CONFRONTING CLIMATE CHANGE AND LAND DEGRADATION IN VIET NAM

INCREASING FINANCE FOR SUSTAINABLE LAND MANAGEMENT

A COLLABORATIVE ENDEAVOUR OF
THE GLOBAL MECHANISM OF THE UNITED NATIONS CONVENTION
TO COMBAT DESERTIFICATION
AND THE INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT

THE GLOBAL MECHANISM

UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

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Enabling poor rural people to overcome poverty

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TABLE OF CONTENTS

LIST OF ACRONYMS

AAU	Assigned Amount Unit
ADB	Asian Development Bank
BAU	business-as-usual
CC	blimate change
CO_2	barbon dioxide
tCO_2e	ton of carbon dioxide equivalent
CERs	Certified Emission Reductions
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CH_4	methane
COSOP	Country Strategic Opportunities Programme (of IFAD)
DNA	Designated National Authority (for the Kyoto Protocol)
EB	Executive Board (of the CDM)
ERPA	Emission Reduction Purchase Agreement
EUA	European Union Allowance
EU ETS	European Union Emission Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
FSSP	Forest Sector Support Programme
GDP	Country Strategic Opportunities Programme
GEF	Global Environment Facility
GHG	greenhouse gas
GIS	geographic information system
GM	Global Mechanism of the United Nations Convention to Combat Desertification
GPS	global positioning system
Gt	Giga tons
GWP	global warming potential
ha	hectare
HDR	Human Development Report

HFC	hydrofluorocarbon
IETA	International Emissions Trading Association
IFAD	International Fund for Agriculture Development
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
ITL	International Transaction Log
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
JI	joint implementation
km^2	square kilometre
LD	land degradation
LULUCF	Land Use, Land Use Change and Forestry
MARD	Ministry of Agriculture and Rural Development (of Viet Nam)
MoNRE	Ministry of National Resources and Environment (of Viet Nam)
MP	Methodology Panel (of the CBM)
M2M	Methane-to-Markets
m^2	square metre
m^3	cubic metre
NAP	National Action Programme to Combat Desertification
NO_2	nitrous oxide
NTFPs	non-timber forest product
NatCom	National Communication on Climate Change to the UNFCCC
OE	operational entity
PBER	Project-Based Emission Reductions
PDD	Project Design Document
PES	payment for environmental services
PIN	project idea note
POA	programme of activities (of the CDM)
PPM	parts per million
Pre CER	pre-certified emissions reduction
REDD	Reduced Emissions from Deforestation and Forest Degradation in Developing Countries
SCCF	Special Climate Change Fund (of the GEF)
SLM	sustainable land management
SPA	Strategic Priority for Adaptation Fund (of the GEF)
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UK ETS	United Kingdom's Emission Trading Scheme
VER	Verified Emission Reduction
WRI	World Resources Institute
WUE	water-use efficiency

FOREWORD

Viet Nam is highly vulnerable to the adverse affects of climate change and land degradation, which disproportionately impact poor rural communities dependent upon natural resources for their livelihood needs. The negative consequences of this twin scourge is brought into sharp focus considering that agriculture accounts for 20% of the country's GDP and employs three-quarters of the country's population. It is therefore imperative for Viet Nam to respond to the challenges posed by climate change and land degradation in order to meet its national development goals.

The Government of Viet Nam has demonstrated its determination to address environmental issues by ratifying the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Against this backdrop, the International Fund for Agricultural Development (IFAD) and the Global Mechanism of the UNCCD (GM) joined forces to support Viet Nam's proactive efforts to counterbalance the detrimental affects of climate change and land degradation.

This joint initiative has clearly illustrated the positive contribution IFAD's country assistance can make to the political and strategic debate on climate change. Its five-year Country Strategic Opportunities Programme (COSOP), containing a USD 50 million investment programme, is now better oriented to respond to land degradation processes further aggravated by climate change. Projects emanating from the COSOP will enable local communities to better contend with erratic weather patterns and assist them in adapting to climate change. This will also ensure the long-term sustainability of IFAD's investments.

In addition to promoting adaptation to climate change through the adoption of sustainable land management practices, this initiative is also facilitating the GM's task of activating innovative financing options by exploring climate change financing mechanisms. It is envisaged that through this initiative, increased investment flows will be forthcoming for pro-poor sustainable land management activities, thereby achieving the UNCCD's ten-year Strategic Objectives.

The positive outcomes and success of this initiative have paved the way for similar joint initiatives in the near future between the GM, IFAD and other country Parties.

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EXECUTIVE SUMMARY

Over three-quarters of Viet Nam's labour force is engaged in the agriculture sector, which accounts for more than 20% of gross domestic product (GDP). Addressing the impacts of climate change today is therefore a pro-growth strategy for the longer term that responds to Viet Nam's aspirations for sustainable socio-economic development.

Implications for agriculture and rural development based on predicted climate change scenarios caused by a temperature increase of 1.4 - 1.5°C in Viet Nam by 2050 include:

- increases in day and night summertime temperatures, and reduction in productivity of key crops that are already close to their heat tolerance threshold i.e. rice;
- a shift in agro-ecological zones northwards and upwards in the mountains;
- fresh water stress through erratic rainfall, drought or floods;
- potential chemical alterations in soil composition and reductions in fertility; and
- a sea level rise of 69 - 100 cm leading to a risk of inundating 5 000 km2 of the Red River delta and between 15 000 and 20 000 km2 of the Mekong River delta.

These scenarios do not bode well for the country. Poor communities are particularly vulnerable to environmental degradation because they are highly dependent on natural resources for their livelihoods for both food and income generation. Over three-quarters of the country's population are dependent on rain-fed or irrigated agriculture and live alongside waterways, in low-lying deltaic regions or along the coast, all of which are prone to seasonal flooding.

Given their location, the vulnerability of poorer areas to extreme climatic events is higher, and recovery from these events takes longer, also as a result of their marginalized socio-economic status. It is expected that the negative impact of climate change on agricultural productivity, water supply and forest health will result in food insecurity and dislocation of communities. Robust adaptation to climate change measures must be instituted to respond to these challenges, and the development by Viet Nam of a Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector, is a good starting point.

However, while the agriculture sector and the rural landscape are affected by climate change, their contribution to climate change through greenhouse gas (GHG) emissions is also significant. In Viet Nam the agriculture sector is one of the major sources of GHG emissions as a consequence of soil tillage, fertilizer use, burning of agricultural field residues and savannahs, and livestock breeding. The combined total of GHG emissions from agriculture and forests constitute almost 70% of Viet Nam's total emissions.

Considering that the carbon market grew in value to an estimated USD 30 billion in 2006 there is high potential for IFAD's agricultural projects to capture supplementary financing from GHG trading mechanisms. The principal options for project-based mitigation of GHGs relevant to IFAD's mandate are: the Clean Development Mechanism (CDM); adaptation funds; Reduced Emissions from Deforestation and Degradation (REDD); and the voluntary carbon markets operating outside the Kyoto Protocol. Viet Nam has undertaken several actions to capitalize on mobilizing climate change-related financing through, for example, the establishment of a Climate Change Country Team and a National Technical Expert Team and by providing tax incentives, preferential land rent and investment credit, to encourage the flow of investments into CDM projects.

International Fund for Agricultural Development (IFAD) projects typically combine aspects of improved agricultural productivity, sustainable natural resource management, off-farm income generation, micro-finance and private sector engagement together with support to improving the policy environment. IFAD is therefore positioned well to support Viet Nam's efforts to mobilize additional financing for scaling up its adaptation and mitigation related work.

The Climate Change Mitigation and Adaptation Action Plan also provides an opportunity for IFAD to contribute to designing a framework of action for the agricultural and rural development sector in areas that are affected by both land degradation and climate change. This will enable IFAD to target its investments more strategically and improve their sustainability after project completion.

Evidence indicates that in pursuing project development, IFAD should keep in sharp focus:

- the impacts of climate change on the livelihood options of rural communities, given their disruptive influence on specific ecological services such as the hydro-geologic cycle, the nutrient cycle, micro-climate, biodiversity and habitat diversity;
- the three time horizons for project design: short (2030), medium (2050) and long term (2070 and beyond) that correspond to the predicted temperature increases and consequent impacts;
- a multi-pronged approach that supports Viet Nam in developing the enabling policy, legislative and incentive frameworks concurrently with on-the-ground adaptation and mitigation measures (a set of policy and project recommendations can be found in section 6); and
- strategic partnerships with national institutions, other development cooperation partners, national and international private sector entities and civil society organizations, to ensure that its projects contribute to a larger coordinated response to address adaptation and mitigation issues.

This approach will enable diverse actors to work within a commonly-agreed framework and will engender the required volume of resources and on-the-ground projects to position Viet Nam to better contend with climate change impacts.

1 INTRODUCTION

BACKGROUND AND RATIONALE

> *Over the last century, average temperatures in the Mekong Region have risen between 0.3 to 0.8°C. Further temperature increases are expected along with more extreme weather events, such as floods and droughts, changes in the amount and distribution of rainfall, disruption of seasonal monsoons, and rising sea levels.*[1]

It is estimated that average temperatures in Viet Nam are 1°C higher than they were 100 years ago.[2] The harmful affects of climate change are already being experienced in Viet Nam and farming communities have begun to respond by introducing livestock breeds that can withstand increased temperatures, shifting crop varieties such as from rice to maize, introducing drought-resistant crop varieties, and adopting water saving methods.[3] Considering, however, that over three-quarters of Viet Nam's labour force is engaged in the agriculture sector and contributes more than 20% of the country's gross domestic product (GDP),[4] the scale of interventions will need to be significantly increased if continued economic growth is to be achieved. Thus, proactively addressing climate change and its impacts urgently is a pro-growth strategy for the longer term that responds to Viet Nam's aspirations for sustainable socio-economic development.

The Asia and Pacific Division of the International Fund for Agricultural Development (IFAD) and the Asia and Pacific Desk of the Global Mechanism (GM) of the United Nation's Convention to Combat Desertification (UNCCD) have been working together to articulate adaptation and mitigation responses to climate change as a means of strengthening sustainability of project

1 5th Report of the Working Group on Climate Change and Development 2007.

2 Ibid.

3 Ibid.

4 WRI, 2003.

interventions and to mobilize supplementary funding from climate change financing mechanisms to scale up pro-poor sustainable land management (SLM) activities.

Viet Nam is highly vulnerable to climate change. It is a signatory to the UNCCD and the United Nation's Framework Convention on Climate Change (UNFCCC), and has also ratified the Kyoto Protocol. In this context, it was selected as a pilot country for focusing the GM and IFAD's efforts to integrate climate change and land degradation-related issues into IFAD's Country Strategic Opportunities Paper (COSOP) for Viet Nam.

This report was jointly commissioned by the GM and IFAD and was compiled by a climate change team, recruited for this purpose. This report analyses the impact of climate change and land degradation (CC/LD) on agriculture and related sectors, with the aim of guiding project design of COSOP priorities and identifying supplementary financing for IFAD projects from UNFCCC and other carbon-related financing mechanisms. The GM provided overall technical guidance in close consultation with IFAD's Country Portfolio Manager for Viet Nam.

2 PREDICTED CLIMATE CHANGE SCENARIOS FOR VIET NAM

Between 1900 and 2000, annual average temperatures increased by 0.1°C per decade [in Viet Nam]. Summers are becoming hotter with average summer month temperatures increasing by 0.1°C to 0.3°C per decade. Compared to 1990, it is expected that temperatures will increase in the range 1.4 - 1.5°C by 2050 and 2.5 - 2.8°C by 2100. The highest temperature increases will be inland.

Changes in rainfall patterns are complex and season- and region-specific. Monthly rainfall is already decreasing in most of the country in July and August and increasing in September, October and November, and rainfall intensity is increasing considerably.

Compared with 1990, annual total rainfall is expected to increase in the range 2.5 percent to 4.8 percent by 2050 and by 4.7 percent to 8.8 percent by 2100. The increase will be largest in the north of Viet Nam and least in the southern plains. It is expected that rainfall will be concentrated, even more than now, in the rainy season months, leading to an exacerbation of drought problems in the dry season. Climate change, then, is set to make precipitation more uneven and variable over time and space.

Sources: UNDP, 2007b; Hoang and Tran 2006.

The information summarized in this box is consistent with the predictions of the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The scale of increase in temperature however needs to be contextualised to appreciate its full significance: for example, the predicted increase in temperature of 1.4 - 1.5°C in Viet Nam by 2050 is appreciable when compared with the fact that it took a 4 - 6°C increase in global temperature to create the climatic conditions that led to the establishment of angiosperms (flowering plants) on land some 425 million years ago.[5] Of grave concern with relation to current climate change processes is the short time horizon within which temperatures are predicted to increase. Adaptation to climate change therefore leaves little room for experimentation - it is of paramount importance to get it right the first time.

5 Hoang and Tran, 2006.

The current agricultural systems in Viet Nam have evolved in response to a historical progression of climatic and biophysical constraints. Implications for agriculture and rural development based on predicted climate change scenarios for 2050 and beyond, include:

- increased atmospheric carbon dioxide (CO_2) concentrations;
- a shift in agro-ecological zones;
- potential chemical alterations in soil composition and reductions in fertility;
- increases in day and night summertime temperatures;
- water stress through drought or floods;
- stronger typhoons; and
- a sea level rise of 69 - 100 cm[6].

6 IPCC 4th Assessment Report 2007; and 5th Working Group Report on Climate Change and Development 2007.

3

IMPACT OF PREDICTED CLIMATE CHANGE SCENARIOS IN VIET NAM

POOR AND VULNERABLE PEOPLE

In Viet Nam, the links between poverty and environment are becoming more evident as a result of climate change. The following points illustrate the vulnerability of poor communities to environmental degradation in general:

- High concentrations of poor rural people live in disaster-prone areas (the northern mountainous region, the central highlands and the Mekong Delta) with degraded land or low quality environmental conditions and depleted natural resources.
- They are highly dependent on the environment and natural resources to support their livelihood options; over three-quarters of Vietnamese people earn their living from the land.
- They are extremely dependent on non-timber forest products (NTFPs) both to increase their caloric intake and for income generation.
- There exists a high risk to health as a result of low caloric intake coupled with increased incidences of disease.

Most of the poor live in rural areas, where farming constitutes the main economic activity and only limited physical and social infrastructure is available. Many have small landholdings or are landless. Over three-quarters of the country's population is dependent on rain-fed or irrigated agriculture and lives alongside waterways, in low-lying deltaic regions or in the coastal zone, which are all prone to seasonal flooding. Patterns of inequality determine the distribution of vulnerability to climate change within these areas. The location of poorer areas increases their vulnerability to extreme climatic events and reduces their ability to recover from these events.

Access to resources is a critical determinant of vulnerability that is frequently mediated by the allocation of agricultural and forest lands. Constraints in land use rights, lack of access to market and extension services, and limited credit seriously disadvantage Viet Nam's poor (comprising a disproportionate number of ethnic minorities). Among the poor, as in most parts of the developing world, women are particularly marginalized and face significant

barriers to achieving economic self-sufficiency. Considering that 30% of the population is under 15 years of age, the pressure for access to land and other resources is set to increase over time.

Predicted climate change scenarios for Viet Nam do not bode well for the population as a whole, and even less so for the poorer segments of society. Climate change processes will intensify the degradation of land and its resources and undermine the very basis of poorer communities' ability to cope. The negative impact on agricultural productivity and forest health will result in food insecurity and increased disease-related problems for the poor. Currently, migration to urban areas has become an attractive coping mechanism for many of the rural poor, bringing with it its unique set of problems. Considering that some 12.5 million people live below the poverty line, it is imperative that appropriate policy responses are developed to mitigate their vulnerability to climate change impacts.

LAND

The majority of Viet Nam's land is classified as degraded (see Table 1). As in all countries, land degradation in Viet Nam is caused by both natural and anthropogenic phenomena. Natural topographical and geological conditions make certain areas susceptible to soil erosion, while drought and floods exacerbate degradation processes. Anthropogenic causes primarily relate to high population pressures, inappropriate cultivation techniques, deforestation and land conversion, contamination from chemicals used during the American War (1959 - 1975), the use of pesticides, water pollution, and inappropriate policy, legislative and incentive frameworks.[7] According to updated data highlighted in the *National Action Programme to Combat Desertification for the Period 2006-2010 and Orientation to 2020*,[8] around 9.3 million hectares are affected by desertification. This area supports the livelihoods of some 22 million people.

Table 1: Total land area affected by land degradation processes

Source: Viet Nam's UNCCD NAP, 2002.

Type of land	Area (hectares)	Zone
Degraded barren land, including laterized land	7 000 000	Whole country
Land affected by sand dune moving	400 000	Central coastal provinces
Land affected by soil erosion and rocky	120 000	North-west, Central Highlands
Land affected by salinization and acidification	30 000	Cuu Long River delta (Long Xuyen area)
Land affected by drought	300 000	South-central (Binh Thuan, Ninh Thuan and South of Khanh Hoa)
Total	**7 850 000**	

7 Viet Nam's UNCCD National Action Programme (NAP), 2002.

8 UNCCD National Action Programme of Viet Nam, 2007.

A review of the average land use per capita across different regions reveals that Viet Nam has a low land area per capita under productive land use or land cover. A substantial amount of land per capita falls under short- or long-term fallow land (see Table 2). This is significant in terms of greenhouse gas (GHG) mitigation potential.

Table 2: Average land use per capita (sq.m / person)

Source: Viet Nam Statistical Year Book, 2000.

No.	Region	Natural land	Agricultural land	Forest land	Special use land	Tenure land	Fallow land
1	Northern mountainous and midland	8321	970	1645	184	154	5359
2	Red River Delta	895	506	40	133	62	154
3	North central Coast	5262	689	1935	171	71	2396
4	South Central Coast	5978	720	2460	191	73	2534
5	Central Highland	18736	2098	10894	297	177	5270
6	North East South	2635	1077	574	159	110	715
7	Mekong River Delta	2496	1675	192	104	104	421
	Average	**4565**	**1016**	**1367**	**155**	**99**	**1928**

The impact of climate change on soil can vary according to specific conditions such as: water availability; existing vegetative cover; and the biophysical and mechanical features of soil such as friability (the condition where soil is easily crumbled or pulverized, which can occur when the level of water in the soil is reduced, as often happens with prolonged drought); compactness; water permeability; nutrient content; and quantity of micro-organisms.[9] Predicting the impact of climate change on soils in general thus becomes a difficult task. What can be stated, however, is that soils can be either a net sink or a net source for GHGs. A current estimate of global carbon stocks in soil is approximately 1 750 +/- 250 Giga tons (Gt).[10]

In general however, as temperatures rise, soil moisture decreases, despite increased water use efficiency (WUE) by plants; barren land can have only a third as much moisture as forested lands.[11] In some areas, ground temperatures can rise to a high of 50-60°C at midday in summer, leading to a virtual 'baking' of the land. Under these conditions soil is stripped of its moisture and the ability to support vegetation becomes a challenge not only because of water unavailability, but also because soil nutrients cannot be made available for plant growth.

However, with more moderate temperature increases, different scenarios may be experienced. Owing to the 'CO_2 fertilization effect', enhanced vegetative growth may occur thus facilitating increased soil organic matter (this is disputed on the grounds that any CO_2 fertilization effect

9 Ibid; and FAO, 2001.

10 The Royal Society, 2001.

11 UNCCD NAP, 2002.

is cancelled by elevated ground ozone levels). An increase in soil organic matter is highly beneficial as it improves soil structure, increases infiltration rate and available water capacity, strengthens resistance to erosion, and facilitates bioavailability of main plant nutrients.[12]

Assuming that there is a CO_2 fertilization effect, this may be offset by the fact that the metabolism of micro-organisms can speed up as moderate temperature increases, and as a consequence, soils can become a net source of CO_2 emissions.

In areas such as the Mekong Delta, acidified soils are prevalent. The filtering of water through the *Melaleuca* forests has been known to mitigate the level of acidification.[13] However, deforestation of *Melaleuca* forests and mortality from forest fires are drastically reducing forest cover.[14]

Two extreme scenarios have been described so far:

i) soils become incapable of supporting vegetation; and

ii) the organic matter in soil increases, with corresponding benefits in terms of improved structure, water retention capacity, increased activity of soil fauna and resistance to erosion.

Both scenarios are possible depending on the agro-ecological zone in question. However, they need to be placed in a broader context of changes in ground cover, water availability and soil erosion, in order to understand whether there will be a positive or negative impact on agricultural productivity. At present, the information available for making definitive predictions is limited. What is clear, however, is that action should concentrate on increasing soil organic matter through measures that minimize CO_2 and nitrous oxide (N_2O) emissions.

WATER

Viet Nam has rich and abundant surface water resources. However, upstream diversions, droughts and seasonal variations in river flows as a result of climate change are reducing per capita water availability in some areas. In terms of surface water quality, the upstream water of most rivers is good for sustaining freshwater ecosystems and for domestic purposes. Downstream water, however, is generally poor quality, unsuitable for domestic purposes and is causing freshwater ecosystem decline. Water quality is poorest in urban areas, which tend to be in downstream areas, and are exposed to industrial and domestic wastewater discharges.

Over the last 40 years, rainfall variations experienced indicate erratic changes taking place.[15] As mentioned earlier, rainfall patterns are expected to change, creating hotter, longer and more arid dry seasons and more intense downpours during the rainy season. While annual rainfall will increase, it will not arrive at the required time or in the quantities expected.

The total flow of the Red River and Mekong River basins amounts to approximately 643 billion m^3.[16] Based on predicted climate change scenarios, it is expected that the total

12 FAO, 2001.

13 Adger, Kelly and Ninh, 2001.

14 UNCCD NAP, 2001.

15 Ibid.

16 Viet Nam Initial National Communication (NatCom) to the UNFCCC, 2003.

flow will increase substantially. For example, the IPCC 4th Assessment Report argues that the maximum flow of the Mekong will increase by 35 - 41% in the basin and by 16 - 19% in the delta. In contrast, the minimum monthly flows are estimated to decline by 17 - 24% in the basin and 26 - 29% in the delta. This indicates that there could be increased risk of floods during the wet season and potential water shortages in the dry season.[17] It is unclear whether the current total capacity of 25 billion m of human-made water reservoirs can adequately respond to the anticipated water shortages, which are compounded by the geographical variations in water availability.[18]

It is anticipated that climate change will also increase the temperature of fresh water bodies, which could speed up eutrophication (oxygen deficiency) processes.[19] The impact on aquatic habitats would be substantial, leading to reduction in fish stocks and possibly driving some species to extinction. This is further compounded by increased river sediment fluxes due to higher levels of soil erosion as a consequence of deforestation and intense rainfall.

Of major concern is the rise in sea level. It is estimated that for every metre of sea level rise, half a million hectares (ha) of the Red River delta and between 15 000 and 20 000 km^2 of the Mekong River delta will be flooded. It is also estimated that approximately 1 000 km^2 of cultivated farm land and sea product culturing area will become salt marshes and that 2 500 km^2 of mangrove will be completely lost.[20]

Given these predicted fluctuations in water quality and availability, agricultural production systems will require significant adaptations if they are to contend with climate change impacts. In Viet Nam, agriculture consumes the highest volume of water (over 70% of water extraction). A shift to a 'crop-for-drop' approach, where agricultural productivity is calculated based on the amount of crop produced per unit of water as opposed to per hectare of land, will be necessary. This would mean improvements in both irrigated and rainfed agricultural systems, SLM for reductions in land degradation, water pricing, adoption of low cost technologies, and recycling of water to name but few.[21]

FORESTS AND BIODIVERSITY

The forested area in Viet Nam was estimated to be 181 500 km^2 (55% of the total land area of 330 000 km^2) in the late 1960s and 56 680 km^2 (17%) in the late 1980s.[22] The loss of two-thirds of its forest cover in this period made Viet Nam the most rapid case of deforestation among Southeast Asian countries.[23] It is estimated that between 1976 and 1990, Viet Nam's natural forest cover decreased on average by 185 000 ha per year.[24] Currently, forests make up 37% of the land area and amount to 12.3 million ha.

17 IPCC 4th Assessment Report, 2007; ADB, 1994.

18 UNCCD NAP, 2001.

19 IPCC 4th Assessment Report, 2007.

20 Ibid, Ch. 10, p. 485.

21 IWMI, 2003.

22 Collins *et al.*, 1991; and De Koninck, 1999.

23 De Koninck, 1999.

24 ADB, 2000.

This dramatic decrease in forest cover has resulted primarily from industrial timber extraction, permanent conversion of forest lands to agriculture, shifting agriculture, forest fires, overgrazing, establishment of human settlements and the American War.[25]

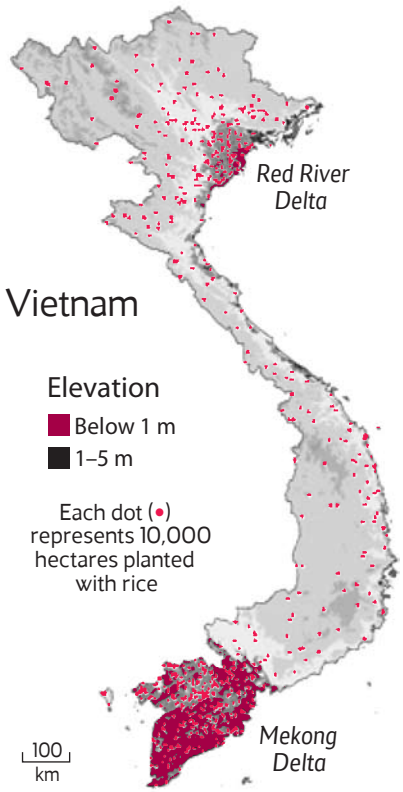
Nevertheless, overall forest cover in Viet Nam has been increasing in recent years from a low of 28% in 1990 to the current level of 37.6%. There has not, however, been a corresponding increase in the quality of forest cover. Rich and medium-stocked forests are now concentrated mainly on hilltops or on steep slopes that are unsuitable for other land uses.

Similarly, the number and total area of forests under protected area status increased from 0.4% of the total land area in 1992 to 7% in 2005. Despite increases in the number and coverage of protected areas, the management of these areas is compromised by the lack of dedicated institutions or management boards, coupled with low levels of funding and limited staff capacity.[26]

Viet Nam is home to approximately 3% of the world's threatened species. While biodiversity remains high for the moment, the total numbers of many species are low and in some cases may have dropped below long-term viable levels. The percentages of populations of globally-threatened species that are conserved within protected areas are generally low.[27]

Predicted climate change scenarios are likely to exacerbate the existing pressures on forests and biodiversity. Currently, it is estimated that 5 million ha of forests are prone to forest fires all year round, while 5.6 million ha are at risk during the dry season. Annually, between 20 000 and 30 000 ha of forest are lost to fire.[28] Considering that the duration and intensity of the dry season is predicted to increase by 2050, a corresponding increase in the incidence of forest fires appears unavoidable. The probability of increased pest infestations, which contribute to weakening the resilience of forest ecosystems to climate change, will compound this situation.

Just as agricultural zones will shift northwards owing to temperature increases, certain types of forest will also shift. It is estimated that by 2070, mountainous tropical trees will find the conditions to grow at an altitude 100 - 550 m higher than they do today and 100 - 200 km further north.[29] These potential changes need



Viet Nams Rice industry depends heavily on low-lying farm areas in the Mekong and Red River deltas. Relatively small increases in sea level could have disastrous consequences.

25 Earth Watch, 2005; and ADB, 2000.
26 IUCN, 2006.
27 IUCN, 2005.
28 UNCCD NAP, 2001.
29 Viet Nam NatCom, 2003.

to be seen in context, however, as it could take a tree species such as poplar at least 100 years to naturally migrate and establish itself as a viable population 1 km away from its current home range.

The Government of Viet Nam is taking various steps to address the degradation and loss of forests. More than 100 500 km^2 have been identified for reforestation while a further 27 000 km^2 of degraded forest have been allocated for regeneration. A Forest Sector Support Programme (FSSP) and a Coordination Office have been established, with the World Bank taking the lead in coordination. A draft National Forest Strategy up to 2010 is currently being compiled. In accordance with the National Forestry Development Plan for 2001 - 2010, in order to protect forests, Viet Nam has restricted the exploitation of timber in natural forests, and will gradually eliminate timber exploitation in natural forests alltogether.[30]

Deforestation accounts for 15% of GHG emissions globally. In Viet Nam, forestry and land use change contribute 19.38 million tons of CO_2 equivalent (tCO_2e) and make up 18.7% of the national emissions.[31] However, Viet Nam's National Communication (NatCom) to the UNCCD projects that the forestry sector would transform from a source of GHGs into a carbon sink during the period 1994 - 2020. Emissions are projected to drop from 19.38 to -28.34 million tons. This trend clearly indicates a shift in the government's forest policy from being production oriented, to being pro-conservation. This bodes well for capturing emerging UNFCCC financing opportunities associated with Reduced Emissions from Deforestation and Forest Degradation in Developing Countries (REDD).

AGRICULTURE

In addition to geographic area of production, crop production per unit area will also be affected by climate change. It is estimated that agricultural irrigation demand in semi-arid and arid regions of East Asia will increase by a minimum of 10% as a response to a 1°C increase in temperature.[32] The planting boundary of tropical crops is expected to move northwards, as well as upwards, in mountainous regions. However, the subtropical plant zone could become narrower.

There are 18 main crops cultivated in Viet Nam, of which rice, tea, coffee, rubber, peanut, cashew nut and black pepper are the main exports. As mentioned earlier, agriculture accounts for around 20% of Viet Nam's GDP. Viet Nam's main export is rice, and it is the 2nd largest exporter of rice globally. 82% of the arable land, constituting 6.7 million ha, is dedicated to rice cultivation. Rice also provides 80% of the carbohydrate and 40% of the protein intake of the average Vietnamese person. Rice production accounts for around 43% of the gross value of agricultural products[33]. For many of the rural poor, corn, sweet potato, cassava, vegetables, beans and fruit are of equal importance.

30 Forest Sector Manual, 2004.

31 Viet Nam NatCom, 2003.

32 IPCC 4th Assessment Report.

33 IRRI, 2007.

Most of the rice is grown in the Red River and Mekong River deltas and is irrigated. Standard crop rotations are two per year. However, in the Mekong River delta, farmers in some irrigated areas grow three crops a year. More than 60% of the south's rice-lands are rainfed. Upland rice is grown on about 100 000 ha in the south-eastern region, the central region and the northern highlands.[34]

As a result of climate change and its impacts, most food crops will be more difficult to cultivate. Considering that rice has been examined the most, it serves as a proxy for understanding the impact of climate change on some other cereals and crops. According to IRRI, if temperatures stay above 35°C for one hour while rice is flowering, the heat will sterilize the pollen. IRRI also offers evidence to support that with every degree of warming, rice yields fall by 10%. Furthermore, many rice cultivars are already close to their heat threshold and a 1°C increase in temperature will lead to widespread mortality.[35] The predicted overall temperature increase, especially during spring and summer, is thus a cause for concern.

Box 1: Rice management

Cultivated wetland rice soils emit significant quantities of methane. Emissions during the growing season can be reduced by various practices. For example, draining wetland rice once or several times during the growing season reduces CH4 emissions. This benefit, however, may be partly offset by increased N2O emissions, and the practice may be constrained by water supply.

Rice cultivars with low exudation rates could offer an important methane mitigation option. In the off-rice season, methane emissions can be reduced by improved water management, especially by keeping the soil as dry as possible and avoiding water logging.

Increasing rice production can also enhance soil organic carbon stocks. Methane emissions can be reduced by adjusting the timing of organic residue additions (e.g., incorporating organic materials in the dry period rather than in flooded periods), by composting the residues before incorporation, or by producing biogas for use as fuel for energy production.

Source: IPCC 4th Assessment Report, 2007.

Water stress exacerbates this scenario. It is anticipated that rainfall patterns will change, bringing hotter, longer and more arid dry seasons and more intense downpours during the rainy season. Despite overall annual rainfall increases the probability of reduced crop yields is high because appropriate water storage infrastructure is unavailable to capture rainfall during the rainy season and supply water in the dry season. Crop loss to floods is also highly likely.

The problem gets more complicated when taking into consideration salt-water intrusion as a result of sea level rise. The 30 cm sea level rise anticipated by 2050 will increase the salinity of the main tributaries of the Mekong River as far as 10 km inland.[36] Considering that

34 Ibid.

35 IPCC 4th Assessment Report.

36 UNDP, 2007b, p. 5.

both the Mekong and Red River basins are either 1 m below or 1 - 5 m above sea level and are key rice growing zones, salt-water intrusion will have a significant negative impact on rice yields (see Map 1).

Another anticipated problem is the damage to irrigation systems and other agricultural infrastructure as a result of flooding during the rainy season. The costs associated with these changes, experienced as reductions in yields and damage to infrastructure, have not been projected. However, current scenarios in the Central region and the Central Highlands for drought alone provide some indication. Statistics for these two regions show that between 1997 and 1998, USD 87.5 million was lost to drought.[37]

While agriculture is affected by climate change, the contribution that agriculture makes to climate change through GHG emissions is also significant. Globally, agriculture is responsible for 10 - 12% of anthropogenic emissions of GHGs.[38] Methane (CH_4) contributes 3.3 $GtCO_2e$ per year and has a warming potential 23 times that of CO_2. Nitrous oxide (N_2O) emissions amount to 2.8 $GtCO_2e$ per year and have a warming potential 310 times that of CO_2 in 100 years, 280 in 200 years and 170 in 500 years.[39] Of global anthropogenic emissions in 2005, agriculture accounts for about 60% of N_2O and about 50% of CH_4.[40]

In Viet Nam, the agriculture sector is one of the major sources of GHG emissions.[41] The primary sources of GHGs from this sector are from cultivation of agricultural crops, fertilizer use, burning of agricultural field residues, burning of savannahs, tillage of agricultural soils, and livestock. Emissions resulting from the burning of agricultural residues are in the order of 51.72 thousand tons of CH_4, 1 086.07 thousand tons of CO_2, 1.2 thousand tons of N_2O and 43.2 thousand tons of other nitrogen oxides (NO_x). Agriculture is a source of 52.45 million tons of CO_2e and makes up 50.5% of the national emissions.[42]

> *Agricultural soils are sources and sinks for atmospheric GHGs, carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Storage of atmospheric CO2 as stable organic fractions in the soil can remove CO2 from the atmosphere, while normal crop production practices generate N2O and decrease the soil sink for atmospheric CH4 in upland soils. The overall balance between the net exchange of these gases constitutes the net global warming potential (GWP) of a crop production system. In upland cropping systems, changes in soil organic matter content, the CO2 emitted from fertilizer production, transport and application, and N2O emissions are the major components of net GWP. The total 'greenhouse effect' in a cropping system needs to be considered in developing new management systems to limit net GWP while maintaining crop production, and not just single components independently. A number of management concepts are currently available that meet this criteria.*
>
> *Source: Mosier, Peterson and Sherrod, 2003.*

37 MARD, 2008.

38 IPCC 4th Assessment Report, 2007.

39 Ibid.

40 Ibid.

41 Viet Nam NatCom, 2003.

42 Ibid.

Considering that most of the rice grown in Viet Nam is in flooded fields under anaerobic (oxygen-depleted) conditions, it is likely to contribute to global warming more than any other crop. Flooded rice paddies release significant amounts of CH_4. In rice paddies, the source of organic material can be residues of the preceding rice crop, root secretions from the growing crop or manure applied as fertilizer.[43]

N_2O emissions are mainly from fertilizers and also from soils where legumes are grown. In many cases, mitigation measures can have significant added benefits on productivity and agricultural ecosystem services. Box 1 contains an example of co-benefits; actions taken to reduce CH_4 in a rice cultivation system can lead to improved soil organic carbon stocks, reduced water costs for the farmer, and alternative fuel sources.

The Government of Viet Nam is paying special attention to adaptation in the agriculture sector with specific reference to rice production, considering that it is the world's second largest exporter. In this regard, the Ministry of Agriculture and Rural Development (MARD) has initiated a process for developing a Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector. This provides a logical entry point for benefiting from the Kyoto Protocol, Land Use, Land Use Change and Forestry (LULUCF) financing window under the Clean Development Mechanism (CDM).

43 IPCC 4th Assessment Report, 2007.

4

GHG MITIGATION ESTIMATES IN VIET NAM

During the last two decades, high rates of economic growth in Viet Nam led to growing energy demands and consequent increases in GHG emissions. Viet Nam's Initial NatCom, stated that the country emitted 103 839.30 Gt CO_2e of GHGs (excluding 50 327 Gt CO_2 removal by LULUCF), in 1994.

Table 3: GHG inventory in 1994

Sector	Amount CO_2 equivalent (thousand tons) (CO2+CH4+N2O)	(%)
1. Energy	25 637.09	24.7
2. Industrial processes	3 807.19	3.7
3. Agriculture	52 450.00	50.5
4. Forestry and land use change	19 380.00	18.7
5. Waste	2 565.02	2.4
Total emissions	**103 839.30**	**100**

Based on a business as usual (BAU) scenario, total GHG emissions are projected to increase from about 140 million tCO_2e in 1994 to about 233 million tCO_2e by 2020 (Table 4 and Figure 1).

Table 4: Estimated GHG emissions to 2020 (Unit: million tons CO_2)

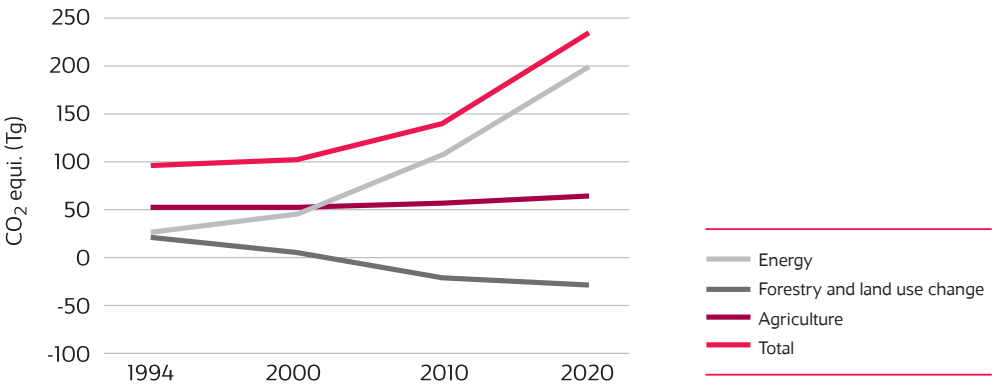
Source: Asia Least Cost Greenhouse Gas Abatement Strategy, 1997; Vietnam NatCom, 2003.

Year	1994	2000	2010	2020
Energy	25.64	45.92	105.17	196.98
Forestry and land use change	19.38	4.20	-21.70	-28.40
Agriculture	52.45	52.50	57.20	64.70
Total	**97.47***	**102.62**	**140.67**	**233.28**

(*) Not including emissions from industrial processes and waste that accounted for about 6.2% (6.4 million tons) in 1994.

Figure 1: GHG emissions projections to 2020

Source: Project ALGAS. 1997, Nat.Com., 2003



Of importance to IFAD is that agricultural emissions are predicted to grow and continue to make up over 50% of national emissions in 2020. Furthermore, if the ambitious reduction targets under the forestry and land use change category are to be met, concerted action needs to be taken in this area.

5

CLIMATE CHANGE FINANCING MECHANISMS AND THEIR RELEVANCE TO IFAD

POTENTIAL FOR USING CARBON FINANCING MECHANISMS FOR MOBILIZING SUPPLEMENTARY FINANCING FOR IFAD PROJECTS

Box 2:

The following excerpts from the World Bank Report State and Trends of the Carbon Market 2007 *(May 2007), provide a summary overview of the carbon market and its future potential.*

The authors take full responsibility for any unintended misrepresentation of details that may arise as a result of the use of selective excerpts from the World Bank report.

The Glossary of Terms provides explanations for many terms used in the following section. More detailed explanations are provided later as regards the Kyoto Protocol and voluntary carbon financing mechanisms.

Table 1: Carbon Market at a Glance, Volumes and Values in 2005-06

	2005		2006	
	Volume ($MtCO_2e$)	Value (MUSD)	Volume ($MtCO_2e$)	Value (MUSD)
Allowances				
EU ETS	321	7 908	1 101	24 357
New South Wales	6	59	20	225
Chicago Climate Exchange	1	3	10	38
UK-ETS	0	1	na	na
Sub-total	**328**	**7 971**	**1 131**	**24 620**
Project-based transactions				
Primary CDM	341	2 417	450	4 813
Secondary CDM	10	221	25	444
JI	11	68	16	141
Other compliance	20	187	17	79
Sub-total	**382**	**1 894**	**508**	**5 477**
Total	**710**	**10 864**	**1 639**	**30 098**

The carbon market grew in value to an estimated USD 30 billion in 2006 (€23 billion), three times greater than the previous year (see Table 1). The market was dominated by the sale and re-sale of European Union Allowances (EUAs) at a value of nearly USD25 billion (€19 billion) under the European Union Emission Trading Scheme (EU ETS).

Project-based activities, primarily through the CDM and Joint Implementation (JI), grew sharply to a value of about USD 5 billion in 2006 (€3.8 billion). The voluntary market for reductions by corporations and individuals also grew strongly to an estimated USD 100 million in 2006 (€80 million). Both the Chicago Climate Exchange (CCX) and the New South Wales Market (NSW) saw record volumes and values traded in 2006.

In contrast to a highly volatile 2006 EUA market, project-based assets showed greater price stability, while transacted volumes also grew steadily. Developing countries supplied nearly 450 $MtCO_2e$ of primary CDM credits in 2006 for a total market value of USD 5 billion (€3.8 billion). Average prices for Certified Emission Reductions (CERs) from developing countries were up marginally in 2006 at USD 10.90 or €8.40 (with the vast majority of transactions in the range of USD 8-14 or €6-11). China continued to enjoy the lion's share of the CDM market, at 61%, and set a relatively stable price floor for global supply of CERs.

Since 2002, a cumulative 920 $MtCO_2e$ (equivalent to 20% of EU-15 emissions in 2004) have been transacted through primary CDM transactions for a value of about USD 8 billion (€6 billion). Hydrofluorocarbon (HFC_{-23}) reduction and nitrous oxide (N_2O) destruction projects accounted for approximately half of the market volumes, while renewable energy and energy efficiency transactions together accounted for nearly 21% of the CDM market over the same period.

European buyers dominated the primary CDM and JI market, with an 86% market share (compared with 50% in 2005); Japanese purchases were sharply down to only 7% of the primary market in 2006. The UK, where the City of London is home to a number of global financial institutions, led the market for a second consecutive year, with nearly 50% of project-based volumes, followed by Italy with 10%.

Private sector buyers, especially banks and carbon funds, continued to buy large volumes of CDM assets, while public sector buyers continued to dominate JI purchases. A large number of international financial institutions and funds engaged in secondary transactions of carbon portfolios with other banks (primarily in Europe) or companies facing compliance obligations (both in Europe and Japan).

LULUCF AND AGROFORESTRY CREDITS

Carbon assets from LULUCF remain at 1% of volumes transacted so far. Their regulatory complexity and limited market access to the EU is likely to reduce the demand for them (at least from private compliance buyers and their intermediaries). On the other hand, the proven community benefits and competitive cost (LULUCF Emission Reduction Purchase Agreements [ERPAs] typically include post-2012 vintages and discount price to allow for replacement credits) may result in some additional demand from public buyers, including European governments.

Voluntary markets may consider less complex and costly ways to manage permanence risk than the current approach of temporary credits under the CDM. Large classes of LULUCF assets, including possibly improved irrigation/drainage management, forest protection (fire, encroachments etc.) and avoided deforestation, remain attractive opportunities for promoting sustainable development in Africa and other natural resource-based economies, but are still systematically excluded from the CDM and other regulatory markets.

There is a significant volume of finances (USD 30 billion in 2006) being generated through the carbon market with high potential for mobilizing supplementary finance for IFAD projects (see Box 2). The price of CERs in Viet Nam was in the range of USD 8-10 during 2006.

The mechanisms most relevant to IFAD are the LULUCF window under the CDM and the voluntary carbon market. Despite the challenges associated with LULUCF project development, new methodologies that generate economically viable returns and that facilitate benefit-sharing with local communities should be pursued. Given IFAD's mandate and comparative advantage at the country level, leadership in this area would bring significant dividends to IFAD's primary beneficiaries.

In Viet Nam, LULUCF and agroforestry CDM projects have not been developed to the same extent as in other Asian countries such as China and India (see Annex 3 for a list of Viet Nam's projects). As presented in the previous sections, the potential for mitigation of GHGs in the agricultural and forestry sectors is high. This, in turn, could generate significant resource flows from the sale of CERs and Voluntary Emission Reductions (VERs) by Viet Nam.

OPERATIONALIZING CARBON FINANCING MECHANISMS IN SUPPORT OF SLM IN VIET NAM

WHAT CARBON FINANCING MECHANISMS ARE AVAILABLE?

The aim of global climate change mitigation is to ensure that the amount of GHGs produced from different sectors, including agriculture and forestry, is reduced so that GHG levels stabilize at or below the equivalent of 440 parts per million (ppm) of CO_2 (current CO_2 concentrations are at 380 ppm). It is argued that 440 ppm of CO_2 will enable global temperature increases to be kept at 2°C or below. This threshold, if crossed, produces positive feedback loops such as the release of CH_4 trapped in permafrost, which in turn could induce a peak in global temperatures, bringing about irreversible ecosystem collapses.

Currently, there are two principal options for project-based mitigation of GHGs of relevance to IFAD. Both could offer financial returns on emissions reductions:

1) **The CDM** under the Kyoto Protocol is regulated under the UNFCCC. The CDM was designed to allow developed nations to pay for emission reductions that occur as a result of projects happening in less-developed countries. Emitters in developed countries can purchase emission reductions from CDM to reach their mandatory emission reduction targets.[44]
2) **Voluntary carbon markets** operating outside the Kyoto framework. Voluntary carbon market projects do not comply within a universally recognized and monitored regulatory

44 GM, 2008.

framework and the voluntary approach may therefore be applicable for projects that do not meet the different regulatory requirements set out by the CDM. Emissions reductions from voluntary projects are typically purchased by actors in the private or public sector that are not regulated but would like to take action on climate change or prepare for future emissions targets that they may be subjected to.45

3) **The Kyoto Protocol's Adaptation Fund** was approved at the UNFCCC 13th Conference of the Parties (COP.13) in Bali, Indonesia in December 2007. The Adaptation Fund is capitalized through a 2% levy on projects from the Kyoto Protocol's CDM and currently is worth about €37 million. It is estimated that it will increase to USD 80-300 million in the period 2008-2012 given the current number of projects in the CDM pipeline.

The Adaptation Fund was established under the Kyoto Protocol to finance concrete adaptation projects to help developing countries cope with the effects of climate change, and it was agreed in Bali that it will be hosted by the Global Environment Facility (GEF). The Adaptation Fund Board has been involved in developing the guidelines and modalities for accessing the funds and it is hoped that the process will be concluded during 2009.

Given Viet Nam's highly vulnerable status to climate change affects, it has high potential for mobilizing resources from the Adaptation Fund. Initiating piloting adaptation project activities now will enable Viet Nam to develop the necessary know-how to develop technically-feasible adaptation activities, potentially eligible for financing from the Adaptation Fund, once the guidelines and modalities have been established.

WHAT CARBON FINANCING MECHANISMS ARE USED IN VIET NAM?

The main carbon financing mechanism used in Viet Nam is the CDM. Currently, more than 32 CDM projects are in the pipeline or under development, with an additional 11 at the project idea stage. The vast majority of projects, however, are in the energy sector, with only one proposed project dealing with forestry.

Nevertheless, it is envisaged that more forestry, agriculture and land use-related CDM projects will be pipelined in the next four to five years, as there is increased focus on conservation and protection of climate-sensitive habitats, including mangrove and coastal plantations and plantations on slopes and in watershed areas. It is also important that Viet Nam has provided its forest definition to the CDM to assist in measuring the baseline.

With regard to voluntary carbon financing mechanisms, this team was unable to find evidence of their use in Viet Nam. The voluntary carbon market provides a large source of finance that can be tapped.

THE GOVERNMENT OF VIET NAM'S RESPONSE: PROMOTING CDM PROJECTS

The Ministry of Natural Resources and Environment (MoNRE) houses the UNFCCC Focal Point and the Designated National Authority (DNA) for the CDM. Moreover, the Climate

45 Ibid.

Change Country Team and National Technical Expert Team has been established, making Viet Nam one of the few countries geared to deploying CDM projects rapidly.

In addition to the institutional setting, CDM projects being developed in Viet Nam will now benefit from tax incentives, preferential land rent and investment credit. The incentives were set out in a decision, recently approved by Prime Minister Nguyen Tan Dung, which aims to encourage the flow of investments into CDM projects in the context of increasing global warming. This decision also stipulates that investors will be provided with financial support for developing CDM projects and will be given priority on selling products from CDM projects.

When carrying out projects that meet CDM criteria, investors must abide by Vietnamese law and international conventions that the country has signed. Projects must also undertake environmental impact assessments. The Prime Minister's decision also regulates the transfer of CERs by investors; the CERs will be managed by the Viet Nam Fund for Environmental Protection.

HOW CAN CARBON FINANCING MECHANISMS BE USED IN THE CONTEXT OF IFAD'S PROJECTS?

Section 3 sketched out the approaches for mitigating GHGs and Section 4 examined GHG mitigation potential. Considering that over 50% of GHG emissions emanate from the agriculture and forestry sectors, it is evident that there is large potential for capturing CDM and voluntary carbon market financing in Viet Nam. This is further supported by the incentives being promoted by the government for CDM activities.

IFAD's comparative advantage at the country level stems from its emphasis on poverty reduction, promotion of agricultural development, working in partnership with national and external actors, promoting innovations for reducing poverty, and support through a blend of investments and technical assistance grants. In addition, IFAD projects typically combine aspects of improved agricultural productivity, sustainable natural resource management, off-farm income generation, micro-finance and private sector engagement together with support to improving the policy environment. This positions IFAD well to support Viet Nam with pursuing carbon financing opportunities to mobilize grant financing that improve the terms of lending. These flows of finance also help improve the incentive framework for local communities to adopt SLM practices and strengthen the financial sustainability of development initiatives after project completion.

Projects emanating from the COSOP will therefore need to be explicitly designed to capture carbon financing opportunities. It must be stressed, however, that carbon revenue in itself will not be able to finance a project in its entirety; it can only be an additional source of revenue.[46] Considering that only afforestation/reforestation projects are eligible under LULUCF during the current commitment period of the Kyoto Protocol (until 2012), supporting the government with its priority to plant 5 million ha of forest for increasing forest cover to 43% by 2020 would be a logical entry point.

46 GM, 2008.

According to Viet Nam's Initial NatCom to the UNFCCC,[47] the following conclusions were reached: "[...] until 2020, the option of protection of natural forest has the highest GHG mitigation potential, while scattered tree planting has the lowest potential. With regard to planting of forests for exploitation, the option of long rotation reforestation has higher GHG mitigation potential than short rotation reforestation and comes second after the option of protection of natural forest in GHG mitigation potential. Total GHG mitigation potential of proposed options from 1994-2020 is 3 221.6 $MtCO_2e$".

Working together with the DNA and the Forest Sector Support Programme (FSSP) Coordination Office, and using the FSSP as a platform, a pilot project could be developed in partnership with several donors. Private sector entities interested in purchasing CERS should be selected at an early stage and be involved in the project development process.

While project development in a CDM reforestation project is undertaken, technical assistance could be provided to pilot an activity that reduces CO_2, CH_4 and N_2O from agricultural production systems. Several activities could be bundled together to generate a financially viable GHG mitigation volume. For example, low or zero tillage practice to reduce CO_2 emissions, combined with manure management from livestock and improved water management in rice fields to reduce CH_4, together with a reduction in the applications of fertilizer to reduce N_2O, undertaken on a large enough scale, could generate significant emissions reductions.

This approach is consistent with the 'CDM Programme of Activities (POA)' or 'programmatic CDM' where a number of smaller-scale CDM-eligible activities are bundled together under an umbrella programme, thus making it financially viable. These activities would not be eligible in the current commitment period. However, there is a high probability that they may become eligible in the post-2012 regime. The aim of the pilot would be for IFAD to learn about the various approaches, requirements, methodologies and procedures associated with both Kyoto and non-Kyoto financing mechanisms.

So far, it appears that the voluntary carbon market has been an untapped resource, and therefore focused attention should be given to opening up these channels for Viet Nam. IFAD could consider adding a component to a conventional project that can clearly quantify the GHG emissions reductions for sale to the following:

- individuals that may wish to offset GHG emissions linked to their way of life (residential energy use, commuting, travel);
- companies that wish to offset GHG emissions from their operations or from specific products or events (sports, concerts, conferences, but also travel, mortgages, utility bills, shipping and other goods and services their customers may wish to render carbon-neutral); and
- high-emitting companies that may wish to voluntarily offset the GHG emissions from some portion of their activities that they cannot immediately reduce through their operations.[48]

Prices observed on the voluntary carbon market range widely from a low of USD 1 to USD 78. The integrity of the offset traded has the biggest influence on price and is often measured using one or more of the following parameters:

47 Viet Nam NatCom, 2003, p. 56.

48 World Bank, 2007a.

- the additionality of the project (making sure the project is not claiming reductions that would already occur without the project);
- the actual existence of the emission reductions (making sure the project activity is monitored and that emissions reductions claimed are verified);
- the exclusion of double-accounting (making sure the same emissions reductions are not sold to several buyers at the same time); and
- the permanence of the reduction (making sure the emissions reductions are not only temporary) and that community benefits exist.[49]

BASIC CRITERIA FOR ACCESSING CARBON FINANCING

The following paragraphs are from the GM's *Step-By-Step Guidelines to Developing Greenhouse Gas Mitigation Activities and Accessing Carbon Finance to Support UNCCD Implementation*.[50] They provide a basic guide to the CDM and related project development.

Does the project reduce GHGs?

The IPCC defined a list of six gases that cause global warming (see Table 5 below). Some gases are more potent than others. N_2O, frequently emitted during fertilizer production, for example, has 310 times the global warming potential of CO_2. A precondition for both the CDM and voluntary emissions projects is that one of these GHGs is reduced.

Table 5: GWP of the six GHGs

Greenhouse gas	GWP over (100 years)
Carbon dioxide (CO2)	x 1
Methane (CH4)	x 23
Nitrous oxide (N20)	x 310
Hydro-fluorocarbons (HFCs)	x 150-11 700
Perfluorocarbons (PFCs)	x 6 500-9 200
Sulphur hexafluoride (SF6)	X 23 900

Is the project 'additional'?

A project is additional if it makes reductions that would not have otherwise occurred. If the project would have been constructed anyway, it is considered not to be delivering emissions reductions that are additional to the BAU scenario. In order to prove that the project is additional, proof needs to be presented, outlining that the project is not BAU, the revenue from selling the credits was considered when the project was designed, and without the credits the project would be financially unattractive or would be subject to a number of market barriers. Proving additionality is mandatory for every CDM project. On the voluntary

49 Ibid.

50 GM, 2008.

market the regulation of additionality is less strict, but most voluntary schemes also require such proof. Buyers of VERs also frequently stipulate additionality as a requirement. More information on how the additionality of a project can be proven is contained in different guidelines such as the *Tool for the demonstration and assessment of additionality* accessible on the UNFCCC's website (http://cdm.unfccc.int/methodologies/index.html).

Does the project support sustainable development?

A crucial component of every project is that it supports sustainable development. Developing countries that host CDM projects must have a defined set of sustainable development criteria according to which every project is assessed and, in turn, approved or rejected. The project should therefore be screened carefully for the impacts it will have on the environment and on local stakeholders; Will there be significant positive impacts or negative ones? Many projects that reduce GHGs typically have positive sustainable development impacts. However, proof of such positive impacts must be presented. Table 6 is an example of the sustainable development criteria used by Egypt. Contributing to sustainable development is a precondition for CDM projects. Voluntary projects are less strictly regulated but typically also aim to contribute to sustainable development.

Table 6: Case Study - Sustainable Development Criteria of Egypt

Social criteria	Economic criteria	Environmental criteria
- Improve quality of life - Alleviate poverty - Improve equity - Improve employment opportunities	- Provide financial returns to local entities - Result in a positive impact on balance of payments - Result in transfer of financial resources - Result in a positive impact on the national economy (e.g. in infrastructure, export and import substitution, energy savings, payback periods and state of technology)	- Reduce GHG emissions - Reduce the use of fossil fuels - Conserve local resources - Reduce pressure on local environments - Provide improved health and other environmental benefits - Meet national renewable energy targets - Increase energy efficiency and conservation

Does a methodology for the project exist?

To calculate the emissions reductions a project results in, a methodology needs to be applied. Methodologies are continuously being developed and approved for the CDM. These are detailed and contain a variety of components and eligibility criteria to ensure the integrity and reliability of the calculations. They include the calculation of emissions with and without the project, as well as information on leakage, i.e. GHG emissions resulting from the CDM project and occurring outside the project boundary.

Where a project does not meet the specific eligibility criteria of an existing methodology, it is possible to develop a new methodology and have it approved by the regulatory bodies of the CDM; the Executive Board (EB) and the Methodology Panel (MP). Due to their regulated

nature, CDM methodologies, or versions thereof, are also regularly applied for voluntary projects or function as blueprints for new methodologies. There is no regulation on which methodologies to use for the voluntary market as a whole. However, different schemes stipulate different requirements. More information on CDM methodologies is available on the UNFCCC website (http://cdm.unfccc.int/methodologies/index.html).

What quantity of emissions reductions does the project result in?

Developing a project in order to be able to claim emissions reductions costs time and money. In some cases, it may not be worth the effort, if the sale of emissions reductions from the project does not justify the cost of project development. Therefore the volume of emissions reductions in tons of CO_2e per year is important. At the very least, the sale of the emissions reductions should cover the costs of the GHG component of the project.

The global CDM pipeline reveals that the largest number of projects - around 25% of the pipeline - result in 100 000 to 500 000 tons of CO_2 emissions reductions per year. It can be expected that the average volume of CO_2 emissions reductions per project will decrease over time once the larger projects have been developed and the focus shifts to smaller projects.

The post-2012 carbon market

Preliminary findings from the International Emissions Trading Association's (IETA's) recent Market Sentiment Survey indicate that more than 90% of respondents believe that the GHG market is an established instrument that will continue post-2012. In addition, more than 65% of those surveyed by IETA anticipated that a global market will be established in the next ten years.

In this context, the recent EU announcement regarding its climate and energy policy for 2012-2020 and beyond appears to have been taken seriously by the business community. Investment decisions are now more likely to take into account the high possibility of a carbon-constrained environment, at least in the EU. Similarly, the recent announcement by the Government of Canada, including a role for CERs, banking and credit for early action, may also trigger efforts by Canadian companies to start identifying and pursuing abatement options at home and abroad.

Developments in the EU, USA, Canada and Australia have helped kick-start a modest post-2012 domestic abatement market. However, there is much ambiguity about the extent to which the CDM and JI will play a role in compliance. Since there is still some uncertainty about details of each of these post-2012 regimes, there is some risk that origination of new carbon projects tapers off. This should not imply a fall in prices for CERs and ERUs in the short term, however, as there still is some strong residual demand to be met before 2012. Furthermore, if the emerging North American regimes encourage early action and banking of CERs, this could stimulate further demand.[51]

Some buyers have been purchasing post-2012 vintages, extending the horizon of the stream of carbon revenues and improving the financial viability of projects that require additional help to meet hurdle rates. The uncertainty about demand post-2012 may justify a

51 World Bank, 2007b.

lower price, given the uncertain compliance value of the credits that may be generated. The most common way to address post-2012 uncertainty in the market is through a zero premium call option provided to the buyer in which the strike price is at the same level as the contract price for pre-2013 vintages, or at the prevailing market price if there is a system in place in which the reductions can be used for compliance. Some buyers do not put a value on this option at the moment, and sellers are essentially giving away the option. But sales of these options may evolve quickly as more confidence appears on the post-2012 front.[52]

52 Ibid.

6

POLICY IMPLICATIONS FOR IFAD

Considering that agriculture is one component within a competing landscape of activities, it is important to view climate change impacts on a broad enough geographical scale. Productivity of agricultural lands is dependent on a constant renewal of nutrients and moisture that are not always found on-site but originate many kilometres away. Climate change impacts on forests, pastureland, wetlands and croplands therefore need to be carefully thought through in light of their disruptive influence on specific ecological services such as the hydro-geologic cycle, the nutrient cycle, micro-climate, biodiversity and habitat diversity. Meaningful actions to strengthen the integrity of ecological services that are vital for maintaining agricultural productivity must be undertaken on a broad scale, usually at the watershed level.

Predicted climate change scenarios are also spread over time. It is thus necessary to conceptualize responses along three time horizons, as articulated by the IPCC: short- (2030), medium- (2050) and long-term (2070 and above). These time horizons correspond to predicted temperature increases and consequent impacts such as sea level rise etc. According to the Stern Review,[53] investing now in adaptation and mitigation measures will cost far less than wrestling with the impacts of climate change in the future.

The impact of climate change on rural development in Viet Nam will ultimately be determined by actual patterns of change with regard to agricultural production systems in the different regions. Forward planning and implementation of a rural development and agricultural strategy that is knowledgeable about climate change will help offset many of its harmful effects.

The preceding sections and arguments converge to provide guidance on the strategic direction IFAD should take for Viet Nam's COSOP. The weight of evidence calls for IFAD to consider supporting Viet Nam in its current efforts to develop a Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector (hereafter the Mitigation and Adaptation Action Plan) as a contribution to the National Strategy and Action Framework for Climate Change.

53 Stern Review, 2007.

This is an opportunity for IFAD to contribute to designing a framework of action for the agricultural and rural development sector in light of predicted climate change scenarios. The Mitigation and Adaptation Action Plan will require a paradigm shift from following an approach of disaster management (one-off events), to contending with persistent effects (that become the norm), such as increased temperature, reduced soil fertility, persistent low water availability in summer, intense monsoonal rainfall and salt-water intrusion. The Mitigation and Adaptation Action Plan does not however preclude the need for a disaster management response, as the new generation of disasters will most probably be significantly different in scope and character and will also require a new paradigm for effective management. However this does not directly fall within the domain of IFAD's operations.

With regard to IFAD's specific mandate, a mitigation and adaptation action plan that contributes to reducing GHGs and institutes adaptation measures to climate change will enable IFAD to target its investments more strategically and improve their sustainability. Given the geographic scale and time horizon being discussed, IFAD will need to pursue a multi-pronged approach that supports Viet Nam in developing the enabling framework concurrently with on-the-ground adaptation and mitigation measures.

This will require IFAD to enter into strategic partnerships with national institutions, other development cooperation partners, national and international private sector entities and civil society actors, to ensure that IFAD's projects contribute to a larger coordinated response to address adaptation and mitigation issues. This approach will enable the various actors to work within a commonly agreed framework (Mitigation and Adaptation Action Plan) and will engender the required volume of resources and on-the-ground projects to bring about the necessary changes.

The following are a set of focus areas suggested for informing Viet Nam's Mitigation and Adaptation Action Plan with relation to the agriculture and rural development sectors - taking into consideration the low adaptive capacities of small and marginal farming communities whose household economy is primarily based on rain-fed crops:[54]

- continued work on securing access for the rural poor to land and forest resources;
- securing access for the rural poor to credit, markets and extension services;
- 'climate-proof' agricultural infrastructure;
- adoption of food security measures (safety nets) and provision of alternative livelihood options;
- focus on ethnic minorities and women, given their particular vulnerability to climate change;
- restructuring the agricultural production system and cropping patterns, including improved agronomic practices that increase yields and generate higher inputs of carbon residue to soils. Examples of such practices include: using improved, and drought- and heat-tolerant crop varieties; extending crop rotations, notably those with perennial crops that allocate more carbon below ground; improved nutrient management to reduce N_2O emissions; zero or reduced tillage; and avoiding or reducing use of bare (unplanted) fallows;

54 IPCC 4th Assessment Report, 2007.

- adjusting cropping calendars (when to plant), cropping patterns (where to plant) and crop varieties (what to plant), taking climate change into consideration. For instance, adjusting the calendar for short season crops such as rice, maize, sweet potato, soya bean, groundnut and others may allow for more crops per year, owing to the extension of the growing season. This would, however, need to be balanced with water availability;
- establishing upland water reservoirs to capture rainfall during the wet season for provision of water during the dry season;
- improving irrigation/drainage water systems especially in rice fields to reduce methane emissions in flooded rice fields. For example, draining out irrigated water during the period from end of tilling to 15-20 days after flowering would not only increase rice production but could also reduce methane emissions and water costs. Drip irrigation systems for other crops will also need to become a standard feature;
- undertaking integrated pest management, taking into consideration 'forced evolution' of pests due to climate change;
- improving focus and research on developing crop varieties that are tolerant to extreme environmental conditions (drought, flood), and that are salt- and heat-resistant;
- promoting the greening of fallow lands as a means to retain soil carbon stocks, improve moisture holding capacity and increase productivity; and
- adopting silvo-pastoral systems, improved livestock diet formulation and manure management (biogas option).

As identified in the updated *National Action Programme to Combat Desertification for the Period 2006-2010 and Orientation to 2020*,[55] the geographical focus for development activities should be areas that are affected by both land degradation/desertification and climate change. These areas are located throughout the country, with high priority given to the North-western, Central Coastal, Central Highlands and Long Xuyen Quadrangular regions.

Considering that knowledge on effective adaptation measures, and to a lesser extent mitigation actions, with relation to the agricultural and rural development sector is limited, a learning-by-doing approach should be adopted. IFAD should consider designing a key set of projects targeting the geographic zones listed above for piloting adaptation and mitigation measures that also enable the capture of carbon financing from both Kyoto and non-Kyoto sources.

In this regard, the following action areas are proposed as a starting point for building solid foundations (more detailed project briefs are contained in Annex I):

- Development of Climate Change-resilient Agricultural Systems Oriented to Reduce GHG Emissions;
- Reducing Emissions from Deforestation and Forest Degradation;
- Community-Based Agroforestry for Carbon Sequestration in the Uplands; and
- Integrated Coastal Land Management to Reduce Local Communities' Vulnerability to Climate Change.

The development of pilot projects related to these action areas, sequenced over the COSOP period, will enable IFAD to gain first-hand knowledge and experience of addressing climate change affects in the context of agricultural and rural development. Considering that this is

55 GM, 2008.

relatively uncharted territory, a systematic deployment of projects will generate the necessary know-how for strengthening IFAD's project portfolio in Viet Nam in the long term. This will also enable the engagement of a range of stakeholders in a process of mainstreaming climate change and land degradation-related issues into development policy and planning and budgetary processes. As the Stern Review[56] argues, concerted efforts made now will significantly reduce both human and financial costs in the long term.

56 Stern Review, 2007.

ANNEX

PROJECT BRIEFS

1) Development of the Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector

(i) Problem statement

Given the predicted climate change scenarios and their negative impact on the agricultural and rural development sector, it is imperative that a comprehensive strategy is adopted to support rural communities to contend with these impacts. The Mitigation and Adaptation Action Plan will provide a framework for instituting adaptation measures to deal with increased temperature, soil degradation, persistent low water availability in summer, intense monsoonal rainfall and salt water intrusion, while at the same time adopting practices that reduce GHG emissions.

(ii) Relevance and conformity with national and IFAD priorities

The Government of Viet Nam is committed to putting in place the necessary mechanisms to be able to address climate change and land degradation effectively. The initiative to develop a Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector is a demonstration of this commitment.

Likewise, IFAD is committed to connecting local experiences to policy development, and fostering government ownership. Furthermore, ensuring long-term sustainability of investments is a key priority for IFAD. Support to instituting an enabling policy framework that enhances the country's resilience to climate change impacts also falls within priorities of IFAD's Strategic Framework.

(iii) Description of the action and its effectiveness

The objective of this initiative is to ensure that the Mitigation and Adaptation Action Plan provides a comprehensive framework for addressing agricultural and rural development in the context of predicted climate change scenarios, and cushions the rural poor from the negative affects of climate change.

The Mitigation and Adaptation Action Plan will need to have the correct orientation for mobilizing climate change financing from all potential sources, including Kyoto and non-Kyoto financial mechanisms, as well as the Adaptation Fund. The Action Plan will facilitate the mobilization of substantial supplementary financial flows, including for IFAD loan projects.

The following are some of the key activities that would need to be undertaken to facilitate the development of a robust Mitigation and Adaptation Action Plan:

- perform a gap analysis to identify capacity-building and research needs;
- draft comprehensive quantitative vulnerability assessments for key socio-economic sectors, with a special focus on ethnic minorities and gender, given their particular vulnerability to climate change;
- articulate measures for speeding up secure access for the rural poor to land and forest resources;

- articulate measures for the rural poor to access credit, markets and extension services;
- identify effective 'climate-proof' designs for agricultural infrastructure;
- articulate measures for food security (safety nets) and provision of alternative livelihood options;
- develop prototype models that introduce climate change-sensitive agricultural production systems and cropping patterns, including improved agronomic practices that increase yields and generate higher inputs of carbon residue to soils, as well as measures that reduce GHG emissions such as through improved irrigation/drainage water management in rice fields;
- identify locations for the establishment of upland water reservoirs to capture rainfall during the wet season and to supply water during the dry season;
- identify integrated pest management measures that take into account the 'forced evolution' of pests due to climate change; and
- draft a strategy for capturing carbon financing for LULCF and other GHG mitigation actions.

The expected result of the above activities is to ensure that the Mitigation and Adaptation Action Plan will be evidence-based and analytically robust. The policy guidance and support mechanisms that emanate from the Action Plan will thus be relevant to the most vulnerable and assist them with adapting to climate change impacts.

This initiative will need to be undertaken together with a group of key national and international stakeholders, and in this regard IFAD will be required to work within a partnership. As it stands, no such partnership exists and IFAD's leadership in this area will be necessary.

(iv) Tentative budget

The cost of developing the Mitigation and Adaptation Action Plan is estimated at approximately USD 1.5 million, of which IFAD could contribute USD 200 000 in grant funding. The remainder of the funding will be mobilized from other partners and possibly GEF through its Special Climate Change Fund (SCCF) or the Strategic Priority for Adaptation (SPA) fund.

2) Development of Climate Change-resilient Agricultural Systems Oriented towards Reducing GHG Emissions

(i) Problem statement

As a result of climate change and its impacts, most food crops will be more difficult to cultivate. Given that rice has been examined the most, it serves as a proxy for understanding the impact of climate change on some other cereals and crops. According to IRRI, if temperatures stay above 35°C for one hour while rice is flowering, the heat will sterilize the pollen. IRRI also offers evidence to support that with every degree of warming, rice yields fall by 10%. Furthermore, many rice cultivars are already close to their heat threshold, and a 1°C increase in temperature will lead to widespread mortality.[57] Considering that agriculture in Viet Nam contributes significantly to the economy, employs the bulk of the population of Viet Nam, and is the 2nd largest exporter of rice globally, the predicted overall increase in temperatures is cause for concern.

Water stress exacerbates the temperature increase described above. It is anticipated that rainfall patterns will change, bringing hotter, longer and more arid dry seasons and more intense downpours during the rainy season. Despite overall annual rainfall increases, the probability of reduced crop yields is high, given that there is no appropriate water storage infrastructure to capture rainfall during the rainy season and provide water during the dry season. Furthermore, crop loss to floods is also highly likely.

The problem gets more complicated when taking into consideration salt water intrusion as a result of sea level rise. A 30 cm sea level rise anticipated by 2050 will increase the salinity of the main tributaries of the Mekong River as far as 10 km inland.[58] Considering that both the Mekong and Red River basins are either 1 m below or 1 - 5 m above sea level and are key rice growing zones, the impact of salt water intrusion will have a significant negative impact on rice yields. Another anticipated problem is the damage to irrigation systems and other agricultural infrastructure as a result of flooding during the rainy season.

While climate change will have significant negative impact on the agriculture sector, in Viet Nam this sector is also one of the major sources of GHGs emissions. From agriculture, the primary sources of

57 IPCC 4th Assessment Report, 2007.

58 UNDP, 2007b, p. 5.

GHGs are from cultivation of agricultural crops, fertilizer use, burning of agricultural field residues, burning of savannahs, tillage of agricultural soils, and livestock.

Rice is cultivated in flooded fields under anaerobic (oxygen-depleted) conditions, and contributes significantly to global warming through CH_4 release - a GHG about 20 times more potent than CO_2. The overall volume of CH_4 emissions from rice cultivation has not been calculated. However it is evident that emissions of this magnitude cannot be ignored. Emissions due to burning of agricultural residues are in the order 51.72 thousand tons of CH_4, 1 086.07 thousand tons of CO_2, 1.2 thousand tons of N_2O and 43.2 thousand tons of other nitrogen oxides (NO_x). In total, agriculture is a source of 52.45 million tons of CO_2 equivalent and makes up 50.5% of national emissions.

(ii) Relevance and conformity with national and IFAD priorities

The development of a Climate Change Mitigation and Adaptation Action Plan for the Agricultural and Rural Development Sector is a demonstration of the Government of Viet Nam's commitment to ensuring this sector is protected from climate change. It is a national priority to continue strengthening the agriculture sector, which has become an even higher priority in light of the current food shortages globally and the unprecedented rise in the price of rice.

IFAD's emphasis on agricultural development and its commitment to long-term sustainability of its investments necessitates that it effectively tackles climate change and land degradation-related issues. IFAD's Strategic Framework priorities for 2007-2010 highlights the importance of improved agricultural technologies, effective production services and improved natural resource management. The proposed project idea is fully consistent with IFAD's priorities and its commitment to pursue innovative and new approaches.

(iii) Description of the action and its effectiveness

The overarching objective of the proposed activity is to ensure continued agricultural development that contends with predicted climate change scenarios, and reduced GHG emissions through improved farming techniques.

The project idea has significant potential to mobilize carbon financing by adopting established methodologies for the agriculture sector approved by the CDM Executive Board. Additionally, carbon finances could also be augmented through non-Kyoto market mechanisms such as methane-to-markets (M2M).

The key proposed activities are the following:

- Conduct a survey of the agro-ecological zones and the potential impact of climate change scenarios on agricultural production for those zones. Analyze current responses of local communities to existing climate change affects.
- Design comprehensive prototype agricultural farming systems for key crops cultivated in Viet Nam that are adapted to predicted climate change scenarios through the adoption of new farming techniques, technologies, tools and infrastructure. These prototype farming systems should also be designed to minimize GHG emissions as a means of capturing carbon financing from both Kyoto and non-Kyoto mechanisms. In this regard, a survey of existing CDM methodologies approved by the CDM Executive Board for the agriculture sector would be a good starting point.
- Develop partnerships to operationalize non-Kyoto market mechanisms such as the M2M initiative.

The key outputs expected from the study include:

- a smooth transition facilitated for local communities, so they can contend with climate change impacts;
- food security ensured through continued crop production by adopting climate-proof farming systems; and
- a flow of carbon financing operationalized to offset some of the costs associated with adaptation activities.

The key implementing partners for the proposed activity, while not restricted to the following, should include MARD, MoNRE and other line ministries, non-governmental organizations (NGOs), farmers' associations, civil society, national and international private sector entities interested in trading in carbon credits, the GM and the CDM.

(iv) Tentative budget

The tentative budget for the proposed activity is USD 30 million.

3) Reducing Emissions from Deforestation and Forest Degradation (REDD) in Viet Nam

(i) Problem statement

According to FAO (2005), deforestation, mainly the conversion of forests to agricultural land, continued at the alarming rate of approximately 13 million ha per year between 1990 and 2005. Deforestation and forest fires result in the immediate release of the carbon originally stored in the trees as CO_2 emissions (with lesser amounts of CO and CH_4). Slower release of emissions takes place through the decay of organic matter. In 2007, the IPCC's Working Group III estimated emissions from deforestation in the 1990s at 5.8 $GtCO_2$ per year. The IPCC also notes that reducing and/or preventing deforestation is the mitigation option with the largest and most immediate carbon stock impact in the short term, per hectare and per year, globally.

(ii) Relevance and conformity with national and IFAD priorities

The proposed activity is consistent with the Government of Viet Nam's priority assigned to reducing the contribution of GHGs from the forestry sector to -28.40 tCO_2e by 2020. Furthermore, more than 100 500 km^2 have been identified for reforestation while a further 27 000 km^2 of degraded forests have been allocated for regeneration. The government's priority is to plant 5 million ha of forest, to increase forest cover to 43% by 2020.

The proposed activity also falls in line with the geographic scope of the 2008 - 2012 COSOP for Viet Nam, which focuses on the poor in upland areas, where the main challenges for poverty reduction will remain over the next five years and beyond. IFAD's comparative advantage at the country level lies in:

- a tightly focused mandate around poverty reduction;
- emphasis on agricultural development;
- a combination of investment and technical assistance grants;
- establishing strong partnerships working with provinces;
- ability to design and implement flexible, responsive projects;
- fostering government ownership during design, development and implementation;
- promoting innovations for the rural poor; and
- connecting local experiences to policy development.

(iii) Description of the action and its effectiveness

The objective of this activity is not only to avoid deforestation and mitigate forest degradation that have a negative impact on the livelihoods of local communities, but also to protect forests as a valuable carbon sink tradable under the Kyoto Protocol. It is anticipated that REDD will become a tradable commodity under the post-2012 UNFCCC regime. REDD has the potential to increase additional resources through non-Kyoto mechanisms such as the Global Forest Partnership. However, institutional support and capacity building are vital for Viet Nam to carry out carbon trading through both Kyoto and non-Kyoto markets.

The key action areas suggested as a part of achieving the overall objective of the proposed activity include:

- develop and standardize methodologies that are scientifically sound and cost-effective in compensating reduced emissions from deforestation in Viet Nam;
- review existing policies and institutional arrangements that contribute to deforestation;
- design incentives for local communities to conserve and protect the forest from deforestation and degradation; and
- build the capacities of key stakeholders in methodologies and procedures for monitoring deforestation in Viet Nam using modern technologies, including remote sensing, geographic information systems (GIS) and global positioning systems (GPS), and in institutional strengthening to ensure effective implementation.

The expected outcomes of the proposed activities include:

- credible methodologies developed that facilitate mobilization of financing from Kyoto and non-Kyoto mechanisms through reduced emissions from avoided deforestation;
- an improved policy regime that favours forest protection;
- a prototype model designed for operationalizing a REDD scheme, replete with an effective benefit-sharing mechanism that provides incentives to local communities for forest protection; and

- enhanced capacities and institutional mechanisms developed for long-term conservation and sustainable use of forest resources.

(iv) Tentative budget

The tentative budget for this activity is USD 10 million, including costs of project execution, monitoring and evaluation.

4) Community-based Agroforestry for Carbon Sequestration in the Uplands

(i) Problem statement

The majority of Viet Nam's land is classified as degraded. Natural topographical and geological conditions make certain areas susceptible to soil erosion, while drought and floods exacerbate degradation processes. Anthropogenic causes primarily relate to high population pressures, inappropriate cultivation techniques, deforestation and land conversion, contamination from chemicals used during the American War, use of pesticides, water pollution, and inappropriate policy, legislative and incentive frameworks, to name but few. Around 9.3 millions ha of land are affected by desertification. This area supports the livelihoods of about 22 million people.

Reviewing the average land use per capita across different regions of the country reveals that Viet Nam has low land area per capita under productive land use (or land cover). A substantial amount of land per capita falls under short- or long-term fallow lands. This is significant in terms of carbon sequestration potential.

One of the effective ways of reducing land degradation is through the adoption of agroforestry practices. Given the extensive land degradation taking place in the highlands, promotion of agroforestry will enable the mitigation of soil erosion processes, ensure resilience of agricultural systems in the face of climate change affects, and enable the mobilization of revenue flows from carbon sequestration.

This proposed project idea is challenging, since a CDM Programme of Activities approach will be needed to generate the necessary economies of scale for activating a substantial flow of carbon finance. A CDM Programme of Activities will permit the linking of disparate geographic areas into one CDM project, to generate the volume of carbon sequestered required to be financially viable.

(ii) Relevance and conformity with national and IFAD priorities

The proposed activity is consistent with the priority the Government of Viet Nam assigns to combating desertification and increasing forest cover. It also contributes to achieving objectives that will undoubtedly fall under the Adaptation and Mitigation Action Plan.

The proposed activity is also in line with the geographic scope of the 2008 - 2012 COSOP for Viet Nam, which focuses on the poor in upland areas where the main challenges for poverty reduction lie and will remain over the next five years and beyond. This initiative will also assist in promoting innovations for the rural poor through the generation of revenue flows from carbon sequestration.

(iii) Description of the action and its effectiveness

The overall objective of the proposed activity is to reclaim degraded/fallow lands through community-based agroforestry practices that will enhance food security, provide fuel and fodder needs, and mobilize additional revenue flows through carbon sequestration.

The proposed activity could qualify under the CDM for obtaining CERs, as well as under non-Kyoto market mechanisms such as the Carbon Sequestration Partnership Programme to generate additional finances.

The key activities are to:

- design a CDM programmatic approach-oriented agroforestry project for the highlands, targeting degraded and long-term fallow lands, with an effective benefit sharing mechanism; and
- operationalize additional payment-for-environmental-services (PES) schemes, for example, for improved hydro-geological services, consistent water flow and reduced flooding, reduced risk of landslides, and improved biodiversity conservation through reducing pressure on natural forests.

The major outcomes expected from implementation of the proposed activities include:

- enhanced agricultural production and reduction of dependency on natural forests for fuel and fodder; and
- operationalization of a flow of carbon and other finance to local communities as compensation for global and local environmental services.

The implementing partners for this activity should include MARD, MoNRE and other line ministries, the FSSP, agricultural and forestry research organizations, NGOs, civil society and the GM.

(iv) Tentative budget

The tentative budget for this activity is USD 10 million.

5) Integrated Coastal Land Management to Reduce Local Communities' Vulnerability to Climate Change

(i) Problem statement

Mangroves provide a range of ecological goods and services for coastal communities. They are sources of timber and medicines, and protect shorelines from storms and tidal surges. Many species of commercially-important fish breed and raise their young among the mangrove roots. Viet Nam has just 165 000 ha of mangroves compared with its 408 500 ha before 1945. The lack of an integrated coastal zone management approach to preserve mangroves for the future is making Viet Nam's coastal areas and local fishing communities vulnerable to sea level rise and flooding resulting from predicted climate change.

(ii) Relevance and conformity with national and IFAD priorities

Viet Nam's NAP identifies the process of coastal land degradation, which is the result of various factors including climatic variations and unsustainable human activities. The NAP calls for an integrated approach to resolving uncontrolled mangrove forest exploitation, which is seriously damaging the coastal areas and destroying coastal mangrove forests for aquaculture.

IFAD's Strategic Framework priorities for 2007- 2010 highlight the importance of improved natural resource management and innovation as means to achieve enhanced results. In this regard, the proposed project idea is fully consistent with IFAD's priorities.

(iii) Description of the action and its effectiveness

The proposed activity aims to develop an integrated coastal land management plan with the overarching objective of conserving mangroves for the future.

The afforestation and preservation of mangrove forests can qualify as potential CDM projects under the Kyoto Protocol and thus can leverage carbon credits in the carbon markets. In addition, afforestation of mangroves could qualify under non-Kyoto voluntary markets such as the Global Forest Partnership Programme.

The key activities proposed are to:

- develop an integrated coastal land management plan to reduce the vulnerability of littoral communities to rising sea levels and to enhance the resilience of coastal ecosystems;
- define conservation measures to protect existing mangrove forests and their biodiversity;
- develop a sustainable harvesting plan to ensure the continued viability of mangrove crustacean populations; and
- design a CDM mangrove reforestation project that can generate additional financial flows to local communities as incentives for protection of the mangrove forests.

The expected outcomes of these proposed activities are:

- climate change-resilient coastal zone communities are buffered by robust mangrove forests; and
- the livelihoods of local communities are improved through providing income opportunities for mangrove protection and reforestation.

The proposed activities should partner with similar initiatives currently implemented in Asia such as the Clinton Global Initiative (CGI) and with organizations such as the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and the International Union for the Conservation of Nature (IUCN). Locally, the implementing partners for these activities should include the relevant line ministries, Viet Nam's Red Cross, NGOs and civil society.

(iv) Tentative budget

The tentative budget for the proposed activity is USD 5 million.

Additionality: According to the Kyoto Protocol, gas emissions reductions generated by the CDM and JI project activities must be additional to those that otherwise would occur. Additionality is established when there is a positive difference between the emissions that occur in the baseline scenario, and the emissions that occur in the proposed project.

ANNEX II

GLOSSARY OF TERMS

Afforestation: The process of establishing and growing forests on bare or cultivated land, which has not been forested in recent history.

Assigned Amount Unit (AAU): Annex I Parties to the UNFCCC are issued AAUs up to the level of their assigned amount, corresponding to the quantity of GHGs they can release in accordance with the Kyoto Protocol (Art. 3), during the first commitment period of that protocol (2008-2012). Each AAU equals 1 tCO_2e. AAUs may be exchanged through emissions trading (Kyoto Protocol Art. 17). Unlike CERs or ERUs, AAUs can only be used by sovereign entities.

Baseline: The emission of GHGs that would occur without the contemplated policy intervention or project activity.

Carbon asset: The potential of GHG emissions reductions that a project is able to generate and sell.

Carbon finance: Resources provided to projects generating (or expected to generate) GHG (or carbon) emissions reductions in the form of the purchase of such emissions reductions.

Carbon dioxide equivalent (CO_2e): The universal unit of measurement used to indicate the global warming potential of each of the six GHGs. Carbon dioxide - a naturally occurring gas that is a by-product of burning fossil fuels and biomass, land use changes and other industrial processes - is the reference gas against which the other GHGs are measured.

Certified Emissions Reduction (CER): A unit of GHG emissions reductions issued pursuant to the CDM of the Kyoto Protocol, and measured in metric tons of carbon dioxide equivalent. One CER represents a reduction of GHG emissions of 1 tCO_2e.

Chicago Climate Exchange (CCX): Members of the Chicago Climate Exchange make a voluntary but legally-binding commitment to reduce GHG emissions. By the end of Phase I (December 2006), all members will have reduced direct emissions to 4% below those in the baseline period of 1998-2001. Phase II, which extends the CCX reduction programme through 2010, will require all members to reduce GHG emissions to 6% below the baseline. Among the members are companies from North America as well as municipalities, US states and universities. As new regional initiatives began to take shape in the US, membership of the CCX grew from 127 members in January 2006 to 237 members by the end of the year, while new participants expressed their interest in familiarizing themselves with emissions trading. For more information see www.chicagoclimateexchange.com.

Clean Development Mechanism (CDM): The mechanism provided by Article 12 of the Kyoto Protocol, designed to assist developing countries in achieving sustainable development by permitting industrialized countries to finance projects for reducing GHG emissions in developing countries and receive credit for doing so.

European Union Allowances (EUAs): The allowances in use under the EU ETS. An EUA unit is equal to 1 tCO_2e.

European Union Emissions Trading Scheme (EU ETS): The EU ETS was launched on 1 January 2005 as a cornerstone of EU climate policy towards its Kyoto commitment and beyond. In its first phase, from 2005 to 2007, the EU ETS regulated CO_2 emissions from energy-intensive installations, which represent some 40% of EU emissions. Those emissions were capped at 6 600 tCO_2 over the 2005-2007 period. Following this pilot phase, Phase II of the EU ETS (extending from 2008 to 2012) should see a tighter constraint on obligated installations, given that the decisions so far rendered on 19 NAPs set an average annual cap at 5.8% below 2005 verified emissions (adjusted for the Phase II perimeter). To meet their compliance requirements, installations may use EUAs, CERs and ERUs (the latter for Phase II only). Supplementarity rules restrict the use of CERs and ERUs in Phase II at different levels in each Member State. For more information see http://ec.europa.eu/environment /climat/emission.htm.

Greenhouse gases (GHGs): The gases released by human activity that are responsible for climate change and global warming. The six gases listed in Annex A of the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydro-fluorocarbons (HFC_{23}), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

International Transaction Log (ITL): The ITL links the national registries to the CDM registry and is in charge of verifying the validity of transactions (issuance, transfer and acquisition between registries, cancellation, expiration and replacement, retirement and carry-over). It is the central element of emissions trading under the Kyoto Protocol. It is currently undertaking tests with a number of registries.

Joint Implementation (JI): A mechanism provided by Article 6 of the Kyoto Protocol, whereby a country included in Annex I of the UNFCCC and the Kyoto Protocol may acquire ERUs when it helps to finance projects that reduce net emissions in another industrialized country (including countries with economies in transition).

New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS): Operational since 1 January 2003 (to last at least until 2012), the NSW GGAS aims at reducing GHG emissions from the power sector. NSW and ACT (since 1 January 2005) retailers and large electricity customers have thus to comply with mandatory (intensity) targets for reducing or offsetting the GHG emissions arising from the production of the electricity they supply or use. They can meet their targets by purchasing certificates (NSW Greenhouse Abatement Certificates or NGACs) that are generated through project activities. For more information see www. greenhousegas.nsw.gov.au.

Offsets: Offsets designate the emissions reductions from project-based activities that can be used to meet compliance - or corporate citizenship - objectives vis-à-vis GHG mitigation.

Operational Entity (OE): An independent entity accredited by the CDM Executive Board to validate CDM project activities, and verify and certify the emissions reductions generated by such projects.

Pre-Certified Emissions Reduction (pre-CER): A unit of GHG emissions reductions that has been verified by an independent auditor but has not undergone the procedures and may not yet have met the requirements for registration, verification, certification and issuance of CERs (in the case of the CDM) or ERUs (in the case of JI) under the Kyoto Protocol. Buyers of VERs assume all carbon-specific policy and regulatory risks (i.e. the risk that the VERs are not ultimately registered as CERs or ERUs). Buyers therefore tend to pay a discounted price for VERs, which takes the inherent regulatory risks into account.

Primary transaction: A transaction between the original owner (or issuer) of the carbon asset and a buyer.

Project-based Emissions Reductions: Emissions reductions that occur from projects pursuant to JI or the CDM (as opposed to emissions trading or transfer of assigned amount units under Article 17 of the Kyoto Protocol).

Project Design Document (PDD): A project-specific document required under the CDM rules that enables the Operational Entity to determine whether the project: (i) has been approved by the parties involved in it, (ii) will result in reductions of GHG emissions that are additional, and (iii) has an appropriate baseline and monitoring plan.

Project idea note (PIN): A note prepared by a project proponent regarding a project proposed for the CDM.

Reforestation: This process increases the capacity of the land to sequester carbon through the replanting of forest biomass in areas where forests have been previously harvested.

Registration: The formal acceptance by the CDM Executive Board of a validated project as a CDM project activity.

Secondary transaction: A transaction where the seller is not the original owner (or issuer) of the carbon asset.

UK Emissions Trading Scheme (UK ETS): Launched in March 2002, the UK ETS was the first domestic economy-wide GHG trading scheme. Participation was on a voluntary basis and combined incentives (reduction by 80% of the Climate Change Levy for some participants under the Climate Change Agreement, or CCA), penalties (withholding of fiscal abatement, contraction of allowances) and flexibility (through an exchange). Only credits under the UK ETS can be traded. On the whole, the scheme is scheduled over its duration (2002-2006) to reduce emissions by 11.9 million tCO_2e for 'direct participants'. Installations eligible for the EU ETS have joined the EU ETS from 1 January 2007 onwards. The UK ETS registry will remain open for CCA participants to trade through the voluntary market to meet their targets. For more information: www.defra.gov.uk/environment/climatechange/trading/UK/index.htm

Validation: The assessment of a project's design document, which describes its design, including its baseline and monitoring plan, against the requirements of the CDM, by an independent third party before implementation of the project.

Verified Emissions Reduction (VER): A unit of measurement of reductions in GHG emissions that have been verified by an independent auditor. It designates emissions reductions units that are traded on the voluntary market.

Verification Report: A report prepared by an operational entity or another independent third party, pursuant to a verification, which reports the findings of the verification process, including the amount of GHG emissions reductions that have been generated.

ANNEX III

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