# First Update of the Strategy and Action Plan for Mitigating Water Disasters in Viet Nam

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Ministry of Water Resources
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United Nations Development Programme
Hanoi, Vietnam

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Geneva

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# of the
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**Ministry Of Water Resources**
**United Nations Development Programme**
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| | |
|---|---|
| ADB | Asian Development Bank |
| AIDAB | Australian International Development Assistance Bureau |
| AMS | Aeronautic Meteorology Service |
| CCFSC | Central Committee for Flood and Storm Control (Socialist Republic of Viet Nam) |
| CFSC | Committee for Flood and Storm Control (local, district, or provincial level) |
| DANIDA | Danish International Development Agency |
| DDMFCSP | Department of Dyke Management, Flood Control and Storm Preparedness (MWR, Socialist Republic of Viet Nam) |
| DHA | Department of Humanitarian Affairs (United Nations) |
| DMU | Disaster Management Unit |
| HCMC | Ho Chi Minh City |
| HMS | Hydrometeorological Service of Viet Nam |
| IDNDR | International Decade for Natural Disaster Reduction |
| MWR | Ministry of Water Resources (Socialist Republic of Viet Nam) |
| NGO | Non-Governmental Organization |
| NIWA | National Institute of Water and Atmosphere Research |
| NORAD | Norwegian Agency for Development Cooperation |
| NOREPS | Norwegian Emergency Preparedness Systems |
| SPC | State Planning Committee (Socialist Republic of Viet Nam) |
| SRV | Socialist Republic of Viet Nam |
| UNDP | United Nations Development Programme |
| VNCIDNDR | Viet Nam National Committee for International Decade for Natural Disaster Reduction |
| WB | World Bank |
| WFP | World Food Programme |
| WMO | World Meteorological Organisation |

# *First Update of the Strategy and Action Plan for Mitigating Water Disasters in Viet Nam*

## 1. Introduction

A *Strategy and Action Plan for Mitigating Water Disasters in Viet Nam* was prepared during 1993-94 with the support of UNDP, the UN Department of Humanitarian Affairs (DHA), and the Ministry of Water Resources (MWR) of the Socialist Republic of Viet Nam. The purpose of the *Strategy and Action Plan* is to address all relevant issues, prevent duplication of effort, and assist in coordinating activities related to water-disaster mitigation in Viet Nam.

By their nature, all strategies contain the seeds of change -- for in achieving the objectives of a strategy, even partially, one changes the conditions upon which the strategy was based. As a result, to the extent that a strategy and action plan is effective, it must be reviewed and updated regularly.

The publication of the *Strategy and Action Plan for Mitigating Water Disasters in Viet Nam* has indeed had an impact: the environment within which water-disaster mitigation efforts take place in Viet Nam has changed considerably from when the *Strategy and Action Plan* was first conceptualized in 1992. These changes, along with new information that has recently come to light, now warrant the preparation of the first update of the *Strategy and Action Plan*. This First Update is presented on the pages that follow. It is expected that regular updates will follow in due course.

Much of the information in this update was gathered at the International Consultation on the *Strategy and Action Plan for Mitigating Water Disasters in Viet Nam* that has held in Hanoi in November/December 1994. The International Consultation was organized by the Ministry of Water Resources and UNDP in order to get collective feedback on the *Strategy and Action Plan* from concerned national and international agencies.

One of the most important outcomes of the International Consultation was the summary report of the working groups. Working groups were organized according to the three main task areas of the strategy -- Forecasting and Warning Systems, Preparedness and Mitigation, and Emergency Relief and Response. Many of the recommendations made by the working groups are taken into account in this First Update. A complete report of the working groups and an account of the International Consultation is contained in a separate volume -- *Proceedings of the International Consultation on the Strategy and Action Plan for Mitigating Water Disasters in Viet Nam* -- published concurrently with the First Update.

The First Update presented below includes sections that discuss (1) the updated Strategy and progress to date; (2) the updated Action Plan and progress to date; (3) progress being made toward sustainable water-disaster mitigation in Viet Nam; (4) new issues that have come to light since the initial publication of the *Strategy and Action Plan*; and (5) other important issues raised during the International Consultation.

## 2. The Strategy

The *Strategy and Action Plan* centers on a strategy matrix, consisting of 18 high-priority tasks, and an action plan flowchart to establish the kind of environment necessary to complete those tasks. In light of new information and changes in the operating environment in Viet Nam, the strategy matrix and action plan flowchart have now been updated as shown in Table 1 and Figures 1 and 2, respectively.

### *2.1 The Updated Strategy*

Modifications to the strategy matrix include the following:

- *The components of the strategy matrix have been renamed "tasks" in order to clarify their roles.* The goals of each task can be achieved by one or more projects. Alternatively, in some cases, one project can fulfill the objectives of more than one task.

- *The non-physical tasks have been put to the left of the physical tasks.* This is to emphasize that non-physical tasks are to be seen (i.e., when reading from left to right) as requiring somewhat greater attention than they have up until now, particularly since they are often more cost-effective than the physical tasks.

- *The activities which rely on communal actions and responses have been put toward the top of the matrix.* This is to emphasize that communal preparedness is essential for sustainable disaster mitigation.

- *The category "Emergency Relief" has been broadened to "Emergency Relief and Response."* This is so that all phases of the disaster mitigation cycle will be considered.

Finally, "Sea-water Intrusion" has been renamed "Sea-water Intrusion and Greenhouse Effect."

### *2.2 Progress to Date on the Strategy*

An outline of current projects being implemented under the various task headings of the Strategy is presented in Table 2. The projects that have commenced since publication of the *Strategy and Action Plan* include:

- Disaster Management Unit (VIE/93/031)
- Rehabilitation and Upgrading of Sea Dykes (WFP Project 4617)
- Sea Dyke Engineering Services (VIE/92/023)
- Rehabilitation of Hanoi Dyke (1259-VIE, ADB)
- Typhoon Forecasting and Warning System (VIE/DIS/0048, NORAD)
- Pilot Remote Flood and Surge Monitoring System (ISMES)
- Sea-Water Intrusion and Greenhouse Effect (The Netherlands Government)
- Srepok Basin Watershed Management (DANIDA)

Details of current projects were presented at the International Consultation held in November 1994 and are included in the *Proceedings of the International Consultation*. Other projects that have been completed have been removed from the strategy matrix. These include:

- Dyke Monitoring and Repair, UNDP VIE/88/015 (completed 1993).
- Mekong Delta Master Plan, UNDP VIE/87/031 (completed 1993).

## 3. The Action Plan

### *3.1 The Updated Action Plan*

The Action Plan originally presented in the *Strategy and Action Plan* has also been updated as shown in Figures 1 and 2.

### *3.2 Progress to Date on the Action Plan*

The Action Plan activities shown with a heavy border in Figure 1 have been completed or are nearly complete. A discussion of these activities is provided below.

#### 3.2.1 Government Recognition of the Importance of Mitigating Water Disasters

The first activity of the Action Plan was to alert the Government to the importance of water-disaster mitigation. This has largely been accomplished. The *Strategy and Action Plan* helped clarify to the Government what was being done to mitigate water disasters and the reasons behind those efforts. It also enabled the Government to assess the importance of this work in relation to other government priorities.

#### 3.2.2 The Roles of the CCFSC, VNCIDNDR and DDMFCSP

The next activity of the Action Plan was to enhance the mandate of the Central Committee for Flood and Storm Control (CCFSC) and the Viet Nam National Committee for the International Decade for Natural Disaster Reduction (VNCIDNDR). This is underway. The Action Plan prompted a review of the means to strengthen the coordination of water disaster mitigation efforts through the CCFSC and VNCIDNDR. The importance has been recognized of maintaining and even strengthening the relationships between all ministerial representatives to these committees to ensure that resources are used as effectively as possible and to avoid unnecessary duplication of efforts to mitigate natural disasters.

Because of its long experience in mitigating water disasters and in its operation of the Secretariats of the CCFSC and the VNCIDNDR, the Department of Dyke Management, Flood Control and Storm Preparedness (DDMFCSP) has developed expertise in all stages of the disaster-mitigation cycle. This expertise can be readily applied to non-water disasters such as earthquakes, fires and landslides. Thus government agencies with responsibilities for these types of disasters are starting to approach the DDMFCSP for advice.

At the same time, the process of coordination through the CCFSC and the VNCIDNDR is being strengthened. It is recognized that this will entail a free flow of information. It is for this reason that the Viet Nam Disaster Management Unit was established, as discussed in the following section.

## TABLE 1 STRATEGIC TASKS FOR WATER-DISASTER MITIGATION

| Forecasting and Warning Systems | | Preparedness and Mitigation | | Emergency Relief and Response | |
|---|---|---|---|---|---|
| Non-physical | Physical | Non-physical | Physical | Non-physical | Physical |
| **1. Public Awareness, Training and Education**<br><br>- School programs<br>- Radio programs<br>- T V programs<br>- Print programs | **2. Warning and Communication Systems**<br><br>- National level<br>- Provincial level<br>- Local level | **6. Water Laws and Regulations**<br><br>- Land use planning<br>- Dikes<br>- Flood & Typhoon<br>- Building Codes<br>- Watershed management and forest law | **12. Watershed Management and Deforestation**<br><br>- Remedial construction.<br>- Modeling and monitoring. | **17. Institution Building for Relief**<br><br>- Establish Disaster Relief Management Unit | **18. Emergency Repair**<br><br>- Equipment<br>- Technology<br>- Materials |
| | **3. River Flood Forecasting**<br><br>- Weather radar<br>- Hydro-meteorological stations<br>- Data transmission<br>- Data base<br>- River models | **7. Flood Insurance; and Self Financing**<br><br>- Flood insurance<br>- Revolving fund | **13. Emergency Communication System**<br><br>- Disaster Communication | | |
| | **4. Flash Flood Forecasting**<br><br>- Weather radar<br>- Hydromet stations<br>- Data transmission<br>- Data base<br>- Mountain river models | **8. Institution Building for Water-Disaster Preparedness (at the Provincial Level).**<br><br>- Manuals<br>- Procedures<br>- Training<br>- Facilities (computer, communications, etc.) | **14. Sustainable Management of the River Dykes**<br><br>- Under-seepage<br>- Overtopping design<br><br>(Includes changing conditions and rehabilitation) | | |
| | **5. Typhoon Forecasting**<br><br>- Satellite ground station<br>- Sea buoy system<br>- Weather radar<br>- Meteorological stations<br>- Data transmission<br>- Typhoon models | **9. Area Specific Studies (Master Plans and Watershed Studies)**<br><br>- Basins<br>- Geographic features<br>- Flash flood prone areas<br>- Reservoirs<br>- Wetlands | **15. Sustainable Management of the Sea and Estuary Dykes.**<br><br>- Overtopping design<br>- New materials<br>- New designs | | |
| | | **10. Sea-water intrusion and Greenhouse Effect**<br><br>- Sea level rise (Greenhouse Effect)<br>- Sea-water intrusion | **16. Sustainable Control of the Rivers .**<br><br>- Training<br>- Sediment minimization and control<br>- Silting control<br>- Erosion | | |
| | | **11. Dyke and Dambreak Studies**<br><br>- Emergency action plans | | | |

## TABLE 2 STRATEGIC PROJECTS FOR WATER-DISASTER MITIGATION

| Forecasting and Warning Systems | | Preparedness and Mitigation | | Emergency Relief and Response | |
|---|---|---|---|---|---|
| **Non-physical** | **Physical** | **Non-physical** | **Physical** | **Non-physical** | **Physical** |
| **1. Public Awareness, Training and Education**<br>*DDMFCSP has started work on this* | **2. Warning Communication System**<br>*UNDP, Disaster Management Unit (DMU), VIE/93/031.* | **6. Water Laws and Regulations**<br>*Mekong River Basin Agreement* | **12. Watershed Management and Deforestation**<br>*WFP, Reforestation in Coastal Viet Nam, WFP 4304.*<br>*DANIDA, Srepok Basin Watershed Management.* | **17. Institution Building for Relief**<br>*UNDP, Disaster Management Unit (DMU), VIE/93/031.* | **18. Emergency Repair** |
| | **3. River Flood Forecasting**<br>*ISMES, Remote flood and surge monitoring system (pilot project).* | **7. Flood Insurance; and Self Financing** | **13. Emergency Communication System**<br>*UNDP, DMU Feasibility Study, VIE/93/031.* | | |
| | **4. Flash Flood Forecasting**<br>*NZMFAT, Ha Tinh flash flood warning system.*<br>Proposed:<br>• *Ana and No Rivers, Dac Lac flood forecasting.*<br>• *Flash-flood warning system, Lam Dong Province.*<br>• *Nam Pan and Nam La Catchment, Son La Flash-flood warning system.*<br>• *Weather radar network in mountain areas.* | **8. Institution Building for Water-Disaster Preparedness (at the Provincial Level)**<br>Proposed:<br>• *Pilot project for capacity-building of selected provincial disaster relief centers (possibly The Netherlands).* | **14. Sustainable Management of the River Dykes**<br>*ADB, Rehabilitation of Hanoi Dyke, 1259-VIE*<br>Proposed:<br>• *Rehabilitation of dykes and sluices, Tan Chau District, An Giang.*<br>• *Upgrading river dyke at Phan Rang, Ninh Thuan.*<br>• *Dyke and drainage at Tuy Hoa, Phu Yen.*<br>• *Dykes, drainage and pumping, Song Be.*<br>• *Drought and flood protection, Tuyen Quang.* | | |
| | **5. Typhoon Forecasting**<br>*NOREPS, Data collection and satellite transmission system for typhoon forecasting and warning.*<br>*Upgrade weather-radar network.* | **9. Area Specific Studies (Master Plans and Watershed Studies)**<br>*UNDP/WB, Red River Delta Master Plan, VIE/89/034.*<br>Proposed:<br>*Course on economic assessment of water-disaster mitigation projects (possibly UNDP).* | **15. Sustainable Management of the Sea and Estuary Dykes**<br>*UNDP & AIDAB, Sea Dyke Engineering Services, VIE/92/023.*<br>*WFP, Rehabilitation and Upgrading of Sea Dykes, WFP/4617.*<br>Proposed:<br>• *Sea dyke and environmental protection, Ben Tre.*<br>• *Sea-wall at La Gi, Binh Thuan.*<br>• *Sea dykes and revetment, Cat Hai Island, Hai Phong.*<br>• *Sea Dyke at Can Gio, HCMC.*<br>• *Safe port Cham Island, Quang Nam-Da Nang.*<br>• *Loc An flood and salinity control, Ba Ria-Vung Tau.* | | |
| | | **10. Sea-water Intrusion and Greenhouse Effect**<br>*DGIS (The Netherlands), Viet Nam coastal zone vulnerability assessment.* | **16. Sustainable Control of the Rivers**<br>Proposed:<br>• *Bank protection, Vinh Long City* | | |
| | | **11. Dyke and Dambreak Studies** | | | |

**FIGURE 1 UPDATED ACTION PLAN – STAGE 1**

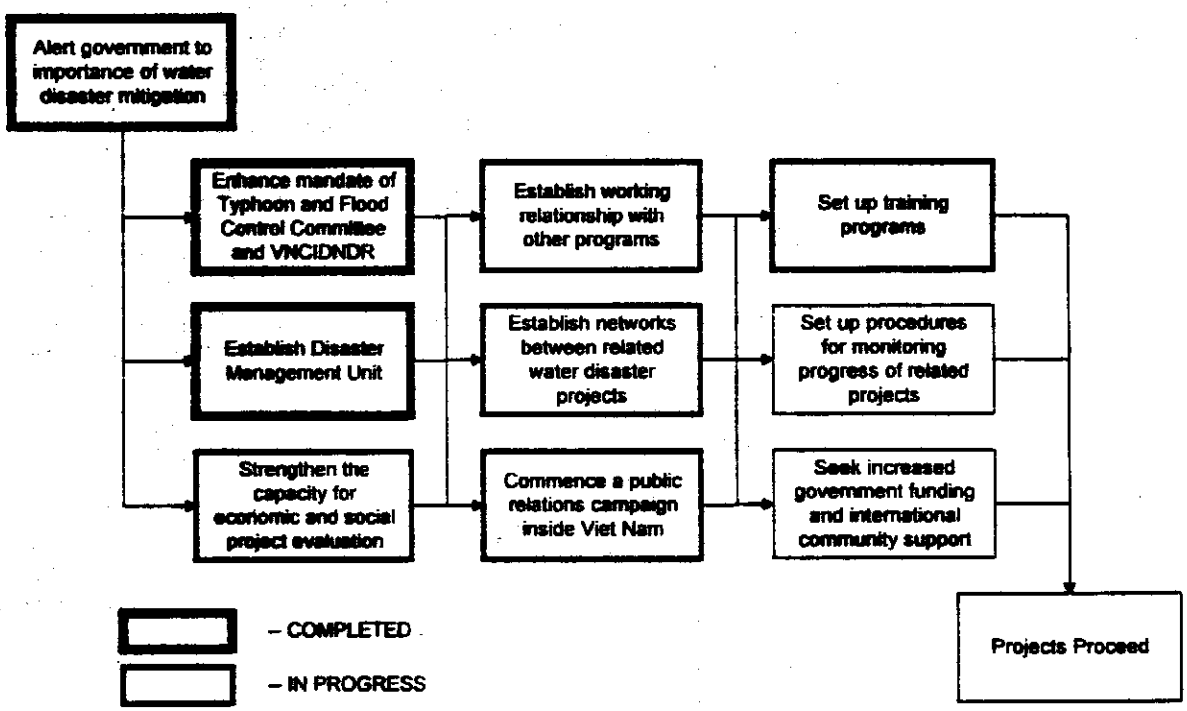
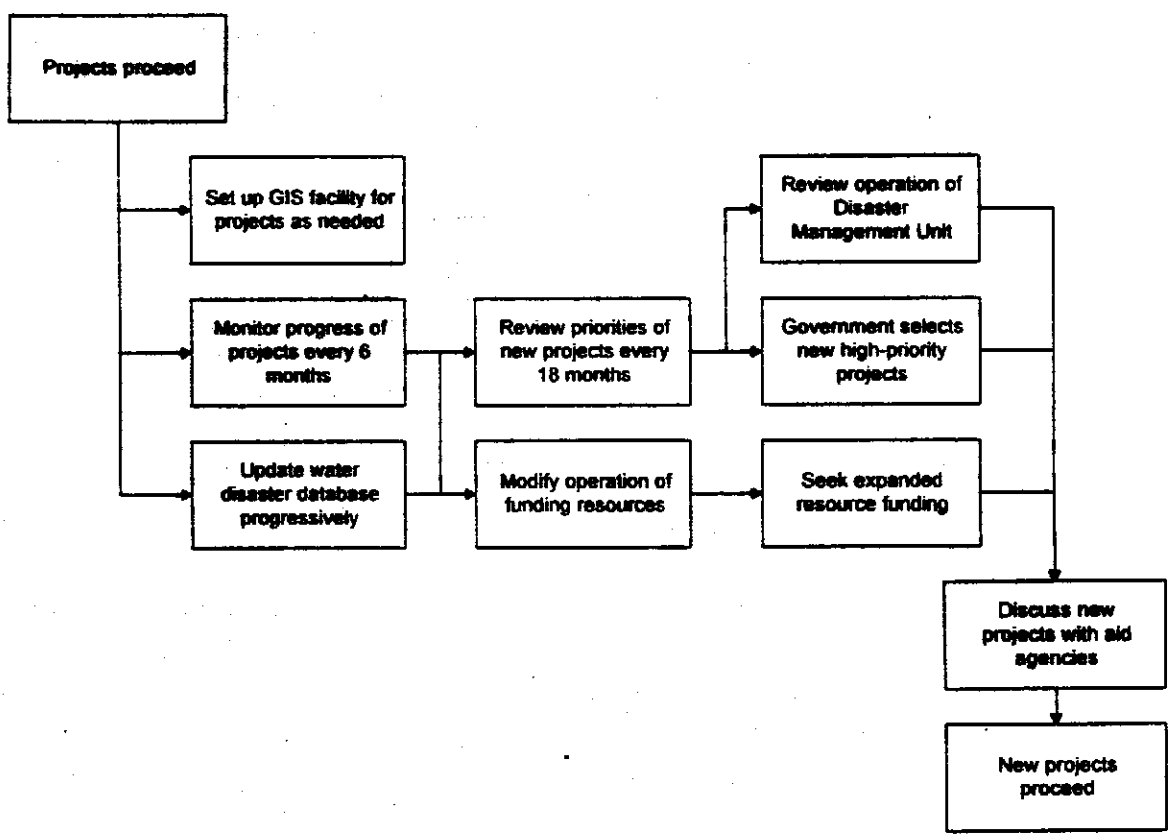



**FIGURE 2 UPDATED ACTION PLAN – STAGE 2**



Perhaps most importantly, the State Planning Committee (SPC) has endorsed the *Strategy and Action Plan* as meeting the development priorities of the Vietnamese government. It has recognized the primary role of UNDP in making clear the importance of mitigating water disasters, introducing new technologies, and coordinating the efforts of the international community for addressing this issue. To further this process, SPC has called for the establishment of a working group that includes the Ministry of Water Resources, the Ministry of Finance, the Office of Government, and other relevant departments, to coordinate the distribution of aid funds and other outside resources.

### 3.2.3 Establishing the Viet Nam Disaster Management Unit

The next activity outlined in the Action Plan was to establish a Disaster Management Unit. As of December 1994, this has also been accomplished. The main objectives of the DMU are to strengthen the national capacities for disaster management through facilitating three critical functions:

Information Collection and Exchange. One of the first tasks of the DMU will be to conduct a review of existing procedures and mechanisms for emergency relief in Viet Nam to assess the informational needs of the agencies involved. The DMU will then establish a database with information related to water-disaster mitigation in Viet Nam including data on natural events, emergency responses during past disasters, modeling results, the location and types of resources available, etc.

Intra- and Inter-Governmental Coordination. The DMU will establish a National Disaster Management Training Team with personnel seconded from a variety of national ministries and provincial departments responsible for water-disaster management. This team will be trained as trainers to provide disaster-management courses at the provincial and local level. Of equal importance, it will provide a basis for the cross-fertilization of ideas and collaboration between various ministries and government agencies.

Public Access to Information. Lastly, the DMU will be a Public Information Center for those individuals and organizations seeking information about water-disaster mitigation in Viet Nam.

### 3.2.4 Economic Evaluation of Water-Disaster Mitigation Strategies

The fourth activity in the updated Action Plan is to *strengthen the capacity for economic evaluation of projects*. At present, few proposals for mitigating water disasters have been subjected to a full economic assessment.[1] Without such assessments, it is not possible to ensure that resources allocated to water-disaster mitigation are applied as effectively as they might be. To this end, UNDP is currently funding a cost-benefit analysis of water-disaster mitigation infrastructure which could become the basis of a course on the economic assessment of water-disaster mitigation strategies.

### 3.2.5 Working Relationships with Other Programs

Successful examples of the fifth activity of the Action Plan – *to establish working relationships with other programs* – need to be built on to make them more widespread. There is already cooperation between some of the provincial agencies – for example, between the water resources services and agriculture and forestry departments, all of which are important in watershed management projects. To encourage such cooperation to spread to other provinces, it will be important for the relevant national authorities to encourage or even require such inter-agency collaboration.

One important link currently being forged between ministries and departments responsible for water-disaster mitigation is the National Disaster Management Training team discussed previously. This team is composed of members seconded from a variety of departments. Through working together on a disaster-management training program, the team members will be able to share information and develop the working relationships necessary for a coordinated response to natural disasters.

### 3.2.6 Networks between Related Water Disaster Projects

The sixth activity of the Action Plan is *to establish networks between related water disaster projects*. This is being attained. MWR is advising potential donors that priority should be given to the tasks set out in the Strategy, and most of them are keeping in touch with the DMU to ensure their projects are being formulated in accordance with the precepts of the *Strategy and Action Plan*. MWR would like to institute the requirement that all projects keep the DMU informed of their activities to ensure better information sharing and coordination

[1] The term "economic assessment" refers to an evaluation of social and environmental effects as well as monetary ones.

between projects. The overall goal of establishing and maintaining such networks is to develop a more programmatic approach to water-disaster mitigation.

### 3.2.7 Public Relations Campaign

The seventh activity is *to commence a public relations campaign inside Viet Nam*; this has also begun. Until now, the work of the agencies involved in mitigating disasters had gone largely unreported. The *Strategy and Action Plan*, however, emphasized the need for a continual public relations campaign in order to heighten communal awareness of the hazards of water disasters.

To this end, a video on the flood and typhoon hazard and on floodplain management in Viet Nam has been produced, and press releases are starting to be issued by the DMU. In addition, the *Strategy and Action Plan* has been translated into Vietnamese, and copies have been issued to the water resource services at the provincial and district levels.

While this is a good start, much more will need to be done to keep the public aware of and prepared for floods. Some techniques for maintaining communal preparedness include:

- permanent marks in public locations showing previous flood levels;
- school lectures regarding floods and typhoons;
- training for CFSC operatives;
- local CFSC displays;
- videos;
- talks by CFSC officers;
- newsletters and information sheets;
- the *Strategy and Action Plan* itself, with Updates, being offered for sale to the public, libraries, schools, and the local and international media;[2]
- full economic studies to show officials and the public the benefits of preparedness and mitigation strategies;
- marketing the *Strategy and Action Plan* using modern methods of public-interest advocacy (i.e., market research, directed advertising, etc.);
- drama in theater and on television.

Preparedness campaigns will need to be designed by professionals skilled in motivation on public health and safety issues. These designs will need to be based on market research and repeated at regular intervals to enable adjustment for demographic changes within the community. The campaigns should preferably aim to enhance the pool of local knowledge concerning:

- drills to reduce the time-wasting search for confirmation of the threat of a disaster;
- community participation networks;
- what steps to take well in advance (e.g., procedures for collecting important documents, memorabilia, animals, and treasured items for rapid evacuation);
- precautions to take in light of an early, indefinite warning;
- improving procedures for securing, harvesting, lifting or evacuating property;
- understanding the potential and limitations of the warning system.

Innovative ideas to generate interest might also be considered, for example:

- developing some sort of local competitions involving prizes for activities that entail improving one's level of preparedness;
- developing competitions with other villages and districts;
- having key personnel exchanges with other villages and districts as needed.

### 3.2.8 Training Programs

With the selection and training of members of the National Disaster Management Training team under the DMU, training programs in water-disaster mitigation are also underway. In the coming months, members from this team will travel to some of the more disaster-prone areas of Viet Nam to provide training to provincial- and district-level authorities responsible for natural disaster prevention and mitigation.

## 4. Steps toward Sustainable Water-Disaster Mitigation

As further steps are taken to implement the Action Plan and more projects are undertaken in the task areas of the Strategy, sustainability must remain foremost in mind. For if Viet Nam's water-disaster mitigation efforts are not sustainable, then the response to future disasters will have to rely on ad hoc solutions that are, by their nature, less effective and less efficient than well-planned and well-coordinated efforts. Recent developments in

[2] It might be noted that two publications of the Asian Development Bank, *Disaster Mitigation* and *Disaster Mitigation in the Pacific*, have sold thousands of copies.

this regard have been encouraging. The initiatives discussed below have been important steps toward improved sustainability of water disaster mitigation in Viet Nam.

### *4.1 Sustainable Development of the Mekong River Basin*

On 28 November 1994, delegates from Cambodia, Laos, Thailand and Viet Nam initialed a draft "Agreement on Cooperation for the Sustainable Development for the Mekong River Basin." It is expected that it will be approved and come into force in April 1993. The agreement has been drawn up on the principles of sovereign equality, territorial integrity, and environmental protection for using the resources of the Mekong River rationally and equitably. The agreement also allows for other riparian countries to become signatories should they desire and agree to the provisions of the agreement.

Under the agreement, the countries pledge to use, manage and conserve the resources of the Mekong River for such activities as irrigation, hydropower, navigation, fisheries, timber floating, recreation, tourism and flood control in a mutually beneficial manner. The agreement accords freedom of navigation along the main stream, and aims thereby to promote regional cooperation and development.

The concept of a Basin Development Plan will be used for promoting an emphasis on joint and basin-wide development projects. These projects will be formulated in accordance with the geographical properties of the basin, the rights and interests of all riparian countries, and the principles of sustainable development.

One of the prime concerns of the agreement will be to harness the destructive power of the river during floods. In light of this agreement, and following the record floods of 1994, the DDMFCSP is to prepare a floodplain management plan for the Vietnamese portion of the Mekong River. This plan will be developed in conjunction with the Mekong River Commission and in close cooperation with Cambodia.

### *4.2 Sustainable Disaster-Forecasting Systems*

In Viet Nam, the Hydrometeorological Service (HMS) is responsible for forecasting while CCFSC is responsible for issuing warnings. Efforts are being made to improve the sustainability of the forecasting and warning systems operated by both these organizations.

For forecasting, a sectoral support mission conducted by the World Meteorological Organization (WMO) in December 1994 sought to assess the status and determine the needs of hydrometeorological observing networks and services in Viet Nam. An executive summary of the WMO report is included in Annex E of the *Proceedings of the International Consultation.*

In line with the recommendations of the International Consultation, the WMO mission surveyed existing networks, data and information with an eye toward improving existing systems -- rather than developing new ones -- and facilitating information exchange and data sharing. The immediate priorities identified by WMO included the following:

- Improving the accuracy and effectiveness of the hydrometeorological observing networks through: equipping key hydrometeorological stations with modern observing equipment; establishing a limited number of Data Collection Platforms in mountainous and coastal areas; and establishing a hydrometeorological instrument repair and calibration facility.

- Establishing a national databank for processing, storing, and disseminating to end-users the existing and future data acquired by the hydrometeorological observing network.

- Strengthening the forecast and early warning capacity for floods and typhoons through establishing a network of storm detection weather radars and a ground system linked to existing high resolution meteorological satellites.

- Upgrading the Aeronautical Meteorological Service (AMS) at national and international airports.

- Providing training to meteorologists and hydrologists through both local and international fellowships, workshops and seminars.

To compliment this, the Government of Norway is funding the installation of a network of automatic oceanographic buoys off the north and central coasts of Viet Nam. These buoys will transmit via satellite real-time data on wave height and period, wind and current direction and speed, temperature, salinity, etc. This data will assist in making more

accurate and timely forecasts of storms and typhoons. (For more details of this system, see Tor Aamodt's presentation in the *Proceedings of the International Consultation.*)

Within the CCFSC, the Department of Dyke Management, Flood Control and Storm Preparedness (DDMFCSP) works closely with the offices of the Provincial Water Hydraulic Service to issue typhoon and flood warnings. These warnings are issued on four levels: (1) from the central offices to the provinces; (2) from the provinces to the districts; (3) from the districts to individual villages; and (4) from each village to individual households. Sustainable initiatives that are currently being implemented to improve this warning system include the use of computer networks for communications between the central office and the provinces.

However, additional initiatives (i.e. funds) are required to improve the typhoon and flood warning systems: (1) more secure telecommunications are required to withstand the effects of water disasters; (2) telephone and broadcasting systems are required to improve the district and village level warning systems; and (3) solutions, such as sirens based on water levels, are required in mountainous and remote regions.

The Government of Italy is funding a pilot remote water-level monitoring station at Hanoi. If this station works successfully during the next flood season, it could provide the basis of a more extensive flood-monitoring network.

All of these efforts point to a need for collaboration. It is a feature of water-disaster monitoring systems worldwide that there must be reliance on equipment and personnel from a number of organizations. Different organizations have different priorities for their hydrometeorological data needs, and it becomes expedient for them to have instrumentation which supplements that of the national weather service. Through sharing data and information, both accuracy and efficiency can be improved to the benefit of all threatened by water disasters.

As much as possible, forecasts should be done both locally, nationally and at the river-basin level. This redundancy would help improve the accuracy of the forecasts and ensure that there will be at least one organization issuing predictions.

The national forecaster has the advantage of having good access to regional data, while the local forecasters have better access to local information, and can issue predictions for more locations than the national forecaster. This arrangement also has the advantage that the two forecasters could compare, discuss and resolve their independent results. Additionally, in times of extremely severe weather when the resources of both forecasters were stretched, the predictions could be left to one agency, to enable the other to concentrate on other urgent problems.

### *4.3 Sustainable Disaster Mitigation of the Coastal Lands of Central Viet Nam*

A new project to upgrade the sea and estuarine dykes of Central Viet Nam, funded by the World Food Programme (WFP), illustrates well how to build the principles of sustainability into a disaster mitigation project. The coastal lands are subject to inundation from two directions: from the sea when storms and typhoons raise the level of the sea; and from the land when the runoff from the mountains causes the rivers to flood (Figure 3).

Losses from inundation by the sea can be very costly since seawater salinizes the soil and it can take several years to bring the land back into production. Furthermore, freshwater floods can reach very high levels and it is difficult to build dykes high enough to protect against them.

How can the land be protected against these two types of floods, most of which arrive within a few hours of each other? The adopted solution, developed over centuries, is simple and ingenious. Most of the high storm surges are generated by typhoons that reach inland past the coastline to the mountains beyond. The mountains then receive intense rainfall, much of which quickly runs off into the waterways, causing flash floods. Thus, even if the coastal lands are flooded by seawater because of a typhoon, this saline water is flushed out by a freshwater flood a few hours later.

The design of the dykes must therefore embody two principles. The dykes must protect against seawater intrusion by sea-level surges when there is no nearby typhoon, and they must be designed to facilitate flushing during typhoons (Figure 4). The non-typhoon surges will normally be lower than those generated by a typhoon hitting the coast close by, because they will mostly be generated by typhoons out to sea or striking the coast far away.

**FIGURE 3 PROCESSES OF FLOODING IN THE CENTRAL REGIONS OF VIET NAM**

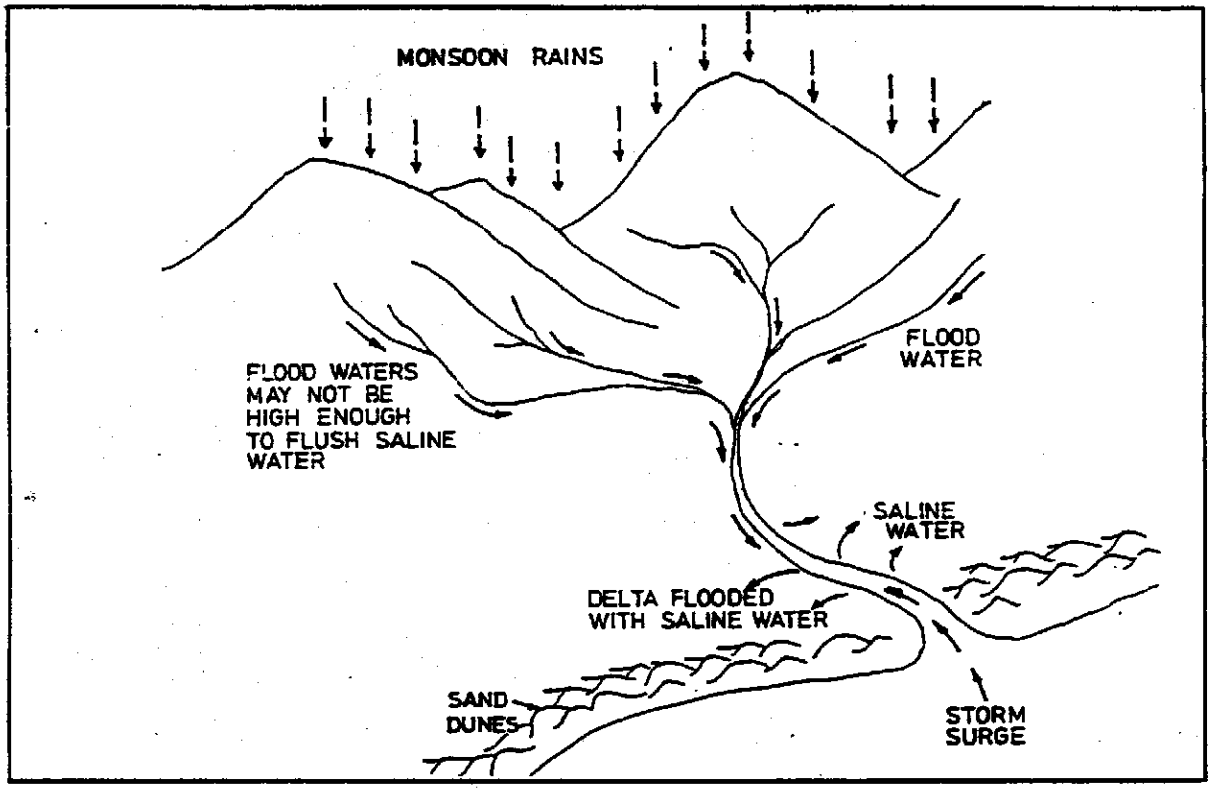
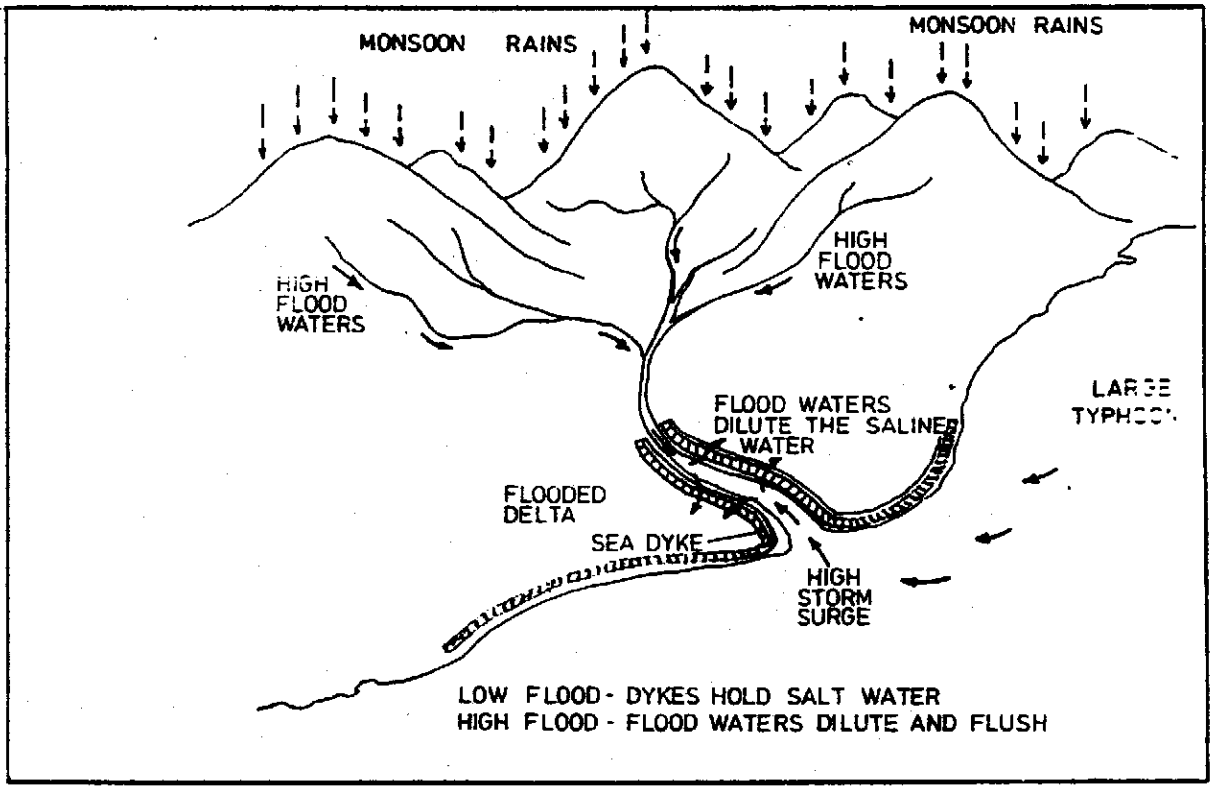



**FIGURE 4 LAYOUT OF SCHEME TO REDUCE FLOODING FROM THE SEA**



In effect, the design is based on the principle that structures to protect against riverine flooding would not be sustainable even though this would enable an extra crop to be grown during the typhoon season. However, smaller structures which allow for overtopping during and after typhoons can be more readily maintained by the local people.

## 5. Other Issues that Have Arisen

A number of other issues have come into greater focus during the past several years. They include increased recognition of the importance of landuse management, watershed management, information exchange, emergency relief and response, and collaboration with the Ministry of Energy.

### *5.1 Landuse Management and Legislative Framework*

The promulgation of the new Statute on Dyke Management described in the *Strategy and Action Plan* has enabled the authorities to enforce the removal of floodway dwellings which were built on illegal landfill at Hanoi.

However, this has not yet been sufficient to overcome the problem of the houses built too close to Hanoi dyke at West Lake. Up until recently, some people were allowed to build large houses right next to or, in some cases, on top of the dyke. In a few cases, some of these adjoining landowners have even dug into the dyke to make extra rooms or even artificial caves. This substantially weakens the dyke, and the threat to the security of Hanoi that it poses has prompted government moves to restore the safety of Hanoi dyke.

This new statute has also not yet been effective in slowing the construction of new housing in the floodway areas between the dykes, both at Hanoi itself and in Gia Lam on the left bank of the Red River opposite Hanoi. Clearly, these new developments are not sustainable. These issues illustrate the need to develop and enforce Viet Nam's water laws to enable the Ministry of Water Resources and other authorities to avoid unwise development and to rectify any breaches of safety expeditiously.

### *5.2 Watershed Management*

There have been increasing calls for greater emphasis to be placed on watershed management. It is recognized that unless watersheds are managed wisely, the efforts at mitigating flood losses will become more and more difficult.

Improved watershed management will entail a high level of cooperation between three key ministries: Water Resources, Agriculture and Forestry. There is already good cooperation between the DDMFCSP and the Department of Land Management in the Ministry of Agriculture. This cooperation needs to be built on by extending it to other departments in the respective ministries and by strengthening the links with the Ministry of Forestry.

At the same time, it should be recognized that some of the impediments to good watershed management are sometimes culturally and/or institutionally based. Thus changes are needed not only in economic activities but in cultural practices and institutional arrangements as well. Such changes need to be planned to ensure that people are provided with the means of sustaining, and where possible augmenting, their incomes without having to cut down or burn vegetation to make room for agricultural production.

To promote these ideas, it will be important to employ social scientists who can advise on how best to develop these changes with minimal disruption to the upland communities. Other skills will also be needed for this multi-disciplinary task. An important strategy may be to base the educational campaigns as much as possible on the languages, customs, and traditional world views of each ethnic group. As well, geotechnical engineers, geomorphologists and soil scientists will be needed to help determine areas of greatest risk from landslides, mudflows and soil erosion.

Since watershed management is one of the most cost-effective strategies for mitigating water disasters, it needs to be given a high priority.

### *5.3 Improving the Flow of Information on Water Disasters*

As Viet Nam becomes more fully integrated into the world economy and has greater access to modern, high-speed telecommunications technologies, the need for better flows of information has increasingly been recognized. International donors and lenders require complete, consistent and accurate data upon which to base their investments. For disaster-relief efforts in particular, such data needs to be provided quickly as well.

Improved information exchange will require several concurrent strategies. First, the Disaster Management Unit as discussed above has already

been established. One of the mechanisms to be set up and managed by the DMU will be a centralized database, with regional links, on disaster-management issues, projects, statistics, etc.

The centralized database will be the basis for providing bulletins, newsletters, technical reports, and information notes to the international relief community in a timely manner. Professionals will be able to access the DMU database via a computer and a modem from anywhere in the world. The regional links will enable the provincial officials to rapidly transmit disaster assessment reports to the CCFSC for prompt action and decisions and to the DMU for dissemination to the professional relief community.

Second, a new policy is expected to be promulgated by the State Planning Committee that will require the executing agencies of all water-disaster projects funded with foreign aid to provide reasonable access to the information collected and/or generated by the project. One of the roles of the DMU will be to monitor, collate and disseminate this information.

### 5.4 *Emergency Relief and Response*

The increasing need for improved information exchange is perhaps most apparent during emergencies themselves. It is well known that the losses after most disasters exceed those during the event itself. Thus it is essential to improve the effectiveness of emergency relief and emergency response: the sooner the relief and response effort commences, the fewer the losses will be. Therefore, it is vital that information on these disasters is collected and transmitted as quickly as possible by local officials. Such information must meet both national and international needs. It must be consistent in content and format, timely, accurate, specific, verifiable, simple to compile by busy local officials, and designed for each type of disaster and for each region.

Consistency and accuracy in information exchange is particularly important in Viet Nam considering the number of organizations involved in emergency relief and response for water disasters. These include SPC, CCFSC, VNCIDNDR, Ministry of Finance, DMU, NGOs and others depending on the nature of the disaster.

In order to help plan for emergency relief and response, the responsibilities, lines of communication and key officers should be set out, bearing in mind that these will change with different phases of the disaster cycle and the nature of the disaster.

In addition, plans for emergency relief and response will need to build in flexibility, since it will only be immediately after the event that the focal officers, the requirements for relief and response, and the roles of each organization can be determined.

Finally, the role of the respective Committees for Flood and Storm Control might usefully be reviewed. As much as possible, the members of these committees should be lay people with strong stakes in the effectiveness of strategies for mitigating the water disasters in their area. As well, they should be regularly brought up-to-date with the latest techniques and should be capable of acting as effective links between all parties, from the people themselves to government officials and government politicians.

### 5.5 *Improving Collaboration with Ministry for Energy*

A final development since the original publication of the *Strategy and Action Plan* has been the improved collaboration between the Ministry of Water Resources and the Ministry of Energy. A notable example of this is the cooperation in determining the flow to be released from Hoa Binh Dam on the Da River, a tributary of the Red River.

During the rainy season, the two ministries confer on the discharge to be released downstream. This was successful in 1994 in keeping the flows below the serious flood levels at Hanoi. However, it also resulted in the dykes being subjected to relatively high water levels for an extended period. As a result, the dykes failed in several places, even though the water levels were lower than in many previous years when the dykes did not fail.

To avoid such problems in future, it will be necessary to assess the risk of dyke failure in greater detail to work out the economically optimal release program for Hoa Binh Dam for a range of scenarios.

In addition, more attention is being paid to the problem of interrupted sediment flows that result from the construction of hydro-electric dams. Reduced sediment flows often result in environmental damage downstream (e.g., erosion of river banks and coastlines).

## 6. Progress with and Challenges for the Strategy and Action Plan

Given the progress already made in the short period since publication of the *Strategy and Action*

*Plan*, one can conclude that it has been unusually successful thus far. The challenge will be to maintain the momentum. With the current organizational arrangements, this depends to a great extent on the staff of the key agencies involved in mitigating water disasters. With an inevitable turnover of staff, it may be difficult to keep up the enthusiasm and drive to mitigate water disasters. As discussed previously, the more successful one is at mitigating water disasters, the less political pressure -- and ultimately funding -- there may be for this work. This may be the crucial problem to solve in the second half of the International Decade for Natural Disaster Reduction.

In a broader sense, the most important goal is to promote sustainable natural resource management, of which water-disaster mitigation is only one part. The development of watersheds, floodplains and coastal areas must meet the needs of today's generation but not inhibit future generations from meeting their needs as well. One of their needs will be to remain protected from the disasters that can result when severe natural phenomena encounter inappropriate human developments.

To this end, the *Strategy and Action Plan* and this First Update provide a blueprint for water-disaster mitigation. It is expected that further updates will follow regularly. Only then will the *Strategy and Action Plan for Mitigating Water Disasters in Viet Nam* be sustainable.

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