Viet Nam
Country Report
1999

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Ⅰ. Introduction

Viet Nam is a tropical country subject to the Southeast Asian Monsoon with an annual rainfall of roughly 2000 mm. About 80% of this falls in summer (May - October) causing rivers to flow full.
At the same time, the Northern and Central parts of Viet Nam are subject to about 4 to 6 typhoons a year on average. Whenever the intense rain from one of these typhoons adds to the monsoonal flows in these rivers, they flood. About one year in five, a typhoon will be so large that it crosses the mountains into the lower Mekong Basin, causing very severe floods in Laos, Cambodia and South Viet Nam.
This very intense rainfall also causes flash floods, landslides, and mud flows in the mountains, and erosion and siltation of river beds and water-retaining structures further downstream. The typhoons also generate high waves and raise the water level of the sea, inundating, ports, settlements and coastal agricultural land with saline water.
The losses from water disasters in my country are large. Every year, hundreds of people die, and the damage to property runs into hundreds of millions of dollars.

Ⅱ. Flooding

This uneven distribution of rainfall is the main cause of floods in the rivers. The river network in Viet Nam has a total length of about 25,000 km, concentrated into three rather clearly-defined networks: the Red and Thai Binh river system in the North, the coastal river system in the Center, and the Mekong-Dong Nai river system in the South.
Due to the different topography in each area, each network has its different characteristics The rivers in the South are gentle, those in the North are fairly steep, and those in the Center are both short and very steep. Some of the big rivers, such as the Red river in the North and the Mekong river in the South, originate from neighbouring countries, running across Viet Nam and into the sea. In the rainy season, all the rivers flood, though the severity maybe different from year to year.

1. Red River Delta

In this century alone, the Red and Thai Binh river systems have had 26 major floods, the biggest being the great flood of 1971 Before that, a flood in 1945 had been considered to be the historic maximum. To give an appreciation of the magnitude of this flood, it might be noted that the level of the 1971 flood was 5-10m higher than the level of the fields inside the dykes.
Within a period of 45 years (1900-1945), there were 18 years in which dykes failed, or one dyke failure with crop losses every two to three years on average. In the 1945 flood, the dyke system failed in 79 places, flooding 11. Provinces over a cultivated area of 312,000 ha and affecting about 4 million people. The 1971 flood caused the dykes to fail in 3 large sections, inundating 250,000 ha and seriously affecting 2.7 million people. The most recent large flood was in 1986 - the fifth-largest of this century. Where a section of dyke along the Red River was destroyed, and a sluice under the Can River collapsed. Were it not for timely emergency works by the local people, the damage incurred would have been far greater than it was.

2. Central Provinces

In the Central Provinces, there is regular annual flooding. Some of the more tragic have been the major floods in 1960 in the Quang Tri - Thua Thien Region, in Quang Nam in 1962, in Binh Dinh in 1932, in Hue in 1983, in the Eastern Provinces of the South in 1952, and in most of the Central Provinces in 1964.

3. Mekong Delta

Flooding in the Mekong Delta is well-known throughout the world. Recent examples of large floods (1961, 1966, 1978, 1984 and 1991, 1995, 1996) have seen hundreds of thousands of hectares of crops destroyed.

4. Highlands

Although most of the land in the Highlands of Viet Nam is well above flood level, there is still much development in the floodplain, since people value this land for agricultural production. As elsewhere in the world, this induces people to settle there as well.
Unfortunately, floods seem to have been on the increase in the Highlands in the recent years: in Lang Son and Cao Bang (1986); in Lai Chau, Dak Lac and Bac Thai (1990), and in Son La and Lai Chau (1991, 1994, 1995, 1996), in Ha Giang, Kon Tum (1996). The floods in 1990 and 1991 affected some densely populated areas of the two provincial towns of Lai Chau and Son La, and 1994, 1996 in Lai Chau, damaging most of their infrastructure.

5. Coastal Disasters

Our country is curerently classified as one of the poorest in the world. As a result, the poorest of our people have few choices in where they live, and where they can grow food.
Some of our coastline is expanding seawards as sediment is brought down from the mountains, and people, seeing the new lands emerging, seek to colonise it. Very soon, they press for defences against the sea, and because the land become economically productive, it becomes difficult to deny them. Small sea dykes may then be erected but when these are overtopped, they demand higher and stronger ones.
Should we agree to this ? Economic studies tell us that many of these sea dykes are worthwhile. But the higher we go, the safer people feel and the more they invest in making their land productive. When the sea dyke overtops again, as we know it will one day, the losses will therefore be much greater than before.
In other parts of the coast, where there has been an interruption to the supply of sediment, the coastline is receding. The impact on the people who are displaced because of this is horrendous. Sometimes this interruption of sediment results from natural processes, and sometimes it is because of works which divert the water to other economic uses such as irrigation.
Which problems should we address first? Indeed, which is more important, irrigation of the protection of the coast?
Much of my country's coastline used to have mangroves which were very effective in reducing energy from waves. But now most of these mangroves have been cut down, while many of our coral reefs, which can also provide protection, are being destroyed.

6. Catchment Management.

In common with many other developed and developing countries, the socio-economic circumstances of many of our people make it difficult for them to value forests, because they provide them with few short-term benefits.
As a result, trees are cut down to provide fuel and timber or to make room for more agricultural production. The resulting deforestation results in increased runoff and a greater rate of erosion. This leads to the flash floods, landslides, mud flows and siltation which I mentioned earlier.
The work to rectify this deforestation is, because of its complex nature, a slow process. It entails the cooperation of many government agencies at the national, provincial and district levels, as well as local communities. It can require a change in economic activities, and sometimes a change in cultural practices.

Ⅲ. Typhoons

Since 1954, there have been 212 typhoons landing in or directly influencing Viet Nam. On average, there are about 30 typhoons originating in the Western Pacific Ocean each year of which about 10 are generated in the South China Sea. Of these, an average of 4 to 6 hit of affect Viet Nam. There are many years where at least 10 typhoons arrive in Viet Nam: recent occasions are 1964 (18 typhoons), 1973 (12), 1978 (12), and 1989 (10), 1996 (10).
The areas most affected by typhoons are the coastal Provinces of the North and Central Regions. However, typhoons in the South, though less frequent, can still be extremely damaging.
About 62% of the population and 44% of the whole are frequently affected by typhoons which, on average, kill some 250 people every year. The worst in this century were the 1904 typhoon in the South which caused death and injury to 5000 people, and the 1985 typhoon in Binh Tri Thien Province which killed 900 people.
Typhoons are normally accompanied by storm surges. During the past 30 years, half the typhoons have caused a storm surge of over 1m, 30% of typhoons over 1.5m, and 11% of typhoons over 2.5m. These typhoons and storm surges have often overtopped - and frequently destroyed - sea dykes, flooding lowland coastal areas.
In Viet Nam, the losses caused by floods and typhoons seem to be increasing over time, as in the rest of the world. For example, about 540 people were killed by floods and typhoons annually in the period 1985 to 1989, whereas in the years 1976 to 1979, the figure was 225.

Ⅳ. History of Responses to Flooding and Typhoons in Viet Nam

As flooding and typhoons have always been a permanent threat to the people of Viet Nam, the struggle to prepare for these inevitable events has occupied an important position in the thousands of years of the history of the Vietnamese nation. The first dyke of Viet Nam was seen in the first century AD under the Hai Ba Trung Dynasty. Early in the eleventh century, under the Ly Dynasty, dykes were constructed to protect the Dai La King's town (later named Ha Noi) from the Red River. In the thirteenth century under the Tran Dynasty, dyke systems were built from Viet Tri (upstream of Ha Noi) to the sea, and the construction of sea dykes also began.
Since then, the capacity of dyke have been constantly strengthened by widening and raising at an accelerated rate. From 1884 to 1945, the Vietnamese people placed 87 million m^3 of earthfill, while since 1945, 255 million m^3 of earthfill and 4.2 million m^3 of rock revetment was used. Since the historical flood in August 1971, the Vietnamese Government has applied six general measures for short-term and long-term flood control as follows:
Reforestation and watershed protection;
Construction of medium and large-scale reservoirs in upstream areas;
Strengthening of the dyke systems;

Flood diversion whenever necessary;
River dredging and clearance for flood discharge channel;
Dyke monitoring and repair.
As can be seen below, the success of these strategies have not been all that might be desired.

1) Reforestation:

During the past years, although reforestation has been promoted, the forest area is being reduced by about 100,000 ha/year. Increasing deforestation has seriously affected the rainfall runoff characteristics of the Catchment, causing land erosion, faster flood flows and lower in the dry season.

2) River Bed Clearance:

Over a 10-year period (1971-981) 45% of the people living outside the dyke were resettled. Some 7 million m^3 of earth have been removed from high river banks, and a number of fallen bridges and sunken ships have been taken out.
However, at recent years, the situation has again worsened. Construction materials have been dropped in the waterways new residential areas have been established on the riverlands, and sand bars along the rivers and in the estuaries have not been dredged through lack of funds.

3) Flood Diversion:

Works for flood diversion, through augmented channel capacity and for flood storage have been installed, but they have always been able to work at their designed capacity.
For example, the Day river Channel has been planned to divert floods from the Red river without endangering the Day river Dyke. The designed discharge of the Day Diversion Spillway is 5000 m^3/s, but only around 3000 m^3/s is possible for flood diversion because areas within the floodplain have been settled for agriculture during the long period since the last flood. The most difficult problems for flood diversion in the Day river is that too many people (nearly 500,000) would now have to be resettled, and about 200 km of dykes need to be more frequently repaired.

4) Upstream Reservoirs:

In the 1971 flood, Thac Ba Reservoir helped to reduce the water level by 0.10-0.15 m in the Red river. Since that time, it has been Granted that the new Hoa Binh Reservoir could lower a repeat of the 1971 flood by 1.2-1.4 in at Ha Noi city.
On the other hand, the Hoa Binh Reservoir, by holding back sediment, is inducing erosion in the lower basin, and lengthening the period of flooding. The former effect increases the danger to the dykes while the latter stretches the resources of the dyke management and repair teams during flooding, especially in trying to ensure continued protection of the banks.

5) Dyke Monitoring and Repair:

Our experience so far has been that dykes are the most important structural measure for flood mitigation and control of damage from typhoons. Our late President Ho Chi Minh once said: “All people must take care of the dykes”.
Even when other measures will be implemented, the dykes will remain an essential and indispensable structural measure to protect life and ensure continued agricultural production. However, during large floods, dyke monitoring and repair needs to be undertaken quickly and reliably.
Viet Nam now, has nearly 8000 km of dykes, including 6000 km of river-dykes and 2000 km of sea-dykes. There are 3000 km of dykes along our larger rivers and 1000 km of major sea-dykes. About 600 revetments of various types and 3000 under-dyke sluices have been built. In addition, there are 500 km of embankments for controlling nuisance floods and preventing salinity in the Mekong Delta.
Over the last two thousand years, techniques for combating failures in the dyke systems have been developed. In particular since 1971, my Department has worked hard to formulate new strategies for detecting zones of weakness for strengthening crucial areas of the dyke system, and for more effectively responding to alarms. However, we are still faced with a number of serious problems:
a. The existing river dykes were built long ago by hand using local materials and without much understanding of geotechnial principles. Because the earth fill and foundations were neither carefully selected nor treated, there are frequent sand boiling, piping seepage and slides along nearly every section of dykes. Thus, during large floods of long duration, there can be dyke breaches and embankment failures, especially where the dykes have poor foundations, and water ponds on both sides because of unauthorised earth excavations in the past. There are also many termite nests and rodent holes creating large cavities inside the dyke, and other causes Of Weakness in the embankments.
b. Changes in the river channels during floods can cause bank erosion, threatening the safety of the dykes. Bank protection by revetments and groins are very costly, and sometimes difficult to construct to a satisfactory standard.
c. Most sluices which allow water to pass through the dykes are out of date and seriously damaged, though they remain operational. In the flood season, many sluices have to be Tendered inoperative in Order to maintain the security of the dykes.
d. The sea-dyke systems, especially in the Central Provinces, are very low and overtop frequently and wash away. Sea-dyke systems in the North, although larger, and able to withstand typhoons up to level 10 at mean sea level. However it is difficult to remain operational when typhoons and storm-surges come.
e. Resources and equipment for dyke monitoring and repair have been minimal and frequently insufficient. Dyke monitoring has been mainly visual, even though most defects are located inside the dyke or in the foundations and are thus difficult to discover. Fortunately, this situation is set to improve substantially with the new dyke monitoring and repair technology being introduced under the UNDP’s Project VIE/88/015.
f. Although the Council of the State of Viet Nam has promulgated an ordinance to protect dykes, violations of this ordinance are increasing, especially, where the dykes pass through densely-populated areas.
In an attempt to maximise the use of its own resources, Viet Nam also applies structural and non-structural measures for mitigating floods, such as:

- Establishment of operation plans for flood mitigation and typhoon emergency action;
- Promulgating laws, ordinances and regulations for flood control;
- Improving the forecast and warning systems;
- Building typhoon-and flood-resistant structures;
- Promulgation of design standards.

Ⅴ. Policies and laws of Viet Nam in the field of disaster mitigation.

Since1946 the flood and typhoon committee were formed from the central level to local level. These organisations have acted effectively in reduction natural disasters.
Viet Nam also have promulgated the law on dyke and the law on flood and typhoon.
A strategy and action plan has also been established and has been implementing.

Ⅵ. Strategy and Action Plan for Mitigating Disasters in Viet Nam.

Consequently, in 1992, to support the goals of the International Decade for Natural Disaster Reduction (IDNDR), the then Ministry of Water Resources of Viet Nam and the Viet Nam National Committee for the IDNDR organised an International Workshop on Flood Mitigation, Emergency Preparedness and Flood Disaster Management in Ha Noi, in association with the United Nations Development Programme (UNDP), the United Nations Department of Development Support and Management Services (DDSMS/DESD), and the United Nations Department of Humanitarian Affairs (DHA/UNDRO). This workshop gave fruit, in 1994, to a comprehensive national *Strategy and Action Plan for Mitigating Water Disasters in Viet Nam*. Based on recommendations of the workshop and over 100 written contributions received from 46 provinces and national government bodies, the Plan addresses the water disaster that most effect Viet Nam:

- River floods
- Flooding from the sea
- Increased runoff
- Erosion and siltation of river beds
- Slope instability, mud flows and landslides
- Torrential rains in combination with strong winds
- Failures of water-retaining structures
- Sea-water intrusion into ground water.

The Strategy and Action Plan has since served as the principle IDNRD framework in Viet Nam for mitigating disasters. The Strategy has three main task areas:
Forecasting and Warning Systems
Preparedness and Mitigation
Emergency Relief
Each task area is further divided into physical solutions – which focus on structures, equipment and materials – and non-physical solutions, which are predominantly to do with organisations, institutions, laws, procedures, investigations and training.

Ⅶ. Mitigation Solutions of the Central Committee for Flood and Storm Control

The Viet Nam Central Committee for Flood and Storm Control (CCFSC), the chief co-ordinating, body responsible for disaster management in Viet Nam, has been principally involved in translating the strategy into action.
Among the most important structural measures is the CCFSC's on-going programme of maintenance and upgrading of the Vietnamese dyke system, which consists of approximately 5,000 km of river dykes and approximately 3,000 km of sea and estuary dykes. With the assistance of the UNDP and of the World Food Programme (WFP), sea dykes have or are being rehabilitated and constructed throughout Viet Name's North and Central coast. In addition, Vietnamese authorities have committed significant resources to stabilising riverbanks on rivers in the Red River Delta, and to the preparation and improvement of emergency flood diversion schemes on important rivers throughout the country.
The CCFSC has devoted great efforts to non-structural solutions in a number of areas. Based on experience gained during the terrible 1996 and 1997 typhoon seasons, which saw the deaths of hundreds of fishermen, the CCFSC has collaborated naval with and fisheries authorities in improving maritime storm warning and emergency rescue procedures. The result has been a drastic reduction in 1998 in lives lost at sea. Similarly, after reviewing the catastrophic 1998 floods in China, the CCFCS has been working with military authorities to better co-ordinate the army's role in flood response and relief.
Another important outcome of the *Strategy and Action Plan* was the joint establishment with the UNDP of a Disaster Management Unit (DMU) within the Standing Office of the CCFSC. Since 1994, the DMU has been working with the CCFSC to join together over 1000 years of Vietnamese flood protection culture with twenty-first century western technology. The DMU has provided disaster management, communications, and assessment training programmes for provincial and district officials throughout the country; set up a reference centre and central database on disaster management with the use of Internet Web and GIS technologies; and also provided funding and expertise for the establishment of a nation-wide disaster communications network, which links all provinces of Viet Nam to the Standing Office of the CCFSC in Ha Noi.
The CCFSC-DMU is currently preparing new *Master Strategy* for mitigating all types of natural disasters in Viet Nam (water disasters, forest fire, drought, industrial accidents, etc.). The DMU will also be assisting national and local officials to streamline Vietnamese disaster reporting and assessment procedures. In 1998/99, the CCFSC-DMU is developing a community-based grassroots disaster preparedness training programme for schoolchildren. The grassroots training programme will build on the existing disaster preparedness experience of the Viet Nam Red Cross Society (VNRC), with the assistance of the International Federation of Red Cross and Red Crescent Societies (IFRCRC), and with funding from the European Community Humanitarian Office (ECHO).

Ⅷ. Recommendations.

In order to have more effecting results in the field of disaster management. Viet Nam needs to mobilize not only the national resources but also international resources from UN organisation and non government organisations to build an rehabilitate construction concerned with the area of disaster management such as:
- Flood fighting
- Dyke maintainent and operation
- Flood warning system
- Local training for communities on disaster mitigations.
- Emergency spillways on primary[1] dykes.

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