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THEMATIC ASSESSMENT REPORT ON THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

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VIETNAM NCSA

THEMATIC ASSESSMENT REPORT

ON

THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

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TABLE OF CONTENTS

TABLES

Pages

ANNEXES

Pages

ABBREVIATIONS

CDM	Clean Development Mechanism
COP	Conference of the Parties to the Convention
GEF	Global Environmental Facility
GHG	Green house gas
GSO	General Statistical Office of Vietnam
IPCC	Intergovernmental Panel on Climate Change
JI	Joint implementation
IET	International Emission Trading
KP	Kyoto Protocol
MARD	Ministry of Agriculture and Rural Development
MOF	Ministry of Fisheries
MOI	Ministry of Industry
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MPI	Ministry of Planning and Investment
OECD	Organization of Economic Cooperation and Development
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization

INTRODUCTION

The United Nations Framework Convention on Climate Change (UNFCCC) is one of the "Rio" Conventions which was negotiated and opened for signature at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in 1992. The Convention was approved and entered into force in April 1994. The Kyoto Protocol entered into force in February 16, 2005 after getting Russia's ratification. For the UNFCCC, Vietnam signed in June 11, 1992, ratified in November 16, 1994 and it came into force in February 14, 1995. Regarding to the Kyoto Protocol, Vietnam signed in December 03, 1998, ratified in September 25, 2002.

One of the activities of the project entitled "Self-assessment of National Capacity to Manage the Global Environment (NCSA)" is to assess the implementation of the the United Nations Framework Convention on Climate Change and Kyoto Protocol (KP) in order to identify national priorities in the implementation of the obligations and commitments under the UNFCCC.

The objective of the thematic report is to identify (i) prioritized issues; (ii) capacity constraints within these issues at the systematic, institutional and individual levels and (iii) opportunities to build capacity to address the identified constraints.

NCSA thematic assessment report on the UNFCCC and KP is presented in four parts:

1. A general introduction of the UNFCCC and KP;

2. Activities to implement the UNFCCC and KP in Vietnam;

3. National prioritized issues and principal assignments related to climate change;

4. Assessment of capacity to implement the UNFCCC and KP in Vietnam.

The thematic assessment report on the UNFCCC and KP is a scientific study produced by team efforts of both national and international consultants and Vietnam NCSA project team. However, the collection and compilation of information may be insufficient. Hence, we hope to receive comments from all readers so that the report becomes more complete and the capacity to nationally legalize the international conventions in Vietnam is to be strengthened.

Hanoi, September 2005

NCSA MANAGEMENT UNIT

EXECUTIVE SUMMARY

Vietnam has been a party to the UNFCCC since February 24, 1995 and Kyoto Protocol since February 16, 2005 (effective date of the Kyoto Protocol). With regards to this, Vietnam has committed to fulfill obligations of climate monitoring and observation; national inventory of green house gase (GHG); scientific research; integrating climate change into environmental and socio-economic policies and actions; implementing national programs on adapting with climate change; putting on mass media issues of climate changes; international cooperation in climate change and the voluntary participation into clean development mechanism (CDM).

To implement the above obligations, what Vietnam has done so far are: to monitor and observe climate change; develop a system of national inventories of GHG; develop policies and measures on reducing GHG emission in different economic sectors; tranfer environmental-friendly technology and use appropriate equipments; promote research work, deploy and enhance the use of new and renewable energy; do scientific research and consultantcy work; improve information management; develop a economic and financial mechanism; improve educational systems, enhance community's awareness and communication ability and strengthen international cooperation in climate change and the voluntary participation into CDM.

Upon the above analysis, capacity priorities to implement the UNFCCC and Kyoto Protocol in Vietnam are proposed comprising of: (1) developing a national action plan to implement the UNFCCC and Kyoto protocol; (2) improving institutional structure and management; (3) Integrating climate change issues in economic policies, programs and development plans; (4) improving a legal framework; (5) doing research on measures to response to and adapt with climate change; (6) developing a lish of the potential projects; (7) enhancing communication and awareness; and (8) promoting and enhancing international cooperation.

In addition, capacity priorities to implement the UNFCCC and Kyoto Protocol in Vietnam are analyzed in serveral social-economic programs and projects that have been proposed in the initial national communication (a national action plan for improving energy efficiency and economical use; options to mitigate GHG emission induced by transportation; A project on five million hectares of afforestation; options and plans for GHG mitigation in agricultural production); national action plans on options to mitigate GHG emission; remedial measures to climate change and prioritized projects on climate change.

As being analyzed, the weakness in implementing the UNFCCC and Kyoto Protocol in Vietnam is that: Not having approved the National Program or Plan for UNFCCC implementation yet; management arrangement and coordination

mechanism is underway of completion; relevant agencies and stakeholders have not been widely involved in implementing the Convention; the legal framework is insufficient; and experiences and financial sources are limitted.

The assessment of capacity and identification of the priority issues for the implementation of the UNFCCC and Kyoto Protocol in Vietnam is conducted at 3 levels comprising of systematic, institutional and individual levels in order to promote the achievements and overcome the remained issues in UNFCCC and Kyoto Protocol implementation in Vietnam.

PART I. THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

I. INTRODUCTION

1.1. The United Nations Framework Convention on Climate Change

United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992, approved and came into force in March 1994. Up to May 2004, 166 countries are members to it. Vietnam signed UNFCCC on 11 June 1992, ratified it on 16 November 1994 and this became effective on 14 February 1995.

The ultimate objective of this Convention is to achieve stabilization of green house gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

1.2. Kyoto Protocol to The United Nations Framework Convention on Climate Change

Kyoto Protocol to the United Nations Framework Convention on Climate Change (KP) was approved by the Conference of the Parties to the Convention (COP) at its third session in Kyoto, Japan on December 1997. Up to August 2005, 84 countries are members to it. Vietnam signed KP on 3 December 1998, ratified it on 25 September 2002 and this came into force on 16 February 2005.

The Parties shall reduce their overall green house gas emissions of such gases by average 5.2 per cent below 1990 levels in the first commitment period 2008 to 2012.

KP presents three “flexible mechanisms” to assist developing countries to fulfill their commitment of emissions as follow:

- Joint implementation (JI);
- International Emission Trading (IET);
- Clean Development Mechanism (CDM).

1.3. Clean Development Mechanism

The CDM is the only mechanism which involves non-Annex I Parties and takes place between an Annex I Party and a non-Annex I Party. The purpose of the clean development mechanism shall be to assist:

- The developing countries in achieving sustainable development and in contributing to the ultimate objective of the UNFCCC;
- The developed countries in achieving compliance with their quantified emission limitation and reduction commitments under KP.

II. OBLIGATIONS UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

2.1. Obligations under the United Nations Framework Convention on Climate Change

Vietnam commits to fulfill the following obligations under UNFCCC:

(1) Monitoring climate and developing a systematic observation networks; promoting the exchange of information on climate and climate change; informing other parties of the Convention about data and information relating to climate change.

(2) Carrying out a national inventory of GHG in every fields of national economy.

(3) Carrying out scientific research and developing inter-governmental or international programs on systematic monitoring, capacities of scientific research related to climate change and training scientific staffs of climate change.

(4) Considering of integrating climate change into environmental and socio-economic policies and actions, etc.

(5) Implementing national programs on mitigating climate change by:

- Taking remedial measures to climate change, adapting and propagating the processes that examine, prevent or reduce and limit emission and preserve sinks and reservoirs of GHG;
- Developing, strengthening plans to manage the riverside and coastal areas.

(6) Putting on mass media issues of climate changes; developing, implementing the national programs or undertaking international cooperation on educating and improving public awareness of climate change and the effects thereof.

(7) Proposing, implementing or internationally cooperating on implementation of projects that are financed with incremental cost and other necessary equipments.

2.2. Obligations under Kyoto Protocol

Obligations of Vietnam under KP are based on Article 10 (repeating Article 4 of the UNFCCC), Article 12 (voluntary participation into CDM) comprising of:

(1) Have in place a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

(2) Development and regularly update information on the national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

(3) The purpose of the clean development mechanism shall be to assist Vietnam in achieving sustainable development and in contributing to the ultimate objective of the UNFCCC.

Especially since February 16th, 2005, Kyoto Protocol has come into force. In order to fulfill KP, Vietnam has obligations to implement CDM - the mechanism that assists developing countries among the non-Annex I countries in achieving sustainable development and contributes to the final goals of the Convention. Under this mechanism, Vietnam is able to:

- To implement a project that results in certified GHG emission reductions.
- To sell such GHG emission reductions to other party or parties at the prices of each ton CO_2.
- The revenue from such project activities is used for payment of administration as well as expenses for remedy of climate change, etc.

PART II: ACTIVITIES TO IMPLEMENT THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL IN VIETNAM

I. HYDROMETEOROLOGICAL MONITORING INSTITUTIONS

1.1. Climate Change Observation and Monitoring System

1.1.1. Meteorological surface station network

Currently, the meteorological surface station network in Vietnam consists of 168 stations. Meteorological surface stations conduct all or a part of meteorological element observations such as: weather phenomena, atmospheric pressure, wind, cloud, solar radiation, sun-shine duration, air and soil temperatures, rain, precipitation, humidity, and evaporation.

Meteorological surface stations are classified into 3 categories based on the number of observational meteorological parameters, times of observations per day and responsibility on observation data transmission.

1.1.2. Specialized meteorological station network

Specialized meteorological stations include 10 upper-air meteorological stations, 6 weather radar stations, 29 agro-meteorological stations, 21 marine hydro-meteorological stations, 396 rain-gauge sites, 232 gauging stations, and 154 stations and centres for monitoring air and water.

Upper-air meteorological stations conduct observations of temperatures, humidity, wind or only of wind within the atmospheric layers below 30 -35 km one or two times or more a day and transmit observed data to international and/or domestic meteorological forecasting centers.

Weather radar stations conduct observations of locations and intensity and sphere of climate system such as typhoons, tropical low pressure, rainstorms, large rain range, etc. within the atmospheric layers below 100 – 300 km within radius of radar operation.

Agro-meteorological stations conduct observations on both hydro-meteorological factors and the growth and development of some crops, mainly wet rice.

Marine hydro-meteorological stations conduct 4 observations a day on sea level, sea temperature and salinity.

Rain-gauge station network in Vietnam conducts observations of precipitation by using direct rain measurement instruments or rain recorders in different areas with a density of multi-fold of those done by the meteorological surface station network.

Hydrological station network conduct observations on water level, run-off, temperature and some parameters on water quality to serve flood forecasting and warning, water and water resource use and management.

1.1.3. Environment monitoring station network

In close relation with the meteorological surface station network, it is a water and air environment monitoring station network.

The first environment monitoring station of Vietnam was established in 1987. So far, environment monitoring station has developed into a systematic network comprising of:

- 1 ground atmospheric monitoring station belongs to the World Meteorological Organization (WMO) Basic Pollution Monitoring Network;
- 3 urban/industrial zone pollution monitoring stations;
- 22 rainfall and dust deposition sampling stations
- 51 river water quality monitoring stations.
- 48 salinity monitoring sites.
- 11 reservoir environment monitoring stations.
- 6 marine environment stations.

The environment factors observed are the following:

- Cumulated dust deposition, rainfall chemical compositions, SO2, NOx and CO.
- Hydro-chemical constituents (BOD, COD, pH, DO), heavy metals hydrocarbon, coliform, salinity.

In addition, Vietnam has 3 stations to conduct observations on connective ozone and UV.

1.2. Observations and researches on climate change

Observations and researches on climate change in Vietnam include:

- To preliminarily correct and edit specific characteristics of observed parameters of each meteorology station about each observation factor according to a standard procedure and set up a file of meteorology books and meteorology boards;
- To gather meteorology books and meteorology boards of all stations to National Documentation Center and to:

- Correct and edit all data on meteorology books and meteorology boards of all stations.

- To set up monthly and annual reviews on every observation factor in the whole network.

- To promulgate meteorological observation data on monthly hydro-meteorological magazines.
- To do preliminary research on and promulgate annual meteorological research results on annual hydro-meteorological characteristic magazines.
- To carry out researches or each special themes or subject on1:

- To analyze year-after-year changes of characteristics of typical meteorological factors;

- To assess level of changes of each factor characteristics during the whole observation process;

- To identify climate anomalousness among the series of meteorological observations.

- To study climate changes over decades and define the sudden changes of principal climate factors in recent years or decades.

- To analyze and anticipate about the cycle of principal climate factors (temperature, rainfall, drought).

- Analyze and anticipate tendency of typical weather factors.

II. DEVELOPMENT OF THE NATIONAL GHG INVENTORY SYSTEM

The national GHG inventory has been carried out in the implementation of projects such as: Climate Change Train (1994 - 1996), ALGAS (1995 - 1997); Economics of GHG Limitation (1996 - 1998) and Vietnam Initial National Communication for UNFCCC (1999 - 2002). The inventory assignments, in regular and irregular manners, are also referred to in the national action plan to implement UNFCCC. The national GHG inventory system of Vietnam comprises of:

2.1. Institution involving in National GHG Inventory

GHG inventory is carried out with the following assignments:

- National focal point:

- Identify the inventory subjects (year, sectors, and inventoried GHG).

- Carry out the inventories as per selected and appraised procedures.

- Promulgate the GHG inventory results.

- A Vietnam Climate Change Country Team and UNFCCC office:

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[1] *Source: Dr. Nguyen Duc Ngu, Dr. Nguyen Trong Hieu: Climate and climate resource of Vietnam Agriculture Publication, 2004.*

- To study guidance of IPCC and propose inventory options according to the latest versions for each sector;

- To develop and implement national GHG inventory plans.

- General Statistic Organization: providing or providing in prioritized manner popular national economic statistics related to national GHG inventory.

- Institutes and specialized research institutions: providing data that is not included in the Statistic Year-book (data of energy, forest, waste, etc.).

2.2. National GHG Inventory procedures:

All National GHG Inventories of Vietnam follow the procedure below:

- To identify the year, sectors, and GHG to inventory.

- To select inventory options for each sector according to guidance of IPCC.

- To draw up a list of emission coefficients for each category of inventory in accordance with recommendations and guidance of IPCC.

- To draw up a list of emission coefficients that has not been identified and guided by IPCC.

- To do researches and experimental researches to identify the emission coefficients that has not been identified by IPCC.

- To gather all popular data in Statistic Yearbooks.

- To gather unpopular data from institutes and specialized institutions.

- To remain inventory mission records according to the samples of IPCC.

- To calculate GHG emission amount by types and sectors.

- To cumulate the GHG emission amount by types and sectors.

- To convert the GHG emission amount into CO2 equivalent and review the inventory results for all inventoried sectors.

III. DEVELOPMENT AND IMPLEMENTATION OF OPTIONS TO MITIGATE IMPACTS OF CLIMATE CHANGE ON THE NATIONAL ECONOMIC SECTORS

3.1. Water resources

- Building reservoirs with the total additional capacity of 15-20 billion m^3.

- Upgrading and raising the scale of drainage system.

- Upgrading existing sea and river-mouth dykes, and step by step building new sea dykes.

- Limiting the population growth rate and organizing new resettlement areas in coastal area.
- Reclaiming areas, especially in hilly midland areas in the North of Vietnam, for agricultural production.
- Using water scientifically and effectively.
- Exploiting while protecting water sources.
- Conducting studies in long-term water resources prediction.

3.2. Agriculture

- Development of crop patterns suitable to climate change.
- Effective use of irrigation water in planned manner.
- Upgrading of irrigation system for agriculture.
- Development of new varieties that could stand against severe environmental conditions.
- Reserve and storage of local crop varieties, establishing crop seed bank.
- Development of farming techniques appropriate to climate change.

3.3. Forestry

- Enhancing reforestation, firstly in watershed, regreening bare lands and hills, protecting and developing of mangrove forest.
- Protecting natural forest and going forward to closing natural forest exploitation. Preventing forest fire.
- Establishing bank of seeds of natural forest trees in order to protect some valuable varieties.
- Enhancing timber processing efficiency and limiting the use of wood as material.
- Selecting and replicating plant varieties suitable to natural conditions taking into account climate change.

3.4. Fisheries

- Changing farming structure in some wetland areas from rice monoculture to fish-rice rotation system.
- Taking into account sea level rise and increase of temperature while building infrastructures, quays, ports, store houses, etc.
- Developing plan on brackish water aquaculture for Central Vietnam with 2000 km of coast and sandy land to create an effective and multiform business without affecting agricultural land.

- Building back-up dyke behind sea dyke to create transitional belts between agricultural land and sea.
- Building storm shelter port systems along the coast as well as in islands.
- Establishing natural ecological reserves, especially coral reefs and atolls.

3.5. Coastal zones

There are 3 strategic options for active adaptation to sea level rise:

- Full protection: implement all-sided protection measures to maintain present situation, effectively response to sea level rise.
- Adaptation: reform infrastructures and habits of the people living in the coastal zone to adapt to sea level rise.
- Withdrawal: Avoid natural impacts of sea level rise by resettlement, moving houses, and infrastructures from threatened areas.

3.6. Energy and Transportation

- Taking into account climate change factors in planning of energy and transport development.
- Upgrading and reconstructing transport infrastructure in areas often threatened by sea level rise and flood.
- Ensure demand side management of energy (DSM) based on high efficiency of energy use, economical and rational use of energy, ensuring energy security and safety.
- Developing strategies to response and adapt to the vagary of weather.

3.7. Medicine and Human Health

- Improve public knowledge on family sanitation and culture through national programs such as “Clean water and environmental sanitation”, “Garden - pond – breeding facilities”, “Biogas”, etc.
- Developing national plan and program for medical control and monitoring in areas that have high danger of infections.
- Establishing green, clean and beautiful areas.
- Promoting public awareness on climate change.
- Preventing infection and disease transmission from outside.

IV. DEVELOPMENT OF GREENHOUSE GAS MITIGATION POLICIES AND OPTIONS

4.1. GHG emission reduction policies

Vietnam has had options of GHG reduction in the following main areas:

4.1.1. GHG Reduction Orientation in Energy

In order to implement national environmental policy in combination with GHG mitigation strategy, the principles of energy development strategy should be ensured: the maintenance of rapid, stable and sustainable economic growth and contribution to mitigation of GHG emission, protection of climate system. This principle should be implemented through following solutions:

- Efficient and economical use of energy;
- Development of new and renewable power forms;
- Economical use of energy in transportation.

4.1.2. GHG Reduction Orientation in Forestry

Forestry development orientation taking into account GHG mitigation of Vietnam based on the Forestry Development Strategy for 2001 – 2020 of Vietnam, implementing activities to mitigate emissions, enhancing GHG sinks. Orientations stated in this Strategy include:

- To promote the implementation of the program to plant 5 million hectares of forest effectively in order to increase the forest coverage to 43% by 2010 to 2020;
- To conserve and restore the existing forest;
- To rehabilitate the combined forest;
- To prevent forest fire.

4.1.3. GHG Reduction Orientation in Agriculture

Agricultural development orientations taking into account GHG mitigation of Vietnam are:

- Development and application of sustainable agricultural farming techniques to enhance the agricultural production and to mitigate GHG emissions.
- Improvement of irrigation-drainage management in rice fields.
- Strengthening the capacities of agriculture research institutions.
- Improving meal and eating tradition of the people so that the meal would include not only rice.

4.2. Options to mitigate GHG emission

4.2.1. Options in energy sector

In order to improve energy efficiency, different measures should be taken:

4.2.1.1. Improvement of lighting efficiency of energy use and conservation

- Improving lighting efficiency in public and households, setting up lighting norms and saving regulations;

- Step by step to test and popularize efficient lighting appliances;
- Supporting lighting manufacture, management and education;

4.2.1.2. Improving energy efficiency and saving energy in enterprises

- Providing information on energy and effective energy services;
- Carrying out programs on energy efficiency, monitoring the implementation of effective energy and environment programs and projects;
- Improving efficiency of industrial boilers;
- Using industrial motors with high efficiency;
- Using high efficiency vehicles.

4.2.1.3. Implementation of Demand-side Management (DSM) Programs

- Management of additional load to reduce the differences of electricity power and consumption;
- Reduction of losses in electricity dissemination and distribution;
- Development and implementation of program on urban energy efficiency and rural electrification;
- Development and implementation of program on high-efficiency household appliances;

4.2.1.4. Effective energy use and saving in buildings

- Strengthening capacity in construction designing taking into account energy efficiency;
- Setting up energy norms for construction materials;
- Standardizing and encouraging the use of high-efficiency equipment;
- Conducting energy audit in big buildings;

4.2.1.5. Economical use of energy in transport sector

- Developing public transport for cities to meet 25-30% of transportation needs in 2001-2010 up to 50-60% in 2010-2020;
- Encouraging economical-fuel vehicles;
- Upgrading transport infrastructure and improving the quality of means of transportation;
- Controlling gas emissions from vehicles;

4.2.2. Options in forestry sector

Based on forest development strategy of Vietnam for the period of 2001-2020, the activities related to forestry and forestry development have been in compliance with policies of environment protection and GHG emission

mitigation/GHG sink increase. To this end, Vietnam has been applying the following important options:

- Focus on implementing the program of plantation of 5 million hectares of forest (Project 661) which was approved by Vietnam National Assembly in 1997, with the aims to increase the forest coverage up to 43% by the end of the period of 2010-2020.

- Develop action plan to prevent the degradation of forest resources, restore the forest by measures such as conservation of existing forest, delimitation for forest restoration, planting of new forest, limiting exploitation of natural forest, and preventing forest fire.

- Stabilize the structure of 3 kinds of forests, including protection forest, special-use forest and production forest.

- Implement integrated social policies such as: allocating forest land to the local households for planting, settlement program, "poverty alleviation" with the aims to actively support the program of planting 5 million hectares of forest.

- Improve the living standard of the people in mountainous areas. Attract as much as possible the local households to participate in activities to protect forest, plant forest and carry out forestry business.

- Socialize at high level the forestry on the basis of a multi-component economy. Renovate the production relationship in forestry.

4.2.3. Options in agriculture sector

Agricultural development orientation taking into account GHG mitigation basically requires to meeting demands on food, foodstuff of the people as well as of the export, meanwhile to mitigate GHG emission from agricultural sector.

Agricultural farming practices to increase production and mitigate GHG emission should be developed and applied comprising of:

Study and develop new agricultural farming techniques, both increasing agricultural production and crop yield and mitigating GHG emission

- Selecting short-duration, high yield and quality rice varieties, replacing transplantation by direct sowing practices, transfer from rice mono-culture system to system of two rice crops and one secondary crop or one rice and one secondary crop.

- Applying pill-form fertilizer (NPK) instead of fertilizer casting as before.

- Studying and enhancing food processing for animals, while selecting high quality, productive breeds.

Improvement of irrigation-drainage management in rice fields

In the irrigated rice fields, implementation of water drainage during maximal stem spreading and after grain-filling phases would save water, increase rice yield and mitigate methane emission.

Establishing data bank and equipping calculation facilities to serve specialized research in agriculture and climate change

Improving meal and eating tradition of the people so that the meal would include not only rice but also various vegetables, foodstuff to ensure providing of adequate calories and reduce pressure on rice cultivation; some rice fields could be used to cultivate secondary crops and other trees instead of rice.

V. TRANSFER OF ENVIRONMENTALLY FRIENDLY TECHNOLOGY AND APPLICATION OF APPROPRIATE INSTRUMENTS

5.1. Technical instruments that have been transferred

During the initial years of UNFCCC implementation, Vietnam has been transferred a number of important technical instruments to serve the following particular assignments:

- GHG inventory tool-kit included 3 volumes:

- GHG inventory reference manual

- GHG inventory manual;

- GHG inventory reporting guidelines.

- Software serving strategic research and GHG mitigation options comprise of:

- The Energy Flow Optimization Model - Environment (EFOM-EVN) was used to analyze environmental strategy.

- The Model for Energy Demand Evaluation (MEDEE-S/E) was used for projection of the energy demand of energy and transport sectors.

- The Comprehensive Mitigation Analysis Process (COMAP) was used in development and evaluation of GHG mitigation options in forestry and land-use.

- Equipment to sample CH_4 in rice fields: this is a technical equipment to recover CH_4 in experiments to identify CH_4 emission amount in rice fields.

5.2. The transferred technology advances

The unique technology advances that has been transferred to Vietnam is the technology to generate electricity by thermal surplus in Ha Tien Cement Factory from 1999-2002.

5.3. The technology advances to be transferred

These are the environmentally friendly technologies that will be transferred in the initial CDM projects of Vietnam:

- Technology to treat waste for electricity generation (Ho Chi Minh city);

- Technology to recover and use associated drilling gas (Rang Dong oil well);
- Technology to improve energy efficiency in Thanh Hoa Beverage Company.

VI. PROMOTING RESEARCHES, DEPLOYTING AND ENHANCING THE USE OF NEW AND RENEWABLE ENERGY SOURCES

6.1. Research and development of solar energy

Vietnam experts have zoned solar radiation energy in the whole Vietnam territory. According to that diagram, the solar energy resource in Vietnam is estimated of about 1300-2200kwh/m^2/year, rather abundant in the Southern regions, with highest value in the South and the Central South of Vietnam and lower in the North and lowest value in the Northern Deltas.

Solar energy in Vietnam is used under three modes:

- Solar Energy dryers
- Water drilled.
- Water heater
- Photovoltaic cells

6.2. Research on and development of wind energy

In Vietnam, potential of wind energy is not high, mainly in islands and coastal areas. According to reports done by Vietnam's Institute of Energy, potential of wind energy of Vietnam is at an average in compared with other countries in the region and in the world. It is considered that wind velocity in many inland areas is not suitable for electricity generation and only about 3000 km of coastal and some mountainous areas have rather rich potential of wind energy.

A project for wind power potentials executed by the Global Physics Institute (Vietnam Academy of Science and Technology) carried out a survey of wind velocity at the heights of: 10, 20, 30, 40 m, identified wind gradients and directions at different heights in Phuoc Mai peninsula (Binh Dinh province) from January 1998 to April 1999 and proposed to develop a wind power plant there.

Several projects, programs and activities of wind electricity generation have been executed during recent years.

6.3. Research on and development of small and micro hydro-power plants

According to research and assessment of Vietnam's Institute of Energy, the total theoretical technical and economic hydropower potential is about 1600-2000 MW, accounting for 7-10% of yield. Out of that potential, there are about 500

small hydro-power plants (100-10,000 kW) accounting for 87-90% and about 5-7% of micro hydro-power plants (5 - 100kW).

Upon small hydro-power plants potential, 610 stations may be installed and exploited with the total output capacity of 1,310MW in 26 provinces, highest in Daklak (196MW), Lao Cai (100MW), Son La (86,5MW), Gialai (75MW), Thanh Hoa (77,5MW). Since 1990, many households have, by themselves, installed many micro hydro-power plants (0.1– 1kW) with low cost.

Up to 2003, more than 500 hydro power plants (5kW-10MW/plant) with total output capacity of 97,273kW. In addition, 110-130 thousand micro plants (5-20W/plant) have been installed and exploited.

6.4. Development and application of biogas and biomass

In 1992, University of Agriculture and Forestry - Ho Chi Minh city deployed a program of biomass in many areas and installed 6,000 plastic bags.

In 1994, Vietnam Gardening Association (VACVINA)) piloted a program of biomass and have installed 2,000 bags in 33 areas.

Under a program of National Targets for Rural Clean Drinking Water Supply & Environmental Sanitation, about 200 - 300 fixed cover biogas tanks and systems were constructed and installed in Ha Tay and Nam Dinh provinces in 1996, and 1,000 ones in Dan Phuong districts, Ha Tay province in 1999.

So far, about 70,000 biogas tanks and systems, out of which several thousands are plastic bags and the rest are solid concrete tanks have been constructed and installed. Biogas technology has been widely popularized and there have been many services of biogas technology.

In 2000, biomass including woods, wood refuses and agricultural by-products, etc. was used under mode of thermal power and electricity accounting for 14 tone of oil equivalent (TOE).

6.5. Geo-thermal energy

In 1991, it was recorded that 125 hot-water streams with the surface temperature of 79-101^{0}C along the coastal areas in Central Vietnam. Researches in 1996 showed that geo-thermal energy can be exploited from nearly 300 sites.

VII. SCIENTIFIC RESEARCH AND CONSULTANCY AND INFORMATION MANAGEMENT TO IMPLEMENT UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

7.1. Scientific research and consultancy

Vietnam is completely capable to do scientific research and consultancy to meet commitments of UNFCCC that are clearly shown by the following analysis:

7.1.1. Needs for scientific research and consultancy

Like other parties to UNFCCC, Vietnam is responsible to carry out scientific research and consultancy in order to fulfill the following assignments in implementing UNFCCC:

- Monitoring and observing changes of weather factors in the whole country territory.
- Analyzing considerations to normal, abnormal, sudden changes, cycles and tendency of several typical weather factors in the whole country territory and propose climate change scenarios for the coming decades.
- To assess climate change impacts on national economic sectors (natural resources, agriculture, fishery, industry, transportation, energy and health) and in the important areas (islands, coastal zones, low-land areas, etc.).
- Regularly and irregularly inventory GHG in key socio-economic sectors: energy, agriculture, forestry, waste and estimate GHG emission amount in coming decades.
- To propose GHG mitigation options with lowest cost in key socio-economic sectors: energy, agriculture, forestry, etc. and draw up a list of GHG mitigation projects to advocate for finance of Global Environmental Facility or other international organizations and scientific and technical consultancy organization of other countries.
- To propose and implement national strategy of Vietnam (potentials, market opportunities, project cycles and criteria, implementation arrangement) and to draw up a list of CDM projects in every sectors of Vietnam.

7.1.2. Measures to strengthen capacity to do scientific research and consultancy

- To develop a plan to do scientific research on climate change in a comprehensive manner including classic and modern research within global climate change (green house effect, GHG inventory, GHG mitigation, etc).
- To mobilize experts and scientific academia of sectors under science institutions (institutes, centers, Scientific and technical departments), education and training institutions (National universities, Universities of Technology) in doing highly special and majored researches.
- To step by step develop bilateral and multilateral relations, cooperate in science and scientific advisory with international organizations (IPCC, United Nations Institute for Training and Research (UNITAR), etc) and countries that have high potential of climate change sciences (China, India, Australia, America, etc.).
- To take advantage of finance of GEF, CDM, international organizations (WB, ADB, UNDP, UNEP, etc.) and other countries that have carried out scientific studies in climate change and GHG mitigation, special technical assistance projects in order to strengthen skills to implement UNFCCC and KP.

7.1.3. To do scientific research and advisory

In order to meet scientific and technical requirements specified in articles relating to science and scientific advisory of UNFCCC and KP. Vietnam has successfully performed many activities within a framework of these articles as following:

- **Organizations studying hydrometeorology**

Vietnam has carried out many activities on scientific researches of the World Meteorological Organization (WMO) as follow:

- The World Weather Watch Program (WWWP).
- The World Climate Program (WCP).
- The Atmospheric Research and Environment Program (AREP).
- The Applied Meteorology Program (AMP).
- The Hydrology and Water Resources Program (HWRP).

- **Organizations studying V & A**
- **Researching on and putting new energy into practice**

Vietnam has carried out research on potentials of solar radiation and wind energy, biomass, small and medium hydro power plants. A program on developing small and medium hydro power plants has been actively implementing and involved many private enterprises. In addition, developing wind power has also been remarkably considered. An array of towers for measuring wind at the height of 40 - 65m have been built. Two projects on a wind-power plants of industrial scale have been implementing: One has been being in preparation and feasible study; the other with one tower of 850kW has been built and effectively operating. Water-boiling facilities by solar energy have been commercialized. In mountainous and remote areas, many solar-battery-panels of 120 KWp have been installed. The domestic use of bio-gass has been increasing. Recently, tens of thousand of biogas digesters have been built and about 180,000 ones are expected to be built nationwide in coming time. Attention has been paid to combining types of recycled energy into a stable energy-supply-system through some projects.

- **Researching on and step by step finalizing GHG inventory methodology.**

Vietnam has carried out research on GHG inventory methodology of the Organization of Economic Cooperation and Development (OECD) right since 1993-1994. Since 1995, Vietnam has received IPCC guidance on this matter, upon which, GHG inventory procedure of Vietnam has been developed.

Vietnam has carried out experimental research on CH_4 emission in rice paddies in typical areas of the North Delta and the South Central coastal provinces. The results are transmitted to Center for research on CH_4 emission in wetland rice

paddies of Asia and contributes to finalize and perfect coefficients of CH_4 emission in wetland rice paddies of IPCC.

- **Anticipating GHG emission amount for the coming decades**:

Within framework of ALGAS project and "the economics of GHG mitigation" project, Vietnam has estimated GHG emission in 2000, 2010, 2020 and 2030 basing on arrangements of anticipation researches on development orientations of national economic sectors that are in closest relations with GHG emission including:

- Economic development forecast till 2030 to serve environmental research (Institute of Strategic Development, Ministry of Planning and Investment (MPI)).

- Master plan of Gas in Vietnam (Institute of Strategic Development, Ministry of Planning and Investment).

- Overall electricity development diagram during 1996-2000 taking into consideration the prospects to 2010 (Institute of Energy, Ministry of Industry);

- Energy development orientations and environmental issues during 1995-2010-2020 (Institute of Energy, Ministry of Industry);

- Vietnam Forestry Sector - Current status and development orientation for 1996-2010 (Forestry Inventory and Planning Institute, Ministry of Agriculture and Rural Development);

- Vietnam agriculture development orientations to 2000 - 2010 (National Institute of Agriculture Planning and Projection - Ministry of Agriculture and Rural Development).

The above forecasts are presented in the following table:

Table 1: GHG emission anticipation by sectors

(Million ton CO_2 equivalent)

Sectors	1993	2000	2010	2020	2030
Energy	27.5	44.48	103.40	187.82	396.35
Forestry	29.88	5.80	-18.70	-25.60	-32.10
Agriculture	48.19	52.50	57020	64.70	68.29
Total	**105.57**	**102.78**	**141.90**	**226.92**	**432.54**

Source: Vietnam: Initial National Communication for UNFCCC, 2003

The project "The economic aspects of GHG mitigation".

The projection shows that the growth rate of GHG emission will be rapid in three early decades of 21 century. The increase of GHG emission is highest in

energy sector - one of the key sectors involved in the national industrialization and modernization process. In contrary, the implementation of five million hectare reforestation together with other forestry projects and programs, the GHG emission has been ever-mitigating and right before 2010, the GHG emission amount has been lower than the potential of GHG sinks and reservoirs.

- Researches on GHG mitigation options with lowest costs in sectors mainly derived from the project "The economic aspects of GHG mitigation".

According to Vietnam Initial National Communication, the following options, by sectors, have been proposed:

Energy and industry

- E1: Replacement of low-efficiency coal fired boilers by higher efficiency one. CO_2 mitigation potential in option E1 is about 10.2 million tons during the period of 26 years. The mitigation cost is US$3.65 per ton CO_2.

- E2: Replacement of low-efficiency oil fired boilers by higher efficiency one. CO_2 mitigation potential in option E2 is about 3.5 million tons during the period of 26 years. The mitigation cost is -US$3.65 per ton CO_2.

- E3: Fuel efficiency improvements with gasoline burn engine in transportation. CO_2 mitigation potential in option E3 is about 21.9 million tons during the period of 26 years. The mitigation cost is -US$6.78 per ton CO_2.

- E4: Development of geo-thermal power. CO_2 mitigation potential in option E4 is about 29.2 million tons during the period of 26 years with mitigation cost of US$ 5.15 per ton CO_2.

- E5: Development of solar power. The development of solar energy is expected to start in 2005. CO_2 mitigation potential in option E6 during the period of 26 years is about 26.1 million tons with mitigation cost of US$ 6.01 per ton CO_2.

- E6: Building wind power stations. It is estimated that option E6 on building of wind power stations in the coming time would bring about CO_2 mitigation potential of about 34 million tons during the period of 26 years with mitigation cost of US$ 4.64 per ton CO_2.

- E7: Efficiency improvement in coal-cooking stoves. CO_2 mitigation potentials of option E7 is about 73 million tons during the period of 26 years with mitigation cost of -US$ 4.15 per ton CO_2.

- E8: Replace incandescent light bulbs by compact fluorescent lamps. CO_2 mitigation potential of option E8 is about 16 million tons during the period of 26 years with mitigation cost of -US$8.31 per ton CO_2.

- E9: More efficient industrial motors. CO_2 mitigation potential of option E9 is about 70 million tons during the period of 26 years with mitigation cost of -US$ 7.19 per ton CO_2.

Forestry

- F1: Active protection of about 3 million hectares of forest including national reserve gardens, rare wood forest, watershed protective forest, important reservation areas, etc. CO_2 mitigation potentials of option F1 is about 1302.6 million tons with mitigation cost of US$ 0.21 per ton CO_2.

- F2: Restoration of special protective forests by area delineation for regeneration together with 1 Mha of newly planted forest. CO_2 mitigation potentials of option F2 is about 372.6 million tons with mitigation cost of US$ 0.11 per ton CO_2.

- F3: Plantation of 1 Mha of new protective forest within the framework of agricultural and settlement program. CO_2 mitigation potentials of option F3 is about 325.8 million tons with mitigation cost of US$ 0.26 per ton CO_2.

- F4: Plantation of 1.6 million hectares of short-term rotation production. CO_2 mitigation potentials of option F4 is about 445.8 million tons with mitigation cost of - US$ 0.15 per ton CO_2

- F5: Plantation of 1.3 million hectares of long-term rotation production. CO_2 mitigation potentials of option F5 is about 496.1 million tons with mitigation cost of US$ 0.20 per ton CO_2

- F6: Planting of 4 billion scattered trees (equivalent to about 1.6 million hectares). CO_2 mitigation potentials of option F6 is about 278.7 million tons with mitigation cost of US$ 2.56 per ton CO_2

Agriculture

- A1: Water management of rice fields. CO_2 mitigation potentials of option A1 is about 105.0 million tons with mitigation cost of US$ 13.12 per ton CO_2.

- A2: Provision of processed feed for animal. The total mitigation potential is 8.0 million tons of CO_2 equivalents during 26 years, with mitigation costs from US$5.19/ton CO_2.

- A3: Setting up biogas stoves in rural areas. Their total mitigation potential is 27.3 million tons of CO_2 equivalents, with mitigation costs from US$9.41/ton CO_2.

- To study national strategy of Vietnam on CDM

Vietnam consultants have studied the following key issues:

(1) GHG mitigation potential in key sectors:

Energy: this sector accounts for the highest GHG emission volume in the socio-economic development. CDM potential with focus on both energy demand and supply includes: energy efficiency and saving; fuel switching; use of renewable energy and reduction of leakage. Total mitigation potential under CDM of energy sector is 78-89 million tons of CO_2 during 2001-2010.

Agriculture: 3 GHG mitigation options: irrigation management, livestock foodstuff processing and use of biogas. The mitigation potential of irrigation

management option is 22.2 million tons of CO_2 during 2001-2010 with mitigation cost of 1.75-8.2 USD/ton of CO_2.

Forestry: mitigation potential of options of forestry sector would likely be 52.2 million tons of CO_2 during 2001-2010 with mitigation cost of 0.13-2.4 USD/ton of CO_2.

(2) Market opportunities for Vietnam

Researches show that: If America joined in CDM market, GHG market price of Vietnam would be 53.7 million USD/year (account for 0.75% export volume of Non-annex I countries); If America joined in 30% CDM market, GHG market price of Vietnam would not be higher than 12 million USD/year.

(3) Development of cost curves of GHG mitigation options:

Energy: Identify GHG mitigation options, evaluate mitigation potential and costs, develop lowest cost curve.

Agriculture: Identify GHG mitigation options and define the baseline rice cultivation area and livestock population; estimate cost and benefit of GHG emission reduction.

Forestry: Identify options relating to forest plantation and reforestation, develop proposals based on baseline land-use and land-use GHG mitigation for 2000-2020, estimate carbon sinks, costs and benefits of the above two options.

(4) To study CDM project cycle in Vietnam.

(5) Identify compulsory criteria of CDM projects:

- The sustainability: suitable with national sustainable objectives and matched with local strategic targets.
- The supplement: technical and economic standards suitable with baseline curve; GHG emission from CDM projects is lower than from baseline projects; calculate and estimate GHG emission amount; main natural resource of CDM projects are supplemented to current commitments.
- The feasibility: ensuring the Government's contribution and the clear description of methodology of monitoring and execution.

(6) The prioritized criteria of CDM projects:

- The sustainability: economic sustainability (creating income and transfering technology), environmental sustainability (GHG mitigation, waste reduction, and be beneficial to the ecology); social sustainability (job opportunities, poverty reduction and improved living standard, etc.)
- The commerce: The actual demand and attractiveness to the investors
- The feasibility: The attractiveness to the investors, the actual appropriate infrastructure, the support of the local authorities.

(7) Development and implementation of the National CDM Strategy of Vietnam.

(8) To draw up a list of CDM projects in Vietnam.

7.1.4. The sciences related to the United Nations Framework Convention on Climate Change that need to be supported

By this time, efforts of Vietnam in implementing UNFCCC focus on CDM projects. It is clear that CDM has played an important role in implementing UNFCCC and KP from now on. Like the other Non-Annex I countries, Vietnam should identify and make a complete list of all scientific issues that are the most likely internationally cooperated. Those issues might be:

(1) Assessment of climate change status during the past years and define the relation between those changes with the current global hotter climate.

(2) Anticipating authentically the tendency of climate change in Vietnam in the coming decades based on the research on climate change data and climate change tendencies in combination with the climate change scenarios of the globe and the South East Asia.

(3) Sciences on V&A.

(4) Sciences on emission and emission mitigation technologies in energy, industry, agriculture and forestry.

(5) To study skills to develop GEF and CDM projects in order to increase the international support and to facilitate UNFCCC and KP implementation.

7.2. Information management relating to climate change

7.2.1. To receive and exchange international information

Like other parties to UNFCCC, Vietnam is informed of information related to UNFCCC by the following institutions:

- The COP: The COP meets every year and is the "supreme body" of the Convention. It is an association of all the countries that are Parties to the Convention review UNFCCC implementation and making necessary decisions for efficient UNFCCC implementation.

- The UNFCCC Secretariat: Specific tasks include the preparation of official documents for the COP, acts as a supporting body of COP responsible for the coordination of In-Depth Reviews of Annex I Party national communications, gather and share information on greenhouse gas emissions, national policies and best practices in accordance with UNFCCC articles.

- The Subsidiary Body for Implementation (SBI): to assist COP to assess UNFCCC implementation.

- The Subsidiary Body for Scientific and Technical Advice (SBSTA): give advice to the COP and other supporting bodies in scientific issues related to UNFCCC.

- The World Weather Watch Organization (WWWO): frequently receives and exchange regular and irregular meteorology data with countries that are parties to it on weather, extremes, meteorological anomalousness and calamities.

- Through many websites and international conferences and workshops.

7.2.2. Information system related to United Nations Framework Convention on Climate Change

- Environmental hydrometeorology information

The national hydrometeorology center is an agency that arranges, manages and arrange hydro-meteorological observations, records, corrects and edits and reports on hydro-meteorological information in general and on natural calamities in particular (flood, drought, etc) to national information management and publication agencies such as: Statistical Documentation Center, General Statistical Office of Vietnam (GSO) and statistical agencies and organizations of other countries.

- Socio-economic information

Almost information of socio-economic sectors can be provided by GSO - A state agency with functions to compile and publish statistical yearbook, other statistical products of the Socialist Republic of Vietnam. In addition, Provincial Statistics Offices in provinces/cities and District Statistics Offices in districts and towns also compile and publish local statistical socio-economic information.

- Special information related to climate change

Much of information related to climate change is not widely popularized in Statistical Yearbooks at both central and local levels. Information of this kind can only be accessed in the special research institutes (Institute of Development Strategy, Institute of Energy, Forest Inventory and Planning Institute, Agriculture Planning and Development Institute, etc). In addition, data on solid, liquid and industrial wastes can be accessed in local Departments of Natural Resources and Environment.

- Information about UNFCCC implementation

Information about UNFCCC implementation are collected, corrected and edited, recorded, compiled and published regularly internally or in form of a national communication to COP, UNFCCC agencies, etc. Recently, Vietnam has had a website for posting important information about the management, criteria and development of CDM projects, etc. All information about UNFCCC can be easily accessed through Office of Ozone layer protection and climate change.

7.2.3. Measures to enhance the control and observation information about climate change

- To enhance and strengthen a system of observing, editing, recording, compiling and publishing hydro-meteorological data.

Hydro-meteorological observation data are frequently transmitted to WMO. Monthly and annual reviews together with annexes on hydro-meteorological data collected from hydro-meteorological station network are published by hydro-meteorological magazines annually.

- Improve technical instruments for observing and transmitting in hydro-meteorological stations that are nominated to join in a global climate change station network.

Since 1995, 3 hydro-meteorological stations: Hanoi, Da Nang, Tan Son Nhat have been nominated to join in a global climate change station network. In general, these are key hydro-meteorological stations that are well equipped with technical instruments for observing and transmitting hydro-meteorological data for fully observing surface and upper-air hydro--meteorological factors and these have met criteria of a standard station in process of editing and compiling hydro-meteorological data.

In the time to come, one more hydro-meteorological station is very likely to join in the regional and global hydro-meteorological station network.

- Enhancing publications of UNFCCC implementation office

For years, bulletins on Climate change have been published. Recently, a scientific journal "climate change" is issued.

These publications have informed organizations and individuals that are in connection with climate change area or have desire to learn about climate change of very necessary information:

- General information on UNFCCC and KP;
- Activities to implement UNFCCC and KP in the world;
- Activities to implement UNFCCC and KP in Vietnam;
- Science and technology news (related to climate change);
- News in brief (related to UNFCCC implementation).

- Strengthen and develop Website of MONRE as well as other ones that are related to climate change and CDM.

- Promote communications and dissemination on climate change and CDM to the wider range of targeted audiences.

VIII. ECONOMIC AND FINANCIAL MECHANISM FOR IMPLEMENTATION OF UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

8.1. Groups of activities under the financial mechanism

Activities to implement UNFCCC and KP are various and devised in aspects of objectives, specific activities, sphere of implementation and many other factors including financial mechanism.

Upon financial mechanism, these activities cam be grouped into four categories:

Group 1: Activities within National Framework Strategy

Many activities to implement UNFCCC and KP, by nature, are contents of the national programs and plans, for instance:

- Program on 5 million hectares reforestation (Ministry of Agriculture and Rural Development);
- Efficient and saving energy use program (Ministry of Science, Technology)
- Cleaner production and environmentally friendly technology adaptation in Vietnam (Ministry of Science and Technology).

These programs have taken into account the national policies on climate change. However, the mobilization of national economic potentials to carry out these programs does not relate to the financial mechanism for UNFCCC and KP implementation.

Group 2: Individual activities out of projects that are financed by State budget.

In implementing UNFCCC and KP, especially in an inception phase, many activities of UNFCCC implementation have to be financed by state budget. These activities are separate and are not included into the budget line come from the budget surplus of projects of group 3 and four presented hereunder.

Group 3: These activities are financed by GEF and other international organizations

GEF and other grant programs play an important role in implementing urgent and indispensable projects in Vietnam. In collaboration with GEF and Small Grant Program (SGP), many other international organizations such as UNDP, WB, UNEP, ADB, etc also actively support activities of this group.

Group 4: Activities of CDM

According to CDM, projects on ET will be implemented in the time to come. This is an abundant source of grants. However, it is required that the specialized skills of CDM must be carefully and thoroughly acquired.

8.2. Financial sources for United Nations Framework Convention on Climate Change and Kyoto Protocol implementation activities

So far, financial sources for UNFCCC and KP implementation activities that have been and would be received include:

8.2.1. The State budget

With regard to the division of activities in to groups in item 8.1 above, the activities presented in the 1st group do not relate to the implementation activities of UNFCCC and KP. To finance activities of group 2, every year, the State allocates a limited budget to the agencies that have been coordinating UNFCCC and KP implementation (The former is Hydrometeorology Institute and the present one is Office for Ozone Layer Protection and Climate Change). This budget changes every year at an average of about 500 million dongs equivalent to 30,000 USD.

In addition, state budget for research works on climate change can also be mobilized from other institutions such as from budget for scientific study of ministries, Union of Associations, provinces and cities.

8.2.2. Finance source of GEF and international organizations

So far, several projects and activities have been supported to implement UNFCCC and KP. These comprise of:

- RETA project: 84.000 USD;
- "Training on Climate Change - CC TRAIN": 30.000 USD;
- "Asian Least cost Greenhouse Gas Abatement Strategies (ALGAS)" project: 312.000 USD;
- "Economics of Greenhouse Gas Limitations": 50.000 USD;
- "Vietnam Initial National Communication": 212.000 USD;
- CDM strategic study project: 200.000 USD;
- CDM capacity strengthening project: 200.000 USD;
- Projects that facilitate measures to strengthen capacity to response and adapt with climate change in the prioritized areas: 200.000 USD;
- The cooperation in organizing national dialogues on EU –Asia in order to enhance the efficient participation of Vietnam, Lao and Campuchia in CDM: 200.000 USD;
- Energy-Efficient Public Lighting: 300.000 USD;
- GHG inventory project in Quang Ninh province: 300.000 USD;
- A project on measures to prevent and response to natural calamities caused by climate change in 5 provinces: Nghe An, Ha Tinh, Quang Binh, Ninh Thuan and Binh Thuan;

- A project on response measures to climate change in villages and communes of Thua Thien Hue province: 300.000 USD;

- GEF/SGP projects;

- The continuous brick-kiln project phase 1 and 2: 120.000 USD;

- To process compost by using coffee cover: 30.000 USD;

- Biogas combined with improved cooking stoves: 50.000 USD.

In the coming time, Vietnam is expected to propose and implement ten GEF projects on climate change and try to have about 20% GEF/SGP projects on climate change area.

8.2.3. CDM projects

Up to September 2005, Vietnam developed and identified more than 40 projects, among which, 4 Project Development Documents (PDD) have been approved by the Vietnamese Designated National Authority for the CDM (DNA). Among them:

- 05 projects on enhancing energy efficiency, conservation and saving;

- 01 project on switching use of fossil fuel;

- 03 projects on recovery of CH_4 gas from waste dump and coal fields;

- 14 projects on applying renewable energy;

- 01 project on forest plantation and reforestation;

- 01 project on recovery and use of associate gas.

- 04 PDDs that have been approved by the Designated National Authority for the CDM include:

(1) Rang Dong Oil Field Associated Gas Recovery and Utilization Project in Ba Ria-Vung Tau province.

(2) The Model Project for Renovation to Increase the Efficiency Use of Energy in Brewery in Thanh Hoa Province.

(3) Ngoi Duong Hydroelectricity Project in Lai Cai province (10,8MW)

(4) Song Con 2 Hydroelectricity Project in Quang Nam province (57 MW).

Among the above four projects, “Rang Dong Oil Field Associated Gas Recovery and Utilization Project” in Ba Ria-Vung Tau province has been officially registered as the first CDM project in Vietnam by the CDM International Excutive & Consultative Board (CIECB).

IX. STRENGTHENING EDUCATION SYSTEM, RAISING AWARENESS OF COMMUNITIES AND ENHANCING CAPACITY OF MASS MEDIA

9.1. Education related to United Nations Framework Convention on Climate Change and Kyoto Protocol

9.1.1. The achievements

So far, Vietnam's education on climate change has brought about the following results:

(1) Development of key forces of climate change sciences and skills to implement UNFCCC

Vietnam has accessed the most basic knowledge of climate change through comprehensive reports and briefs, summaries of IPCC sent to the General Department of Hydrometeorology (a member of WMO) in a preparation period of UNFCCC signing (1989-1991). Managers of the General Department of Hydrometeorology have studied these documents and mobilized a number of officials of Department of International Cooperation, Institute of Hydrometeorology in studying these documents and participating in regional and international conferences on climate change to form key forces of climate change sciences.

(2) Training the National Team on Climate Change

After received the project "Training on Climate Change - CC: TRAIN", UNITAR consultants have provide the National Team on Climate Change of Vietnam including representatives of relevant ministries and sectors (as General Department of hydrometeorology, Government's Office, the former Ministry of Science, Technology and Environment, Ministry of Forestry, Ministry of Agriculture, Ministry of Industry, Ministry of Transportation, Ministry of Education and Training, Ministry of Health, Ministry of Justice with training and guidance in skills to implement UNFCCC. Thanks to this project the National Team on Climate Change of Vietnam can provide professional consultancy on climate change.

(3) Training professional experts in skills on climate change

The following leading skills in process of UNFCCC and KP implementation:

- GHG inventory and estimation;
- Assessment of climate change impacts and development of response measures;
- GHG mitigation orientations, developing GHG mitigation options and designing GHG mitigation projects;
- Techniques to develop and manage CDM projects.

(4) To arrange extracurricular activities in: Hue University, Ha Tay Forestry University, Polytechnic College, Ho Chi Minh Agriculture and Forestry University, etc.

(5) Several graduation theses and dissertations have been studied and written on subjects of climate change and application technology of climate change in the process of training bachelors and masters in a number of universities, colleges and vocational training schools

(6) Almost closed projects especially GEF/SGP projects have properly focused on community education on environmental issues in general and climate change issues in particular.

(7) Tens of technical seminars and workshops on various special thematic areas of climate change (GHG inventory, assessments of climate change impacts, development of GHG mitigation options, development of GEF and CDM projects, etc).

(8) Several documents have been published to serve research on climate change and relating issues:

- United Nations Framework Convention on Climate Change (Document);
- Kyoto protocol (Document);
- Collections of climate change studies (two volumes);
- Guidance on GHG inventory;
- GHG mitigation options;
- Questions and answers of climate change;
- Climate change and sea level rise;
- Kyoto protocol, clean development mechanism and new opportunities.

(9) Many scientific reports on climate change have been posted and published in journal of hydro-meteorological, journal of the Earth sciences, journal of scientific activity, etc.

9.1.2. Measures to improve education of climate change

(1) The national UNFCCC and KP focal point agencies have to pay much more attention to subjects of climate change education and training as specified in the National Action Plan to implement UNFCCC and KP.

(2) The subjects of climate change education and training must be comprehensively developed including 3 steps:

- To arrange a compilation or make a loose translation and publish official publications on theories and current status of climate change and the responses measures in Vietnam as well as in the whole globe;

• To develop and pilot and then put into practice appropriate plans of climate change education to different subjects:

- Secondary pupils;

- Students of universities and colleges majored in natural and social sciences that are not closely related to climate change;

- Students of universities and colleges majored in natural and social sciences that are closely related to climate change;

- Officials who are in charge of assignments that are not closely related to climate change;

- Officials who are in charge of assignments that are closely related to climate change;

- People.

• To train specialized personnel the skills to implement UNFCCC and KP activities.

(3) To identify, select and form units or institutions that are concerned in scientific research on climate change.

9.2 The mass media

9.2.1 The achievements

(1) Many popular articles on climate change have been posted in daily and weekly newspapers or broadcast in radio station.

(2) To develop a number of video compact disks or records with appropriate, vivid and easily understandable contents and broadcasting on the Central Television or on the radio station.

(3) To publish and disseminate the regular and irregular bulletins on UNFCCC, current UNFCCC and KP implementation in Vietnam and in the globe.

(4) To organize news conference in the valid date of KP with the attendance of more than 100 journalists.

(5) To participate in the trade fairs of CDM projects in Cologne (Germany) in 2005.

9.2.2 Measures to enhance mass media

• To strengthen the Office of Ozone layer protection Convention and UNFCCC in the line that increases the number of staffs who are capable to compile the popular publications and arrange the development of the audio and visual products.

- The focal point agency of UNFCCC should pay more attention to contents and subjects of the mass communication in coordinating UNFCCC activities.

- To develop a library or an information center in an appropriate, convenient places to serve officials and people who are interested in climate change.

X. INTERNATIONAL COOPERATION IN THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL IMPLEMENTATION IN VIETNAM

10.1. The summary of international cooperation related to the United Nations Framework Convention on Climate Change and Kyoto Protocol implementation

The international cooperation in UNFCCC and KP implementation in Vietnam can be briefly summarized in two following phases:

10.1.1. The preparation for signing the UNFCCC

Since the General Department of Hydrometeorology became the official member of WMO, it has been assigned to be the focal point for international cooperation and issues related to meteorology and hydrology, hải văn, and environment (air and water).

In 1998, IPCC was established. After that Vietnam was invited to participate every meeting of IPCC and Ad-hoc working groups I, II, III in order to prepare the document of UNFCCC. In 1992, in the World Summit on Environment and Development of United Nations, Vietnam delegation leaded by the Prime Minister Nguyen Khanh has signed UNFCCC together with other 144 countries.

10.1.2. After being the United Nations Framework Convention On Climate Change signatory

After signing UNFCCC, Vietnam has deployed UNFCCC implementation with many international cooperation activities as follows:

- To received the project "*Climate change train*" and cooperated with UNITAR consultants to organize training sections on climate change, UNFCCC and develop the National Action Plan to implement UNFCCC.

- Together with other 11 Asia countries to implement "*Asia Least-Cost Greenhouse Gas Abatement Strategy*" (ALGAS) Project with other 7 countries representing for four continents (Asia, Europe, Africa, America) to implement an Economics of GHG mitigation project.

- To receive UNEP's finance to develop the Initial National Communication on UNFCCC of Vietnam.

- To receive finance of WB and Australia to implement the project of National Strategic Research on CDM.

Presently, three international cooperated and supported CDM projects in Vietnam have been conducted to strengthen CDM capacities in Vietnam and facilitate the implementation of measures to response to climate change in prioritized areas and enhancing a participation of Vietnam, Lao and Campuchia in CDM implementation.

Together with implementing the above projects, Vietnam has participated in meetings of COP, SBSTA and SBI.

After UNFCCC was signed and came into force, Vietnam has been participating in activities of IPCC and the Ad-hoc working groups I, II, III to develop the second and third national communication on climate change.

For climate change, Vietnam also cooperates with other Asian countries not only in regional projects but also in activities conducted by meteorological and global physical sub-committee.

Vietnam also has good co-operation with China, India in exchanging experts, consultants specialized in climate change research and CH_4 experimental observations in wetland rice paddies.

10.2. Measures to enhance international cooperation

So far, international cooperation has brought about great benefits to Vietnam in fulfilling commitments under UNFCCC in Vietnam. Upon cooperation, Vietnam has applied many specific measures to enhance this important performance:

(1) Institutional arrangement of international cooperation

The focal point of UNFCCC has to analyze, select and involve and coordinate agencies in enhancing international cooperation, these agencies include:

- An agency concerned directly receives and conducting every activity related to international co-operation.
- The supporting agencies of external relations.
- The supporting agencies of sciences and techniques.

(2) Enhancing the efficient use of international finance

To use international finance efficiently, Vietnam has out great national efforts and potentials in the 3 most important steps:

- The capacity to manage and organize of an agency directly assigned to support internationally and conduct international co-operation.
- The national potentials include the quality and the quantity of technical and scientific staffs of an agency that directly receive international support and the supporting agencies specialized in areas related to climate change.

- Infra-structure, including laboratory, experimental stations, facilities of calculation, communication and transportation.

(3) To organize a national climate change country team or a national steering committee.

Upon the key assignment of each phase, the national climate change country team or the national steering committee including a limited number of members but the most appropriate representatives of an agency concerned and supporting agencies specialized in various areas such as technical science (hydrometeorology, environment, industry, agriculture, forestry, transportation, public health, etc), diplomacy, justice, banking and finance.

(4) To take advantage of multi- lateral international cooperation

Vietnam has taken advantage of international cooperation with international organizations (WB, UNDP, UNEP), of the regional organization (ADB) and of many other governments (Australia, Germany, Netherlands, etc.). Vietnam has also has good external relationships with Asean countries (Thailand, Malaysia, Indonesia, etc.) as well as other Asian countries (China, India, Korea, etc.).

(5) To be modest, eager to learn and to make the best of opportunities to acquire the latest science and techniques of climate change.

Many new sciences have been emerged in UNFCCC and KP implementation for 10 years such as national GHG inventory, development of GHG mitigation options, designs of CDM projects, etc that Vietnam experts have been modestly acquired from experts of developed and developing countries, etc. With the combination of documentation study and advisory of international consultants, Vietnam has had enough consultants in science and techniques of climate change.

PART III. NATIONAL PRIORITIZED ISSUES AND PRINCIPAL ASSIGNMENTS RELATED TO CLIMATE CHANGE

I. THE NATIONAL PRIORITIZED ISSUES

To effectively implement UNFCCC and KP, Vietnam has set out the following national prioritized issues:

(1) To develop the national action plan to implement UNFCCC and KP.

(2) To strengthen capacities to implement UNFCCC and KP.

(3) To integrate climate change issues into policies, programs, and development plans of economic sectors.

(4) To strengthen legal system on climate change.

(5) To study measures to response and adapt with climate change.

(6) To develop portfolio of potential projects.

(7) To propagandize and to raise public awareness.

(8) To enhance international co-operation.

II. NATIONAL PROGRAMS DIRECTLY RELATED TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL

Directly related to UNFCCC and KP implementation, there are the following programs, plans, projects and measures:

(1) A national action plan on energy saving and efficient use

The objectives of the program comprise of:

- To make initial changes in awareness an actions of the state management agencies and the energy users: to develop initial base of state management in using energy as a basic for deploying a comprehensive energy saving program for period after 2000.

- To achieve energy saving efficiency practically contribute to complete socio-economic plan for 1996 - 2000. The expected saving level is as follow:

- To reduce about 8-10% of the total energy consumption by 2000 equivalent to 1.2-1.5 million TOE;

- To reduce about 150-2000 MW accounting for 3.5-5% maximum capacity of the electricity system.

- To remain energy volume within GDP of 2000 to be equal to that of 1995 (=0,400 kg OE/USD).

Principal contents of the program:

- To make energy volume becomes one of the macro-economic management norms.
- To enlarge a mobilization of the state agencies, enterprises and every energy user to perform energy saving measures.
- To select and directly appoint households to use energy in industrial production and services to coordinate a program on energy saving: to audit energy and develop a program on energy saving that comprises of free and non-free measures, etc.
- To deploy demand side management of energy (DSM) measures in charging additional electricity: to reduce peak additional charge, to apply the rush-hour price, to replace public lights, to develop solar energy driven water boiler, use gas instead of electricity, etc.
- To arrange high buildings (hotels, offices) and head offices of agencies in the categories that is subjected to energy management.

For the new constructions: To apply technical standards of energy efficiency in every phase: isolation, natural ventilation, air and light conditioning.

For using constructions: To issue standard use capacity, to conduct energy audit to form the basic to develop a program on energy saving.

Measures to implement the Action Plan:

- To found a state institution of energy saving activities.
- To organize institutions of advisory services and technology transfer of energy saving.
- To issue standards and to label energy equipments.
- To encourage and support financially.
- To enhance international co-operation in saving energy.

(2) GHG mitigation options in transportation sector

GHG mitigation options in transportation sectors focus on road transportation especially in big cities such as Hanoi, Hochiminh city in both development planning and policy and technical mechanism.

Measures of development planning:

- To develop an appropriate transportation plan to deal with traffic jams and to save fuels.
- To develop public traffic in big cities in order to reduce traffic jams caused by private means of transportation and fuel consumption due to too many private vehicles that contributes to reduction of air pollution.
- To improve, enlarge and upgrade quality of the existing infrastructure system such as national road way number 1 and 5 and open a number of new

national road ways, the transitional belts to reduce the volume of vehicles going through the city centers.

- Develop public transportation by railway.

- To arrange management of urban transportation: street lights, notice boards to delimit traffic lines and routes, etc.

Measures of policy mechanism:

- To set up discharged gas norms for road way vehicles and handle those that are too out of date, consume too much fuels and discharge much poison;

- To set up a station network of safety and environmental protection verification for road way vehicles.

- To impose an administrative fine on vehicle owner of vehicles that does not meet the environmental and discharged gas norms.

- To research on application of environmental tax policies with transportation vehicles.

- To issue a decision to prohibit an import of "waste" and renewed vehicles, old means of transportation with high emission, etc.

- To encourage research and import of non-pollution means of transportation by reducing and exempting taxes especially for those that do not use fossil fuels.

Technical measures:

- To change design of inner components of motors in order to enhance efficiency of fuels and reduce GHG emission.

- To innovate the gas emission treatment system.

- Fuel switching: Switching fossil fuel into new ones such as methanol, ethanol, natural gas, propane, hydro.

In the future, to contribute to more active GHG mitigation, there should be a combination of three above categories of measures.

(3) The five million hectares of afforestation

The project has 3 objectives: To speed up reforestation, regreen bare land and ball hills, increase forest coverage to 43% of the total areas nationwide; To create a material region closely linked with the development of wood processing industry, and a provision of firewoods and other forestry products to meet domestic demand with the aim to export high value products from these reforested forestry products; To create job opportunities, increase people's income, make people who used to burn and destroy forest plant and protect forest and contribute to production and living stabilization and ensuring national defense.

Activities of the program include the following:

• To enhance measures to protect existing forests

- For the very important special-use and protection forests: To arrange full-time personnel to manage, provide legal guidance and allocate forest to local authorities and communities to protect;

- For production forests: To allocate to afforestation yards and farms, etc, social institutions, community-based army forces, etc to manage, protect and use permanently.

• To plant 5 million hectares of forest as per specified in plan for 1998-2010.

- To plant 2 million hectares of special-use protection forests: to breed 1,735,000 hectares up-stream protection forests, to plant 60,000 additional hectares of protection forests to prevent sand, 55,000 hectares of protection forests to prevent coastal sand, hectares of protection forests to protect the city's environment and rehabilitate ecology of 80,000 hectares of the disappeared forests.

- To plant 3 million hectares of production forests: 920,000 hectares for paper powder, 500,000 hectares for artificial polywood, 450,000 hectares for timbers, 760,000 hectares for households wooden articles, 480,000 hectares for specialities (cinnamon-trees, anise, pine trees, etc.) 200,000 hectares of bamboo and scattered forests.

According to initial plan, 795,000 hectares would be bred in three years 1998-2000; 1,840,000 hectares in five years 2001-2005 and 2,365,000 hectares in five years 2006-2010.

(4) Options and plans to mitigate GHG in agriculture sector

Upon the results of research and surveys in agriculture sector, the following seven GHG mitigation options are considered and assessed:

a) Management of irrigation water in wetland rice paddies.

b) Changing farming structure in some wet areas from 3 crops of rice mono-culture system to one rice crop and one secondary crop and then one rice crop rotation system.

c) Replacing transplantation by direct sowing practices.

d) Applying pill-form fertilizer (NPK).

e) Improving food processing for animals

f) Use biogas instead of traditional burning materials in rural areas

g) Enlarging the area of short-duration rice varieties in the farming structure.

Among the above mentioned seven options, 3 options (a), (e) and (f) are more prospective than the other due to:

• The potentials of GHG mitigation are rather high.

• Be appropriate with rural economic development targets and enhancing agricultural development.

• The particular benefits to farmers.

The above mentioned seven GHG mitigation options will be conducted in accordance with the following plan:

Short-term plan (to 2010):

• To further apply and enhance management of irrigation water in wetland rice paddies in some areas especially in the Northern Delta and then in the South with total area of 3 million hectares.

• To enhance and develop food processing for animals in the main breeding areas. It is estimated that 2 million heads of cattles (buffaloes and oxen) will be provided with enough processed food.

Long-term plan (2020-2030):

To further implement the above mentioned GHG mitigation options. The areas of rice plantation are actively irrigated accounting for 5.5 million hectares of which, 1.1 million hectares in Red river delta, 0.6 million hectares in the North of Central Vietnam, 0.5 million hectares in the South of Central Vietnam coastal delta and 3.2 million hectares in the Southern delta.

During this period, 4.4 millions heads of buffaloes and oxen have been provided with processed food.

National plan and GHG mitigation options

The proposed plans to mitigate GHG based on GHG mitigation strategies in three key sectors: energy - transportation; agriculture and forestry. Each individual sector has 3 or 4 strategies, 1 - 4 short-term plans or long term plans or both short term and long term plans (Table 2; 3; 4). In general, in energy - transportation and agriculture, there are usually both short-term and long term plans. In forestry, there are usually short-term plans or long term plans alone.

GHG mitigation options of the three above sectors should be closely linked with the national socio-economic priorities. This is the most basically condition to ensure the feasibility of the GHG mitigation plan. However, the national action plan document was drafted in the beginning of 2001 and there have not been update current requirements of the key socio-economic areas.

Table 2: GHG emission mitigation plans of energy and transportation sectors

Contents	Short-term and medium term (5-10 years)	Long-term (more than 10 years)	Note
Improving	Improving lighting efficiency	Improving lighting efficiency	According to National Action

efficiency of energy use and conservation	Improving energy use efficiency of Enterprises	Improving energy use efficiency of Enterprises	Plan in implementation of UNFCCC 2001
	Implementing DSM program	Implementing DSM program	
	Efficient energy use in high buildings	Efficient energy use in high buildings	
Using renewable energy sources	Exploitation of geothermal energy	Geothermal energy	According to National Action Plan in implementation of UNFCCC 2001
	Exploitation of renewable energy: hydropower, wind, solar	Hydropower, natural gas, wind and biomass	
Saving energy in transport sector	Public transport meets 25 - 30% of transportation needs	Public transport meets 50 - 60% of transportation needs	According to National Action Plan in implementation of UNFCCC 2001
	Encouraging economical use of energy	Upgrading infrastructure	
	Controlling waste gases	Controlling waste gases	
	Promoting quality of means of communications	Promoting quality of means of communications	

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Table 3: GHG emission mitigation plans of forestry sectors

Contents	Short-term and medium term	Long-term (more than 10 years)	Note
Promotion of the implementation of 5 million hectare afforestation program, to increase the forest coverage up to 43%	Planting of 2 million hectares of specialized protective forest, including: Planting watershed protective forest, sand and sea wave preventing forest belts, urban environment gardens, special-use forest.		According to National Action Plan in implementation of UNFCCC 2001
	Planting of 3 million hectares of production forest		

Conservation of existing forest	Strict conservation of natural forest areas including national conservation gardens, rare wood forest, watershed protective forest, etc.	Conservation of existing forest structure, including 12 million hectares of natural forest and 3 million hectare of planting forest	According to National Action Plan in implementation of UNFCCC 2001
Restoration of integrated forest	Planting of short- and long-term rotation forest, natural forest regeneration, and planting of scattered trees.	Planting long-term rotation forest; forest regeneration, planting of scattered trees (4 billion trees)	According to National Action Plan in implementation of UNFCCC 2001
		Stabilization of existing forest structure	
Forest fire prevention and preparedness	Studying various forest fire prevention measures	Setting up a forest fire warning and forecasting system	

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Table 4: GHG emission mitigation plans of agriculture sectors

Contents	Short-term and medium term (5-10 years)	Long-term (more than 10 years)	Note
Development and application of agricultural farming practices to increase production and mitigate GHG emission	Studying and developing rice cultivation techniques: direct sowing, short duration varieties, and change of cropping patterns, applying pill-form fertilizer.	Applying technical measures for main rice-cultivated and other areas	According to National Action Plan in implementation of UNFCCC 2001
	Studying measures in husbandry: food, breeds	Processing high quality food for animals, selecting high productive breeds	
Improvement of irrigation/ drainage management in rice fields	Studying irrigation management by draining water during the two phases in the Red River and Cuu Long (Mekong) River deltas.	Irrigation and drainage management for other areas	According to National Action Plan in implementation of UNFCCC 2001

Strengthening capacities of agricultural research institution	Strengthening experimental measurement stations and data/documentation offices	Strengthening computing facilities	According to National Action Plan in implementation of UNFCCC 2001
Improvement of composition of daily meals (not only rice)		Studying meals with various food-stuff, vegetables besides rice	According to National Action Plan in implementation of UNFCCC 2001

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Adaptation measures to climate change impacts

Impacts of climate change on water resources and adaptation measures

Vietnam is located in down streams of two big international rivers: Mekong and Red Rivers. The Red River has a basin of 169,000 km^2; annually it transports to the East Sea 138 billion m^3 of water. The Mekong river basin area is about 795,000 km^2, annually, water runoff to the East Sea is 505 billion m^3. Impacted by climate change, run-offs of Mekong and Red Rivers have been changed (see Annex 1).

Calculation results show that by 2070, the change of annual run-off would be recorded +5.8- -19.0% for Red River and +4.2- -15.3% for Mekong River ; of low-flows would be recorded -10.3 - -14.5% for Red River and -2.0- -24.0% for Mekong River; of flood-top discharge would be recorded +12.0- -5.0% for Red River and +15.0- -7.0% for Mekong River.

So, in both two great rivers, the change of annual run-off and low-flows caused by climate change would be more negative while the change of flood-top discharge would be more positive.

For other medium and small rivers, climate change would likely cause decrease of annual run-off -50.6% and may also likely increase to +49.0% (see Annex 2).

In response to these impacts, many options of construction may be implemented: Building reservoirs, upgrading and raising the scale of drainage system and sea dykes, etc. and a series of other options such as rationally exploiting and using land, scientifically and effectively using water, exploiting while protecting water sources, etc.

In addition, to limit the population growth rate, plan and organize new resettlement areas and to conduct studies in long-term water resources prediction are also considered to be effective options (see Annex 3).

Climate change impacts on Agriculture and Adaptation measures

Impacted by increasing temperature, the adaptation time of tropical crops would extend, while the one of subtropical crops would decrease. According to forecast, there would be following changes to the crop distribution:

- The planting boundary of tropical trees/crops would move towards higher mountainous region and northwards. On the other hand, the adaptation area of subtropical plants would become narrower. By the year 2070, the mountainous tropical trees would be able to grow at the altitude 100-550 meters higher and move 100-200 km northwards in comparison with present.

- Due to abnormal changes of rainfall intensity, flood inundation and drought would occur more frequently.

- Significant cultivation areas in Mekong and Red River deltas would be under salt water due to sea level rise.

In response to these impacts, many options of construction may be implemented such as: Development of crop patterns and farming techniques appropriate to climate change, development of new varieties that could stand against severe environmental conditions, effective use of irrigation water in planned manner (see Annex 3).

Climate change impacts on forestry and adaptation measures

Climate change would affect forest ecology in various aspects.

- Sea level rise would make mangrove forest decrease, and adversely affect indigo forests and forest planted on the sulfated land of provinces in the South of Vietnam.

- It is possible that there would be changes in boundary distribution of primary forest as well as secondary forest. For instance, *Dipterocarpaceae* wood trees would expand to Southwards and to higher altitudes. Deciduous forest with drought stand varieties would develop more due to the lack of soil moisture and high plant evapotranspiration.

- The increasing temperature in combination with abundant solar radiation would promote photosynthesis process that leads to acceleration of assimilation process of verdurous trees. However, due to increase of evapotranspiration, soil moisture would reduce the biomass growth index of forest trees would get down.

- The extinction danger of animals and plants would increase some important plants like aloe wood, boswood, textured wood, siadora, etc. would likely being exhausted.

- The increase of temperature and drought would lead to increasing danger of forest fire, development and spreading of plant pests and diseases, etc.

In response to these impacts, many options may be implemented such as: Protecting and developing forest, preventing forest fire, enhancing reforestation,

developing plant varieties suitable to natural conditions taking into account climate change, enhancing timber processing efficiency, etc (see Annex 3).

Climate change impacts on aquaculture and adaptation measures

Salinity intrusion would lead to consequences:

- Habitat of fresh water living creatures would become smaller due to occupation of sea water.
- Mangrove forest would reduce and affect ecosystem of some aquacultural species.
- The fixing-organic-matter capacity of seaweed ecological system would that results in decreasing sources of photosynthesis products and nutrition for living creatures in sea-, river-beds. Thus, quality of living habitat of various living aqua-creatures would get worse.

Increasing temperature would also lead to the following consequences:

- The increase of water temperature would lead to clearer thermal vertical stratification that, in its turn, would affect biological habit of living creatures.
- With increasing temperature, some species would move northwards or "dive" to deeper depth that would change vertical distribution structure of aqua-creatures.
- Increasing temperature would also accelerate mineralization and organic decomposition processes and affect food system of living creatures. The living creatures should consume more energy for respiration, as well as for other living activities that reduce the productivity and commercial quality of aquacultural and sea products.
- Increasing temperature would cause the degeneration or destruction of coral reef; change physiological, bio-chemical processes occurring in interaction between coral reef and alga.
- Due to big rainfall intensity, salt concentration of seawater would reduce by during a short period. As a result, brackish water and coastal living creatures, especially, dual crust mollusks (like arca, oyster, etc.) would die massively because they could not stand against changes of salt concentration.

For sea products and fisheries, impacts of climate change has caused the following consequences:

- Due to sea level rise, hydro-physical hydro-biological and hydro-chemical regimes would be degraded, and as a result, the existing coenosium would change its structure and components, supplemental reserve would reduce seriously.
- Due to increasing temperature, benefit resources distribution would be more dispersed. Meanwhile, the number of tropical fishes with low commercial value, except tuna, would increase. The number of sub-tropical fishes (with high

commercial value) would decrease or even disappear. Most fishes in coral reef would vanish.

- Phyto plankton the first link of food chain for plankton and juvenile fish would be destroyed leading to the sharp decreases of plankton - the main flood source for animals in the middle and above layers.

In response to these impacts, many options of construction may be implemented: Building back-up dyke behind sea dyke to create transitional belts between agricultural land and sea, building storm shelter port systems along the coast, building infrastructures, quays, ports, store houses, etc.; and a series of other options such as changing farming structure in some wet areas from rice monoculture to fish-rice rotation system, developing plan on brackish water aquaculture for Central Vietnam, etc. (See Annex 4).

Climate change impacts on coastal zone and adaptation measures

The impacts of sea level rise on coastal zone are mainly the sea level rise that was assessed on the basis of IPCC's scenarios with sea level rise by 1 meter.

- Sea level rise by 1m would cause inundation, particularly in the Mekong Delta.

- Sea level rise would affect the wet land in coastal zone of Vietnam, most seriously in the arena forest of Ca Mau province, Ho Chi Minh City, Vung Tau and Xuan Thuy sea areas (in Nam Dinh Province).

- The coastal population would be affected by annual flood and inundation, especially in the Mekong River Delta.

- Sea level rise would make a great area of land in the Mekong, Red River deltas and Central coastal zone become narrower. On the other hand, storm surge would be stronger, threaten structures in the coastal zone and low lands.

- Sea level rise would threaten industrial, transport and national defense structures that were designed according to present sea level. The increase of flood and inundation would negatively affect the foundations of structures. The increase of typhoons, tornadoes would require to strengthen the resistance of structures that lead to increase of their costs.

Adaptation measures to these impacts are among 3 options: Full protection, adaptation, and withdrawal in accordance with reality of each locality (see Annex 4).

Climate change impacts on energy, transportation sectors and adaptation measures

Impacts of sea level rise may cause the following consequences:

- Activities of oil drill platforms in the sea, transport system of oil and associated drilling gas and gas power plants built on the coast would be affected, and that may increase expenditures on maintenance, repair and operation...

- The seaports including wharves, quays, and stores that were designed according to present water level should be modified, or even moved to other places. The North-South railway and transport lines close to the sea, electricity transformer stations and transmission lines in the coastal areas would be also affected.

- Electricity transformer stations and transmission lines in the coastal areas would be affected. Sea level rise would inundate lowland, leading to increasing energy for pumping out water for drainage. Run-off regimes of big rivers where hydropower stations were built would change that obviously affect water regulation mechanism there.

Increasing temperature would affect energy and transportation sectors:

- Expenditures for cooling and thus decrease efficiency and productivity of thermal power plants.

- Power consumption for living, industrial and commercial activities would be also considerably higher.

- Increasing evapotranspiration in combination with abnormal fluctuation of rainfall regime, leading to changes in water reserve and discharge of hydropower reservoirs.

Climate changes in line of increasing raining intensity and rainfall would affect directly energy sector, firstly offshore drill platforms, system for transporting oil and gas to the shore, electricity transmission and distribution system, etc.

Too high rainfall intensity also creates potential danger for reservoir regulation, causing flood, inundation and threatens the safety of downstream areas that would result in increasing expenditure on water drainage pumping. Heavy rainfall may cause flash floods, landslides, destruction of dam structures and various hydropower systems.

Adaptation measures to these impacts are upgrading and reconstructing transport infrastructure in areas often threatened by sea level rise and flood, etc, taking into account climate change factors in planning of energy and transport development, using energy efficiently in a saving manner, in addition, developing strategies to response and adapt to the vagary of weather. (See annex 5).

Impacts of climate change on human health

- Warmer climate would have adverse impacts on human health. Extreme weather would lead to some dangers threatening old people; people suffered from cardiac disease, mental disorder. Warming climate would change seasonal structure; warming winter in North of Vietnam would result in changes of biological rhythm of the people.

- There are many infectious diseases that are considered to be common in humid tropical region affected by climate change such as: malaria, dengue fever, etc.
- The increase of temperature would facilitate the growth and development of various viruses and insects - disease carriers leading to increasing patients, etc.

Adaptation measures to these impacts are improving socio-economic standard of the people, implementing national plan and program for medical control and monitoring in areas that have high danger of infections, implementing strict quarantine at the borders. In addition, establishing green, clean and beautiful areas contributes to mitigating climate change impacts (see Annex 6).

III. CATALOGUE OF TENTATIVE PROJECTS ON CLIMATE CHANGE

3.1. Catalogue of tentative projects

One of annexes of the *"Initial National Communication for UNFCCC"* if catalogue of some projects of GHG mitigation potentials (Table 5).

Table 5: Catalogue of some projects of GHG mitigation potentials

Items	Projects	Area	Priority ranking
1	Development of renewable energy	energy	2
2	Energy saving in Industry	energy	2
3	Encouraging utilization of renewable energy in rural areas	energy	2
4	Project on forest plantation on sandy soil in the coast of the Southern Central Vietnam	forestry	2
5	Improving cooking stoves of the rural - mountainous community	energy	1
6	Using biogas as fuel to mitigate greenhouse gas emission in rural areas	energy	1
7	Research on co-generation technology (electricity and heat) from biomass fuel in Vietnam	energy	3
8	Project on energy conservation and saving in small and medium-sized enterprises	energy	2
9	Wind power stations for the people in remote island (Coto island, Quang Ninh province)	energy	1
10	Project on planting protective forest in the watershed of Ngan Sau, Ngan Pho Rivers	forestry	2
11	Irrigation management of wetland rice field to reduce methane emission	agriculture	1

12	Exploitation of geo-thermal energy in Vietnam	energy	3

Source: Vietnam: Initial National Communication for UNFCCC, 2003

This catalogue of tentative projects on Climate change is also presented in "National Action Plan in implementation of UNFCCC". This is a direct result of a time-consumed research on newly emerged and important issues related to climate change such as: national inventory on GHG, options to mitigate GHG and principal orientations to mitigate GHG in agricultural and forestry energy.

This catalogue, by nature, consists of project concepts. In addition, most of these concepts fall on energy sector. It is noted that, in recent years, some concepts have become feasible and been put into practice with much more specific objectives and narrower sphere. This catalogue has been emerged and then developed from lessons learnt in implementing other projects of the same kind during 1994-1999:

- Study on global environmental issues in South East Asia area (1993-1994).
- Climate change training (1994-1996).
- Assessment of losses caused by climate change in coastal zones (1994-1996).
- AGLAS (1995-1997).
- Economics of GHG emission mitigation (1996-1998).
- Vietnam: Initial National Communication for UNFCCC (1999-2002)
- Research on national strategy on CDM (2000-2003).

3.2. Priority ranking and assessment of projects' weakness

Based on the current needs for implementation of environmental projects in climate change area of Vietnam, the tentative projects can be ranked (Table 7) and their capacity weakness at systematic, institutional and individual levels can be assessed as follow (Table 6):

Table 6: Matrix of Capacity Weakness

Items	Projects	Priority ranking	Weakness		
			Systematic level	Institutional level	Individual level
1	Development of renewable energy	2	Renewable energy exists under many forms (Solar, wind, biogas, small hydro power and thermal energy) and hence, project proposal is only one of energy	Particular projects for each forms of energy have not been identified	There have not been experts for each type of renewable energy yet.

			policies		
2	Energy saving in Industry	2	Industrial sectors are diversed (mechanics, electronic and chemical industries) and hence, project proposal is only one of energy policies	Particular projects have not been identified for each industrial sector, each enterprise, etc.	There have not been experts for industrial sectors yet.
3	Encouraging utilization of renewable energy in rural areas	2	Project proposal is only one of policies on rural energy	Particular projects for each rural area and form of renewable energy have not been identified	There have not been experts in renewable energy yet.
4	Project on forest plantation on sandy soil in the coast of the Southern Central Vietnam	2	- The budget would be too much for forest plantation on all area of sandy soil in the coast of the Southern Central Vietnam - The weather is too severe, it is required to apply high technology in forest plantation.	- The scope of the project is the same as the scope of five million hectare reforestation project - Forest plantation is difficult to be put into practice, forest protection is even more difficult.	There have not been experts in forest plantation on sandy soil in the coast
5	Improving cooking stoves of the rural – mountainous community	1	The habit to maintain the available tools in many rural areas.	The number of cooking stoves that need to be improved is too high, the application scope of the project is nationwide	There have not been experienced experts in manufacturing, maintaining and repairing improved cooking stoves yet.
6	Using biogas as fuel to mitigate greenhouse gas emission	1	Biogas application has been very popular in rural areas of Vietnam in recent years (this is,	To implement project activities in rural areas has been not very	Households in mountainous areas do not feed many domestic

	in rural areas		however, is very urgent issue in mountainous areas)	essential anymore (it is better to develop biogas projects in mountainous areas)	cattles but mostly graze freely.
7	Research on co-generation technology (electricity and heat) from biomass fuel in Vietnam	3	There have not been achievements in researches on co-generation technology in Vietnam	There have not been experimental research and prior-feasible study to draw up a project portfolio	There have not been experienced experts in co-generation technology
8	Project on energy conservation and saving in small and medium-sized enterprises	2	Project proposals have not been creative anymore because energy saving has become one of the technical solutions for GHG mitigation	Most of project activities (presented in this text) is only a method to save energy	Enterprises must be able to afford train and maintain staffs of energy management and audit
9	Wind power stations for the people in remote island (Coto island, Quang Ninh province)	1	Wind power stations do not operate in bad weather and natural calamity	Short-term wind surveys and observations at height do not provide appropriate technical parameters for wind power stations	When wind power stations have troubles, it is difficult to find out experts and technical worker in an island.
10	Project on planting protective forest in the watershed of Ngan Sau, Ngan Pho Rivers	2	Financial budget for planting these forests is too high	The scope of the project is likely the same as the scope of five million hectare reforestation project	The awareness of a mumber of households in the area is not high
11	Irrigation management of wetland rice field to	1	Financial budget for construction of irrigation systems is too high in	It is not easy to construct irrigation systems	Some farmers do not believe in output increase of rice

	reduce methane emission		comparison with the potential benefits from output increase and electricity savings		when paddy fields dried up in several periods
12	Exploitation of geo-thermal energy in Vietnam	3	- Vietnam has not has technology to exploit geo-thermal energy. - Exploitation of geo-thermal energy has been only in characteristic of energy orientation	There have not been any unit, enterprises, etc experienced in exploiting geo-thermal energy.	There have not been experts specialized in geo-thermal energy exploitation.

PART IV. ANALYSIS OF CAPACITY TO IMPLEMENT THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND KYOTO PROTOCOL IN VIETNAM

I. FOCAL POINT AGENCY AND RELEVANT STAKEHOLDERS

1.1. Focal point agency of the United Nations Framework Convention on Climate Change and Kyoto Protocol

The Focal point agency of UNFCCC and KP is the Foreign Relation. So far, there have been 08 officials (04 long term contracted and 04 short term contracted; 07 Bachelors and 01 Master) involving in coordination on UNFCCC and KP implementation. 04 officials are majored in environment and climate change; The needs for strengthening capacity to implement UNFCCC and KP of focal point agency are on the following areas:

(1) Human and finance resources, infrastructure.

(2) Coordinating stakeholders of line-ministries and sectors.

(3) Skills to develop projects.

(4) Skills to negotiate and seek for financial sources.

1.2. Relevant stakeholders

1.2.1. Some Governmental organizations

The project team and experts have carried out a questionnaire survey (for questionnaire, see Annex 7) to 58 officials of different Ministries and sectors closely related to UNFCCC implementation: MONRE, MPI, MOST, MOI, MARD, MOF, DONREs of the North, Central and South Vietnam and universities nationwide.

All 58 people have a wide and thorough knowledge of UNFCCC. Among them, 37 have been carrying out activities related to UNFCCC, 22 have been trained on climate change and participated in workshops on UNFCCC and climate change, 27 are capable to implement UNFCCC activities. The capacity gaps at institutional and individual levels are: human resource, institutional arrangements, management, legal system, information, technique and finance. The areas that lack of coordination: policy, planning, law implementation, finance, management, communication, science- technology, information exchange, forestry. The needs for strengthening capacity are now on institutional building, planning, doing researches, training, communicating, data gathering and cooperating. The survey results presented in Annex 8 clearly show that all organizations and institutions that are closely related to UNFCCC and KP implementation have potentials and needs for capacity strengthening in coordination activities. However, the coordination capacity of the focal point agencies should be further strengthened in order to actively mobilize a wide

range of stakeholders in implementing the UNFCCC, the KP and CDM effectively in coming time.

1.2.2. Some non-governmental organisations (NGOs)

Functions and activities of non-governmental organisations (NGOs) closely related to climate change.

(1) Research Center for Energy and Environment (RCEE)

The Research Center for Energy and Environment (RCEE) has been established by the Vietnam Union of Science and Technology Associations (VUSTA) in 1998. The Center has the following fields of activities:

- Research and technology transfer on the field of energy and environment protection.
- Consultancy for companies and organizations including foreign institutions on energy development and environment protection, especially on the field of renewable and clean energy development and energy efficiency and saving.
- Research on Climate Change Issues.
- Doing research on and applying the Clean Development Mechanism (CDM).
- Training and educational activities
- National and International cooperation

(2) Institution of Industrial and Chemical safety (INDUTEC)

Institution of Industrial and Chemical safety (INDUTEC) has been established by the Vietnam Chemical Associations in 2003. The institution has the following scientific and technological activities:

- Scientific research on industrial safety, chemical safety and environment.
- Scientific and technological services.
- Research on the comprehensive development program of energy sector and renewable energy of Vietnam at presently, in the future to 2010 and vision to 2020.
- Comprehensive research on the linkages between sustainable development and energy development in Vietnam.

(3) Ecology and Environment Institution (EEI)

The Ecology and Environment Institution (EEI) has been established in 2003 and as a member of Vietnam Associations of Conservation of Natural resources and Environment. The Center has the following functions and responsibilities:

- Scientific research.
- Training and education.

- Scientific, technological and environmental advisory.
- Scientific, technological and environmental services.
- International co-operation: to cooperate with international organizations to develop and implement projects on ecology, environment and technology transfer.

(4) Research Center of Climate Change and Sustainable Development (RCCCSD)

Research Center of Climate Change and Sustainable Development has been established by the Vietnam Union of Science and Technology Associations (VUSTA) in 2005 with the following functions:

- Doing scientific research and applying technological advances and transferring technology in activities related to climate change.
- Doing scientific research and applying technological advances of agricultural issues related to climate change aiming at a sustainable agricultural production.
- Developing and assessing CDM projects in accordance with the comprehensive criteria.
- Defining CDM project portfolio by sectors:

- Enhancing efficiency of fuel conservation and saving;
- Switching the use of fossil fuels;
- Recovering and using CH_4 gas from waste dumps and coals fields;
- Applying renewable energy;
- Forest plantation and reforestation;
- Recovering and using associated drilling gas.

(5) Scientific and Technological Center of Hydrometeorology and Environment

Center of Science and Technology of Hydrometeorology and Environment has been established by the Vietnam Union of Science and Technology Associations (VUSTA) in 2002 with the following functions:

- Scientific research, technology tranfer, observations, surveys, assessment of natural resources by hydrometeorological perspective.
- Scientific and technological services in areas related to hydrometeorology and environment.
- Vocational and advanced training courses, etc. on hydrometeorology.
- International cooperation in activities related to scientific research and technology application.

Assessment of potentials of the NGOs

Strengths and advantages

- NGOs have been established since 1997 when the UNFCCC come into force in Vietnam and KP have been promulgated all over the world. Hence, NGOs have opportunities to study UNFCCC and KP document as well as activities thereof before identifying their key operational functions and areas related to UNFCCC and KP.

- Each above mentioned NGOs has certain potential of technique and science to organize, manage or participate into UNFCCC and KP implementation activities. Particularly, each of these NGOs has at least senior and well experienced consultant in UNFCCC implementation and the similar activities.

- The strong points of NGOs fall into the following fields of activities:

- Laws and institutional arrangement in UNFCCC and KP implementation;

- Meteorology, hydrolory, environment and scientific research on climate change, climate change observations and monitoring;

- Strategies, policies and energy technical sciences;

- Strategies, policies and agricultural technical sciences.

Weakness and limitations

- Among the above mentioned NGOs, not any NGOs have a comprehensive potential to implement UNFCCC and KP from legal, institutional to special areas.

- The forces of experts of almost of NGOs are very poor and there are hardly mature experts.

Proposals to enhance co-operation between the Government and NGOs

(1) The Focal point agency of UNFCCC organized meetings, conferences and workshops with the participation of Governmental agencies and NGOs to assess the achievements of Vietnam in general and the efficiency of the co-operation between the Governmental agencies and NGOs in particular in UNFCCC and KP implementation during the recent years.

(2) The Focal point agency of UNFCCC organized science workshops with the wide participation of experts and consultants regardless of Governmental agencies or NGOs to assess the achievements of scientific research on climate change in Vietnam during 10 - 20 years and to define orientations thereof towards 10 - 20 years to come.

(3) Upon the above mentioned workshops, the focal point agency developed a document of principles and methodology to link Governmental agencies and NGOs to co-implement UNFCCC and KP.

(4) Enhancing communication and providing assistance to NGOs in training their staff.

II. ANALYSIS OF THE STRENGTHS, WEAKNESS, OPPORTUNITIES AND THREATS (SWOT) AND ASSESSMENT OF CAPACITY

2.1. SWOT analysis in United Nations Framework Convention On Climate Change and Kyoto Protocol implementation activities

The analysis of the strengths, weakness, opportunities and threats and the capacity assessment are presented in the following activities:

(1) Capacity to develop policies, strategies, laws and programs.

(2) Capacity to implement policies, strategies, laws and programs.

(3) The development of a consensus between partners.

(4) Information dissemination and awareness rising.

(5) Monitoring, assessment, reporting and learning.

The most important thing of Vietnam is that all above policies, strategies, laws and programs to implement UNFCCC and KP have been integrated into contents of the national strategy to implement the Agenda 21. However, the development and implementation of strategies, policies, programs and plans on climate change has not been appropriately considered by the sectors of all levels and the external support and assistance has not been mobilized from national and international institutions and agencies (Tables 7, 8, 9, 10 and 11).

Table 7: SWOT analysis in capacity to develop policies, strategies, laws and programs

Strengths (S)	Weaknesses (W)
- The state always pays appropriate attention to the national policies and strategies in diplomacy in general and in international Conventions in particular. - To mitigate and limit climate change impacts are considered to be one of the prioritized sustainable development areas in "the Agenda 21 of Vietnam". - The Governmental agencies and NGOs of the areas related to climate change all want to contribute to the development of policies, strategies, laws and programs on climate change.	- Most of sectors related to UNFCCC implementation has not appropriately considered about the development of policies and strategies. - Climate change area is ranked at a modest position in the Agenda 21 of Vietnam. - The development of policies, strategies, laws and programs on climate change has not been highly prioritized. - International environmental agreements (MEAs) has not been integrated into plans and strategies of different sectors and levels.

Opportunities (O)	Threats (T)
KP has come into force since 16 February 2005. This has promoted the formulation of carbon market.	- There should be a complete legal framework, human and financial resources for developing CDM projects. This activity will be slowly conducted if it is not appropriately considered by the leaders of different levels.

Table 8: SWOT analysis in capacity to implement policies, strategies, laws and programs

Strengths (S)	Weaknesses (W)
- All policies, strategies and programs on climate change contribute to promote the sustainable development of the country. - The strategies and policies, etc on climate change linked with specific solutions. - A number of policy instruments can be concretized by agents in socio-economic activities. - Many governmental agencies and NGOs voluntarily participate in implementation of policies, strategies and programs on climate change approved by the Government.	- There are remained issues in infrastructure of socio-economic areas including energy, transportation, agriculture, forestry, etc. - Some measures and policies have not been matched with the current national context. - Most of sectors of all levels have not paid adequate attention to UNFCCC implementation; - Most of sectors of all levels have not paid adequate attention to MEA implementation; - Capacity and understanding of NGOs about climate change has still been weak and limitted. This leads limitation in socializing the implementation of the UNFCCC.
Opportunities (O)	**Threats (T)**
- Many international opportunities (WB, UNEP, UNDP, ADB, etc.) can support countries especially developing countries to implement policies, strategies and programs and projects on climate change. - The regional countries are pleased to co-operate with Vietnam in implementation of programs on climate change. - The international experts on climate change are pleased to facilitate Vietnam to implement the approved policies, strategies and programs and projects on	- There is limitation in state resources of the state, organizations and individuals for implementing policies and strategies in environmental protection in general and in climate change in particular. - There are not many competent national experts in climate change. This leads to weakness in implementation arrangement as well as advocating and attracting external support. - Sectors and levels have now given greater priority to short-term economic targets than to the implementation of international

climate change.	commitments in climate change.

Table 9: SWOT analysis in capacity to develop of a consensus between partners

Strengths (S)	Weaknesses (W)
- The understanding and respects for each other between agencies and experts have been and will be partner in UNFCCC and KP implementation. - The documents of policies, strategies and programs and projects on climate change have been widely commented and contributed by many agencies and experts.	- In some cases, relevant agencies have not been closely coordinated; the communication and information exchange has not been conducted regularly; there has not been a effective mechanism for coordination and information exchange between relevant partners.
Opportunities (O)	**Threats (T)**
- Many international and national partners want to participate in climate change activities in Vietnam. Through these activities, their experience and capacity have been enriched and strengthened. Similarly, more chances for cooperation have been created, developed and strengthened. There are also advantages in strengthening and enlarging these relationships.	- How to strengthen the direction, management, coordination and development of the cooperation between different partners and fully mobilize potentials of relevant stakeholders in implementation of the UNFCCC.

Table 10: SWOT analysis in capacity to disseminate information and to enhance knowledge

Strengths (S)	Weaknesses (W)
- There are many media (newspapers, leaflets, etc) and opportunities (workshops, training courses, etc) for information dissemination and improving knowledge of climate change. - Some key officials frequently participate in conferences and regional and international workshops, etc and hence they are updated with information and knowledge meeting requirements of UNFCCC implementation	- There are remained issues in infrastructure and physical conditions for disseminating information and improving knowledge of climate change. - The potential contribution of stakeholders in disseminating information and improving knowledge of climate change has

activities. - State budget and foreign support have been initially given to information dissemination and knowledge improvement in climate change.	not been taken into full play. - Workshops, training courses and dialogues have not targeted to wide range of audience. Information on UNFCCC, KP and CDM has not been sufficiently disseminated in mass media.
Opportunities (O)	**Threats (T)**
- Issues of natural calamity has been considered by the public because the scale and consequence has been ever-increased while these are mainly caused by climate change. - The state has been also paying much attention to environmental sciences. - International cooperation in general and scientific issues on climate change in particular has been ever-developing. - Information on climate change is rather rich and sufficient on many international websites and websites of other countries, as well as on website of Convention Office.	- The resources for the information dissemination and improvement of knowledge of climate change is limitted.

Table 11: SWOT analysis in monitoring, assessment, reporting and learning

Strengths (S)	Weaknesses (W)
- The environmental observations and assessment have been conducted in Vietnam for years. It's also been ages since the observations and assessment of climate factors were firstly conducted. - There have been four GHG inventory reports developed in 1990, 1993, 1994 and 1998. - Issues related to climate change have been reported in the Initial National Communication of Vietnam. - The on issues related to climate change have been reported in the Initial Communication of Vitenam. - Assessment on a state of climate change, impacts of climate change and response and	- There has not been a consistent procedure for monitoring, evaluating and reporting on climate change. - The GHG inventory and assessment of GHG emission have not been conducted regularly. - The finance source is not affordable to the guidance on skills to conduct observations, assess and report etc in issues related to UNFCCC and KP implementation.

mitigation measures, etc have been reported in many international and national workshops. - Effectively learning new methodologies and approaches to assessment and development of GEF, CDM projects, etc through documents, textbooks and international and national training workshops.	
Opportunities (O)	**Threats (T)**
- The implementation of CDM under KP id an opportunity to conduct observations, assess and report etc in GHG in scales of enterprises and business units. - The national and international conferences, workshops, etc are the good forums to develop potential, assess and report in GHG in specialized areas. - The database, scientific knowledge, etc have been regionally and internationally exchanged regularly and irregularly. - The mess media have been ever-perfected.	- There has not been enough specific plans for monitoring and evaluation. - There is a lack of consistent and specific guidance for reporting work on climate change from central to local levels. - The essential database for monitoring and evaluation has not been adequately developed. - The modern mass media have not been taken advantages.

2.2. The capacity limitations in the United Nations Framework Convention On Climate Change and Kyoto Protocol implementation

2.2.1. The capacity limitations in the national prioritized issues

Regarding national prioritized issues, capacity limitations at systematic, institutional and individual levels can be assessed as follow (Table 12, 13, 14, 15, 16, 17, 18 and 19)

Table 12: Developing the National Action Plan to implement UNFCCC and KP

Levels	Limitations
Systematic	- Climate change has not attracted proper attentions of the relevant agencies, sectors and thematic areas.
Institutional	- The Convention Focal Point has been operating on part-time basic. This causes difficulties in developing a national action plan;
Individual	- Not many officials have been competent and experienced in developing a national action plan on climate change.

Table 13: To strengthen capacity to implement UNFCCC and KP

Levels	Limitations
Systematic	- The implementation of international conventions has not been considered to be priority issues of the national socio-economic development. - Resources from the state, organizations and individuals for environmental protection in general and for implementation of MEAs on climate change are very limitted. - There has been a lack of a consistent legal framework for implementation of MEAs to which, Vietnam is a signatory country.
Institutional	- Understanding and knowledge of sectors and levels on climate change is limited. - The Convention Focal Point has not been qualified enough to coordinate the implementation of the UNFCCC.
Individual	- Most of key officials have not been qualified enough to independently co-ordinate and provide guidance to the new officials on the special activities as well as external relations as they have been working on part-time basic and have not been intensively trained on climate change.

Table 14: To integrate climate change in policies, programs and plans to develop economic sectors

Levels	Limitations
Systematic	- The legal framework on climate change, particularly laws on energy – have not been complete. - The state management system on climate change from central to grass-root levels has not been properly strengthened.
Institutional	- There have been remained issues in integrating climate change into policies, programs, and plans to develop national economic sectors. - Information dissemination on climate change including on impacts thereof to the national economy has not been conducted regularly and the methods of communication has not been varied.
Individual	- Economic experts who are competent in climate change activities have not been gathered to integrate climate change into policies and plans to develop an economy. - Climate change has not been popularized and disseminated to policy makers, the developer of programs and plans to develop national economic sectors.

Table 15: To strengthen legal system of climate change

Levels	Limitations
Systematic	- There has not been specific law on climate change. - Policies and laws of sectors and on many areas have either not mentioned or insufficiently mentioned about climate change issues and response measures. - Relevant stakeholders have not been fully involved in developing laws on climate change.
Institutional	- Capacity to develop law on climate change of sectors and levels is limited. - Capacity to coordinate the development of law on climate change is limited.
Individual	- Legal consultants have not been actually interested in climate change issues. There is a lack of technical consultants on this subject.

Table 16: Research on measures to response and adapt with climate change

Levels	Limitations
Systematic	- There is no common model for climate change response and adaptation. - Most of measures to response and adapt with climate change require the close linkage among sectors, between the central and local levels and a considerable great finance source. - Climate change response and adaptation has not been approached systematically and consitently.
Institutional	- Capacity of sectors, levels and national rescure agencies is limited. - Training on measures to response and adapt with climate change has not been conducted by institutions.
Individual	- There have not many competent and experienced officials to do research on measures to response and adapt with climate change. - People do not know much about measures to response and adapt with climate change.

Table 17: Development of the portfolio of potential projects

Levels	Limitations
Systematic	- There have not been policies that support and ecourage the development of projects on climate change, response measures and technology transfer. - There has not been a close linkage and collaboration between agencies that develop projects on climate changes and those that implement them. - There have not been conferences and workshops on information dissemination in developing project proposals, drawing lessons and finding appropriate solutions to strengthen capacity to develop projects. - Finance given to stregnthening capacity to develop projects is limited, mostly internationally supported.
Institutional	- Capacity to develop and implement projects on climate change of sectors and levels is limited. - Counterpart resources of national institutions are limited.
Individual	- There have not been many consultants who are competent in skills to develop and implement projects on climate change in various areas. - International consultants have not been actively involved.

Table 18: Information dissemination and awareness rising

Levels	Limitations
Systematic	- There has not been a national action plan to disseminate information and enhance awareness of climate change. - There has not been a regular budget for disseminating information on and rising awareness of climate change. - The climate change projects have not given a considerable proportion of budget to conduct information dissemination and awareness rising of climate change.
Institutional	- Sectors and levels have not given considerable concerns about and have not been capable to disseminate information on and enhance awareness of climate change. - With regard to the Focal point, human and financial resources have not been sufficient for disseminating information on and rising awareness of climate change.
Individual	There is a lack of well qualified consultants on communication.

Table 19: Enhancing international co-operation

Levels	Limitations
Systematic	- Climate change has not been regarded as one of the most prioritized issues in national cooperation policies.
Institutional	- Sectors and levels has not been active in cooperating with international partners to seek opportunities to collaborate in climate change.
Individual	- There is a lack of officials who are competent in climate change and qualified in foreign language; - Few people work for international organizations that are related to climate change.

Upon assessment of 8 national prioritized issues, a following matrix of capacity limitations has been developed:

Table 20: Matrix of capacity limitations

Items	Issues / Limitations	Development of a national action plan to implement UNFCCC and KP	Strengthening capacity to implement UNFCCC and KP	The integration of climate change issues into policies, programs, and plans to develop national economic sectors.	Strengthening legal system of climate change	Research on measures to response and adapt with climate change.	Development of the portfolio of potential projects	Information dissemination and awareness raising	Enhancing international co-operation
1	The UNFCCC Focal Point has been working on part-time basic	√	√	√	√	√	×	√	√
2	UNFCCC and KP have not attracted						×		×

	proper attentions of the relevant agencies, sectors, etc.	√	√	√	√	√		√	
3	Legal pramework has been improper	√	√	√	√	√	×	×	×
4	There is remained issues in implementation arrangement.	√	√	×	√	×	√	×	×
5	Lack of human resource and experiences	√	√	√	√	√	√	√	√
6	Lack of finance	×	√	×	×	√	√	√	×

Note: Symbols √: True; x: False

2.2.2. Capacity limitations in dealing with the shortcomings of UNFCCC and KP implementations

After analyzing the nature and level of the short-comings and weakness in the national priorities, these short-comings and weakness have been classified into three categories: Weakness that is difficult to overcome (C1); Weakness that can be easily and quickly overcome (C2) and inconsiderable weakness and shortcomings (K).

Table 21: Assessment of the principal weakness and shortcomings in the national priorities

C1: Weakness that is difficult to overcome;

C2: Weakness that can be easily and quickly overcome

K: Inconsiderable weakness and shortcomings

Items	Assignments / Weakness or shortcomings	Development of a national action plan to implement UNFCCC and KP	Strengthening capacity to implement UNFCCC and KP	The integration of climate change issues into policies, programs, and plans to develop national economic sectors.	Strengthening legal system of climate change	Research on measures to response and adapt with climate change.	Development of the portfolio of potential projects	Information dissemination and awareness raising	Enhancing international co-operation
1	The UNFCCC Focal Point has been working on part-time basic	C2	C2	C2	C2	C2	K	C2	C2
2	UNFCCC and KP have not attracted proper attentions of the relevant agencies, sectors, etc.	C2	C2	C2	C2	C2	K	C2	K
3	Legal pramework has been improper	C2	C2	C1	C1	C2	K	K	K

2.3. Building capacity

2.3.1. The basics of capacity building

Vietnam has many basics to develop capacity to implement UNFCCC by four groups of prioritized activities as follows:

Group 1: Activities are related to GHG including innovating and completing national GHG inventory; implementing GHG mitigation policies and options; developing GHG mitigation projects and implementing CDM mechanism.

Group 2: Activities are not related to GHG including scientific research; systematic observations and monitoring climate change and training scientific and managerial staff.

Group 3: Activities are related to research works on impacts of climate change and adaptation measures.

Group 4: Activities emerged from results of groups 1 and 2 including developing national communication on climate change and a national action plan to mitigate GHG.

The basics for developing capacities are presented in accordance with each national priority on climate change (Table 22). In fact, implementing GHG mitigation policies and options and enhancing GHG sinks are regarded as the most difficult tasks and hence the most important basics for developing capacities are GHG mitigation strategies, policies and options by principal sectors as presented in the Initial National Communication for UNFCCC.

Table 22: The basics for developing capacities

Activities	Systematic	Institutional	Individual
Improving GHG inventory quality and completing national GHG inventory	Providing guidance on IPCC skills, GHG inventory procedures and GHG inventory reports.	The close cooperation of relevant agencies in implementing GHG inventory	Competent consultants in GHG inventory methodology
Implementing GHG mitigation policies and options and enhancing GHG sinks	GHG mitigation strategies, policies and options in principal sectors are presented in the initial communication for UNFCCC.	The active involvement of governmental agencies in making sustainable economic development and environmental protection policies of the country.	Competent consultants in GHG mitigation policies, options in principal sectors.
Developing projects	- The strategy to develop projects on climate change of GEF - Vietnam. - The portfolio of potential projects of climate change of Vietnam in the Initial National communication for UNFCCC of Vietnam. - The national strategy of Vietnam on GEF/SGP.	Many agencies are experienced in development and implementation of projects: - Department of Natural Resources and Environment, Department of International co-operation (Ministry of Natural Resources and Environment) - The national GEF/SGP steering committee of Vietnam.	Competent consultants in developing projects of climate change.
- Developing national communicat	The Initial National communication for UNFCCC of Vietnam was developed in 2002, in	Institute of Hydrometeorology in collaboration with Department of	Experts and consultants from different ministries and

ion and implementing a GHG national action plan	which many GHG mitigation options are presented.	International co-operation – The former General Department of hydrometeorology is experienced in organizing and coordinating other relevant agencies to develop National communications.	sectors have involved in development of the national communication: Foreign Affairs, Justice, Energy, Industry, Forestry, Fishery, Public Health, Transportation, etc.
Implementing CDM mechanism	- CDM Steering and Advisory Board. - Co-operating with institutions and enterprises of Japan, EU, England, Germany, Netherlands, etc.	Department of International co-operation (Ministry of Natural Resources and Environment) in collaboration with Institute of Energy (Ministry of Industry), Vietnam Institute of Science and Technology, Research Center of Energy and Environment, Research Center of Climate Change and Sustainable Development, etc identified CDM projects and the initial portfolio of CDM projects.	Some experts have acquired some important skills in implementing CDM.
Doing researches, systematic observations and monitoring climate change	- Vietnam is one of the active members of WMO and has participated in many global climate research programs for years. - The hydrometeorological monitoring network has been well organizing and operating for years. - The hydrometeorological documentation center has	- The former General Department of Hydrometeorology and The present Center of Hydrometeorology have well managed and coordinated the observations, forecasts, and research on hydrometeorology. - Institute of Hydrometeorology have been actively fulfilled the function to	Many experts and consultants of research on hydrometeorology in general and on climate change in particular in research institutes, universities, etc.

	been well operating for years.	do research on hydrometeorology and climate change.	
Training scientific, technical and managerial staff	- Vietnam has an education system of all grades from primary, secondary, tertiary and master education specialized in various fields such as natural and social sciences being capable to meet requirements of education in climate change. - Vietnam has a tradition of self-help for self-improvement and international cooperation in various fields of education.	- Institute of Hydrometeorology, Hanoi National University is agencies that experienced in master education in hydrometeorology major and climate change therein. - International cooperation in educating experts in new technical issues and sciences in climate change field.	Many experts and consultants of hydrometeorology , among them, many used to be managers.

2.3.2. Measures to strengthen capacity to implement national prioritized issues

Measures to strengthen capacity to implement national prioritized issues are presented in the table 23 below:

Table 23: Measures to strengthen capacity

Activities	Systematic	Institutional	Individual
To complete legal framework on climate change	Complete legal framework on energy.	- To strengthen capcity to develop legal documents on climate change of sectors and levels. - Mainstream climate change on economic policies and development plan of national economy.	Strengthen capacity of consultants on climate change
To study the measures to response to and adapt with climate change	To pay much attention to the measures to response to and adapt with climate change in developing a national action plan to	- To develop projects on responses to climate change and advocate for GEF's finance. - To convene workshops on impacts of climate change and response measures in different regions.	To nominate officials to intensively study the assessment of climate change impacts and measures to adapt with climate change

	implement UNFCCC		
To popularize and raise awareness of climate change issues	To focus on this activity in the national action plan To allocate certain budget for conducting this activity	To co-operate with news-agencies to implement this activity	To compile and edit document related to climate change so that they are appropriate with different target groups
To develop a porfolio of potential projects	To maintain and promote capacity and experiences in in activities relating to climate change	To establish a group of consultants to provide advices on developing projects on sectors and localities.	To train specialized staff on skills to develop project concepts and develop projects on climate change.
Enhancing international cooperation	To maintain and promote capacity and experiences in international cooperation in activities relating to climate change	- The steering committee has concrete measures to maintain and promote international cooperation in the UNFCCC implementation activities. - To strengthen capacity of the Convention Office to implement the UNFCCC and KP to fulfill internal and external tasks.	To conduct supplementary occupational training for officials who have high acquisition of foreign languages and foreign language training for officials who have deep professional knowledge

CONCLUSION

The NCSA thematic assessment report on the UNFCCC and Kyoto Protocol in Vietnam prepared within framework of the NCSA Vietnam has provided an overview of the achievements, the national priority issues and the key programs and activities that are directly related to the UNFCCC and Kyoto Protocol implementation; capacity strengths, weaknesses, opportunities and threats that Vietnam has been confronting. Key findings can be summarized as follows:

1. The report has provided an overview assessment of the achievements in implementing the obligations and commitments under the UNFCCC and Kyoto Protocol in Vietnam; measures to mitigate impacts of climate change on national economic sectors: water resource; agriculture; forestry; fishery; coastal zone; energy and transportation; health and community health.

2. Eight national prioritized issues have been proposed. Among them, development of a national action plan is given the highest priority.

3. The report analyze the capacity strengths, weakness, opportunities and threats (SWOT) in the UNFCCC and Kyoto Protocol implementation of the national focal agency and relevant stakeholders in Vietnam, upon which, the key capacity strength of Vietnam in climate change is that climate change issues are streamed and integrated into a national strategy to implement the Agenda 21. So far, MONRE, in collaboration with relevant ministries, sectors, agencies, organizations amd localities has gained many significant and encouraging achievements in the UNFCCC and Kyoto Protocol and CDM implementation. With regard to this, legal framework on climate change has been step by step completed and finalized (The Prime Minister has issued a Directive 35/2005/CT-TTg on October 17, 2005 on arranging the implementation of the Kyoto Protocol under the United Nation Framework Convention on Climate change). In order to implement the UNFCCC and Kyoto Protocol and CDM more effectively and comprehensively in coming time, the collaboration and coordination between the Convention Focal Point and other relevant agencies, institutions and partners from central to local levels should be further strengthened. A plan to implement Kyoto Protocol from 2006 - 2010 should be issued soon. In addition, considerable investment as well as support of potential international organizations is an important factor to promote the above mentioned activities.

The report has provided an overview of the implementation of the UNFCCC and Kyoto Protocol in Vietnam. The NCSA thematic assessment report will act as a good reference for managers and researchers who have been implementing the UNFCCC and Kyoto Protocol and other relevant stakeholders.

To make the conclusions, recommendations and assessment in this report more practical and specific with much updated information, forums should be further organized for information exchange, discussion and consensus between relevant

ministries and agencies of the Government as well as there should be more in-depth and broad analysis on this matter in coming time.

The project team and consultants would like to extend our gratefulness to all relevant institutions and agencies that have actively participated in and provided us with valuable documents and information for development of this report. The project team and consultants would also like to receive any comments of managers and consultants of relevant areas for finalizing the report with higher quality and supporting the successive assessments of the project./.

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ANNEXES

Annex 1: Run-off change in Red and Mekong Rivers (%)

River, Locations	**Scenarios**	**Annual run-off (m^3/s)**			**Low flow (m^3/s)**			**Flood-top discharge (m^3/s)**		
		At present	In 2070	%	At present	In 2070	%	At present	In 2070	%
Red River at Son Tay	Temperature increases and annual total rainfall increases, daily rainfall increases 20%	3766	3985	+5.8	560	502	-10.3	37800	42300	+12.0
	Temperature increases and rainfall decreased in rainy season, rainfall in dry season increases, daily rainfall increases 25%	3766	3267	-13.0	560	489	-12.6	37800	43500	+15.0
	Temperature increases and rainfall decreases in both seasons Daily rainfall decreases 10%	3766	3019	-19.0	560	479	-14.5	37800	37000	-5.0
Mekong river at Pakse	Temperature increases and annual total rainfall increases, daily rainfall increases 20%	10209	10645	+4.2	1723	1686	-2.0	14800	17100	+15.0

	Temperature increases and rainfall decreased in rainy season, rainfall in dry season increases, daily rainfall increases 25%	10209	8701	-15.0	1723	1443	-16.2	14800	17600	-19.0
	Temperature increases and annual rainfall increases, daily rainfall decreases 10%	10209	8645	-15.3	1723	1312	-24.0	114800	13700	-7.0

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 2: Run-off change in small and medium Rivers (%)

Basins	At present (m^3/s)	In 2070 (m^3/s)	% of changes
- Ma & Chu	890	797	-11.5
- Hoat	760	758	-2.1
- Lach Bang	836	829	-2.1
- Yen	788	777	-2.4
- Hoang Mai	741	723	-3.5
- Bung	725	689	-5.0
- Ca	1130	1093	-4.3
- Rao Cai	1440	976	-33.3
- Rac	1730	1596	-7.8
- Gianh	2330	1790	-23.2
- Ta Trach	2362	1350	-42.9
- Tra Khuc	2072	1256	-39.4
- An Chi	2073	1235	-40.5
- Hinh	1677	2511	+49.7
- Cai Nha Trang	1420	1504	+5.9
- Luy	438	653	+49.0
- Se San	1310	1397	+6.6
- Srepok	1080	1255	+16.2

- Ba	720	778	+8.0
- Nam Ngam	1781	1710	-4.0
- Nam Pong	373	293	-21.5
- Dong Nai	1119	794	-29.1
- Be	1053	708	-32.8
- Sai Gon	656	363	-44.7
- Vam Co	447	221	-50.6

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 3: Adaptation measures to climate change impacts on water resources, agriculture and forestry

Sectors and areas	Options
Water resources	- Building reservoirs with the total additional capacity of 15-20 billion m^3. The high priority should be given to the East of South Vietnam, Central Highland and mountainous areas in North Vietnam. - Upgrading and raising the scale of drainage system. - Upgrading existing sea and river-mouth dykes, and step by step building new sea dykes. - Limiting the population growth rate and planning, organizing new resettlement areas. - Reclaiming areas, especially in hilly midland areas in the North Vietnam, for agricultural production. - Using water scientifically and effectively. - Exploiting while protecting water sources, conducting studies in long-term water resources prediction.
Agriculture	- Development of crop patterns suitable to climate change. - Effective use of irrigation water in planned manner. - Upgrading of irrigation system for agriculture. - Development of new varieties that could stand against severe environmental conditions. - Reserve and storage of local crop varieties, establishing crop seed bank. - Development of farming techniques appropriate to climate change.
Forestry	- Enhancing reforestation, firstly in watershed, regreening bare lands and hills. - Protecting natural forest and going forward to closing natural

	forest exploitation. Preventing forest fire. - Establishing bank of seeds of natural forest trees in order to protect some valuable varieties. - Enhancing timber processing efficiency and limiting the use of wood as material. - Selecting and replicating plant varieties suitable to natural conditions taking into account climate change.

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 4: Adaptation measures to climate change impacts on fishery in coastal zones

Sectors and areas	Options
Fishery	- Researching on prediction of movement of fishes and providing fishermen with necessary fish monitoring equipment. - Importing and developing valuable aquaculture varieties that could adapt to high temperature, for instance sugpo prawn, green clawed crayfish, lobster, white bass, black bass, etc... At the same time increase the depth of fish lakes, and ponds. - Changing farming structure in some wet areas from rice monoculture to fish-rice rotation system. - Taking into account sea level rise and increase of temperature while building infrastructures, quays, ports, store houses, etc. - Developing plan on brackish water aquaculture for Central Vietnam with 2000 km of coast and sandy land. - Building back-up dyke behind sea dyke to create transitional belts between agricultural land and sea. - Building storm shelter port systems along the coast as well as in islands. - Establishing natural ecological reserves, especially coral reefs and atolls.
Coastal zones	In accordance with reality, the 3 following options for active adaptation should be implemented: - Full protection: implement all-sided protection measures to maintain present situation, effectively response to sea level rise. This option requires to make all dykes higher and strengthen coastal management. - Adaptation: reform infrastructures and habits of the people living in the coastal zone to adapt to sea level rise, accept some losses. - Withdrawal (also called “avoidance”): Avoid natural impacts of sea level rise by resettlement, moving houses, and infrastructures from threatened areas.

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 5: Adaptation measures to climate change impacts on energy and transportation

Sectors and areas	Options
Energy and Transportation	- Taking into account climate change factors in planning of energy and transport development. - Upgrading and reconstructing transport infrastructure in areas often threatened by sea level rise and flood. - Ensure demand side management of energy (DSM) based on high efficiency of energy use, economical and rational use of energy, ensuring energy security and safety. - Developing strategies to response and adapt to the vagary of weather.

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 6: Adaptation measures to climate change impacts on Medicine and Human Health

Sectors and areas	Options
Medicine and Human Health	- Accelerating the implementation of the program "Eliminating hunger and reducing poverty", improving socio-economic standard of the people, especially of those in remote areas with many economic difficulties. Meanwhile, improve public knowledge on family sanitation and culture. - Developing national plan and program for medical control and monitoring in areas that have high danger of infections. - Establishing green, clean and beautiful areas (parks, green trees, springs, flowers, etc.) in the dense populated areas; meanwhile, set up house-building criteria, considering climate change. - Promoting public awareness on climate change.

Source: Vietnam: Initial National Communication for UNFCCC, 2003

Annex 7: Questionnaire for interviewing key stakeholders related to the UNFCCC implementation

This questionnaire is completed by marking with a tick (√) for a choice that you/ your organization considers to being the most appropriate one with the multiple choice questions and giving your opinion in writing with the open questions.

1. General questions on the Convention

1.1. Have you heard about the United Nations Framework Convention on Climate Change?

Yes

No

1.2. How well known do you think the commitments under the Convention are?

Properly well-known .....

Ill-known, with many misunderstandings .....

Little-known .....

Other.....

1.3. Do you possess any data, information related to the Convention, or do you / your organisation produce any?

Yes, in the following field ……

No…….

1.4. How do/could you / your organisation contribute to the promotion of the information dissemination and awareness raising?

……

1.5. What is the level of awareness of the problem within the government?

High

General

Low

1.6. What is the level of awareness of the problem within the public?

High

General

Low

1.7. How efficient is information flow within the organisation?

……

1.8. Are there any physical, biological, socio-economic indexes available that measure the effectiveness and efficiency of the implementation of the commitments under the Convention? If yes, in which field?

……

1.9. Have you initiated any form of capacity building before?

Yes

No

1.10. Do you have access to databases, training, meetings etc.?

Yes

No

1.11. What databases required for planning and decision making do exist?

……

1.12. What is lacking and who has access to the existing ones?

……

1.13. Do you have any capacity difficulty?

Yes

No

1.14. What further work (data gathering, research, institutional development, training, etc.) would be needed for the effective implemetation of the commitments under the Convention?

……

1.15. How clearly the duties (sphere of authority, responsibility) of the different individulas are defined?

……

1.16. Does your organisation/insitution/etc. wish to participate in the implementation of the commitments of Vietnam under the Convention?

Yes

No

1.17. In which commitments are you/ is your organisation/institution/etc. affected or interested?

……

1.18. How do your present activities relate to the implementation of the commitments under the Convention?

……

1.19. Have you ever used technical assisstance or consultation during the implementation of the Convention?

Yes, the following ……...

No

1.20. Are you in contact with other organisation/ institution/ ministry/etc. of which activities are in line with the guiding principles of the Convention?

Yes

No

1.21. Which institutions and fields do you consider as the most important in the implementation of the Convention? (Please prioritise! The table can be extended.)

Fields	Institutions

1.22. Are the role, responsibilities and the sphere of authority of the different institutions/bodies defined properly or clearly?

Yes

No

1.23. How efficiently do these institutions cooperate?

Yes

No

1.24. What do you think is lacking for the adequate coordination?

……

1.25. How would you define the role of your institution in relation to the other implementing agencies of the convention?

……

1.26. Do you think there is adequate coordination on the different levels including sub-regional, regional, national, international?

Yes, in the following fields…..……

No

1.27. Which groups of the society (adopting broad intepretation) do you think is important to be involved and in what way? (The table can be extended.)

groups of the society	Ways to participate

2. Proper use/ concentration of capacities

2.1. Do you think the capacities to the commitments under the Convention (human, institutional, legal, financial and information management capacities) are ensured?

Yes

No

2.2. If you answered no to the previous question, please prioritise the lack of capacities!

1.

2.

3.

4.

2.3. What are the required conditions for the present and planned activities related to the Convention? Do they have continuously available financial resources?

……

3. Causal relations

3.1. Which social and economic factors (may) contribute to the incerase of GHG emission?

……

3.2. Which obstacles hinder the efforts against the increase of GHG emission? (gaps in the Convention, programmes, subsidies, applied indicators and indexes,

projects and activities that are not in line with the guiding principles of the Convention, lack of resources, methodological gaps, low awaraness , etc.)

……

3.3. Are the resources for this task clearly separated in the budget of your institution?

Yes

No

4. Framework of implementation

4.1. Are there existing laws that support the objectives of the Convention?

Yes, there are more such laws existing.

Yes, there are more such laws existing, but ……....

4.2. What is the extent of law enforcement?

The law enforcement is inproper

The law enforcement is proper

There are problems of law enforcement in the following fields ……

4.3. Is it necessary to further strengthen the relevant legislative background?

Yes

No

4.4. Do you think it is realistic to adopt new law(s) that provide adequate background for the long-term action programmes?

Yes

No

4.5. The coordination of which fields is needed for the effective implementation of the Convention?

……

4.6. Which existing programmes can contribute to the implementation of the Convention?

……

4.7. Are there any periodic monitoring and evaluation of the implementation of the existing programmes?

Yes

No

Annex 8: Results of the questionnaire survey of key stakeholders related to the UNFCCC implementation

Issues	**Results**		
Information about the UNFCCC	Yes	No	
	58	0	
The popularity of the UNFCCC	Little-known	Well-known	unknown
Information source, database	Yes	No	
	4	18	
Information exchange	Yes	No	
	58	0	
The related fields	Yes	No	
	37	21	
Relations between education and the UNFCCC	Yes	No	
	22	36	
Capacity to implement commitments under the UNFCCC	Yes	No	
	31	27	
The obstacles in the UNFCCC implementation process	Finance	Information	Technical issues
	32	21	17
The collaboration in the UNFCCC implementation	Yes	No	
	39	19	
The areas that lacked of coordination	Finance	Information	Natural resources
	25	14	4
The needs for strengthening capacity	Education	Information gathering	Institutional development
	43	38	21
Important fields to implement the UNFCCC	Energy	Industry	Natural resources
	32	29	15
Social economic factors to increase GHG emission	Awareness	Legal framework	Population growth
	41	33	16
Obstacles in prevention of GHG emission	Awareness	Finance	Legal framework
	45	36	23
The supporting legal instruments	Yes	Not yet	Supplementary
	49	7	
Programs to implement the UNFCCC	Yes	No	
	40	13	