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Linking Poverty Reduction with Forest Conservation

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Linking Poverty Reduction with Forest Conservation

Case Studies from Vietnam

Jason Morris, Le Thi Phi, Andrew Ingles, John Raintree and Nguyen Van Duong

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Published by: IUCN, Bangkok, Thailand

IUCN
The World Conservation Union

Citation: Morris. J, Le Thi Phi, Ingles. A, Raintree. A and Nguyen Van Doung (2004). *Linking Poverty Reduction with Forest Conservation: Case studies from Vietnam*. IUCN, Bangkok, Thailand. 74 pp.

ISBN: 2-8317-0857-5

Cover photo: Bee Keeping in CamXuyen

Cover & Layout by: Clung Wicha Press Co., Ltd., Bangkok Thailand

Produced by: IUCN Asia Regional Office

Print by: Clung Wicha Press Co., Ltd, Bangkok, Thailand

Available from: IUCN Asia Regional Office
63 Sukhumvit Soi 39, Wattana, Bangkok 10110, Thailand
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INTRODUCTION

This document is one of the outputs of the project on Poverty Reduction and Conservation: Linking Sustainable Livelihoods and Ecosystem Management. Funding for this project was provided by IUCN's 3IC Fund, with additional funding for the publication provided by IUCN's Regional Forest Programme in Asia

IUCN's 3IC Fund

IUCN has established the 3IC Fund to provide a positive incentive system to help IUCN to adapt to a changing world and guide the course of future institutional programmatic work. The 3IC Fund is designed to:

catalyse	*Innovation*
promote	*Integration*
generate	*Information*
stimulate	*Communication*

Use of the Fund is based on an integrated approach across IUCN's programmes (including regional, global thematic and commission programmes) and clear outputs that are scientifically credible, that can be readily communicated to key audiences and have strong potential to attract further investment by donors and partners.

In addition to specific results, each project supported by the 3IC Fund is to contribute to:

- Strategy formulation – to identify strategic management options regarding the engagement of IUCN in addressing the given issue.
- Policy/position formulation – to inform the IUCN programme and the Union's constituency by proposing how IUCN could advocate the issue.
- Communication product(s) – to effectively contribute to sharing knowledge and learning on the key issues, in particular beyond the traditional constituency of IUCN.

Poverty Reduction and Conservation: Linking Sustainable Livelihoods and Ecosystem Management project

The aim of this project is to strengthen IUCN's ability to incorporate poverty reduction and livelihood considerations into conservation actions.

In recent years there has been increasing discussion about the link between conservation, poverty reduction and human livelihoods, gaining momentum since the Rio Earth Summit in 1992. IUCN has intensified its attempts to address questions of ethics, poverty and human livelihoods in its conservation efforts. These efforts have emerged partly out of concerns for the interests of the poor, partly out of recognition that conservation efforts will be more effective if carried out with the participation of rural people, and partly out of a pragmatic recognition that donor funding for conservation is increasingly dependent on demonstrated linkages with livelihoods and poverty reduction. The challenge is to show that poverty directed, pro-poor conservation contributes to poverty reduction in a number of ways, including improving governance, protecting and expanding the poor's asset base, ensuring a more equitable distribution of costs and benefits and safeguarding livelihoods against economic shocks and natural disasters. Therefore, the purpose of the project is to develop a strategy and approach for linking sustainable livelihoods and ecosystem management that is based on lessons learnt from activities being undertaken by IUCN and by linking more effectively with social development organisations.

The Publication

This publication comprises of two parts:

- PART 1: LINKING POVERTY REDUCTION WITH FOREST CONSERVATION: a brief review of policies and programmes in Vietnam.
- PART 2: CULTIVATING NON-TIMBER FOREST PRODUCTS FOR SECURE LIVELIHOODS: a case study of the impacts of NTFP domestication and agro-forestry on poverty reduction and livelihood improvement in Vietnam.

Both studies were conducted as a learning exercise and the findings will be contributing to improving IUCN's approach to addressing livelihood issues.

A similar publication has been produced for Lao PDR comprising of:

- PART 1: NATURAL WEALTH a desk study about the opportunities and challenges to link poverty reduction with forest conservation in Lao PDR to help meet national development goals.
- PART 2: BITTER BAMBOO AND SWEET LIVING which describes the impacts of NTFP conservation activities on poverty reduction and sustainable livelihoods.

Linking Poverty Reduction with Forest Conservation: A Brief Review of Policies and Programmes in Vietnam

Authors: Jason Morris and Andrew Ingles
January 2003

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1 INTRODUCTION

The Government of Vietnam (GoV) has placed poverty reduction and forest conservation among its top priorities, aiming to reduce national poverty to less than 10 per cent by 2005 and restore forest cover to 43 per cent by 2010. To achieve these goals, GoV has launched several major programmes and strategies, namely the national Hunger Eradication and Poverty Reduction (HEPR) programme; the Comprehensive Poverty Reduction and Growth Strategy (CPRGS); the National Forest Development Strategy (NFDS); and the Five Million Hectare Reforestation Programme (5MHRP). The new multi-sectoral approach driving the forestry sector recognises poverty reduction and upland development among the main goals of the 5MHRP and figures them prominently in the NFDS. The CPRGS has also recognised the importance of forest and environment conservation by identifying forest cover - along with clean air and water - as indicators of poverty. The MARD-IUCN Project for the Sustainable Use of Non-Timber Forest Products has helped to highlight the potential of non-timber forest products (NTFPs) in developing practicable links between forestry conservation and poverty reduction.

Despite ambitious aims, actual integrated solutions are still difficult to find. Inclusion of poor and upland communities in the 5MHRP has mostly taken the form of tree-planting and forest protection contracts, which are costly to the State and bring limited revenue to the people. Such programmes can actually transform communities from forest users and managers in their own right to hired labourers of the forestry sector. And although forest cover may have increased in recent years, forest quality has decidedly reduced. Meanwhile, the CPRGS has recognised basic environmental indicators, but is still a long way from comprehensively integrating environmental concerns into national poverty reduction and economic growth strategies. The HEPR programmes make little, if any, reference to the environment. In both directions, it seems that the complex dynamics underpinning poverty and forest conservation are overlooked, perhaps overwhelmed by the drive to reach national and international targets.

This paper provides a brief review of the main policies and programmes in Vietnam relating to, first, poverty reduction and, second, forest conservation. Emphasis is given to NTFPs as a potential opportunity for addressing links between poverty reduction and forest conservation. The final section of the paper discusses how the current policy framework for poverty reduction and forest conservation potentially enable and impede each other.

2 POLICY FRAMEWORK

2.1 Policies for poverty reduction

"Vietnam is considered by the international community to rank among the best-performing countries in terms of poverty reduction" (CPRGS, 2003). By national standards, poverty has decreased by two thirds since 1990. By international standards, it decreased by one half over the same period. Constantly high economic growth rates during the 1990s, averaging around 7.5 per cent annually, and a wide range of economic reforms and sectoral policies may partly, at least, explain the success (CPRGS, 2003). However, Vietnam remains a poor country. In year 2000, the per capita income was around 400 USD and about one third of the population lived in poverty.

In response to the challenge, GoV continues to develop a range of policies and programmes aimed at reducing poverty and improving the national standard of living. They include agriculture and forest land allocation, credit programmes for the poor, investments in infrastructure, sedentarisation and fixed cultivation programmes, reforestation schemes, education and health services, and agriculture and forestry extension services (L.Q. Trung, 2002). However, agriculture and forest land allocation still lag in remote and mountainous areas. Access to credit is still difficult for the poor because they lack collateral and have low risk tolerance. Improvements in infrastructure and services for health, education, extension, transportation, communication and production have been scattered unevenly throughout the country. To target the poor more effectively and better integrate these types of investments,

GoV launched two multi-sectoral national programmes for hunger eradication and poverty reduction in 1998 and, more recently, approved a broad-based national strategy for poverty reduction.

2.1.1 National hunger eradication and poverty reduction programmes

In 1998, GoV initiated two national programmes for poverty reduction, namely Hunger Eradication and Poverty Reduction (HEPR - Decision 133) and Poor Communes with Extreme Difficulties in Mountainous and Remote Areas (PCED - Decision 135). Together, they are commonly referred to as the national HEPR programmes. The Ministry of Labour, Invalids and Social Affairs (MOLISA) is the standing agency for Decision 133, while the Committee for Ethnic Minorities and Mountainous Areas (CEMMA) is the standing agency for Decision 135. The HEPR programmes promote a multi-sectoral approach, aiming at improvements in clean water, educational enrolment, productive capacity, cultural and social knowledge, infrastructure, transportation and communications, training of leaders and access to credit. GoV has specifically named relevant ministries and institutions to support the programmes, such as the Ministries of Agriculture and Rural Development, Education and Training, and Health.

Decision 133 was enacted for the period of 1998-2000 and has since been taken over by Decision 143 for the period of 2001-2005. The decision applies to extremely poor communes, mountainous areas, borderlands, islands, and remote and scattered communities, based on a national list of 1,715 poor communes. The components of the decision include extension services for income generation through agro-forestry and fisheries, capacity building for poverty reduction in poor communes and support to ethnic minority groups living in extreme conditions. The goal is to reduce the proportion of households living under the national poverty line to less than 10 per cent by 2005. The estimated budget for Decision 133 (Decision No.133/1998/QD-TTg) was 10 trillion VND (approx. 700 million USD) and 22.6 trillion VND (approximately 1.7 billion USD) for Decision 143 (VNA, November 4, 2001).

Decision 135 was enacted for the period of 1998-2005. It targets the 1,000 poorest communes in remote and mountainous areas, otherwise known as "communes in extreme difficulty" (CEDs). Its goal is to reduce the proportion of households living under the national poverty line in CEDs to 25 per cent by 2005. This compares to a current poverty rate of 91 per cent of households in CEDs in the Central Highlands and 73 per cent of households in CEDs in the Northern Region (according to the 1998 Vietnam Living Standards Survey).

Little information is available on the outcomes of the programmes. Anecdotal successes have been hailed in the media for increasing incomes and generating improvements in food security, health, road access, forest cover, and technologies for agriculture and animal husbandry (VNA, November 4, 2000: VNA, April 19, 2001; VNA, November 27, 2001). However, the media has also criticised the programmes for slow rates of capital disbursement, lack of general awareness about the programmes, overlap between projects, hiring of unqualified consultant companies and, ultimately, failing to meet the real needs of poor people (VNA, November 4, 2000; VNA, February 3, 2001, VNA, May 12, 2001).

2.1.2 Comprehensive Growth and Poverty Reduction Strategy

In April 2002, the Prime Minister approved the Comprehensive Growth and Poverty Reduction Strategy (CPRGS). The CPRGS is the Vietnamese Poverty Reduction Strategy Paper (PRSP) prepared for and supported by the World Bank. The CPRGS is a guiding document for economic growth and poverty reduction objectives in Vietnam and "translates the Government's Ten-Year Socio-Economic Development Strategy, Five-Year Socio-Economic Development Plan, as well as other sectoral policies into specific and concrete measures with well-defined road maps for implementation" (CPRGS, 2003). A main objective of the CPRGS was to formulate a set of evaluation indicators in line with the Millennium Development Goals.

The CPRGS takes a broad-based approach to poverty reduction and has formulated specific indicators for:

1) poverty reduction;
2) provision of essential infrastructure to extremely disadvantaged groups;
3) job creation;
4) universalisation of education;
5) reduced birth, child mortality and child malnutrition rates;
6) reproductive health, HIV/AIDS, epidemics and other social disease;
7) development of culture and information and improvement of the spiritual life of the people;
8) improvement of living standards and cultural preservation and development for ethnic minority groups;
9) environment protection and sustainability;
10) reduction of vulnerability for the poor;
11) gender equity and women's empowerment; and
12) good governance for poverty reduction.

(CPRGS, Annex B, 2003)

The CPRGS's broad-based approach to poverty reduction reflects the many diverse factors underpinning poverty. However, the push to articulate these complex dynamics through simple, quantifiable and universal indicators risks over-simplifying the task. A case in point is the use of forest cover as an indicator. Although deforestation can have severe impacts on the poor communities who depend on them, simply increasing forest cover can be as likely to impoverish these communities as enrich them, especially if protecting forests means restricting access of the poor. At this level, the link between forest conservation and poverty reduction is uncertain and insecure.

2.2 Policies for forestry and forest conservation

The evolution of forestry related policies and programmes dates back to the 1950s when agricultural land and most forestland was nationalised and put under the management of cooperatives and State owned enterprises. Major reforms in agriculture and forestry began in the mid 1980s when GoV

initiated a process to move from a centrally planned to a market driven economy. In the early 1990s, a National Forestry Action Plan (NFAP) was developed. A large number of laws, decrees, decisions, regulations and circulars have since been issued to support the implementation of the NFAP. Currently, the three main categories of forest are: special use, protection, and production forests. These categories generally reflect the dominant management objectives for forest and biodiversity conservation, environmental protection and forestry production, respectively.

While forestland remains the property of the State, forests are being progressively allocated to economic units such as State Forest Enterprises (SFEs), cooperatives, households, and other private organisations and social groups. During the implementation of the land allocation programme, several additional policies, directives, and regulations[1] were circulated to address issues arising during implementation. Since 1996, a revised system for land allocation has been applied, allowing farmers to use allocated forestland for agroforestry purposes. Land allocation processes are advancing slowly and underpin the transformation of State forestry into social forestry. In addition, guidelines have been issued for restructuring SFEs[2] as commercial enterprises, public service organisations, or Special Forest management boards. Overall, the role of SFEs is to be diminished in the forest sector and private investment is to be encouraged.

Among these policies and programmes, the following are noteworthy:

2.2.1 Partial ban on timber harvesting from natural forests

Enacted in 1992, this has been one of the most important changes in forestry policy. The ban is being implemented gradually to limit timber exploitation

[1] Decree 02/CP on forestland allocation for forestry purposes, issued 1994; Decision 202/CP on contractual forest management and reforestation, issued 1994; Decree No 1/CP on contractual allocation of land to the SFEs for agriculture, forestry and aquaculture; Decision 245/TTG on state management of forests (with recognition of the role of communities).

[2] Decision 90/TTg issued in 1994

from natural forests. The current quota is about 300,000 m^3 per year. The ban has increased the importance of NTFPs as potential sources of revenue, especially for the local communities and SFEs who have been directly affected by it.

2.2.2 Programme 327 for greening the barren lands and denuded hills

Programme 327 was a major reforestation initiative[3] taking place from 1992-1996. The programme aimed at establishing forests for environmental protection and improving the livelihoods of rural populations. The content and targets of the programme[4] were adjusted in 1996 so that reforestation activities were also directed to the protection and establishment of forests for watershed protection and the rehabilitation of special use forests. The main achievements of the programme were:

- forest protection contracts issued to cover 1.6 million hectares of forests, involving more than 466,000 households;
- natural regeneration achieved on 299,000 hectares of forests; and
- new plantations established on 397,000 hectares.

2.2.3 Five Million Hectare Reforestation Programme (5MHRP)

Following on from the 327 programme, the 5MHRP was approved[5] in 1998 and remains the single most dominant programme of the forest sector. It envisages the establishment of five million hectares of forest by 2010, which would increase forest cover from 28 per cent to the 1945 level of 43 per cent of Vietnam's total land area. One significant change is the targeting of one million hectares for rehabilitation by natural regeneration. The five million hectares also includes the establishment of some 450,000 hectares of NTFP plantations for products such as cinnamon, star anise, pine resin, other essential oils, and bamboo.

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[3] Decision No 327, dated 15 September 1992

[4] Prime Ministerial Decision No 556/TTg, 1996

[5] National Assembly Resolution No 8/1997/QH10 and Decision 661/QD-TTg dated July 29, 1998

The 5MHRP has multiple aims relating to:

- conserving biodiversity and protecting soil and water resources;
- creating raw materials for forest-based industries and for satisfying domestic and export demands;
- contributing to sustainable development in mountainous regions, with special attention to ethnic minorities and upland communities practising shifting cultivation; and
- supporting national programmes on hunger eradication and poverty reduction.

The 5MHRP has high ambitions for income generation through forestry and NTFPs. But a common question directed at the 5MHRP is where does it intend to reforest its five million hectares? The "barren hills" of Vietnam are commonly promoted as the target areas for reforestation. The epithet suggests that these lands are unoccupied and useless, but they are often important fallow lands in crop rotation systems and common access shrublands for NTFPs, especially for poor communities. These NTFPs can provide vital supplies of fuel, construction materials, foodstuffs, medicines, fodder and supplementary income, especially in periods of food shortage or sudden illness.

2.2.4 National Forestry Development Strategy

In 2001, the Ministry of Agriculture and Rural Development (MARD) approved the National Forestry Development Strategy (NFDS), which is now under revision and will be submitted to GoV for approval. It identifies key orientations in sustainable forest resource management and forestry development for Vietnam during the period 2001-2010. These new directions reflect a shift from a resource exploitation-based forestry to a people-based forestry that focuses on:

- forest protection;
- rehabilitation and development;
- biodiversity conservation;
- protection of precious and rare forest fauna and flora;

- promotion of small and medium forest product processing;
- contribution to hunger eradication and poverty reduction;
- improved livelihood of people in mountainous areas;
- socialisation of forestry; and
- improved role of and contribution to the forestry sector in national socio-economic development.

The role of NTFPs in this process is specifically recognised in six key forestry development programmes of the FDS, namely the 5MHRP Sustainable Forest Management and Development Programme; Timber and Forest Product Processing Programme; Forest Resources Inventory; Assessment and Monitoring Programme; Forest Tree Seedling Programme; and Human Resources Development Programme.

The people-based focus of the FDS and its multi-sectoral approach offer much promise for integrating poverty and forest conservation, but it is still at an early stage of development and its practical successes have yet to be proven.

2.2.5 Forest Sector Support Partnership

Adopted by GoV in November 2001, the Forest Sector Support Partnership (FSSP) aims to better guide and manage support activities in the forest sector during the period 2001-2010. The FSSP is considered by the GoV and supporting international organisations as a tool of the NFDS, as well as to support GoV in implementation of the 5MHRP.

Government attention to NTFPs was also revealed in the national forestry research agenda that was recently revised and published in the proceedings of the "Forest Sector Support Partnership Workshop: Setting Research Priorities for Vietnam's Five Million Hectare Reforestation Programme," which was held in Dalat, 20 to 22 November 2001.

2.2.6 National system of protected areas

In 2002, Vietnam's system of protected areas consisted of 17 National Parks, 60 Nature Reserves and 18 Landscape Conservation Areas (ICEM, 2003). A special category for Species/Habitat Conservation Area has recently (Decision 08/2001) been introduced, but no sites have been established yet. The protected area system is 2,123,354 hectares, while MARD has proposed to increase the number of sites to 109 and expand total area to 2,629,188 hectares (ICEM, 2003).

Protected areas in Vietnam approximate to IUCN's categorisation as follows:

Special use forest category	Equivalent IUCN category
National Park	II
Nature Reserve	I
Species/Habitat Conservation Area	IV
Landscape Conservation Areas	III & IV

Source: ICEM, 2003

Notably, none of the Vietnamese categories correspond to IUCN Category V (Protected Landscapes/Seascapes) and Category VI (Managed Resource Use Area), which "allow for a substantial role for people and the sustainable use of resources . . . [and] would enable protected area managers to encourage a gradient of human intervention and use over the protected areas system as a whole" (ICEM, 2003).

As in most of mainland Southeast Asia, protected areas in Vietnam are threatened from a range of sources, including infrastructure development (e.g. roads, dams, reservoirs, tourism construction), agricultural encroachment, illegal trade of timber and wildlife, and unsustainable exploitation of NTFPs. While extra-local economic interests and environmentally un-friendly development policy arguably drive these threats, the livelihoods of

the poor are, in many instances, located on the front lines of the conservation-development conflicts. In Vietnam, 85 per cent of protected areas are located in areas of "medium" and "high" poverty (ICEM, 2003). Hence, a better understanding and integration of poverty issues with protected area conservation is essential in Vietnam.

2.2.7 International treaties

Vietnam has ratified the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species (CITES). It has also adopted a range of national conservation policies and objectives for the forest sector. However, there is insufficient knowledge about NTFPs to plan and implement comprehensive actions to fully achieve all of these obligations and objectives. Critical knowledge gaps include:

- the distribution, value, conservation status, threats and appropriate management regimes for important NTFP species[6];
- the range of feasible technical opportunities and appropriate social arrangements for the protection, regeneration and sustainable development of NTFPs in different categories of forests;
- the role within different poverty reduction, conservation and reforestation programmes; and
- the actual conservation impact of government regulatory systems and development programmes related to NTFPs.

[6] For example, some 3,800 species of medicinal plants have so far been identified by the Institute of Medicinal Materials, of which 114 species are classified as endangered. Less is known about other types of NTFPs in Vietnam.

3 LINKING POVERTY REDUCTION WITH FOREST CONSERVATION

GoV's recognition of important links between poverty reduction and forest conservation is reflected in national strategies and programmes. The NFDS and 5MHRP have attempted to address these issues by promoting poverty reduction and upland development through forestry-based income schemes, notably in tree-planting and protection contracts for the 5MHRP. The CPRGS and national HEPR programmes give only a superficial treatment of environmental conservation issues, if at all. However, the links are complex. Continuing challenges in Vietnam are ensuring quality of natural forests (especially biodiversity of species and eco-systems) and addressing issues of access to forests and forest products for the poor.

Forest plantation programmes risk restricting and disenfranchising poor and marginalised communities from forests and turning them into hired laborers of the forestry sector. Policies for protected areas (i.e. special use forests) generally prohibit local communities from accessing forests and extracting forest products, regardless of levels of impact and long-standing use or claims over those lands. Reforestation programmes can have the same impact when they occupy important areas for agriculture, fallows and NTFP collection. In some cases, this can create conflict between the newly recognised forest owner or manager (as in a forest protection contract) and a wider community of not uncommonly poor families that depend on common access to those lands for basic livelihoods.

Despite NTFPs being hailed as a promising link between forests and the poor, international experience has shown how commercialisation without attention to issues of equity and local empowerment can lead to increased indebtedness and exploitation of collectors as well as disentitlement of poor from land and forest resources (Neumann & Hirsch, 2000). Disenfranchisement of poor women from NTFP markets is a special concern, especially as

labour returns increase, technologies become more sophisticated and processing facilities are more centralised (Neumann & Hirsch, 2000). National experiences in the MARD-IUCN NTFP Project showed how NTFP domestication activities favoured wealthier households with land, labour and capital, while also creating risk for poor households, women and children who depended on common access to shrublands and naturally regenerating forests for NTFP collection (Morris, B.T. An, N.T. Nghia & V.D. Quang, 2002).

Poverty reduction in Vietnam is closely linked with - and not always adequately distinguished from - the national struggle to modernise and industrialise. Much attention to large-scale infrastructure, notably roads, hydroelectric dams and irrigation systems, has usually been without adequate attention to impacts on the environment and the local communities that directly depend on those environments. The CPRGS has recognised the importance of environment to the poor, but exactly how these concerns will translate into poverty reduction is still vague and uncertain. Attention to environmental concerns in the cross-sectoral work of poverty reduction is nearly absent in the CPRGS and the national HEPR programmes. Employing "forest cover" alone as an indicator is not only insufficient for reducing poverty, but inadequately addresses forest biodiversity and other qualities. Additionally, there is a need to understand more specifically how different levels of economic attainment link with different types of forest use, dependence and quality. Much research and piloting on these issues is still required to provide the basis for effective policy making.

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Cultivating Non-Timber Forest Products for Secure Livelihoods:

A Case Study of the Impacts of Non-Timber Forest Products Domestication and Agro-Forestry on Poverty Reduction and Livelihood Improvement in Vietnam

Authors: Jason Morris, John Raintree, Le Thi Phi and Nguyen Van Duong
January 2003

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ACRONYMS

CRES	Centre for Natural Resources and Environmental Studies
Eco-Eco	Institute for Ecological Economy
ICDP	Integrated Conservation and Development Project
IUCN	IUCN - The World Conservation Union
MA&D	Market Analysis and Development
MARD	Ministry of Agriculture and Rural Development
NTFP	Non-Timber Forest Products
PBP	Peanut - Green bean - Potato crop cycle
PRA	Participatory Rural Appraisal
RNE	Royal Netherlands Embassy
SFE	State Forest Enterprise

1 INTRODUCTION

Experiences from the MARD-IUCN Project for the Sustainable Use of Non-Timber Forest Products (NTFP) in Vietnam showed that environmental conservation projects can, and do, contribute to poverty reduction and livelihood improvement. Using a methodological variant of the Market Analysis and Development (MA&D) approach (Raintree, L.T. Phi & N.V. Duong, 2002), the NTFP Project identified a range of NTFP-based interventions that contribute both to forest conservation and economic advancement. In Ha Tinh Province, NTFP domestication trials yielded promising economic returns for poor farmers. In Bac Kan Province, integrating NTFP species with agro-forestry models helped villagers meet short and long-term livelihood needs. Together these interventions brought income benefits to poor communities, secured supplies of basic materials, introduced new technologies and recuperated degraded soils for cultivation. A primary goal of NTFP project interventions was to reduce extraction pressures in natural forests, but this result requires closer study.

Many other challenges also remain in effectively linking forest conservation with poverty reduction. Despite being among the most directly dependent populations on natural forests, the poorest people in the field sites were frequently excluded from project activities because they lacked land, labour, experience or social and political influence. Furthermore, conversion of fallow lands into private cultivation plots potentially impacted negatively on the poor, who depend on common access to these lands for fuel and other NTFPs. Particular attention should be given to poor women and children who are the primary collectors in the locality.

This report aims to better understand the links between poverty reduction, livelihood improvement and eco-system management through the activities of the NTFP Project. The case study is based on cost-benefit analyses for NTFP domestication models (N.V. Duong, 2002) and a preliminary assessment of project impacts (Morris, B.T. An, N.T. Nghia & V.D. Quang, 2002). The

remainder of this section provides background information on the NTFP Project, the MA&D approach and the field sites. A brief review of methodology is outlined in the second section. The third section argues that NTFP domestication and agro-forestry models showed important economic and other benefits for poor communities and gave preliminary indications of reduced pressure on forests, but faced challenges in equitable distribution of benefits and scaling-up successes. The final section provides some final conclusions and recommendations.

1.1 MARD-IUCN NTFP Project

The project for the Sustainable Use of Non-Timber Forest Products was a trial project funded by the Royal Netherlands Embassy (RNE) and co-executed by the Ministry of Agriculture and Rural Devleopment (MARD) and IUCN - The World Conservation Union (IUCN). The project was implemented from July 1998 to March 2002 with the goal of 'biodiversity and forest conservation through the promotion of ecologically sustainable and economically viable use of NTFPs' (Results Based Matrix, s.1.2). A main component of the project was to build capacity for research and development in the Non-Timber Forest Products Research Centre (NTFP-RC), under the Forest Sciences Institute of Vietnam in MARD. As a trial project, it was oriented towards the development of new methods, tools and strategies for sustainable use and development of NTFPs, more than counting the number of hectares of forest conserved or the amount of NTFPs produced (Results Based Matrix, s.2.3).

Field activities in two pilot sites supported capacity building and methodological development. Both pilot sites were located in the buffer zones of protected areas. Vietnamese partner institutions managed the pilot sites in collaboration with the NTFP-Research Centre. The Centre for Natural Resource and Environmental Studies (CRES) of the National University in Hanoi managed activities around Ke Go Nature Reserve of Ha Tinh Province. The Institute for Ecological-Economy (Eco-Eco), a local NGO, managed activities around Ba Be National Park of Bac Kan Province.

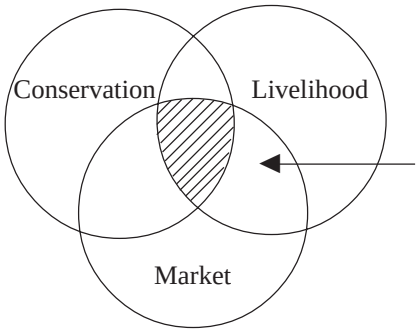
At the time of this report, a proposal for a second phase of the NTFP Project was recently approved, testifying to interest from government and donors. In particular, the MA&D methodology provided an innovative and promising approach for integrating livelihood concerns with environment conservation in Vietnam.

1.2 Market Analysis & Development Approach[1]

Through participatory action research, the NTFP Project developed and tested a conservation-oriented methodological variant of the Market Analysis and Development (MA&D) approach. The approach focused on three main areas, as pictured in these circles:

These circles define three distinct but interrelated objectives. In project terms, 'conservation of biodiversity' is certainly a primary objective, but it is understood that in general this cannot be achieved without satisfying the needs of the local inhabitants who depend upon the protected area resource for their livelihoods, hence 'livelihood improvement' is a related objective. Similarly, the third objective 'market development' is a means of improving livelihoods. The key to addressing multiple objectives is to recognise and build upon the inherent linkages between them. Since the project wanted to design an action plan that could target all three objectives, the area of greatest interest is represented by the intersection of these three circles.

[1] Section 1.2 of this report has been reproduced from Raintree, L.T. Phi & N.V. Duong (2002) with permission from IUCN.

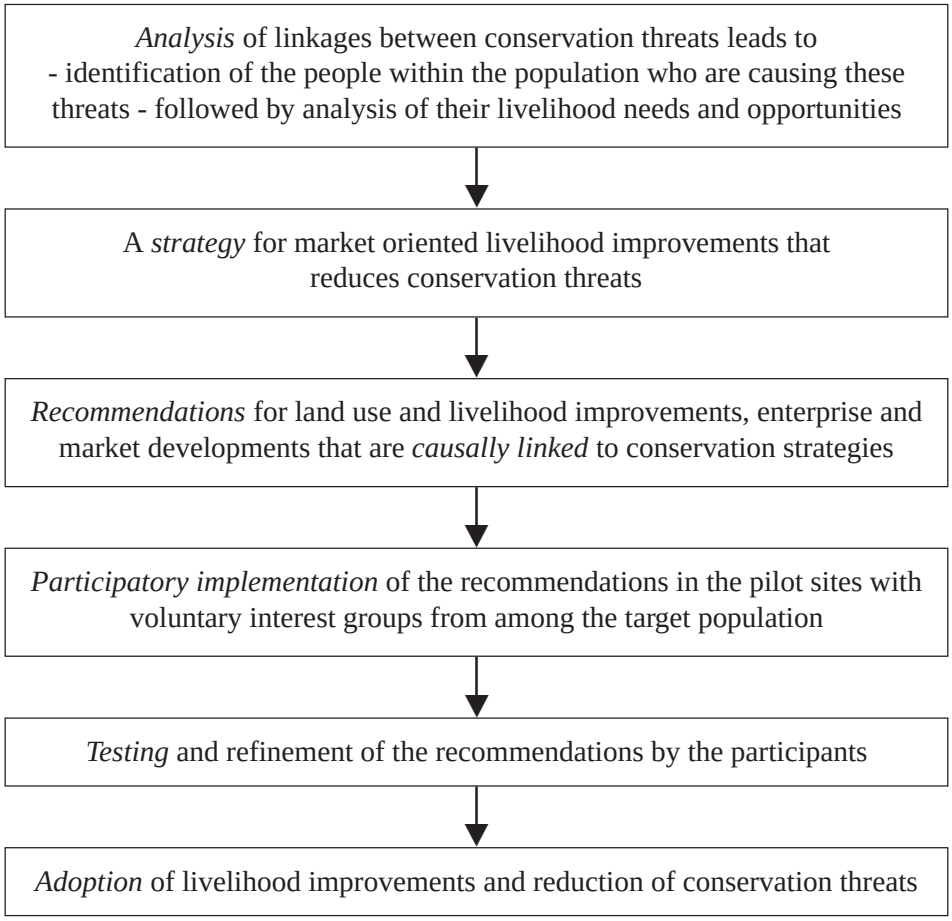


This is the main area of interest in order to meet all of the project objectives. In practical terms, solutions that only address one or two of the objectives might also be included in project activities, as long as they have no negative impact on the others, but the priority solutions should be those that fall within the shaded area.

In other words, the best solutions for the project are those that have all three of the following characteristics:

Conservation effectiveness	Can be effective in supporting the conservation or sustainable utilisation of threatened resources
Livelihood compatibility	Can help improve household livelihoods in ways that are compatible with household opportunities and limitations, i.e. options that are genuinely adoptable by the households in question
Market viability	Has a high probability of succeeding in the marketplace

The basic logic of the intervention strategy is as follows:



The key parts of this are the intervention strategy and the recommendations that emerge from the second and third box, leading to the following logic: a diagnosis of problems and opportunities within the livelihood systems of the strategically defined households leads to the development of well-grounded strategies for:

- mitigation of conservation problems through
- appropriate and sustainable land use and livelihood improvements, some of which may be mainly subsistence oriented, while others may involve

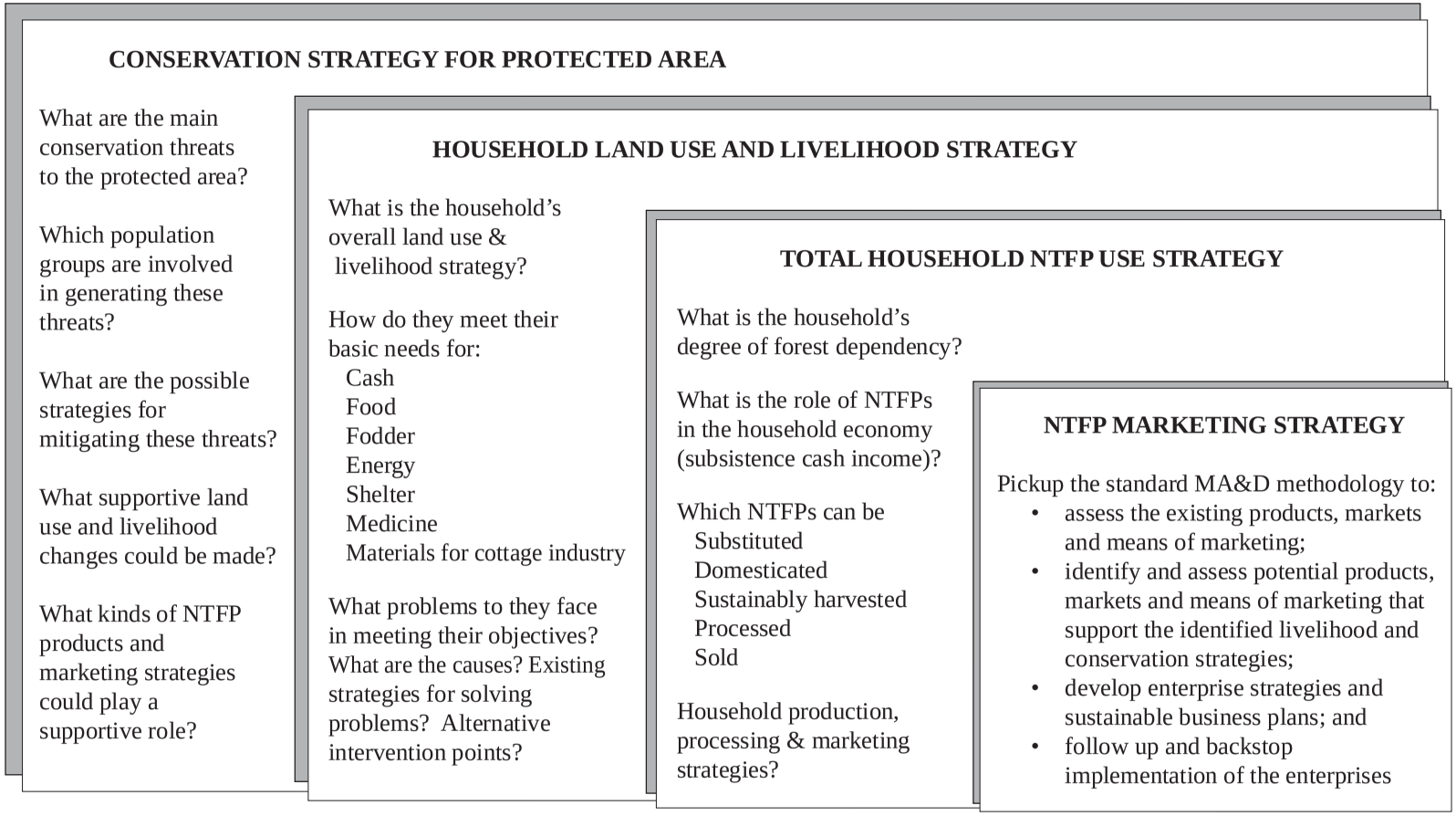
- marketing of sustainably produced forest products that have been screened for market viability, which in turn require
- an analysis of the existing marketing channels and identification of potential improvements in the marketing systems themselves.

This logic is based upon the recognition that in order to achieve genuine relevance to the needs of the site inhabitants, the final NTFP Marketing Strategy must fit within a nested series of other strategic contexts in which households are already involved (see figure 1.1).

1.3 Field activities at pilot sites

A Marketing Unit in the NTFP Research Centre led the application of the MA&D methodology in the pilot sites, although implementation was followed up unevenly between the partner institutions. CRES collaborated closely with the Marketing Unit to test a limited number of NTFP species for domestication, which included seedling propagation, cultivation, primary processing and marketing. Eco-Eco incorporated some of the recommended NTFP species into their agro-forestry models, but preferred to emphasise a more holistic approach to agro-forestry, which they felt was more suited to the subsistence-oriented communities and difficult market access in Bac Kan province.

Figure 1.1 Contexts of NTFP marketing strategy



1.3.1 Poor communities around Ke Go Nature Reserve

Ke Go Nature Reserve, Ha Tinh Province, is around 350 kilometres South of Hanoi. Due to heavy impacts of the American war, difficult climatic and soil conditions, land shortages in certain areas and the establishment of various water reservoirs, the area has been characterised by instability and migration during its recent history. Ha Tinh is one of the poorest provinces in Vietnam. It has limited natural resources for commercial and industry is not well developed. However, market access is good because of National Highway No.1. Nearly the entire population is agriculturalist. Few ethnic minority groups live in the area.

Based on a Participatory Rural Appraisal (PRA) exercise in six villages, the field team worked in Village 4 of Cam My Commune and Village 1 of Cam Son Commune. The villages were selected for their high dependency on forests and high poverty. Both villages are homogenously Kinh (Vietnam's dominant ethnic group) and have good market access. Cam My is close to the District Capital, while Cam Son is closer to the Provincial Capital. Around the Ke Go Nature Reserve are several large plantations of pine forests belonging to State Forest Enterprises (SFE) and substantial areas of fallow lands and barren hills. The SFE contracts out resin extraction from the pine forests, which is a welcome source of income for some households.

Among the activities supported by CRES, domestication trials were established for rattan (*calamus salicifolius*), a new variety of cassava (*pueraria thomsonii*), a medicinal tuber (*dioscorea persimitis*), vetiveria grass for making incense (*vetiveria zizanioides*), a common Vietnamese medicinal plant (*adenosma caeruleum*) and forest ginger (*alpinia officinarum*). Apart from rattan, all of these species are annual crops. The field team assisted farmers to build nurseries for rattan, cassava and the medicinal tuber *dioscorea persimitis*. For *vetiveria* and *adenosma*, farmers were trained on how to transplant seedlings from the forest. The field team organised training courses on cultivation techniques and provided regular technical support. Farmers purchased seedlings and materials through a credit fund organised by CRES. Farmers were also instructed on and provided basic equipment

for primary processing of cassava and vetiveria grass. In a few instances, the Marketing Unit organised meetings with farmers and local traders to facilitate market linkages. The majority of farmers cultivated these NTFPs for sale.

1.3.2 Ethnic minority groups around Ba Be National Park

Ba Be National Park, Bac Kan Province, is over 200 kilometres directly North of Hanoi and commuting takes approximately six hours by car. Bac Kan is among the poorest provinces in Vietnam. It is the only northern province whose per capita income has declined in recent years (Le Trung, 2002). However, it is also among the few whose forest cover is reported to have increased over the same period. Market access to the Ba Be pilot site is difficult because of a windy mountainous road. However, the natural beauty and historic importance of Ba Be Lake has made it a popular tourist destination, which local government has marked for upcoming improvements in infrastructure.

Based on a Participatory Rural Appraisal (PRA) exercise in four villages, Eco-Eco worked in Na Lang and Na Co villages. Both villages are in Khang Ninh commune. Na Lang is a lowland village of the Tay people along the highway leading to the park, while Na Co is a highland village of the Dzao people adjacent to the park border. Tay people, the largest ethnic minority group in Vietnam, are the majority ethnic group in Bac Kan and considered to be the most closely assimilated with the Kinh. The current General Secretary of the Communist Party is Tay and, incidentally, from Bac Kan. The Tay cultivate mainly lowland wet rice, with upland crops for fodder, cash supplements or as buffer crops. Although poor by national standards, Na Lang is among the wealthiest villages in Ba Be District. The Dzao people are also among the larger ethnic minority groups in Vietnam and live primarily in the northern mountainous areas. The Dzao generally live at higher elevations than the Tay and cultivate corn, bean, cassava and some wet-rice in terraces. Na Co is among the poorer villages in the district.

Eco-Eco supported mainly agro-forestry models that–true to their name–combined ecological improvement with economic benefits. Usually timber and fuelwood species were planted in sloped lands further away from home, fruit trees in home gardens, soil-improving species in transecting hedgerows and NTFPs along borders for 'living fences' (e.g. bamboo and rattan). The most common species used were *canarium* and *mangletia* (multi-purpose species), *chukrasia* (timber), a Chinese variety of mango and a local variety of persimmon that has high market value but requires a complicated grafting technology for propagation. All species had long maturation periods, from five to 50 years. Other activities included household-level bamboo plantations, scatter-plots of *acacia mangium* for fuelwood, weaving shrimp traps with bamboo and fuel-efficient cookstoves.

Similar to the Ke Go pilot site, the field team provided initial training courses and regular technical support for farmers. However, Eco-Eco subsidised all materials and production inputs (e.g. fertilisers, pesticides etc.). Farmers were expected to contribute land, labour and assume production risks. Initially, seedlings were purchased from dealers, but later the field team supported farmers in building nurseries for seedling propagation.

2 METHODOLOGY

As mentioned above, the current study is based on previous NTFP project studies: (1) cost-benefit analyses of NTFP domestication trials in the Ke Go pilot site (N.V. Duong, 2002); and (2) a preliminary assessment of socio-economic and environmental impacts (Morris et al., 2002). The methodologies for these studies are briefly reviewed here.

2.1 Cost-benefit analyses

The Marketing Unit worked closely with a small sample of seven project participants to conduct cost-benefit analyses on domestication trials for:

Cassava (new variety)	*pueraria thomsonii*
A medicinal tuber	*dioscorea persimitis*
Vetiveria grass	*vetiveria zizanioides*
A medicinal plant	*adenosma caeruleum*
Ginger	*alpinia officinarum*
Banana	

For comparison, cost-benefit analyses were carried out with a traditional crop cycle of Peanut – Green bean – Potato (PBP) and a local variety of cassava.

All cost-benefit analyses were conducted on a standard area of 500 square metres over a period of one year. Because *adenosma caeruleum* required only eight months for cultivation, a winter crop of potato was included to complete a full year cycle. The species cultivated by each participant are described in Table 2.1. Participants calculated all monetary costs, materials used and time spent for cultivation on a daily basis. The Marketing Unit provided participants with worksheets to record data (Annex 1).

Table 2.1 Overview of participants

Name	Cassava (n.v.)	*Dioscorea persimitis*	Vetiveria grass	*Adenosma caeruleum*	Ginger	Banana	Cassava	Peanut	Green bean	Potato
Sanh		X						X	X	X
Vinh	X							X	X	X
Cuong				X	X	X	X			
Bieu				X	X	X	X			
Quy	X	X	X				X			
Dung		X	X				X			
Ngu	X							X	X	X

Standard economic values for labour, materials and products were agreed upon at a meeting with participants and, where relevant, based on discussions with local dealers. The Marketing Unit chose to standardise values to average out price fluctuations among individuals and apply constant values for non-monetary items, such as labour, collected materials (i.e. non-purchased) and harvested by-products for consumption (i.e. not sold). The values were agreed upon as follows:

Seedlings

Banana	1 500/clump
Cassava (n.v.)	800/moi
Cassava	2 000/kg
Potato	12 000/500m^2
Green bean	15 000/500m^2
Vetiveria grass	50 000/500m^2
Dioscorea	5 200/kg
Adenosma	250 000/500m^2
Peanut	6 000/kg
Ginger	5 000/kg

Labour

Labour day	15 000/day

Fertilisers

Dam	2 600/kg
Kali	1 200/kg
Lan	1 200/kg
Manure	100/kg
NPK	1 300/kg
Rice husk	1 000/kg
Lime	500/kg

Materials

Herbicide	5 000/500m^2
Pesticide	5 000/500m^2
Poles (cassava)	40 000/500m^2
Poles (*dio.pers.*)	50 000/500m^2

Sale of product

Banana	18 000/buong
Cassava (n.v.)	2 500/kg
Cassava	
Dry	1 500/kg
Fresh	700/kg
Dioscorea	2 000/kg
Dry peanut	4 300/kg
Fresh ginger	2 500/kg
Green bean	9 000/kg
Potato	250/kg
Adenosma	1 000/bo
Peanut stems	1 800/kg
Vetiveria grass	
Dry	9 000/kg
Fresh	3 500/kg

Participants could not agree on a standard price for the leaves of potato and stems of banana tree, which are used for pig feed, because they are never sold on the market. Therefore, their values were calculated based on the cost of a replacement as 100 000 VND/500m^2 and 50-60 000 VND/500m^2, respectively.

2.2 Preliminary impact assessment

The assessment focused on three main areas of impact:

(1) land and natural resource use systems;
(2) economic benefits and sustainability; and
(3) participation of target groups and equity.

Data collection was based on one-week field trips in each pilot site led by the Monitoring and Evaluation Unit of the NTFP Research Centre, the project's field advisor and a short-term advisor on gender. Methods were based on household interviews, focus groups and secondary data collection.

The assessment was considered preliminary because the trial nature of the project did not allow enough time or scale to realise the full impacts of the activities. In Ha Tinh Province, the project had just enough time for farmers to test the species on a small scale. In Bac Kan Province, the project's four years was not even enough to reach first harvest. However, some indication of trends and local perceptions has allowed for preliminary conclusions.

3 RESULTS

3.1 Economic valuation

Cost-benefit analyses showed that NTFP species yielded substantially higher returns than traditional crops, as shown in Table 3.1 (for more detailed calculations, see Annexes 2-3). The six NTFP species introduced by the project showed profits ranging from 411 000 to 1 183 000 VND[2] per 500m^2. In all cases, profits were higher for NTFPs than either of the traditional crops.

[2] VND : Vietnam Dong (national currency)

Table 3.1 NTFP species compared to local cassava and PBP (1000 VND)

	Peanut - Green bean - Potato	**Local Cassava**	**Vetiveria grass**	***Adenosma caeruleum* - Potato[a]**	**Banana**	**Ginger**	**Cassava (n.v.)**	***Dioscorea persimitis***
1. Seedling costs	81	70	50	262	30[b]	161	37	142
2. Labour	483	221	180	338	353	307	290	343
3. Fertilizers	185	39	65	107	200	176	117	110
4. Materials	5	-	-	-	-	-	62	48
5. Other costs	13	-	-	-	-	-	-	-
6. Input total	*767*	*330*	*295*	*707*	*583*	*644*	*506*	*643*
7. Output total	*1105*	*467*	*1232*	*1118*	*1138*	*1827*	*981*	*1803*
8. Profit (Row 7 - Row 6)	**338**	**137**	**937**	**411**	**555**	**1183**	**475**	**1160**

a. *Because adenosma caeruleum requires only eight months to cultivate, it was combined with potato (four months) to complete a one-year crop cycle*

b. *Initial investment in seedlings is 180 000 VND/500 m^2, which will bear fruit for six to eight years. Therefore, the annual cost of seedlings was calculated as 180 000VND/6 years = 30 000 VND/year.*

Source: N.V. Duong, 2002

When compared directly, profits from NTFP species were three to 8.5 times higher than the local variety of cassava (Table 3.2), and 1.2 to 3.5 times higher than profits from the traditional crop cycle of Peanut – Green bean – Potato (PBP) (Table 3.3). Compared with local cassava however, input costs were also much higher, except for vetiveria grass. Fertiliser costs were 1.7 to 5.2 times greater for all six NTFP species and seedling costs were more than double for *dioscorea persimitis*, *adenosma caeruleum* and forest ginger (Table 3.2). Even though the outputs more than made up for the difference, high input costs can be an obstacle to poorer and inexperienced farmers with low risk tolerance and who lack access to credit.

Table 3.2 NTFP species compared to local cassava

	Local cassava	**Vetiveria grass**	***Adenosma caeruleum* - Potato**	**Banana**	**Ginger**	**Cassava (n.v.)**	***Dioscorea persimitis***
1. Seedling costs	100%	71%	374%[a]	43%[b]	230%	53%	203%
2. Labour	100%	81%	153%	160%	139%	131%	155%
3. Fertilizers	100%	167%	274%	513%	451%	300%	282%
4. Materials	-	-	-	-	-	-	-
5. Other costs	-	-	-	-	-	-	-
6. Input total	*100%*	*89%*	*214%*	*177%*	*195%*	*153%*	*195%*
7. Output total	*100%*	*264%*	*239%*	*244%*	*391%*	*210%*	*386%*
8. Profit	**100%**	**684%**	**300%**	**405%**	**864%**	**347%**	**847%**

a. *Because adenosma caeruleum requires only eight months to cultivate, it was combined with potato (four months) to complete a one-year crop cycle*

b. *Initial investment in seedlings is 180 000 VND/500 m^2, which will bear fruit for six to eight years. Therefore, the annual cost of seedlings was calculated as 180 000VND/6 years = 30 000 VND/year.*

Source: N.V. Duong, 2002

Profits from NTFPs were less significant when compared directly with PBP, but labour inputs were reduced by 1/3 to 2/3 (Table 3.3). Reduced labour may also be translated into higher economic gains or quality of life depending on how farmers re-invest the saved time. In addition, fertiliser costs were less (except for banana) and seedlings costs were less for vetiveria grass, banana and the new variety of cassava.

Table 3.3 NTFP species compared to traditional crop cycle of PBP

	Peanut - Green bean - Potato	**Vetiveria grass**	***Adenosma caeruleum* - Potato**	**Banana**	**Ginger**	**Cassava (n.v.)**	***Dioscorea persimitis***
1. Seedling costs	100%	62%	323%	37%	199%	46%	175%
2. Labour	100%	37%	70%	73%	64%	60%	71%
3. Fertilizers	100%	35%	58%	108%	95%	63%	59%
4. Materials	100%	-	-	-	-	1240%	960%
5. Other costs	100%	-	-	-	-	-	-
6. Input total	*100%*	*38%*	*92%*	*76%*	*84%*	*66%*	*84%*
7. Output total	*100%*	*111%*	*101%*	*103%*	*165%*	*89%*	*163%*
8. Profit	**100%**	**277%**	**122%**	**164%**	**350%**	**141%**	**343%**

Source: N.V. Duong, 2002

These results for NTFPs can be considered preliminary because they were planted as trials, which may have negatively affected productivity through technical errors, small-scale and lack of supportive services, such as seedling suppliers. It is possible that profits would be greater if these factors were accounted for. Some of the species have a strong enough market for large-scale cultivation, while others should be kept to a small-scale only to supplement and diversify income. A review of each of the NTFP species follows:

Vetiveria grass

Profits from vetiveria grass were 6.8 times higher than the local variety of cassava and 2.8 times higher than PBP. Meanwhile, inputs were only 89 per cent of cassava and 39 per cent of PBP. Labour inputs were 4/5 of cassava and 1/3 of PBP. Vetiveria grass is also easy to plant, it endures dry conditions (xeromorphic) and it can grow on low fertility soils where agricultural crops

cannot, making it very suitable for the fallow lands and barren hills around Village 1 of Cam Son. Market demand for vetiveria grass is high, giving it strong potential for large-scale cultivation. With a combination of low inputs, good profits, land suitability and a strong market, vetiveria grass was perhaps the NTFP that raised most interest amongst farmers. It also attracted attention from local leaders, who independently hosted a training course for other communes on vetiveria grass domestication. The provincial newspaper also ran a story on vetiveria grass as a plant for poverty reduction.

Adenosma caeruleum

Because of the short cultivation time of *adenosma caeruleum* - only eight months - it can be planted with a winter crop in a one-year cropping cycle. Profits from *adenosma caeruleum* and winter potato were three times higher than cassava and 1.2 times higher than PBP. Input costs were slightly less compared to PBP, but twice as high for cassava. The major investment was for seedlings (250 000 VND/500 m^2) which, on average, accounted for 46 per cent of inputs by the participants. The main reason for this was that no seedling suppliers were available in the locality so farmers had to spend much time collecting them from the forest. For example, Mr Cuong said that it took him four days to collect enough seedlings for only 100 square metres of land. Hence, support in seedling supply could make profits higher. Market demand for *adenosma caeruleum* is small, especially as processing facilities are unavailable in the province. Farmers would have to limit themselves to producing for the local market.

Banana

Profits from banana were four times higher than cassava and 1.6 times higher than PBP. Market demand for banana is high in the locality. This is partly because banana is difficult to grow in the area because of strong winds. Prices for banana are higher in Ha Tinh Province than in Hanoi and other provinces and the market is often supplied from southern Vietnam. Therefore, if farmers are able to protect their banana trees from wind, they have a strong potential for expansion.

Forest ginger

Profits from forest ginger were 8.6 times higher than cassava and 3.5 times higher than PBP, making it the most profitable of the six NTFP species. Inputs were less than for PBP (84 per cent), but nearly twice as much as for cassava. Seedling costs were twice as much in both cases and fertiliser requirements were high, especially for manure. Forest ginger was found to be very suitable to the local land and climate. There were no problems with pests or diseases and production levels were comparable to other areas in the district at around 730 kg/500 m^2. The one key drawback, however, was that market demand was limited.

New variety of cassava

Profits from the variety of cassava introduced by the NTFP Project were 3.4 times higher than the local variety and 1.4 times higher than PBP. Inputs were only 2/3 of PBP and 1.5 times higher than the local variety of cassava. Profits could increase if farmers processed the cassava into powder, which would also give them more control over prices compared with selling fresh. For example, one participant of the NTFP Project, Mr Van, harvested 200 kilograms of the new variety of cassava. He sold 100 kilograms fresh at the district market for 120 000 VND. He then processed the other 100 kilograms into 18 kilograms of powder, which cost him three more days of labour and 20 000 VND to rent a processing machine. But Mr Van sold the powder at 30 000 VND/kg for a total price of 540 000 VND, which was over four times higher than selling fresh. The NTFP Project supplied Village 4 in Cam My with processing equipment, but farmers still tended to sell fresh in the market. During interviews with the Marketing Unit farmers suggested that they wanted the cash more immediately.

Dioscorea persimitis

Profits from *dioscorea persimitis* were 8.5 times higher than cassava and 3.4 times higher than PBP. Inputs were less than PBP, but nearly twice as high as cassava. According to the Marketing Unit, many people in the locality remarked that they had never planted a crop with such high income. The Marketing Unit and field team also tried to encourage primary processing

for *dioscorea persimitis* by leading project participants on a study tour to Hung Yen, where *dioscorea persimitis* is processed locally. Later, they invited an expert on processing *dioscorea persimitis* to the Ke Go pilot site to host a training course. However, as with the new variety of cassava, it has been slow to catch on. Again, farmers expressed that they preferred to get the cash more immediately.

The cost-benefit analyses showed that NTFP species yielded substantially higher returns than traditional agricultural crops of local cassava and PBP. Inputs were lower when compared with PBP, although they were higher when compared with cassava, in all cases except for vetiveria grass. Profits could increase if farmers invested in primary processing, such as for the new variety of cassava and *dioscorea persimitis*, and cultivated on a large scale. The reasons why primary processing has been slow to catch on need to be explored further. Farmers suggested that they preferred more immediate cash, which could reflect seasonal cash shortages or initial apprehension about the product's market viability. The Marketing Unit recommended that vetiveria grass, banana and *dioscorea persimitis* have strong potential to expand scale of plantation, while *adenosma caeruleum*, forest ginger and the new variety of cassava should be cultivated modestly.

The impact assessment of the NTFP Project gathered preliminary data on the contribution of domestication trials to household income. The data is only preliminary because farmers planted on a small-scale to test the species. But for a couple of households that cultivated over 1 500 square metres and nearly 3 000 square metres of NTFPs, these NTFPs contributed 21 per cent and 26 per cent to household income, respectively (Table 3.4).

Table 3.4 Contribution of NTFP Project species to household income

Interview Code	Area (m^2) NTFP trial	Total hh income	Agricultural crops		Husbandry		Fruit trees	
			VND	%	VND	%	VND	%
C.My 4	500	3685	1995	54%	350	9%	0	0%
CM8	500	7180	1630	23%	1200	17%	0	0%
CM10	500	21750	8250	38%	4500	21%	250	1%
C.Son 4	1800	10684	2690	25%	2500	23%	0	0%
CS5	2210	7310	2540	35%	1500	21%	500	7%
CS6	1000	7010	1510	22%	2300	33%	0	0%
CS7	1000	6500	3800	58%	1800	28%	0	0%
CS9	500	8410	1960	23%	1800	21%	100	1%
Average	**1000**	**9066**	**3047**	**34%**	**1994**	**22%**	**106**	**1%**

Cont...	Industrial trees		Natural forests		Other sources		NTFP species	
	VND	%	VND	%	VND	%	VND	%
CM4	100	3%	800	22%	0	0%	***440***	***12%***
CM8	150	2%	0	0%	4000	56%	***200***	***3%***
CM10	3000	14%	0	0%	5000	23%	***750***	***3%***
CS4	200	2%	500	5%	2000	19%	***2794***	***26%***
CS5	200	3%	0	0%	1000	14%	***1570***	***21%***
CS6	400	6%	60	1%	2600	37%	***140***	***2%***
CS7	0	0%	0	0%	0	0%	***900***	***14%***
CS9	0	0%	300	4%	4000	48%	***250***	***3%***
Average	**506**	**6%**	**208**	**2%**	**2325**	**26%**	**881**	**10%**

Source: Morris et al., 2002

Perhaps a more telling sign of economic viability was increased interest in and economic choice to invest in the NTFP domestication trials. Over two seasons, participation levels increased for the project's varieties of rattan, cassava, vetiveria grass and the *adenosma caeruleum*. Some farmers indicated that they had independently sought out seedlings from family and neighbours to test for themselves. According to the Marketing Unit, nearly all households in both villages have registered to plant *dioscorea persimitis* for the third season (pers. comm. Le Thi Phi).

3.2 Other livelihood benefits

At the Ba Be pilot site, where emphasis was placed on securing sustainable livelihoods, farmers indicated several other benefits of NTFP Project activities (Table 3.5). These benefits can be summarised as providing essential materials for short and long-term consumption, notably timber and fuelwood as well as introducing new cultivation technologies and species that have allowed farmers to recuperate degraded soils, diversify crop structures and increase production levels.

3.3 Impacts on equity

Project activities were implemented in poor, remote and ethnic minority communities. The project also implemented a few activities that specifically targeted the poorest households and women. For example, an activity on weaving shrimp traps was a low-investment venture that allowed some of the poorest households to add value to bamboo collection. Compared with collecting fuelwood, it was less labour intensive and could be done at home. The fuel-efficient cookstoves built in both pilot sites were also aimed at women, the primary fuelwood collectors, because it saved time and labour on collecting, cooking and cleaning the kitchen.

However, the major activities of the project, namely NTFP domestication and agro-forestry models, tended to be dominated by wealthier households. Table 3.6 provides a typical example from the NTFP Project's impact assessment of how the highest wealth group (Rank A) was over-represented in project activities, while the poorest group (Rank C) was least represented.

Table 3.5. Impacts of field activities and land and resource use in Ba Be

Outputs	Effects	Impacts	Assumptions
- 26 ha bamboo *(truc, mai)* - 5.9 ha fuelwood plantation w/ acacia mangium - 5.6 ha of 36 agro-forestry demonstration models (Eco-gardens) w/ fuelwood, timber, fruit tree, and NTFP species - 4.5 ha of agro-forestry models w/ fuelwood and timber species - 2.1 ha of enrichment planting on shrublands w/ fuelwood and timber species - 3.4 ha of rice terraces bordered w/ tephrosia (for soil improvement)	- Introduced new land-use models[a] that promote forest cover and NTFP domestication + agro-forestry models on hilly lands + enrichment planting on shrublands + planting fuelwood and timber + planting soil improvement species + planting NTFPs on border areas for fencing and income + recuperating less valuable land varieties with appropriate species (e.g. acacia on low fertility land; bamboo and forestry trees on steep lands) - Introduced new technologies that increase agricultural production, income value of land use, and/or other environmental benefits (e.g. reduced soil erosion) with non-NTFP species + planting fruit trees + rice terraces (Na Co) - Introduced planting technologies and created interest in new species for cultivation: *truc* and *mai* bamboos, acacia mangium, canarium, chukrasia, mangletia, persimmon and mango	- Increased total land area under cultivation per household from 60 to 70 percent to 90 to 100 per cent[b] by recuperating barren lands and fallow lands	- Barren and fallow lands are insignificant to household economies and, therefore, can be replaced without consequence on land and resource uses systems
		- Domesticated fuelwood and timber for household needs	- Domesticating fuelwood and timber will reduce collection of fuelwood and timber from natural forests
		- Diversified and added value to household income with higher value crops	- Higher income will reduce income activities derived from harvesting in natural forests

Table 3.5. Impacts of field activities and land and resource use in Ba Be (cont')

Outputs	Effects	Impacts	Assumptions
- Nursery for acacia mangium - Temporary nursery for forestry and fruit tree species - Nursery for grafting persimmon - Nursery for forestry species	- Introduced nursery technology to key farmers	Note: To date, seedlings have been produced only to provide for project activities. Thus, it is difficult to judge the contribution and sustainability of nurseries beyond project.	
- Land-use plans (LUP) at village and household level	- Households have individual plans for land use that congrue with village LUP	Note: To date, household plans have served only project planting. Thus, it is difficult to judge contribution and sustainability of LUP beyond project.	
- Six trial cookstoves	- Six households have substituted traditional stoves with improved cookstoves	- Decreased fuelwood use, but not fuelwood collection[c] - Improved living conditions (cleaner kitchen, saved time in cooking, less perceived risk of housefire)	- Correct use of cookstoves will reduce fuelwood pressure on natural forests

a *Farmers who were interviewed affirmed that they were previously unaware or did not practice these technical methods*

b *Estimation of farmers*

c *This apparently contradictory finding was documented in the NTFP Project's evaluation of cookstoves*

In Village 4 of Cam Son Commune, Rank A households were over-represented by nearly three times, representing four per cent of village households but 12 per cent of project participants. Rank B households were proportionally represented. Rank C households were under-represented by 2/5, representing 15 per cent of village households but only nine per cent of activity participants. An average of 70 per cent of Rank A households participated in activities, compared to only 21 per cent of Rank C and 30 per cent of Rank B households.

Table 3.6 Participation according to wealth rank in Village 1 of Cam Son commune

	A			B			C			Total
	#	%	% WR	#	%	% WR	#	%	% WR	#
Wealth Group	**6**	**4%**	**100%**	**86**	**63%**	**100%**	**44**	**32%**	**100%**	**136**
Dioscorea	6	9%	100%	45	67%	52%	16	24%	36%	67
Ginger	0	0%	0%	0	0%	0%	4	100%	9%	4
Vetiveria	2	14%	33%	9	64%	10%	3	21%	7%	14
Adenosma	0	0%	0%	0	0%	0%	1	100%	2%	1
Rattan	3	10%	50%	23	74%	27%	5	16%	11%	31
Cassava	4	6%	67%	45	70%	52%	15	23%	34%	64
Reg. Trial	0	0%	0%	8	80%	9%	2	20%	5%	10
Average	**4.4**	**11%**	**70%**	**26.0**	**65%**	**30%**	**9.2**	**23%**	**21%**	**39**

Note: Under each rank, the first column indicates the number of participants, the second indicates the percentage of activity participants, and the third indicates percentage of wealth rank. For example, six "Rank A" households planted dioscorea persimitis, which accounted for nine per cent (6/67) of the households that planted dioscorea persimitis and 100 per cent (6/6) of Rank A households.
Source: Morris et al., 2002

Table 3.7 shows reasons given by a sample of seven poor households (including four female-headed households) for not participating.

Table 3.7 Reasons for not participating in field activities

Reasons for not participating *(with sample quotations)*	n[a]
Lack capital *("I would plant 10 kg of San Day [if project pays for half]," woman in Cam My; "I will plant if project provides funds," woman in Cam Son)*	4
Lack labour *("I have no husband and only a small child," woman in Cam My; "I am too old too plant anything," woman in Cam Son)*	3
Lack land *("You need a big expanse of land and a lot of labour," woman in Cam Son)*	3
Perceived themselves as outside project *("Nobody called on us to plant seedlings," woman in Cam My; "They have a project [but I don't]" woman in Cam Son)*	3
Knew or acted too late *("When I registered, the seedlings were all gone," woman in Cam Son; "At first, I didn't know that project provided credit [for seedlings]," woman in Cam Son)*	2
Afraid to risk investment or waiting to see results of others *("I asked for a few seedlings from my neighbour, and if they turn out well I might plant more next year," man in Cam Son)*	2

a *Number of responses exceeds sample size because one respondent can give several reasons*
Source: Morris et al., 2002

Lack of land, labour and start-up capital; social marginalisation (sense of not belonging, not being informed); and investment risk are issues that need to be addressed if NTFP domestication is to benefit the poorest and most vulnerable households. The above quotations suggest that securing a source of livelihood or increasing production levels requires more than only a production technology or a commercial endeavour. It also requires a response to the social and political conditions inhibiting their productive capacity.

A potentially unintended negative impact of NTFP domestication on poor and vulnerable groups was the conversion of common access lands to private ownership. One reason that the Ke Go pilot site was suitable for NTFP domestication was the abundance of "unowned" lands around the State

Forest Enterprises (SFE) and Ke Go Nature Reserve, commonly referred to as the "barren hills." They are usually hilly, have low soil fertility and can be characterised as dense shrublands and regenerating forests. Many farmers expanded their NTFP cultivation activities onto these "barren hills," which may impact negatively on the people who depend on common access to these lands for fuelwood, NTFPs and grazing livestock. For example, *cay sim* (*rhodamnia dumetorum*) is a shrub that proliferates on shrublands and is a primary source of fuelwood for local households. Children commonly collect a plant called *dzanh dzanh* (*gardeniajosminoides ellis*), used as a medicine plant and a dye for sticky rice during festive occasions, to help generate cash for school supplies and other necessities.

The accessibility of these common lands is particularly important for poor households with limited land and capital resources. But, for these same reasons, they were less likely to benefit from the NTFP Project's domestication activities. Loss of the common lands would impact especially on women and children, who usually have the main responsibilities for collecting fuelwood and grazing livestock. They would have to travel further distances and possibly into illegal areas inside the SFE and Nature Reserve.

3.4 Impacts on conservation

The NTFP Project's operating hypothesis behind *ex situ* domestication models was that they will reduce pressure on natural forests. However, the situation is complex and depends on many factors. In the Ke Go pilot site, harvesting timber for charcoal and collecting fuelwood for sale are among the main conservation threats to the SFEs and Ke Go Nature Reserve. Table 3.8 indicates that some farmers participating in the NTFP project reduced their levels of charcoal production and NTFP collection for sale. Their reason was usually that they were too busy tending to their NTFP trials. But the table should be interpreted with caution for two reasons. The first is that it presents only cases where evidence of a reduction existed. The second is that, in the context of the interviews, farmers may have unwittingly invented or exaggerated these reductions to demonstrate success or express satisfaction with the project.

Table 3.8 Changes in forest collection

IV Code	Reason/product	Number of times in forest per month (unless indicated otherwise)	
		Before NTFP Project	**During NTFP Project**
CM3	Fuelwood Charcoal "Non" leaf[a] Grazing livestock	25 2 5 On hill lands of family or commune's fallow lands[b]	15 0 1 Dense shrublands inside Nature Reserve
CM5	Fuelwood Charcoal Grazing livestock	20 2 Commune's fallow lands near house	15 0 Pine forests of SFE
CM6	Fuelwood Charcoal Timber Grazing livestock	20 2 2 Commune's fallow lands near house	10 0 0 Inside Nature Resurve
CS3	Fuelwood Timber Medicinal plants Hunting Grazing livestock	15 5-7[c] 14-15 5-10/year Hill lands of family	10 2 5-7 0 Pine forests of SFE
CS4	Fuelwood Charcoal Grazing livestock	Many times (not remember) 3-5 Hill lands of family	5 0 Pine forests of SFE
CS6	Fuelwood Charcoal Timber Medicinal plants	25 5 10 15	10 2 5 6

a *Used for making conical hats*

b *Area used for grazing*

c *Timber harvesting usually requires two to three days/time*

Source: Morris et al., 2002

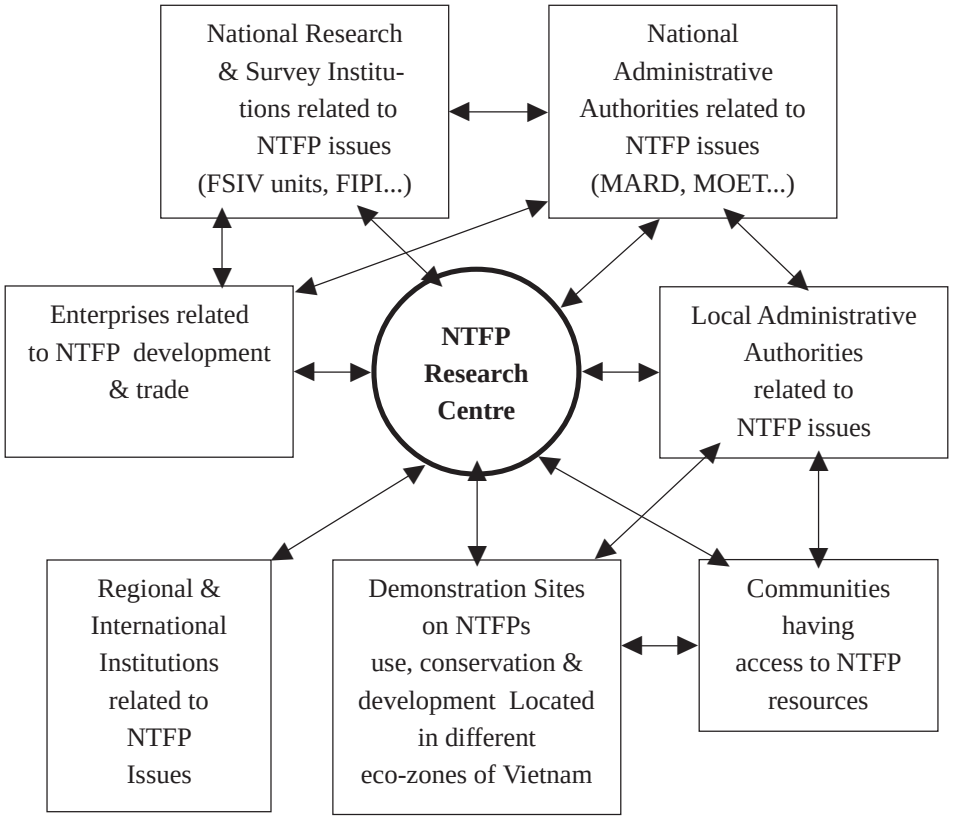
Table 3.8 also suggests reduction of common access lands for grazing livestock. Farmers resorted instead to areas inside Ke Go Nature Reserve and the SFEs. The reduction in common lands was likely a result of many factors. Nonetheless, it gives an early warning for NTFP domestication.

3.5 Scaling up

Because the first phase of the NTFP Project was a trial phase, expanding results will likely play a larger role in the second phase. However, the NTFP Project's external evaluation documented that local governments expressed much interest in the products developed and wished for continued support and future collaboration (L.T. Can, H.T. Boi & V.N. Long, 2001). In one case, the District office for Agriculture and Forestry at the Ke Go pilot site independently organised a training course for three communes on the domestication of vetiveria grass, based on the experiences of the NTFP Project. A local newspaper also ran a story on vetiveria grass, heralding it as a promising new prospect for poverty reduction in Ha Tinh Province. The opening lines of the article stated that with ". . . the strong development in the incense industry today, *huong bai* is truly a plant of poverty reduction for the people in the hilly lands of Cam Son Commune" (Ha Tinh Province Newspaper, 24.12.2001; translation: Jason Morris).

At the national level, the NTFP Project has contributed to understanding the role of NTFPs as a sub-sector of the forestry sector, particularly through its involvement with the Forest Sector Support Programme and the formulation of the National Forest Development Strategy. In the opinion of the external evaluation team, which included a respresentative from MARD, the NTFP Project "has undergone transformation from an ICDP originally designed for execution by IUCN and two NGOs to one that is headed to play a pivotal role in the development of the NTFP sub-sector" (as cited in L.T. Can et al., 2002, s.2). The evaluation team proposed the following structure for an NTFP research and development network, in which the NTFP-Research Centre would occupy the hub (Figure 3.1).

Figure 3.1 Option for NTFP Research & Development Network



Source: L.T. Can, 2002

4 CONCLUSION

In the MARD-IUCN NTFP Project, NTFPs were tested as links between forest conservation and livelihood improvement. The project focused on *ex-situ* cultivation through domestication and agro-forestry models. In this way, the project tested whether improving household economies and securing sustainable livelihoods could reduce extraction pressures on natural forests.

Cost-benefit analyses conducted by the project's Marketing Unit showed that NTFP species generated new and more profitable economic opportunities for farmers in the Ke Go pilot site. Compared to the local variety of cassava, NTFP species yielded profits that were three to 8.5 times higher. However, input costs were also higher, except for vetiveria grass, which can be an obstacle for poor farmers without access to credit or low risk tolerance. Compared to the traditional crop cycle of Peanut – Green bean – Potato, profits from NTFP species were usually only slightly higher. However, labour inputs were reduced by 1/3-2/3.

Discussions with local farmers in the Ba Be pilot site also showed that agro-forestry models using a mix of NTFPs, timber species and fruit trees helped secure livelihoods by providing essential raw materials for short and long-term consumption needs. Project activities also introduced new technologies and species that enabled farmers to recuperate degraded soils, diversify crop structure and increase production levels. Experiences in both pilot sites have shown how the activities of conservation projects have helped farmers increase income, improve production levels, increase choice of farming systems, save labour, improve livelihood security and diversify consumption options. These results have attracted the attention of local government and media in Ke Go and a second phase of the NTFP Project has ambitious expectations for the NTFP sub-sector.

The NTFP's operating hypothesis that economic advancement will reduce forest degradation needs closer study. Preliminary indications suggest that project participants reduced their time spent on harvesting timber for charcoal and collecting fuelwood for sale. However, grazing inside the forests of the SFE and the Ke Go Nature Reserve had increased due to a decrease in availability of the common access "barren hills," some of which was used for NTFP domestication. Unintended negative impacts on the poorest households and socially disadvantaged groups, such as women and children, also needs more attention. The barren hills are also important fuelwood and NTFP collection areas for the poor, who cannot afford to invest in private holdings, and women and children, who are the primary collectors. They are also commonly used for grazing livestock, which is usually done by children and the elderly. Indeed, social equity was a weak point for both NTFP domestication and agro-forestry models, which tended to favour wealthier households better endowed with land, labour and capital.

In light of these achievements, a few recommendations can be given. The first is that while NTFP commercialisation can bring economic benefits to poor communities with reasonably good market access, special attention should be given to poor households, women and other NTFP collectors that may be disadvantaged in accessing project activities. When common access fallow lands and regenerating forests are converted into private agricultural holdings, the benefits to the middle poor are potentially at the cost of the very poor. To avoid exclusion of the very poor, emphasis should be given to NTFP species that require low-inputs, such as vetiveria grass, or alternative activities suitable to their needs and conditions. Weaving bamboo into shrimp traps in the Ba Be field site may have been one such activity.

Second, links between livelihood improvement and forest conservation need to be monitored more closely. Raising awareness about the economic values of NTFPs also has the potential of increasing collecting pressures on natural forests, perhaps especially by the poorer households that cannot afford to invest in domestication models. Improved income also does not automatically mean reduced collecting. Higher income can also mean higher consumption

and increased extraction pressure. Or households may use economic gains from NTFP domestication to invest in less conservation-friendly activities, such as pig-raising or rice wine production, which both require a lot of fuelwood.

Finally, analyses by the Marketing Unit showed the importance of paying attention to marketing aspects. One common pitfall of NTFP commercialisation activities is their vulnerability to boom and bust cycles. In the NTFP Project, the Marketing Unit provided information on market conditions to help determine production scale and different value-adding activities, such as primary processing. Experiences of the Marketing Unit in introducing primary processing also showed that understanding and responding to these opportunities is a process that needs time and involves many other factors beyond profits. From a conservation perspective, market analyses also need to be linked with impacts on natural resources, as promoted by the methodological variant used in the NTFP Project.

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Annex 1. Worksheets for cost-benefit analyses

Worksheet #1. Monetary inputs

Crop: _____

Area: _____ *(m^2)*

Land type: _____

Previous area of planting: _____

Inputs	Unit	Quantity	Price per unit	Cost
1. Seedlings: - Purchased - From previous crop				
2. Fertilizer: - Manure - Nitrogen - Phosphate - Potassium - NPK - Other				
3. Other materials: - Pesticide - Fencing - Poles				
4. Other costs - Labour - Rental for processing equipment - Interest on credit				
TOTAL:				

Worksheet #2. Labour inputs

ACTIVITY	Day/month (lunar calendar)	Hours	Notes

1. Land preparation
- Clearing
- Ploughing (each time)
- Harrowing (each time)
  - Break soil
  - Apply fertilizer			

2. Sowing seedlings - Collecting seedlings from forest - Digging holes - Planting			
3. Tending - Irrigating (each time) - Fertilizing - Weeding - Adding soil - Fencing - Spraying pesticides			
4. Harvesting - First time - Second time - Third time, etc.			

Worksheet #2. Labour inputs (cont')

ACTIVITY	Day/month (lunar calendar)	Hours	Notes
5. Processing and storing - Drying - Cleaning - Storing			
6. Selling - First time - Second time - Third time, etc.			
TOTAL:			

Worksheet #3. Outputs (Harvest)

Product	Unit	Quantity	Notes
1. Main product:			
- First time			
- Second time			
- Third time, etc.			
Sub-total:			
Of which: Consumed			
Sold			
2. By-product:			
- First time			
- Second time			
- Third time, etc.			
Sub-total:			
Of which: Consumed			
Sold			

Annex 2. Data tables of cost-benefit analysis for NTFPs

Table A2.1 Cost-benefit analysis by item

NTFP	Vetiveria grass			*Adenosma caer.*		Banana		Ginger		*Dioscorea persimitis*			Cassava (n.v.)		
Participant	Bieu	Dung	Quy	Bieu	Cuong	Bieu	Cuong	Bieu	Cuong	Dung	Quy	Sanh	Ngu	Quy	Vinh
A. INPUTS															
1. Seedlings															
- Amount in Kg	-	-	-	-	-	-		*30*	*54.4*	*26*	*26*	*30*	-	-	-
- Amount in clumps	-	-	-	-	-	120	120	-	-	-	-	-	*40*	-	*40*
- Labour days (from forest)	-	-	-	*11*	*20*	-	-	-	-	-	-	-	-	-	-
2. Fertilizer															
- Manure (Kg)	-	150	200	-	250	200	300	400	500	250	250	300	200	250	250
- Nitrogen (Kg)	-	3	10	5	25	70	60	25	20	10	10	15	10	10	10
- Phosphate (Kg)	15	-	15	-	-	-	-	50	-	25	30	40	-	-	20
- Potassium (Kg)	-	-	-	12	-	-	-	-	8	-	-	-	15	20	-
- NPK (Kg)	70	-	-	-	-	-	10	15	15	10	10	15	30	40	35
- Rice husks (bag)	-	-	-	-	-	-	-	16	20	-	-	-	-	-	-
3. Other materials															
- Pesticide (1000 VND)	-	-	-	-	-	-	-	-	-	5	5	3	10	10	15
- Fencing (1000 VND)	-	-	-	-	-	-	-	-	-	50	50	30	50	50	50
4. Labour															
- Clearing land	-	-	-	-	4	9	-	-	-	-	-	-	-	25	-

Table A2.1 Cost-benefit analysis by item (cont')

NTFP	**Vetiveria grass**			***Adenosma caer.***		**Banana**		**Ginger**		***Dioscorea persimitis***			**Cassava (n.v.)**		
Participant	Bieu	Dung	Quy	Bieu	Cuong	Bieu	Cuong	Bieu	Cuong	Dung	Quy	Sanh	Ngu	Quy	Vinh
- Preparing land	3.5	2	2.5	2	3	3	2	3	3	2	2.5	1	1	2	1
- Planting	2	1	1.5	3	3	5	4	4	4	3	3.5	2	8	9	6
- Tending	2	2	2	3	3	5	8	6	8	9.5	10	7	5	5	4
- Harvesting	3.5	2	2.5	2	3	2	2	2	2	7	7	5	2	3	2
- Processing & Storing	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-
- Selling	2	1	1.5	5	4	7	9	4	5	3	3	3	3	3	4
5. Other costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B. OUTPUTS															
1. Main product															
- Seedlings (1000 VND)	500	50	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dried (Kg)	-	85	-	-	-	-	-	-	-	-	-	-	-	-	-
- Fresh (Kg)	232	50	400	-	-	-	-	690	772	760	820	1125	360	388	330
- Bunch (for banana)	-	-	-	-	-	60	52	-	-	-	-	-	-	-	-
- Bunch (for *adenosma*)	-	-	-	800	985	-	-	-	-	-	-	-	-	-	-
2. By-product															
- Seedlings, clumps	-	-	-	-	-	60	40	-	-	-	-	-	-	-	-
- Pig feed (1000 VND)	-	-	-	-	-	50	60	-	-	-	-	-	100	100	110

Table A2.2 Cost-benefit analysis by 1000 VND

NTFP	**Vetiveria grass**			***Adenosmacaer.***		**Banana[a]**		**Ginger**		***Dioscorea persimitis***			**Cassava (n.v.)**		
Participant	Bieu	Dung	Quy	Bieu	Cuong	Bieu	Cuong	Bieu	Cuong	Dung	Quy	Sanh	Ngu	Quy	Vinh
A. INPUTS															
1. Seedlings	**50**	**50**	**50**	**250**	**250**	**30**	**30**	**150**	**172**	**135**	**135**	**156**	**32**	**48**	**32**
2. Fertilizer															
- Manure	-	15	20	-	25	20	30	40	50	25	25	30	20	25	25
- Nitrogen	-	8	26	13	65	182	156	65	52	26	26	39	26	26	26
- Phosphate	18	-	18	-	-	-	-	60	-	30	36	48	-	-	24
- Potassium	-	-	-	15	-	-	-	-	10	-	-	-	18	24	-
- NPK	91	-	-	-	-	-	13	18	20	13	13	20	39	52	46
- Rice husk	-	-	-	-	-	-	-	16	20	-	-	-	-	-	-
Sub-total:	**109**	**23**	**64**	**28**	**90**	**202**	**199**	**199**	**152**	**94**	**100**	**137**	**103**	**127**	**121**
3. Other materials															
- Pesticide (1000 VND)	-	-	-	-	-	-	-	-	-	5	5	3	10	10	15
- Fencing (1000 VND)	-	-	-	-	-	-	-	-	-	50	50	30	50	50	50
Sub-total:	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**55**	**55**	**33**	**60**	**60**	**65**
4. Labour	**225**	**135**	**180**	**225**	**240**	**330**	**375**	**285**	**330**	**368**	**390**	**270**	**285**	**330**	**255**
INPUT SUB-TOTAL:	**384**	**208**	**294**	**503**	**580**	**562**	**604**	**634**	**654**	**652**	**680**	**596**	**480**	**595**	**473**

Table A2.2 Cost-benefit analysis by 1000 VND (cont')

NTFP	**Vetiveria grass**			***Adenosmacaer.***		**Banana[a]**		**Ginger**		***Dioscorea persimitis***			**Cassava (n.v.)**		
Participant	Bieu	Dung	Quy	Bieu	Cuong	Bieu	Cuong	Bieu	Cuong	Dung	Quy	Sanh	Ngu	Quy	Vinh
B. OUTPUTS															
1. Main product															
- Seedlings	500	50	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dried	-	765	-	-	-	-	-	-	-	-	-	-	-	-	-
- Fresh	812	175	1400	-	-	-	-	1725	1930	1520	1640	2250	880	950	803
- Bunch (for banana)	-	-	-	-	-	1080	936	-	-	-	-	-	-	-	-
- Bunch (for *adenosma*)	-	-	-	800	985	-	-	-	-	-	-	-	-	-	-
2. By-product															
- Seedlings, clumps	-	-	-	-	-	90	60	-	-	-	-	-	-	-	-
- Pig feed (1000 VND)	-	-	-	-	-	50	60	-	-	-	-	-	100	100	110
OUTPUT SUB-TOTAL:	**1312**	**990**	**1400**	**800**	**985**	**1220**	**1056**	**1725**	**1930**	**1520**	**1640**	**2250**	**980**	**1050**	**913**
C. PROFIT (C = B - A)	**928**	**782**	**1106**	**297**	**405**	**658**	**452**	**1091**	**1276**	**868**	**960**	**1654**	**500**	**455**	**440**
Average profit	**937**			**351**		**555**		**1183**		**1160**			**465**		

a *First year harvest of banana is the least over a six-year fruit bearing cycle.*

Annex 3. Data tables of cost-benefit analysis for traditional crops

Table A3.1 Cost-benefit analysis by item

Traditional crop	Cassava				Peanut			Green bean			Potato		
Participant	Bieu	Cuong	Dung	Quy	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh
A. INPUTS													
1. Seedlings													
- Amount in Kg	35	30	35	40	8	10	9	-	-	-	-	-	-
- Amount in clumps	-	-	-	-	-	-	-	-	-	-	-	-	-
- Labour days (from forest)	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Fertilizer													
- Manure (Kg)	200	300	100	-	300	350	200	300	300	300	350	350	350
- Nitrogen (Kg)	-	5	3	-	5	6	5	-	-	-	5	5	5
- Phosphate (Kg)	10	10	10	-	25	-	30	-	-	-	-	-	-
- Potassium (Kg)	10	-	-	-	-	-	-	-	-	-	-	-	-
- NPK (Kg)	20	-	-	-	10	20	-	20	20	20	-	-	-
- Lime	-	-	-	-	6	-	-	-	-	-	-	-	-
3. Other materials													
- Pesticide (1000 VND)	-	-	-	-	5	5	5	-	-	-	-	-	-
- Fencing (1000 VND)	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Labour													
- Clearing land	7	-	-	3	-	-	-	-	-	-	-	-	-

Table A3.1 Cost-benefit1 analysis by item (cont')

Traditional crop	**Cassava**				**Peanut**			**Green bean**			**Potato**		
Participant	Bieu	Cuong	Dung	Quy	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh
- Preparing land	3	2	2	3	3	3	3	2	2	2	2	2	2
- Planting	2	3	2.5	2	7	6	6	1	1	1	2	2	2
- Tending	2	7	1	7	3	3	3	1	1	1	1	1	1
- Harvesting	2	3	2	3	4	3	4.5	1	1	1	1	1	1
- Processing & Storing	3	-	3	3	4	4	4	-	-	-	1	1	1
- Selling	-	3.5	2	-	-	-	-	-	-	-	-	-	-
5. Other costs													
- Labour (1000 VND)	-	-	-	-	-	-	-	-	-	-	-	-	-
- Processing (1000 VND)	-	-	-	-	14	12	12	-	-	-	-	-	-
- Interest for credit (1000 VND)	-	-	-	-	-	-	-	-	-	-	-	-	-
B. OUTPUTS													
1. Main product													
- Dried (Kg)	300	100	250	200	100	90	92	40	40	40	-	-	-
- Fresh (Kg)	-	300	-	150	-	-	-	-	-	-	500	500	500
2. By-product													
- Root seeds (Kg)	35	30	35	40	-	-	-	-	-	-	-	-	-
- Stems in powder (Kg)	-	-	-	-	70	60	60	-	-	-	-	-	-
- Leaves (1000 VND)	-	-	-	-	-	-	-	-	-	-	100	100	100

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Table A3.2 Cost-benefit analysis by 1000 VND

Traditional crop	**Cassava**				**Peanut**			**Green bean**			**Potato**		
Participant	Bieu	Cuong	Dung	Quy	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh
A. INPUTS													
1. Seedling	**70**	**60**	**70**	**80**	**48**	**60**	**54**	**15**	**15**	**15**	**12**	**12**	**12**
2. Fertilizer													
- Manure	20	30	10	-	30	35	20	30	30	30	35	35	35
- Nitrogen	-	13	8	-	13	15	13	-	-	-	13	13	13
- Phosphate	12	12	12	-	30	-	36	-	-	-	-	-	-
- Potassium	12	-	-	-	-	-	-	-	-	-	-	-	-
- NPK	26	-	-	-	13	26	-	26	26	26	-	-	-
- Lime	-	-	-	-	3	-	-	-	-	-	-	-	-
Sub-total:	**70**	**55**	**30**	**0**	**99**	**76**	**69**	**56**	**56**	**56**	**48**	**48**	**48**
3. Other materials	**-**	**-**	**-**	**-**	**5**	**5**	**6**	**-**	**-**	**-**	**-**	**-**	**-**
4. Labour	**180**	**248**	**188**	**270**	**315**	**285**	**308**	**75**	**75**	**75**	**105**	**105**	**105**
5. Other costs	**0**	**0**	**0**	**0**	**14**	**12**	**12**	**0**	**0**	**0**	**0**	**0**	**0**
6. Interest on credit	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
INPUT SUB-TOTAL:	***320***	***363***	***288***	***350***	***481***	***438***	***449***	***146***	***146***	***146***	***165***	***165***	***165***

Table A3.2 Cost-benefit analysis by 1000 VND (cont')

Traditional crop	**Cassava**				**Peanut**			**Green bean**			**Potato**		
Participant	Bieu	Cuong	Dung	Quy	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh	Ngu	Sanh	Vinh
B. OUTPUTS													
1. Main product													
- Dried (Kg)	450	150	375	300	430	387	396	360	360	360	-	-	-
- Fresh (Kg)	-	210	-	105	-	-	-	-	-	-	125	125	125
2. By-product													
- Root seeds (Kg)	70	60	70	80	-	-	-	-	-	-	-	-	-
- Stems in powder (Kg)	-	-	-	-	126	108	108	-	-	-	-	-	-
- Leaves (1000 VND)	-	-	-	-	-	-	-	-	-	-	100	100	100
OUTPUT SUB-TOTAL:	***520***	***420***	***445***	***485***	***556***	***495***	***504***	***360***	***360***	***360***	***225***	***225***	***225***
C. PROFIT (C = B - A)	**200**	**57**	**157**	**135**	**80**	**57**	**55**	**214**	**214**	**214**	**60**	**60**	**60**
Average profit	**137**				**64**			**214**			**60**		
Profit per 500 m^2	**137**				**338**								