NETWORK OF ASIAN RIVER BASIN ORGANISATION
Thematic Workshop on Water-Related Disaster and Its Management in Asian Countries
Yogyakarta- Indonexia, 26th Nov – 29th Nov, 2007

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT OF VIETNAM
General Office for RBOs in Vietnam

WATER-RELATED DISASTER AND ITS MANAGEMENT IN VIETNAM (Main points of National Strategy for Natural Disaster Prevention respond and Mitigation)

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Abstraction: Vietnam is a one of disaster-prone countries, particularly storms and floods. However, the government's care, the people's disaster prevention tradition, and international support have significantly helped alleviate the consequences of natural disasters.

To achieve these objectives, it needs to have an integrated strategy as the requirement of this strategic document which can be adaptable to each type of disaster in each area of the country.

This report present main points on Vietnamese strategy for Natural Disaster Prevention respond and Mitigation and it also includes an action plan until 2020 as the basis for policy planning; integration of disaster reduction into socio-economic development programs in each region and sector; planning and development of infrastructure; mobilization of domestic and international investment and resources as well as taking advantages of international support in natural disaster mitigation.

The strategy has just been approved by H.E. Prime Minister of Vietnam. The reference number of the decision is 172/2007/QĐ-TTg on the 16th November, 2007.

I. NATURAL DISASTER IN VIETNAM

1.1. General context

In recent decades, natural disasters have happened at an increasingly serious level over the world. The disasters have caused severe consequences to human life, especially the poor. Disasters are natural phenomena; their magnitude and consequences have increased due to human activities in the socio-economic growth, technological development, urbanization, population boom, natural resources and environmental degradation. In the past 2 decades, more than 200 million people on average directly suffered from the consequences of natural disasters every year.

Vietnam is located in the tropical monsoon area, one of the five storm-prone areas of the Asia Pacific region. Therefore the country often faces natural disasters of various types. In recent years, disasters have continually occurred all over the country, causing vast losses in human life, property, socio-economic and cultural infrastructure as well as environmental degradation. In the recent decade (1997-2006), Natural disasters such as typhoons, floods and drought have caused significant losses, including 7500 missing and dead people, asset damage equivalent to 1.5% of

GDP. Natural disasters in Vietnam have been increasing in terms of magnitude, frequency and volatility.

1.2. Geographical and socio-economic background of Vietnam

1.2.1. Geographical location and topography

The territory of Vietnam stretches across 15 north latitude degrees (from $8^o30'$ to $23^o20'$) and 7 east longitude degrees (from $102^o10'$ to $109^o20'$), bordering China to the North, Laos and Cambodia to the West, and facing the East Sea to the East and the South.

With the total territory area of 329.241 km^2 and a coastal line of 3260 km, every 100 km^2 of land has 1 km of coastline. Its width is about 600 km at the widest part and 50 km at the narrowest point.

Viet Nam has a relatively diverse topography. The country's territory is made up of mountains, highlands, deltas, rivers, coastline, islands and peninsulas. Hills and mountains cover ¾ of land area. Mountain ranges tend to have North-West to South-East Direction and perpendicular to the direction of North East – South West tropical monsoon. Parallel mountains separate the land and make up North West – South East direction rivers. Most of rivers flow into the East Sea. High, steep and separated mountains scattered all over the country, and blended with dense river networks.

Plains account for the remaining 25% of the territorial area, consisting of the Red River delta, the central coastal plain, the Southeast plain and the Mekong River delta.

The territory is divided into seven economic and sub-climate zones, namely the Northern Mountains, the Red River Delta, the North Central Coast, the South Central Coast, the Central Highlands, the South East and the Mekong River delta.

With the above mentioned features, Vietnam usually suffers from storms, floods, and other types of natural disasters.

1.2.2 Soil conditions and vegetation cover

The North region has the most complicated geological structure compared with other regions in the country. One third of the northern mountains consist of rock with a thin weathered layer, which is infertile and poorly water-absorption. Black soil is often distributed in calcareous areas which are rich in calcium and magnesium. Mountains and hills occupy 80% of the regional land area. The forest coverage in this region is lowest in the country. The northern mountains and highlands still have much bare land and hills. Alluvial land area in the Red River delta only accounts for 14% of the total area of the North. The ancient alluvial soil in this region is often characterized by the yellow and brown color, small amount of clay, poor in water absorption, and prone to drought and erosion.

The North Central Coast has a large proportion of mountains and hills, small and narrow plains with unfertile soil and limited alluvial land area. The most common types of soil in this region are light yellow soil in high mountains, red soil, brown-red soil, yellow-red soil, depleted grey soil, erosion prone soil. The forest coverage in the region is 28%. bare lands and hills account for 3.4% of the natural land area.

The South Central Coast has a complex and diverse geological structure with various types of soil including alluvial soil, coastal sandy soil, and exhausted soil, etc. The forest coverage is relatively high (34.5%).

The geological structure in **the Central Highlands** is made of 2 covered layers: a soft covered layer and a weathered covered layer. Alluvial soil in the region only accounts for 2.8% of the natural land area, black soil accounts for 1.86%, and depleted grey soil – 10%. the yellow red soil accounts for a large proportion of 68.2%. The forest coverage in the region is considerably high at about 60%.

The South East has a relatively similar geological structure as the Central Highlands with two major types of soil, namely grey soil and red soil. The forest coverage is about 19.5%.

The Mekong river delta has a homogenously geological structure. Alluvial soil makes up 31.4% of the natural land area, acid soil – 41.1%, saline soil – 19.1% and grey soil – 3.5%...

In general, the geological structure in Vietnam is relatively stable with many high mountain ranges scattered in every regions; the territory is separated by dense river. There are high rainfall areas such as the North and the Central Coast. High and steep mountain range plus high rainfall make these regions vulnerable to landslides and flash floods. In addition, earthquake occurs in the North East region though it is at low frequency and magnitude.

1.2.3. Climate

There is a great difference in **temperatures** amongst regions and between day and night. The North has 4 distinct seasons, whereas the South has only the dry season and rainy season, and the Central is affected by the South West monsoon.

Evaporation is relatively high and different amongst the regions, of those the South East and the Mekong River Delta have the highest evaporated level.

Humidity is also high and fluctuated between the regions and seasons. The South is often less humid than other regions in the country.

Rainfall: Vietnam is located at the edge of South East Asia where is bordered to the Pacific and the Indian Oceans. It is also influenced by various continental and ocean air blocks. Therefore, the rainfall is high but fluctuated and varied throughout the country. The average annual rainfall is approximately 2,000 mm. The Middle Central Coast is often observed the highest average annual rainfall, where as South Central Coast is the lowest rainfall region.

1.2.4. Hydrology

As its territory is separated by mountain ranges, Vietnam has dense river networks. There are 2,360 rivers of 10 km and above length. 13 river systems have the basin area of 3000 km^2 and above, in which 9 river systems have the basin area of more than 10,000 km^2, namely Mekong river, Red river, Ca river, Ma river, Thai Binh river, Dong Nai river, Ba river, Bang Giang – Ky Cung river and Thu Bon river.

The catchment area of Vietnamese river systems is 1.167 million km^2, of which 835,000 km^2 outside its territory (71.5%). The average annual flow is 835 billion m^3, of which 835 billion m^3 (37.5%) is originated in Vietnam territory.

1.2.5. Socio-economic conditions

Rapid population growth and urbanization have caused serious pressure and made the natural resources and environment degraded. The total population in the country has reached more than 85 million people now. In the near future, the population of Vietnam will be about 100 million people (as reported at APEC 2006). The rapid population growth in the areas of potential productiveness has led to land shortages, for both residential and cultivated purposes. The human

being has encroached the flows, river estuaries, coastline, river and stream sides; they have also exploited natural resources and minerals in an uncontrollable manner, as well as cut down and burnt forest trees, which consequently increased the amount of wastes.… These are the factors that limit the flow, impoverished the land, silted reservoirs, caused landslides in the mountainous and hilly areas, as well as mud and rock floods. As a result, natural disaster risks have risen.

The average economic growth was beyond 7%/year in the 1990s and will be even higher in the next 2 decades. If not combined with natural disaster prevention, response and mitigation, this growth may cause more environmental pollution and ecological unbalance, which in turn increasing disaster risks and unsustainable development.

1.3. Major types of natural disasters in Vietnam

1.3.1. Typhoons

Vietnam is located in the northwest of the Pacific Ocean, one of the storm-prone areas with a vast and violent number typhoons and an increasing trend especially in the recent 3 decades. Typhoon is one of the major and dangerous types of natural disasters in Vietnam. In more than 50 years (1954-2006), there were totally 380 typhoons and tropical depressions in Vietnam, of which 31% hitting the North, 36% in the North and Middle Central Coast and 33% in the South Central Coast. Typhoon's landfalls usually accompany with high tide and heavy rain, thus resulting in and floods. It is estimated that up to 80-90% of the Vietnam's population are affected by typhoons.

1.3.2 Floods

Floods in Northern river systems:

The basin areas of Red River-Thai Binh Rivers are 164,300 km^2, in which 87,400 km^2 are on the territory of Vietnam, covering 23 provinces and cities and accounting for 75.7% of the natural land area of the North.

Flood season in the Red river system and Thai Binh river system normally occurs from May to September, earlier than that in other regions. On avarage, there are about 3 to 5 floods within the region annually. Each of them may last from 8 to 15 days, depending on its scale and strength. Major floods in the Red river are often originated in the 3 rivers of Da, Thao and Lo, of which the Da River plays a major role. It often accounts for 37%-69% of the flood flow in Son Tay (49.2% on average), while the Lo river accounts for 17%-41.5% (28% on average) and the Thao river accounts for the lowest proportion – 13%-30% (19% on average). Floods in the Thai Binh River are often originated in the 3 rivers of Cau, Thuong and Luc Nam and partly from the Red river through Duong river.

Flood amplitude is high on the Red river system, above 10m in Hanoi. Whereas that of the Thai Binh river is above 6m in Pha Lai.

Floods on rivers in the Central:

The flood season on the rivers from Thanh Hoa to Ha Tinh is in the period June to October every year. Floods on these rivers generally occur on main streams because of dyke systems preventing the overflow. Flood amplitude is above 7m on the Ma river system and above 9m on the Ca river system.

On the rivers from Quang Binh to Binh Thuan, the flood season is from September to December. This region is characterized by short and steep river systems with rapid flows. Dyke

systems in this region are relatively low or uncompleted. Therefore, floods not only occur on the mainstreams but also spread across the plains with the amplitude of above 8m.

Floods on rivers in the Central Highlands

This region does not have a major river system with a relatively low annual rainfall precipitation. The influenced area of floods in this region is narrow and characterized by mountainous and flash floods. Flood amplitude at Dabla bridge on the Dabla river is 10m.

Floods in the South East

Since rainfall is not very high plus a thick and diverse vegetation cover forests, floods in the Dong Nai river are not considerably strong but long-lasting. Nevertheless, history has seen some unusual and extremely strong floods, such as in October 1952, the highest flow at the flood crest in Bien Hoa is 12,500 m^3/s.

Floods in the Mekong delta

Floods are usually caused by the Mekong river upstream floods. The flood water level in the Mekong river delta is also directly influenced by tides and water regulations of Tonle Sap. The progress of floods in the Mekong river delta is slow and floods last for a long period of 4 to 5 months annually, causing inundation in most areas of the Mekong river delta.

1.3.3. Flash floods and mud floods

Flash and mud floods are often found in mountainous and hilly areas where characterized by steep slopes, heavy rains and disadvantaged drainage conditions. Flash floods also occur due to breakages of small reservoirs or landslides blocking up flows, etc. Flash floods have occurred and threatened in all 33 mountainous provinces of the 4 regions, namely the Northern Mountains, the Central, the Central Highlands and the South East. Due to climate changes in recent years, flash floods have become much more popular in Vietnam. On average, there are 2 to 4 flash floods every year during the flood season. In many cases, flash floods happen frequently at the same location. The occurrence of flash floods is usually sudden and within a small area, but very severe and often causes tremendous human and asset losses. Some typical flash floods are the ones in Son La town on 27 July 1991, in Muong Lay and Lai Chau in 1994, in Ha Tinh on 20 September 2002, in Yen Bai in 2005, etc. Currently flash floods are difficult to predict but can be proactively prevented by zoning high risk areas and establishing warning systems.

1.3.4. Inundation

Inundation in Vietnam is usually caused by heavy rains and it is long lasting in some areas. Although causing limited human loss, it causes remarkably negative impacts on agricultural production and the ecology.

1.3.5. Droughts and desertification

Drought is a common type of disasters in Vietnam, which causes the 3rd greatest losses, following typhoons and floods. In recent years, droughts have continually happened throughout the country. In some particular year, droughts reduced 20-30% of the food productivity, thus severely threatening people's livelihoods. Drought control is difficult due to water source shortage and depleted reservoirs. Prolonged droughts result in desertification in several regions, especially the South Central, sandy coastal areas and steep land in the highlands and mountains.

1.3.6. Salinity intrusion

The coastline of Vietnam is 3,260 km long with many river estuaries, therefore salinity intrusion is found along the entire coastline at different rates. Three zones at higher risk of salinity intrusion are the South West coastal provinces, Central coastal provinces and the downstream part of the Dong Nai River. The South West coastal region is the most severely affected by salinity intrusion with 1.77 million ha of salinized land, accounting for 45% of the total area. Salinity intrusion prevention and water freshening in this area are usually very costly.

1.3.7. Squalls and cyclone

A squall is a phenomenon of accidental strong wind within a narrow extent due to extremely strongly developed thunderclouds. A squall may have sudden change of direction, and the wind velocity is from Grade 8 or more. Accompanying squalls are usually showers, or even hails in some cases.

Cyclone, also called tornado is a whirlwind in a narrow area but has a very powerful strength (equivalent to a strong windstorm), formed by a strong and specially structured thundercloud. A thundercloud may form two or three tornado at the same time, which are then combined into a cyclone. A cyclone often goes with showers, rainstorm or hails with dusts and sand …

Both squalls and cyclones are violent types of natural disasters. They happen suddenly and are not yet forecasted, therefore they cause vast and unpredictable consequences but that of cyclone is considerably more serious. Squalls are often accompanied by strong winds that pull down trees and houses, destroy communication and power lines, as well as sink small boats and ships … Cyclones, due to stronger winds, high velocity and frequent directional changes, often cause violent damage. Squalls and cyclones are common phenomena in Vietnam, and their frequency has increased in recent years.

1.3.8. Landslides

Landslide is a common type of disasters in Vietnam, consisting of river bank erosion, coastline erosion, and landslides on mountain slopes, land fissuring, etc. Landslides are usually caused by external factors (water), internal factors (geological changes) and human activities (uncontrolled mineral exploitation or construction), etc.

River bank erosion is very common throughout the country. It causes remarkable losses of residential and cultivated land area and destroys many villages along riverbanks.

Coastline erosion happens due to waves, tides, seawater rising and sea currents. Coastline erosion has led to sea intrusion, caused house losses and destroyed the environment, etc.

Landslides in hill and mountain slopes are usually caused by concentrated heavy rains combining with weak geological structure and human impacts like mountain destruction for roads, forest destruction, etc. Landslides often come with mud floods and cause serious damage to the human life and assets.

1.3.9. Earthquakes and tsunami

Earthquake is the phenomenon of ground surface vibrations, caused by the sudden movements of geological blocks in the earth's womb, volcanic eruptions, landslides, cave collapses, etc. Earthquakes have happened in Vietnam though in a limited strength.

Tsunami is the phenomenon of long circle ocean waves at a high-propagated speed. When reaching the coastline, depending on the depth of the sea and the topography of the coastal area, these waves can be tens of meters high and travel deep into the land, causing vast catastrophes. Tsunami is the result of earthquakes in the ocean bed. Though tsunami has not yet happened in Vietnam, many coastal areas of Vietnam may be at risk of tsunami effects due to earthquake potentials in some neighboring countries.

1.4. Consequences of natural disasters to socio-economic development

a) Socio-economic consequences:

Natural disasters in Vietnam are the impediment to the economic development, sustainable development, and poverty reduction. Therefore, they have become major constraints to the accomplishment of the Millennium Development Goals. Vietnam has more than 80% of its population living at risk of direct impacts of natural disasters.

Natural disasters have taken away many achievements of the national socio-economic development. In the last 5 years (2002-2006), natural disasters have cause a vast losses of human life and assets which are about 1,700 people and VND75,000 billion.

Natural disasters intensify the rich-poor gap and impede the hunger eradication and poverty alleviation, especially in disaster-prone areas. On average, millions of people are in need of assistance due to natural disasters every year. Many of them, who have just escaped from poverty, are re-impoverished due to the disasters.

Natural disasters affect educational development such as destroying educational infrastructure and interrupting school time, especially in mountainous areas and the Mekong river delta.

Natural disasters also have negative impacts on vulnerable groups such as the old, the disabled, women, and children.

b) Environmental consequences:

Natural disasters cause environmental destruction and pollution and harmful influence on production and people's life.

c) Consequences of natural disasters to national defence and public security:

- Destroy defence and security constructions.
- Reduce the national reserve.
- Cause social instability.
- Cause problems in public security and order.

II. NATURAL DISASTER PREVENTION, RESPONSE AND MITIGATION IN VIETNAM

Throughout the course of development, natural disaster prevention, response and mitigation in Vietnam has always been a fight for life and closely linked with the founding and defence of the country. Disaster prevention and mitigation in Vietnam has made great progress throughout the history.

2.1. Course of development

Since thousands of years, Vietnamese ancestors have seen natural disasters as one of the "4 biggest dangers to mankind": water (floods), fires, robbers, and invaders.

Dykes and embankments for flood prevention were constructed many centuries ago. By 1248, the Red river dyke system had formed. At present, the system of river and sea dykes is thousands of kilometres long.

No sooner had the Democratic Republic of Vietnam been founded than President Ho Chi Minh signed Order No. 70/SL on 22 May 1946 to establish a Central Committee for Dyke Maintenance, the predecessor of the current Central Committee for Flood and Storm Control.

During the period of 1945-1954, the Vietnamese people had to fight against invaders and natural disasters at the same time. Northern provinces used nearly 7 million m^3 of soil to strengthen critical sections of dykes.

During the period of 1955-1975, the establishment of the Ministry of Water Resources and the promulgation of regulations on dyke protection, other directives and resolutions have become major steps in flood and storm control. In this period, Northern provinces built millions of cubic metres of dykes, hundred thousands of cubic metres of stone embankments, built flood retarding zones, renovated flood diversion systems, and planted trees for wave resistance.... During this period, the North suffered many destructive floods that broke dykes in some areas. However, production and social stability were soon restored thanks to prompt damage recovery actions.

During the period of 1976-present, flood and storm prevention and response have been regarded as one of the important measures for socio-economic development. The following legal documents have been issued: the Ordinance on Dykes (1989), Ordinance on Flood and Storm Control (1993), the amendments to these two ordinances (2000), the Strategy for Water Disasters (1994), the Law on Dyke (2006), and decrees to guide the implementation of these laws and ordinances. Many policies on natural disaster prevention, response and mitigation have been issued, such as policy for the 'living with floods' areas in the Mekong river delta; policy for flood diversion and retarding areas in the North; policy for "avoidance and adaptation" areas in the Central region. Many structural solutions have been carried out, such as building reservoirs, renovating dykes, building parking place for boats and ships, etc. Non-structural solutions include forest rehabilitation, renovating communication systems, forecasting, warning, international cooperation, raising community awareness, strengthening institutional capacity and organizational capacity for flood and storm prevention, response and search and rescue network.

2.2. Achievements and limitations

2.2.1. Remarkable achievements

- Step by step improving legal documents, creating a legal corridor for natural disaster prevention, response and mitigation. In recent years, Vietnam has developed and issued relevant legal documents, such as Dyke Management Law, Water Resources Law, Law on forest protection and development, Law on Environmental Protection, Land Law, Law on Natural Resources and Minerals, Law on Fisheries, etc., Ordinance on dyke management, Ordinance on flood and storm control, Ordinance on exploitation and protection of water resources structures, Ordinance on the protection of hydro-meteorological surveying structures, etc. Decrees to guide the implementation of laws and ordinances have been promulgated.

- Strengthening and refining the organizational structure, enhancing the capacities, equipments and facilities for the direction of natural disaster prevention, response and mitigation activities form the central to local levels.

- Developing and implementing relevant socio-economic development programs, such as the plantation of watershed forests, protective forests, mangrove forests, reservoir construction for flood and drought reduction, "Living With Floods" Program, Safety for Fishing Boats and Ships Program, Dyke Reinforcement and Renovation Program, etc.

- Conducting research, applying technologies to flood and storm control as well as natural disaster prevention, response and mitigation

+ Research on river bank and coastline erosion prevention and control.

+ Research on extreme flood prevention for the Red river delta.

+ Research on 12 types of natural disasters.

+ Research on the establishment of self-help funds.

+ Models of disaster-safe houses.

+ Methodology for damage and relief need assessment.

+ Flood mapping in central provinces.

+ Research on flash flood prevention planning.

+ Applying new technologies to disaster forecast, warning and management.

+ Using new materials and technologies in building disaster prevention and mitigation structures.

A. International cooperation:

+ Integrate in international organizations for natural disaster mitigation, for example Asian Disaster Reduction Center (ADRC), Asian Disaster Preparedness Center (ADPC), **ASEAN** Committee on Disaster Management (ACDM), World Meteorological Organization (WMO), Typhoon Committee (TC), Natural Disaster Mitigation Partnership (NDM-P), International Strategy for Disaster Reduction (ISDR), etc.

+ Cooperate with international organizations such as UNDP, UNESCAP, WB, ADB, etc., foreign agencies and NGOs in disaster mitigation.

- Search and Rescue: Establishing the National Committee for Search and Rescue, strengthen organization structure from central to local levels; enhancing facilities and equipments for search and rescue activities; developing an overall plan for search and rescue until 2015.

- Relief and recovery activities: The government annually allocates a certain proportion of budget and essential commodities for emergency relief and prompt damage recovery. When disasters happen, political and social organizations such as the Fatherland Front, Trade Union, Youth and Women Associations… have actively organized donation activities for victims in affected areas. Relief and recovery efforts also come from on-site sources, taking advantage of the people's mutual support tradition.

- Training and advocacy activities: thanks to the mass media, training and advocacy on activities to raise public awareness have been improved. Training and exercises have been provided at grassroot level as well as for responsible officers in ministries, sectors and localities. As a result, the awareness of government officers and the people have increased. Poor families in

coastal areas are supplied with equipments to obtain information and prevent natural disasters proactively.

- Resources for natural disaster prevention, response and mitigation

+ The government gives preference and annually increases funding for natural disaster prevention, response and mitigation. The investment is given priority to specific programs and projects which aims at these objectives such as the forest plantation program, dyke upgrade program, reservoir program, landslide program, "living with floods" program, safety for boats and ships program.

+ Provinces mobilize local resources, the contributions of the people, social and political organizations, and international organizations in natural disaster prevention and damage recovery.

+ Supplementarily allocate Official Development Assistance (ODA).

2.2.2. Limitations

In recent years, considerable efforts have been made for natural disaster prevention; infrastructure, facilities and technical capacity have been improved; the leadership and coordination in response to natural disasters at central and local levels have had substantial progress. However, with regard to the consequences of natural disasters and the socio-economic development goals, the following shortcomings and limitations need to be addressed in the near future:

2. Disaster prevention, response and mitigation activities are reactive and mainly focus on problem response.
3. The response to disasters is slow due to objective and subjective reasons.
4. Unstable production system, inappropriate production structure.
5. Poor infrastructure results in vulnerability to disaster risks.
6. Forecasting and warning systems do not meet standard requirements, particularly with regard to such disasters as flash floods, landslides, whirlwinds, etc.
7. Emergency relief, damage recovery and reconstruction are insufficient, lack of direction and coordination.
8. Search and rescue operations are unprofessional and limited due to lack of equipments and facilities, thus they cannot take advantage of the combined strengths of all forces and people.

2.2.3. Reasons

1. Awareness

- Inadequate public awareness of natural disasters and sustainable development, especially living in harmony with the nature.

- Dependent and reactive attitude, disregard and inexperience in facing natural disasters.

- Dissemination activities to raise community awareness of disaster prevention, response and mitigation are infrequent and disorganized. The knowledge on disaster prevention is mostly spread throughout the mass media and has not been included in school curriculum.

2. Planning

- Lack of integrated planning and coordination among ministries, sectors and localities. Lack of due attention to the integration of natural disaster prevention, response and mitigation into local and sector's socio-economic development programs.

- In construction planning, lack of due attention to flood and storm avoidance and safety, particularly in industrial zones, tourism areas, urban areas, coastal and mountainous areas, residential areas and roads.

- The encroachment on sea and rivers for construction or setting structured projects in areas highly prone to floods, flash floods, storms, sea water rising and landslides make them more vulnerable. Therefore, it is costly for protection and maintenance.

- Development planning has not been integrated with environment and landscape preservation. For example, natural sand dunes on the sea shore, watershed protective forests are and mangrove forests have been destroyed for aquaculture.

3. Policy and mechanism

- Lack of penalties for failure to obey laws, regulations, and the orders of relevant authorities.

- Overlaps of functions and duties amongst different agencies, and lack of clear responsibilities.

- Lack of measures to encourage disaster-related insurance purchases.

- Lack of encouragement and incentives for individuals and organizations volunteering and participating in search, rescue and response activities in natural disasters.

- Lack of rules and regulations for organizations on the appeal, collection, receipt and distribution of disaster relief.

- Lack of improved policies on the mobilization of resources for disaster prevention and mitigation.

4. Investment

- Investment in natural disaster prevention, response and mitigation is scattered and has not satisfied the requirements of disaster mitigation.

- Investment in the maintenance, management and utilization of existing structures is not corresponding to that in new construction.

- Disbursement for some critical, approved projects such as reservoirs, parking place for boats and ships, dyke protection, etc. is slow and does not meet current requirements.

5. Direction and management

- The directions and orders in response to natural disasters have not yet been seriously executed. The implementation is slow and dependent way of thinking still exists.

- The direction and implementation of four "on-the-spot" principles are not serious.

- There have been inappropriate directions where economic development was separated from natural disaster prevention, response and mitigation. For instance, coastal protective forests were destroyed for aquaculture while watershed protective forests were cleared for crop production.

- Ineffective management and protection of watershed forests, coastal and riverside protective forests led to the degradation of forest coverage in some areas. As a result, the

effectiveness of flood, storm and drought prevention and control was limited. Consequently, this resulted in unexpected dangers.

- The poor management of sand exploitation and other activities on river banks have led to harmful impacts on flood discharge and caused erosion.

- The shortcomings of vehicle management on rivers and at sea, particularly pelagic fishing boats resulted in unexpected damage when disasters occur.

- The effectiveness of quality control in some particular construction project was limited. Therefore, they were damaged by disaster though at low intensity. Some structures even prevent flood discharge or make flood worse.

- Slow project progress and disbursement, especially ODA.

- The management and utilization of disaster recovery resources are limited, lack of transparency or for inappropriate purposes.

III. NATURAL DISASTER TRENDS AND REQUIREMENTS OF DISASTER PREVENTION IN THE NEW PERIOD

3.1. Natural disaster trends and challenges

Natural disasters are forecasted to happen more regularly in terms of types and frequency over the world, more complex in terms of developments and more serious in terms of consequences. Global warming, climate changes, El Nino, La Nina phenomena and typhoon and drought increase, etc. over the world and in the region have caused direct impacts on the climate and natural disasters in Vietnam.

The territory of Vietnam extends over 15 latitudes with 3,200 km coastline and is located in the humid tropical monsoon area. In addition, the country has a complex topography and dense river network. These make up different sub-climate zones, ecologies and, as a result, various types of natural disasters including typhoons, floods, flash floods, droughts, landslides, etc. Affected directly by the Pacific Ocean typhoon centre, Vietnam is hit by 6-7 typhoons and tropical depressions every year.

Moreover, on the subjective side, the rapid industrialization and modernization over the country have resulted in comprehensive development, at the same time this lead to the increase of disaster risks. Due to disobeyed natural norms, loose environmental and natural resource management and population pressure, it is recognized that there were inappropriate behaviours such as mountain destruction for roads, encroachment on sea and rivers, leveling hills and mountains for construction, forest destruction, etc. These resulted in the increase of disaster risks and negative impact on the economic development and destroyed the environment.

Obviously, natural disasters have had vast influences on the people’s life and the sustainable development of the country.

3.2. Requirements of natural disaster in the coming period

Ensure the implementation of commitments between Vietnam and the international and regional communities in natural disaster prevention, response and mitigation.

Follow the contents of the Strategy for socio-economic development until 2020 to carry out solutions for natural disaster prevention, response and mitigation.

Abide by the laws concerning natural disaster prevention, response and mitigation.

Execute the policies of the Party and the state on natural disaster prevention, response and mitigation in each sector and area.

IV. NATIONAL STRATEGY:

A. GOALS AND OBJECTIVES

A.1. Overall goals:

- To minimize the loss of human and assets.

- To ensure the sustainable development of the country.

A.2. Specific objectives by the year 2020

- Ensure the safety of dyke systems at the designed level from level 3 to "special".

- Ensure the safety of large and medium reservoirs at the designed level.

- All parking space for boats and ships will have been constructed as in the approved plan.

- Establish and improve the fisheries communication system, ensure that 100% of pelagic fishing boats and ships have sufficient communication equipments.

- Complete the evacuation of residents in areas highly prone to flash floods and landslides.

- Obtain sufficient equipments and facilities for rescue mission as in the approved planning.

- 100% of ministries, sectors and localities integrate natural disaster prevention, response and mitigation into their socio-economic development programs.

- Sign sea rescue agreements with neighboring countries.

- 100% of provincial officers and 50% of district officers receive training in natural disaster prevention, response and mitigation.

- 70% of communes along dykes and in estuary and coastal areas have knowledge of flood and storm control and disaster mitigation.

- Establish 72-hour storm forecast.

- Formulate laws on disaster prevention and mitigation.

B. MAJOR TASKS

B.1. Preparedness and prevention phase

B.1.1. Non-structural methods:

B.1.1.1. Early forecast and warning:

- Enhance the quality of the forecast of storms, floods and other natural disasters in line with forecast capacities in the region and over the world.

- Map disaster risks in areas, provinces, districts and critical zones for proactive prevention, disaster risk assessment and policy formulation. Preference will be given to highly flash flood prone areas.

- Modernize early warning systems from central to local level. Ensure quick emergency response and coordination. Enhance the effective means of communication in the mountains, sea

and remote areas. Central-level warning system is responsible for nationwide monitoring and provides general orientation. Regional warning systems monitor large areas and critical zones. Local warning systems are tailored to meet specific characteristics of localities, i.e. villages, communes and resident areas.

- Install more equipment to monitor the developments of storms, floods and other natural disasters. Apply modern technologies to the management, monitoring and control of storms, floods, coastline and river bank erosion, landslides, etc., particularly in the Mekong River Delta and central provinces.

B.1.1.2. Legal documents

- Review and amend legal documents and policies on natural disaster prevention, response and mitigation, make preparations for the law on natural disasters.

B.1.1.3. Government's direction

- Strengthen the capacity of relevant government bodies in ministries and sectors, at both central and local level, especially in communes and villages.

- Improve the preparedness according to the principle four on-the-spot principle, especially in communes and villages.

- Develop short-term and mid-term plans for disaster prevention and mitigation in the nation and critical zones and localities.

B.1.1.4. Search and rescue capacities

- Enhance the on-the-spot rescue capacity of organizations, individuals and communities, especially those in mountains, remote and border regions, islands and vehicles at sea and on rivers.

- Gradually improve capacities and facilities for professional search and rescue forces. Pay attention to ensure smooth communication.

- Participate in regional and international cooperation in search and rescue.

B.1.1.5. Integrate natural disaster prevention, response and mitigation into socio-economic development programs.

- Integrate natural disaster prevention, response and mitigation content into development programs, plans and strategies of sectors and localities. It must be in line with sector, regional and national development strategies, appropriate for local disaster features and ensure safe and sustainable development.

- Constructions must satisfy safety requirements, at the same time be environmentally friendly, help to mitigate disaster risks and will not provide any agent for more risks.

- Include natural disaster risk assessment in the design and appraisal of all investment projects. The projects can only be accepted after providing safe solutions against disaster risks.

- Pay attention to simultaneous implementation of safety programs for high-risk residential areas, such as mountainous, riverside, coastal and flooding ones. Attach much importance to land use planning and production structure shift.

B.1.1.6. Raise community awareness of natural disaster prevention, response and mitigation.

- Implement simultaneous measures and methods to raise social awareness and capacities to respond to natural disasters:

- Include basic knowledge about natural disaster prevention, response and mitigation in the school curriculum; carry out practical activities in schools to help students know how to respond to disaster situations and support their family and community.

- Provide training for those directly involving in disaster prevention and mitigation activities, especially decision-makers, managers, planners, practitioners, and local officers.

- Frequently carry out such exercises as search, rescue, evacuation, dyke protection, etc. for responsible officers in localities and sectors.

- Expand television and radio networks to remote areas, increase broadcast time, diversify means of communication in order to spread knowledge on disaster prevention and mitigation throughout communities.

- Encourage cultural and arts organizations to raise public awareness as well as promote natural disaster prevention, response and mitigation by their art works and programs.

B.1.1.7. Socialization of natural disaster prevention, response and mitigation

- Promote the community involvement in formulating relevant laws, regulations, programs and plans. Disclose these documents after they have been approved.

- Promote the community involvement in managing and monitoring the implementation of programs and projects.

- Develop and multiply the model “disaster safe villages” in which the communities are aware of potential disaster risks and consequences. Collect human resources and facilities, establish funds for disaster prevention and mitigation and other humanitarian foundations.

- Develop the self-preparedness capacity in the community, mobilize on-site resources for proactive search and rescue.

- Promote mutual help and protection against disasters, encourage organizations and individuals to participate in relief efforts for affected localities by various efficient ways.

B.1.1.8. Information sharing and international cooperation

The following information is shared among different sectors, localities, regional countries and over the world:

- Types of natural disasters.

- Forecasts and warnings.

- Information on search, rescue, and relief needs.

- Experience in organization, management, direction, preparedness, response, recovery and reconstruction.

International cooperation in:

- Forecast technologies.

- Research on disaster prevention solutions for each area.

- Search and rescue missions, especially those at sea and in flash flood regions.

- Training, experience sharing, adoption of criteria and methods for disaster risk assessment.

- Financial support for programs and projects on disaster prevention and mitigation.

B.1.2. Structural methods:

B.1.2.1. Dyke systems, flood diversion and retarding structures:

- Ensure safety for river and sea dykes at the designed flood level. Strive for river dyke safety at the historically high flood level.

- Enhance quality of dykes, prevent degradation, and improve such critical zones as dyke foundation and sluices underneath the dykes.

- Complete designed dyke cross-sections, reinforce surface of dykes at level III and above.

- Use modern technologies and new materials for the construction, repair, upgrade and reinforcement of dyke systems.

- Continue to plant trees to resist waves in suitable places.

- Flow clearance for flood discharge.

- Continue to build flood diversion and retarding structures as planned.

B.1.2.2. Reservoir and dam systems

- For existing reservoirs: inspect their conditions, repair and upgrade them to ensure safety. Build spillways for reservoirs lacking them, or those whose spillways do not ensure designed flood discharge. Inspect and improve their operation to ensure safety, particularly in case of heavy rains and floods.

- For reservoirs under construction: Concentrate resources to hasten the construction progress and ensure quality.

- Continue reservoir planning for flood cutting and multi purposes. Make preparations for building approved reservoirs.

B.1.2.3. Socio-economic infrastructure:

- Constructions must meet requirements for flood discharge, safe from floods, storms and other types of disasters.

- Reinforce road system in flood areas with suitable materials.

- Use multistorey buildings for government offices, hospitals and healthcare centers, schools and kindergartens, especially in communes and wards so that they can act as shelters if necessary.

- The planning and construction of information and electricity systems, warehouses, harbours must ensure safety standards in case of floods and storms.

B.1.2.4. Civil buildings:

- Encourage private houses by providing support and low-interest loan programs. Each family should have at least a room safe from floods and storms.

B.1.2.5. Parking space and shelters for boats and ships

- Continue the planning and hasten the progress of making shelters and parking space for boats and ships.

B.2. Response phase:

- Collect and process information from affected areas.

- Make timely decisions for specific situations.

- Establish forefront commands and task forces.

- Evacuate residents in dangerous areas.

- Deploy human resources, equipments and facilities for disaster response.

- Carry out search and rescue operations. Follow the four on-the-spot principles. Leadership, human resources, facilities and logistics must be adequate for rescue mission.

- Good coordination and cooperation among forces, ministries, sectors, localities and people.

C. ACTION PLAN

C.1. Strengthen the organizational structure, legal documents, institutions and policies

- Enhance the capacity of existing organizational structure for natural disaster prevention, response and mitigation, develop a proposal for the establishment of a specialized agency from central to local level to help the Prime Minister and authorities perform the state administration functions in natural disaster prevention, response and mitigation, undertake flood and storm control, search, rescue and other disaster-related activities.

- Propose specific mechanisms and policies to encourage the establishment of support organizations in natural disaster management, training centers and public service units

- Issue a law on natural disaster prevention and control and by-laws.

- Review, revise and amend instructive documents to give consistent criteria for natural disaster damage assessment and principles for post-disaster damage recovery.

- Implement a pilot self-reliant fund project to for natural disaster prevention, response and mitigation.

- Implement pilot insurance programs for natural disasters.

C.2. National priority programs, projects and proposals in natural disaster prevention and control

C.2.1. Natural disaster risk mapping and assessment

- Flash flood risk mapping.

* Leading agency: MONRE;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Inundation mapping and flood risk assessment

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Drought risk mapping:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2012.

- Earthquake and tsunami risk mapping

* Leading agency: Vietnamese Academy of Science and Technology

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2015.

- Storm and rising water risk mapping

* Leading agency: MONRE;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Coastline and river bank erosion risk mapping:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

C.2.2 Planning:

- Review and amend the flood prevention and control planning for Red River and Thai Binh river system:

* Leading agency: MARD, localities;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007.

- Review and amend the flood prevention and control planning for Mekong river delta:

* Leading agency: MARD; localities

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

- Review and amend the flood prevention and control planning for rivers in the Central region, from Thanh Hoa to Khanh Hoa:

* Leading agency: MARD and localities;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

- Review and amend the flood prevention and control planning for rivers in the South Central Coast and the South East:

* Leading agency: MARD and localities;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

- Review and amend the population planning in flash flood and landslide-prone mountainous areas:

* Leading agency: People's committees of mountainous provinces;

* Coordinating agencies: MONRE, MARD, Vietnamese Academy of Science and Technology;

* Implementation time: 5 years/ time.

- Review and amend the population planning in riverbank and coastline erosion prone areas:

* Leading agency: People's committees of relevant provinces

* Coordinating agencies: MONRE, MARD, and Ministry of Science and Technology;

* Implementation time: 5 years/ time.

- Review and amend the land use planning in association with natural disaster prevention and control:

* Leading agency: MONRE and localities;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

- Review and amend the construction planning in disaster prone areas

* Leading agency: Ministry of Construction;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

- Review and amend the integrated exploitation and management planning in river basins

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 5 years/ time.

C.2.3. Forecast capacity strengthening:

- Strengthening storm warning and forecast capacities:

* Leading agency: MONRE and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Strengthening flood warning and forecast capacities in Red river Delta:

* Leading agency: MONRE and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Strengthening flood warning and forecast capacities in the Mekong River Delta:

* Leading agency: MONRE and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Strengthening flood warning and forecast capacities in rivers of the Central region, Central Highlands and the South East:

* Leading agency: MONRE and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Strengthening flash flood warning and forecast capacities for mountainous provinces:

* Leading agency: MONRE and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Strengthening Tsunami warning and earthquake information capacities

* Leading agency: MONRE, Vietnamese Academy of Science and Technology and CCFSC;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually.

C.2.4. Community awareness raising and non-structural measures:

- Including knowledge of natural disaster issues in school curriculum:

* Leading agency: Ministry of Education and Training;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Community training on natural disaster issues

* Leading agency: CFSCs at all levels and CCFSC;

* Coordinating agencies: Organizations and individuals at home and abroad

* Implementation time: Annually

- Information dissemination on natural disaster issues via the mass media:

* Leading agency: Ministry of Culture and Information, VOV, VTV;

* Coordinating agencies: Concerned ministries, sectors and localities.

* Implementation time: Annually

- Capacity strengthening for natural disaster management agencies from the central to local level:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Capacity strengthening for search and rescue forces:

* Leading agency: Ministry of Defense

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Reviewing and amending building codes in line with natural disaster characteristics in each region:

* Leading agency: Ministry of Construction;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Applying scientific and technological advances as well as new techniques and materials to natural disaster prevention, response and mitigation:

* Leading agency: Ministry of Science and Technology;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Program on protective forest plantation and protection:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Program on tree plantation for wave resistance in dyke systems:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Completing information and communication system, managing boats and ships at sea:

* Leading agency: Ministry of Fisheries;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2010.

- Establishing welfare programs for children, the old and disabled in disaster areas:

* Leading agency: MOLISA;

* Coordinating agencies: organizations and individuals at home and abroad

* Implementation time: Annually

- Establishing volunteer networks in natural disaster prevention, response and mitigation:

* Leading agency: Ho Chi Minh Communist Youth Union;

* Coordinating agencies: organizations and individuals at home and abroad

* Implementation time: Annually.

C.2.5. Structural measures

- Improving facilities, strengthening the community's preparedness:

* Leading agency: People's committees at all levels

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Program on dyke system upgrade:

* Leading agency: MARD

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: Annually

- Constructing reservoirs upstream for flow regulation:

* Leading agency: as planned projects;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020

- Construction of erosion prevention structures:

* Leading agency: MARD;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020

- Construction of residential clusters for flood resistance and storm avoidance:

* Leading agency: People's committees at provincial level

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020

- Expansion of flood discharge opening for railroad bridges and sluices:

* Leading agency: Ministry of Transport;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Construction and expansion of spillways for flood discharge:

* Leading agency: as specific projects in ministries and sectors;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2020.

- Construction of storm shelters for boats and ships:

* Leading agency: Ministry of Fisheries;

* Coordinating agencies: concerned ministries, sectors and localities

* Implementation time: 2007-2015.

Natural disaster prevention, response and mitigation to 2020 will be implemented through programs and projects managed by Ministries, sectors and localities. Funding for implementation is estimated at approximately 30,000 billion VND from the state budget, local budget, ODA, FDI, community's contributions and legal fund mobilized from other sources./.