradation are:

> Low economic life
> Clearing forests to expand agricultural lands
> Population pressure on the environment
> Consequences of war
> People's limited awareness on the environment

Programs such as the Policy Analysis Matrix (PAM), government project 327, settlement,reforestation, Sindhy Cross Breeding Program and feed program for animals (SAREC) are just some of the methods to renovate the area and forest cover.

Forest degradation has caused decrease in plant and animal species and other environmental consequences, not only affecting Xuan Loc but other adjacent zones as well. Eventhough there are reforestation programs, cutting trees and exploitation of forests still continue. However, its being a part of watershed of the Huong River, Xuan Loc commune still has the potential on land and biological resources.

CHALLENGES AND OPPORTUNITIES FOR CONSERVATION FARMING IN VIETNAM

NGUYEN VAN BO

Conservation farming (CF) is a farming system consisting of suitable combination of crops (forest, agricultural, medicinal and pastural) in order to use natural resources (land, water, climatic advantages) more efficiently and with appropriate technologies, while increasing income of farmers and protecting the environment.

Vietnam is in great need of conservation farming because of its limited land resources, which is mostly comprised of sloping lands. Moreover, other reasons including: environment destruction; backward knowledge on land use technologies; population pressure; and, food accessibility in remote areas adds up to the need for conservation farming in Vietnam.

Conservation farming in Vietnam was analyzed through its strengths, weakness, opportunities and threats. In the analysis, it showed that the following are the factors that may promote CF in Vietnam: enthusiastic scientist; cooperation between institutions engaged in CF; long-term experience of people engaged in CF; and, the regular publication of CF materials.

The weaknesses however, were the following: unstandardized methodologies among regions; limitation in knowledge about the field and language barrier; weak linkage between scientists and extension workers; and, management issue at the ministry level.

Opportunities for CF include international support, more programmes related to CF, and food security among others. The threats on the other hand that might be posed against the program include fund limitation, CF is of low priority in the national level, agroforestry is not attractive therefore, fewer people are willing to be involved and many more.

However, with the use of appropriate approaches, technologies and cooperation with people, CF in Vietnam may prosper and bring about changes in the environment that will be beneficial to everybody.

Annex 5: Claveria Field Site Notes

Briefing Material for the Field Tour to the Conservation Farming Sites in Claveria during the Roving Workshop on Conservation Farming on Sloping

Claveria is an agricultural town located 42 kilometers northeast of Cagayan de Oro City. It occupies more than 112, 000 hectares of the upland areas of the province of Misamis Oriental, and the only land locked among the 24 towns. Elevation ranges from 450 to 1200 meters above sea level with undulating to steeply slopes predominate the terrain (92%). Maize, cassava, and upland rice cropping dominate the lower elevation (<700masl), while vegetables and maize in rotation dominate the upper elevation. It is the vegetable bowl of Misamis Oriental exporting different varieties of vegetable to Cebu and Manila markets. Gmelina arborea, Cassia mangium, Sweitienia spp, and Eucalyptus spp are commonly introduced fast growing timber tree species

Claveria landscape is derived from pyroclastic parent materials deposited by two volcanoes, Mt. Balatocan and Mt. Mogabon, which are positioned 15-20 km north and southeast of the town center, respectively. This town is a volcanic plateau ascending abruptly from sea level on the west to about 450 to 1200 meters elevation in the east. Local topography is complex, ranging from flat to steeply hilly, and from broad smooth terrain to extremely dissected landscape. The soils are deep, fine mixed isohyperthermic Ultic Haplorthox. Soils are acidic with pH ranges from 4.2 to 5.2. Rainfall is approximately 2500 mm per year well distributed during the 9-month period from May to January.

Farm sizes presently ranges from 0.25 to 5.0 ha, averaging 3.0. Ownership is common among large farmers (more than 3.2 ha.). Tenancy or leasehold is common among small farmers. There is intense pressure on flat lands. Clean cultivated fields, tilled with animal power extend to the steepest slopes thus causing severe farm level soil erosion, which ranges from 50 to 250 tons per ha. per year. The amount of fallow has been rapidly decreasing. Fallow rotation has yielded to permanent field farming. Cool temperature, tranquil environment, beautiful landscapes and beautiful friendly and lovely people attract visitors to the place. Hills and mountains are perfect to the eyes. One of the important places to see is the delightful "El Canyon Grande San Miguel" in barangay Panampawan which is a 500-meter escarpment of the Cabulig river, and provides a good vista to the other side of marvelous river facing toward the terrain of extended grasslands to the national park of Mts.Balatucan, Mogabon, Lumot and Sumagaya.

ICRAF research activities

Conservation farming on sloping lands has been the main focus of research activities in Claveria. This aims to provide simple and low-cost alternative conservation farming technologies to the sloping upland farmers who are experiencing rapid soil fertility depletion and low productivity caused by soil erosion and other soil nutrient depletion mechanisms (e.g. crop removal, fixation, leaching, etc.) and inherently poor soil. Research activities have been geared toward evaluating or assessing pathways toward sustainability on sloping lands. These research activities include:

A. Natural vegetative filter strips (NVS)

1. Effect of NVS density on crop yields and soil loss
2. NVS management strategies to reduce labor inputs
3. NVS strategies to reduce the scouring effect (lime + fertilizer application)
4. NVS: Evaluation of farmer's strategies to reduce scouring effects

B. Enriched NVS

1. Smallholder timber production systems: tree hedgerow vs. tree block planting assessment
2. Smallholder timber production system: pruning trial
3. Crop productivity using forage legumes and grasses as contour hedgerow species
4. Grass and tree legumes in contour hedgerow systems

The establishment of the natural vegetative filter strips provides a foundation for the farmers to establish perennials (fruit and timber trees, pineapples, forage legumes and grasses, etc.) and ruminants on the farms that diversify plant species and make farming enterprise stable. Diversity provides stability in terms of productivity, ecologically and farmers' income.

C. Rotational Hedgerow Fallow

1. System assessment of hedgerow rotational fallow
2. System improvement of hedgerow rotational fallow

D. Ridge tillage system

1. Innovative method of soil conservation incorporating NVS and ridge tillage system on sloping farms.

E. Testing of practical method of conservation farming technology dissemination.

Testing of practical model of technology transfer that create impact on the adoption and adaptation of conservation technologies is important. A model that can be replicated in other upland areas. There are conditions necessary for the rapid dissemination and adoption of conservation farming technologies:

1. The technology must be simple and low-cost in establishment and maintenance.
2. Supports (moral and financial) from the local government (provincial, municipal, barangay (village), sitio (sub-village) are tapped
3. People can be mobilized (social mobilization) to extend the technology and create peer pressure within and among farmers to adopt conservation farming.

Impact assessment on different approaches (evolution) of technology dissemination are underway such as:

a. Individual approach - "contour hedgerow extension team (CHET)
b. Group training approach -
c. People's organization (PO) approach -
d. Local government unit (LGU)-led approach -
e. Two-pronged (LGU + PO) approach - The Landcare Approach

What is a Landcare?

Landcare is a participatory community-based approach and grounded model designed to effect change in complex and diverse situations. Landcare approach is a method to rapidly and inexpensively diffuse agroforestry practices among upland farmers. It is based on the farmers' innate interest in learning and sharing knowledge about new technologies that earn more money and conserve natural resources. It is basically a group of people, concerned about land degradation problems, who are interested in working together to do something positive for the long-term health of the land. The core of the Landcare model is two fold-effective local community groups and partnership with government This grassroots approach is generally recognized as a key to success in all community development activity. Groups are to respond to the issues that they see as locally important, solving problems in their own way. In

other words, Landcare depends on self-motivated communities responding to community issues, not issues imposed by external agency. Approaches, which use grounded theory (where participants determine the key issues rather than these being pre-determined), are more likely to effect permanent change.

Landcare groups are usually supported by government and are networked to ensure ideas and initiatives are shared and disseminated (Campbell and Seipen, 1996). This partnership between local communities. Conservationists, government and scientists working together to change the way the land is used is another key feature of Landcare. The partnership developed allows differing, and sometimes conflicting perspective to be aired on issues, which are inherently complex.

The Impact So Far

ICRAF has initiated the dissemination activities in late 1996 when it responded to farmers' request for technical assistance in laying out conservation farming. This technical and institutional innovations has led to the formation of 56 Landcare groups within the 17 barangays in Claveria. Most of these Landcare groups are based in the sitio or neighborhood where farmers can interact with each other more frequently, and even meet each other almost daily. Each sitio has 30-60 farming families.

These Landcare groups have caused the adoption of conservation practices based on natural vegetative filter strips (NVS) to about a thousand farmers, establishment of 143 communal and individual nurseries that produce hundreds of thousands of fruits and timber trees seedlings which are planted on the NVS, or along farm boundaries. They were also able to get funding for 75 working animals for dispersal to the members with no working animals.

The greatest success of Landcare is changing the mindset of the farmers and policymakers or the local government or some landowners on the way they use the land and protect the environment.

The success of Landcare movement is not just the length and number of NVS laid out, number of nurseries established, the number of seedlings raised and the number of its members. However, these are ones of the indicators but not the ultimate ones. Landcare movement is rebuilding the minds, attitudes and practices of all the stakeholders of the resource base such as farmers, policymakers, government and the people in general on the use of the land that will meet the current basic

needs of man like food, clothing shelter, education, etc while preserving the land for the future generation to come. The Landcare members have this contagious efforts and mindset that everybody should protect the land. There are now farmers who have done unselfishly movement, and who was able to share the conservation farming to other in his neighborhood. Farmer who enthusiastically led his people to disseminate the conservation farming, nursery activities and the benefit of tree planting. Farmers who have been pushing training in the barangay and down to the sitio level. Farmer leaders who volunteered his time for free just to share his time and talent for the cause of Landcare. On the policymaker side, I am breathlessly watching them formulating ordinances urging sloping farmers to adopt soil conservation measures, and allocating from the municipal and barangay funds from their regular internal revenue allocation (IRA) to fund conservation farming activities and establishment of nurseries. These are ones of the important indicators of success of Landcare approach that enable the people to think, initiate and implement plans and programs that will lead to adoption of conservation farming.

The establishment of NVS is the first step in the long journey of Landcare. We are very lucky that we have found a simple technology that does not scare away the prospective Landcare members. Once they have this first step, they are likely to go on to further steps like establishment of perennials (fruit and timber trees), fodder grasses, and even sharing the wonderful technology to other farmers This effort becomes contagious and never ending process until all the farmers will put conservation farming practices and even put more steps towards improving their livelihood through the adoption of agroforestry practices, and meeting their current basic needs while preserving the land and the environment, and will eventually perform activities that have a common benefits (e.g. riparian management, watershed management, etc.).

DESCRIPTION OF THE VISITED SITES

Site 1. Smallholders timber tree production systems

The substantial increase in the number of trees on private land is happening elsewhere in Asia. In countries such as Philippines, Vietnam, and Thailand smallholders, even shifting cultivators, are now engaging in farm forestry for the first time in great numbers. But in many parts of the Philippines, farming and land use practices are in transition. In response to certain physical and socioeconomic factors, upland farmers have been making a fundamental change from extensive forms of agriculture (shifting cultivation or rotational slash and burn) to more intensive short rotation or permanent farming practices. Since the imposition in the late 80's of a complete logging moratorium on all primary forest, small-holder timber tree production has emerged across the country in response to the market demand.

Today, timber trees like *Gmelina arborea*, Mahogany *(Swietenia macrophylla)* and *Acacia mangium* are grown usually as farm boundaries, on contour hedgerows or as pure stand. These systems have been designed to meet a range of challenges posed by rapid intensification and deforestation of agricultural land to protect soil and water resources, increase wood resources, replace harvested tree products and inputs with planted trees, and increase food and livelihood security for rural households.

Therefore, this study aims at **assessing** and **improving** the timber production systems by smallholders, in order to understand the existing constraints to tree planting, to evaluate the potentials of timber tree based agroforestry systems, and to optimize farm productivity. The overall aim of this is to understand and quantify the biophysical and socio-economic processes involved in timber tree production systems by small-scale farmers on sloping lands and their improvement.

In Claveria it has been observed the existence of a number of household nurseries growing a variety of timber and fruit trees that has been established without outside support. Household nurseries have a great potential for the widespread adoption of tree planting practices. In order to gather data on the germplasm delivery pathways, potentials and constraints to adoption and successful management of these spontaneous nurseries, a survey and data gathering will be carried out based on a chain sampling. In addition, in order to compare group nurseries and household nurseries, a number of community nurseries managed by the farmer's association Claveria Land Care Association (CLCA) will be closely monitored. Data to be gathered include labor inputs, outputs and advantages and disadvantages perceived by farmers

and the evolution of nursery activities practiced by key members and selected participants through a multivisit survey.

ON-FARM EXPERIMENTAL STUDIES

Tree arrangement trial

In the smallholder context timber, tree planting has two special features that make it different from traditional forestry plantations:

1. Low tree density, in order to reduce establishment costs and to avoid reduction of area cropped (e.g., placing the trees along field boundaries may reduce crop loss since the competitive effect would be found on one side of the tree line only.
2. Silviculture of trees rather than silviculture of a stand and therefore intensive tree management.
3. In very dense stands, height growth is reduced significantly. In stands that are so open that the trees grow as isolated individuals, height growth is also likely to be reduced; the reasons appear to involve growth of branches and lower bole at the expense of height.

Therefore, the main hypothesis identified is: if properly managed timber trees established in hedgerows or lines is superior to tree/crop monoculture in terms of:

> GROWTH: trees grow faster in hedgerows and make up for lower population by increased biomass per tree.
> overall biomass per hectare is higher with hedgerows.
> INCOME: it will promote higher income than crop/tree monoculture.
> MANAGEMENT: lower management cost, since weeding costs are charged to the annual crop.

This experiment is laid out in randomized complete block design with 4 replication in 2 farmer's fields.

A. Pruning experiment.

So far, pruning of timber trees has received little attention as an appropriate agroforestry management practice. While many studies are available on the impact of pruning on timber tree growth, there are few studies on the effect of high intensity lift pruning on tree growth in the context of agroforestry.

In Claveria, timber trees are frequently lift pruned up to 80-90% of the tree height leaving a 10-15 cm. stub from the main stem. Motives of farmers for this high intensity pruning are, to achieve a straight stem and better quality of wood, to eliminate competition with crops and for firewood. Lack of proper tools and know-how are commonly seen as constraints to improved pruning practices.

It is perceived that there is a need to improve pruning practices. There is a need to understand the suitability of the current management system and to suggest sustainable lopping levels. These can be achieved by understanding the effect of looping intensity on tree growth and productivity.

The study aims to test the different levels of pruning regimes to the growth of select timber trees *(Eucalyptus deglupta* and *Gmelina arborea).* This experiment is conducted in 3 sites in a total of 4 replications.

B. Thinning experiment.

Most woodlots in Claveria are devoted to Gmelina arborea. Establishment and management practices usually involves: plantation at 2 x 2m or 3 x 3m. with 1 or 2 intercrops; pruning for the first 2 to 3 years and harvesting those largest dominant and subdominant trees with merchantable size after a rotation period of 7-10 years. After this "selective harvest", farmers expect suppressed remaining trees to reach commercial size in the following years. But silviculture on even-aged stands show us that once the crown of a tree has been reduced in size by the competition of its more vigorous neighbors it cannot always be restored to dominant position by cultural treatment. This situation will lead to low return to farmers and discouragement to plant again.

Therefore there is a need to show the benefits of thinning in growth and yield of timber trees. There are 3 levels of thinnings: 1- no thinning (control), 2- 20% of the trees removed, and 3- 40% of the trees removed. This is based on the original planting density by the farmers of 2 by 2 meters.

Site 2. Tunggol Estate Landcare Group

Tunggol estate is a 480-hectare of land owned by Mr. Tunggol. This was used a ranch until 1985 during the height of communist insurgency problem in Claveria. The land was offered for sale (VOS) to the Department of Agrarian Reform (DAR) in 1991. The DAR subsequently distributed the lands to landless farmer. The farm sizes range from 1.0-5.0 hectares. The earlier occupants were able to get bigger piece of land than the later ones.

Soil erosion was identified by the farmers a major constraints to sustainable production of their sloping farms. There were couples of spontaneous adoptions as an offshoot to IRRI and ICRAF conservation farming research activities. When ICRAF opened its door to technical backstopping for sloping farmers to adopt and adapt soil conservation farming based on natural vegetative filter strips (NVS), request for technical assistance were many and some of the farmers came from this place. This prompted ICRAF to organize the contour hedgerow extension (CHET) team. CHET team is consist of: extension technician from municipal agriculture, ICRAF field staff (part-time basis), and inspirational farmer adopter.

Tunggol estates were one of the places where CHET team worked. When Landcare group was organized in late 1996, farmer beneficiaries formed themselves into Tunggol estate Landcare group. They elected their set of officers. In the beginning there were 5 members. Later on, the membership expanded, and the group was split into 2: tunggol 1 and tunggol 2. When the municipal federation was formed with 6 original Landcare groups, a member of this Landcare was elected as President. This Landcare group was the first to establish communal nursery in early 1997. They were able to raise seedlings of timber trees particularly Eucalyptus spp. The seedlings were distributed among members of the Landcare groups. The communal nursery provided a venue for the members to learn the nursery establishment and management. After they have learned, they opted to have their nurseries at their backyards. They observed that they can produce better quality of seedlings and with less labor because they don't have to walk to the communal nursery anymore. And besides they have the sense of security of the seedlings.

Almost all of the sloping farmers in the Tunggol estates have adopted the natural vegetative strips where they enriched the NVS by planting timber trees, fruits, pineapple, fodder grasses and other cash perennials. These different species are interplanted to each to ensure diversity and stability. Most of the farmers who adopted the system felt the value of their lands have gone up because of the established soil and water conservation measures and cash perennials. They are confident that they have the long term productivity and sustainability of their

farms. They felt that food has been secured in their families, and hopefully when they can harvest the fruits of the cash perennials will alleviate their poverty.

There are now about 50 conservation farming adopters around tunggol estate in which they laid out the NVS as the initial step. They later enriched the NVS by planting fodder grasses and legumes, timber and fruit, and cash perennials. Fodder grasses include Napier grass *(Pennisetum purpureum),* Setaria (*Setaria splendida),* Guinea grass *(Panicum maximum),* etc. Forage legumes include Flemingia *(Flemingia congesta),* Rensoni *(Desmodium rensonii),* etc. Timber trees are: Bagras *(Eucalyptus deglupta),* Mahogany *(Sweitinia macrophylla),* Yemane *(Gmelina arborea),* Ipil-ipil *(Leucaena leucocephala),* Cassia mangium, etc. Fruit trees are: Durian *(Durio zibeththenus),* Rambutan *(Nephelium appaceum),* Marang *(Artocarpus odoratissima),* Jackfruit *(Artocarpus heterophyllus),* Guavas *(Psidium guavaja),* Mango *(Mangifera indica),* etc. Cash perennials are: coffee *(Coffea spp.),* Cacao *(Theobroma cacao),* Pineapple *(Ananas comosus),* Bamboo *(Bambusa arundinacea),* Rubber *(Hevea brasilienses),* Bananas *(Musa sapientum)* etc. There are communal and household nurseries that raise seedlings of fruit and timber trees.

Site 3. Mahayahay Landcare group.

Mahayahay is one of the 8 sitios of barangay Ani-e. This sitio consist of households. Most of these farm families are beneficiaries of the comprehensive agrarian reform program (CARP) of DAR. The land is degraded grasslands formerly owned by Geronimo Gerin who used these lands as grazing. Mr. Gerin removed his stocks during the height of NPA fighting in 1985, and offered for sale (VOS) to the DAR. The DAR subsequently distributed to the farmers. In these acid and degraded sloping lands, farmers faced several problems in producing crops from these lands. Soil erosion is one of the major problems in sustaining crop production.

The Mahayahay Landcare group was organized when 3 out of 42 household members joined the one-day cross visit and short training conducted by ICRAF in late 1996. The 3 participants established the NVS on part of their farms. These 3 were the core people who initiated and invited other farmers to join the Landcare group. After few months the membership rose to 8. Since they were excited to plant timber trees, they established their communal nursery in middle of 1997. They produced substantial number of seedlings, and most of the seedlings were planted on the NVS. But unfortunately, during the El Nino (almost 6 months of drought) most of these seedlings died.

When the barangay captain saw the exciting development which is also in line with the Human and Ecological Security (HES) and Clean and Green programs of the local government, he Mr. Matugas (Mr. Virgilio Matugas -president) to facilitate the formation of Landcare group to the other 7 sitios in the barangay Ani-e. Mr. Matugas was later on chosen as the chairperson of the federated Landcare groups. The organization of Landcare was preluded with the slide showing on conservation farming conducted by ICRAF in response to the request of the barangay officials.

There are now 14 members of the Landcare group and 22 adopters. They continue to grow seedlings in their nursery which also include fruit trees. They plan to reach out more farmers in the sitio until the 42 households will adopt soil and water conservation and agroforestry practices. They are getting support from the local government. The Landcare groups now are more interested in planting fruit trees after they have done enough for timber trees.

The Landcare group is also working cooperatively in fixing the feeder road that goes to this sitio. Other social functions are also done by the Landcare groups. The Landcare groups does not only provide a mechanism to address issues related to farming but also provide a forum where they can discuss other social issues, and social integration and belongingness of the people in the community.

Mahayahay Landcare group has been frequently visited by farmers within and outside Claveria where they can see and do hands-on in NVS establishment, nursery establishment and management, and asexual propagation of fruit trees. The Landcare members are unselfishly sharing their time and talent to these farmers.

Site 4. Laculac Landcare group

Laculac is one of the 8 sitios of Ani-e. Before the Landcare was organized in 1997, spontaneous adoption was observed to few sloping farmers. One of these farmers is Mr. Judito Juban. Mr. Juban migrated from Bukidnon in early 1980's and was also a sloping farmer. When he came to Claveria he bought a hectare of sloping farm at very low price (P6,000). He confessed that he won't come to his farm after a heavy downpour because the rills and gullies were formed, and seed or plants and fertilizer were washed down to the downslope. He saw IRRI's field trial, and tried to apply the system to his farm by his own. He never planted the contour with leguminous trees as what he saw in the experiment but he used natural grasses in which later he changed to *Setaria splendida* and timber trees particularly *Gmelina arborea.*

When the barangay initiated the formation of Landcare in barangay Ani-e in 1997, Mr. Juban was the obvious person to be requested to further promote the adoption of soil and water conservation. Besides, the neighbor farmers observed the benefit of soil conservation in Mr. Juban's farm more than his words to convince them. The landowners also became a member of the Landcare, and one of them is Mr. Casino. He asked his tenants to adopt soil conservation measures, and he even reached to a point of telling his tenants: "no adoption; no farming in my land". This encouraged his tenant farmers and other farmers to adopt soil conservation measures. Mr. Juban was the resource person to assist them in laying out contour lines or establishing NVS.

Mr. Juban became the president of the Laculac Landcare group in which all his 17 members have already adopted soil conservation measures by having NVS or fodder grasses laid out in contour. The member opted to plant bananas, fodder grasses, fruit and timber trees as they enriched their NVS. They worked together to establish their Landcare nurseries where they raised seedlings of fruit and timber trees. They are also getting free seedlings from other Landcare groups. The barangay government is also providing nursery materials for their nursery.

Site 5. Misamis Oriental State College of Agriculture and Technology (MOSCAT).

MOSCAT started as a municipal high school. It became a Claveria National High School in June 1963. Later, it was converted into a state college in June 1983. It is located in the upland farming community of Claveria, Misamis Oriental. About 45 kilometers northeast of Cagayan de Oro City. It is accessible from the coast via the old Jasaan route and through Villanueva town.

MOSCAT guiding philosophy is the enhancement of the general well-being of rural farming communities of Claveria, and the neighboring municipalities of Misamis Oriental especially the poor, under-privilege and disadvantaged through effective instruction, research and extension. It has a total land area of 97.37 hectares.

MOSCAT seeks to provide quality and relevant training and instruction in agriculture, science and technology, promote research, advanced studies and progressive leadership in the advancement of knowledge for the improvement of the quality of human life. In the pursuit of its mission, it shall provide tertiary education on the following objectives:

a. to enable individuals to develop their potentials;

b. to enhance their range and and quality participation in society;
c. to pursue quality and excellence; and
d. to direct and harness resources for the continuing improvement of life especially in the countryside.

Courses Offered:

- DAT-BAT program, major in:
  - Animal production technologies
  - Crop production technologies
  - Farm mechanization
  - Postharvest technology and processing
- Bachelor of Technology in Environmental Management
- Diploma/Bachelor in Agroforestry Technology
- Diploma/ Bachelor in Food Technology
- Diploma in Agriculture Information Technology
- Bachelor in Agricultural Education

Manpower Capabilities

MOSCAT has 46 faculty and 41 administrative staff. Nine of the academic staff have advanced studies or training abroad, 3 are pursuing their doctoral studies locally, while, while 6 are completing their masteral programs.

Outreach/Extension

The outreach/ extension focus is the piloting of commodities identified in the Provincial Agriculture Development Plan of Misamis Oriental. At present, it has two pilot project areas: Sericulture in Claveria and Cutflower Production in Gingoog City with 22 identified farmer-cooperators.

MOSCAT collaborates with other members agencies in undertaking research and development in agriculture, forestry, and in natural resources management in Northern Mindanao. It reaches various sectors of society through its Farmers' Agribusiness Development Center (FADC). The center accepts as a venue for workshops, seminars and training program on upland conservation, agroecosystems management and other agro-industrial income generating technologies in cooperation with local government units, NGO's, Pos, and with the Department of Agriculture.

MOSCAT is also actively involved in implementing a.) Integrated Development Approach for Nutrition Improvement (IDANI) of the rural poor, b.) Agroforestry Support Program for Empowering Communities Toward Self-reliance (ASPECTS) for sustainable developments as collaborating institution of Central Mindanao University (CMU) and the University of the Philippines at Los Bahos Agroforestry Program (UAP), respectively.

Linkages

MOSCAT has established linkages with local, national and international institutions and agencies. It is the host of the International Centre for Research in Agroforestry (ICRAF), and the recipient of the European Union funded AGRED project. It has established contact with Iowa State University College of Forestry.

Site 6. Lanise Landcare group

Lanise is one of the 17 barangays that Landcare is adopted. This barangay is situated in high elevation of 900-1200 masl where vegetable growing is favorable. There are 417 farm families, and these are divided into 9 zones or sitios. Farmers are rotating vegetables and maize. They put premium inputs to the vegetable and the maize is benefiting from residual fertilizer. Tomato is the main vegetable crop. Cabbage, sweet pepper, beans, carrots and radish are also cultivated. Coffee, cacao and rubber are also cultivated.

Vegetable growers traditionally believed that the soil should be well drained to avoid rotting, disease infestation and early senescence. This is the obvious reason why vegetable farmers orient the rows up and down the slope. This practice cause severe soil erosion and loss of fertilizer inputs.

The Landcare was adopted in April 2, 1997. This aims at addressing severe soil erosion in vegetable production and planting of fruit and timber trees to improve and diversify farm income. The local government (barangay) facilitated the formation of Landcare group to all of the 9 sitios. Besides the political will, it also provides funds for training and establishment of communal nursery at the each sitio.

The Landcare movement faced a serious challenge in Lanise. This is due to the traditional concept about vegetable growing, the difficulty in putting trellis to the vegetable in contour curvature, and hauling of vegetable harvests particularly if the contour is oriented perpendicular to the road (tomato production).

Inspite of these drawbacks, there are now 40 vegetable farmers who adopted NVS laid out along the contour. They observed that adoption of NVS has no effect on disease infestation, rotting and on senescence. Few of them modified their trellising method to address contour curvature. These farmers are sharing to other vegetable farmers about their experiences, and encourage other non-adopters to also adopt conservation farming based on NVS. There are now communal nurseries established by the Landcare group with financial assistance from the local fund. These seedlings are planted on the NVS and along farm boundaries. Fruit trees are Durian, Rambutan and Mangoes. Timber trees are Bagras, Mahogany, Cassia mangium, and Gmelina arborea.

***Site* 7. *El Canyon Grande San Miguel* -**

This is one of the tourist attractions in Claveria. The canyon is a deep escarpment of more than 500 meters deep to the Cabulig river, and it is facing the toward the terrain of extended grasslands to the national park of Mt. Balatucan. Cabulig river cuts across the municipality and empties its water to the next town of Jasaan. The river segregates the mainland and the tabuk barangays (villages). The canyon overviews the other 8 villages of Claveria to the north and northeast.