2 AVAILABLE DATA AND INFORMATION

2.1 Natural Disaster Mitigation

(1) Strategy & Action Plan for Mitigating Water Disasters in Vietnam

A *Strategy and Action Plan for Mitigating Water Disasters in Vietnam* was initially prepared in 1994 with the assistance of the United Nations Development Programme (UNDP), the UN Department of Humanitarian Affairs (DHA) and the then Ministry of Water Resources of Vietnam, which was subsequently to become the Ministry of Agriculture and Rural Development (MARD).

At the time, due to the rapid social, economic and technical changes taking place in the country a new approach to the mitigation of water disasters in Vietnam was required. In order to gain a better understanding of the problems involved an international workshop entitled *Flood Mitigation, Emergency Preparedness and Flood Disaster Management* was held in Hanoi in June 1992. The results of that workshop produced the initial Strategy & Action Plan which was later updated in 1996 with the publication of a report outlining progress to date on implementation of the Action Plan and modification to the Strategy. The Strategy identified the three main task areas of flood forecasting and warning systems, preparedness and mitigation, and flood emergency relief and response planning.

The Action Plan originally presented in the *Strategy and Action Plan* and later updated, included the following seven activities:

1) Alert government to importance of water disaster mitigation.
2) Enhance mandate of Typhoon and Flood Control Committee.
3) Establish Disaster Management Unit (DMU).
4) Establish working relationship with other programs.
5) Establish networks between related water disaster projects.
6) Commence a public relations campaign inside Vietnam.
7) Set up training programs.

To date the first three of these activities have been successfully completed with all remaining activities currently in progress. Although not officially ratified it is understood the strategy and action plan outlined above is the policy of the Vietnamese Government and as such can be taken as the *National Strategy & Action Plan for Mitigating Water Disasters in Vietnam.*

(2) Floods of November & December 1999

Historic floods occurred in the central provinces of Vietnam in the last

weeks of 1999, occurring in early November and four weeks later in early December, following heavy cyclonic rains in the region. Flood waters in seven provinces caused large areas of inundation, resulting in loss of life, extensive physical damage and total economic loss. For the November flood the most affected provinces were those from Quang Tri to Quang Nam and for the second flood event, occurring one month later, the provinces from Thua Thien-Hue to Khanh were mainly affected. Of all the provinces Thua Thien-Hue was to sustain the highest number of casualties and the greatest amount of damage. It was also affected by both floods.

As reported by the Central Committee for Flood and Storm Control (CCFSC) massive flooding with peaks surpassing Alarm Level III by 0.5 to 1.0m occurred on most rivers in the flood-affected areas. The four official flood alarm warning levels used by the Vietnam Standing Office of the CCFSC are indicated in the following table:

Flood Alarm Levels Used in Vietnam

Alarm Level I	*Possible Flood Condition* – River water level is high; threat to low height embankments; flooding of very low lying areas.
Alarm Level II	*Dangerous Flood Condition* - Floodplain inundation; expect towns and cities to be generally protected by flood defences, high velocity river flows pose danger of bank and dyke erosion; bridge foundations at risk from scour.
Alarm Level III	*Very Dangerous Flood Condition* – All low lying areas submerged, including low lying areas in cities and towns; safety of river protection dykes in jeopardy; damage to infrastructure begins.
Alarm Level III+	*Emergency Flood Condition* – General and wide spread uncontrollable flooding; dyke failure a certainty and probably uncontrollable; damage to infrastructure is severe.

Flood water levels on some rivers surpassed historical flood levels. In Thua Thien-Hue province the flood water level on the Bo River at the Phu Oc gauging station was at 5.18m (0.29m above the historical flood level in 1983). Flood water levels on the Huong River at the Hue gauging station were at 5.94m (1.06m above the historical flood level in 1983 and 2.94m above Alarm Level III). The flood water levels on the Huong River rose rapidly, at its highest recorded rate, approximately 1m per hour during the peak of the flooding.

(3) CPI–Central Provinces Initiative to Mitigate Natural Disasters in Central Vietnam

As a direct result of the devastating floods that occurred in Central Vietnam at the end of 1999 a series of disaster mitigation initiatives were instigated by several Government authorities and the Vietnam international donor community. The most important of these was the initiative led by the Ministry of Agriculture and Rural Development (MARD) in association with the United Nations Development

Programme (UNDP) and the Royal Netherlands Embassy, to form a strategic partnership to mitigate natural disasters in Central Vietnam. This was to become known initially as the Central Provinces Initiative Partnership (CPI-Partnership).

The first step in the development of this partnership was a Fact-finding Mission to Central Vietnam in January 2000 with the specific task of preparing Terms of Reference for more in-depth studies for a multi-donor mission to design the partnership, which was to follow later. Coupled with these activities was a Natural Disaster Lessons Learned Workshop for representatives of all provinces affected by the floods. The workshop was held in March 2000 in Da Nang City and the subsequent Multi-donor Mission, to the Central Provinces took place in May 2000.

(A) Fact Finding Mission January 2000

A joint Netherlands-UNDP mission took place in January 2000 and included senior officials of the Disaster Management Unit (DMU) of the Ministry of Agriculture and Rural Development (MARD). The mission involved initial meetings with relevant ministries in Hanoi followed by field visits to five of the most flood-affected provinces for site inspections and discussions with provincial leaders and local inhabitants.

In general the mission found the information available to both provincial and local authorities and the community on likely flood levels and their expected time of occurrence was inadequate and that existing flood warning systems need to be upgraded and disaster-proof communication systems provided for. It concluded that an *Integrated Natural Disaster Mitigation Policy* for Central Vietnam should take into account theses shortcomings and involve both structural and non-structural measures. Non-structural measures are people orientated activities and would include such aspects as:

- Enhanced disaster response emergency planning.
- Disaster area mapping and zoning.
- Disaster warning systems.
- Grassroots commune and village disaster preparedness training and planning and other similar programs.

Structural measures are construction orientated activities and would include such aspects as;

- Existing reservoir and dam safety.
- River and estuary dykes.
- Coastal erosion protection.
- Estuary and port dredging.
- Salt water intrusion barriers.

Two important issues were identified by the Fact-finding Mission and recommended for implementation at an early date. These concerned the preparation of flood inundation maps indicating areas inundated by the 1999 floods and the provision of improved flood forecasting and warning systems in the central provinces. In all provinces visited the instrumentation and procedures for data analysis and dissemination of timely and accurate warnings were found to be quite inadequate.

(B) Natural Disaster Lessons Learned Workshop – Da Nang March 2000

As part of the process in the formulation of the Central Provinces Initiative to Mitigate Natural Disasters in Vietnam, a local workshop entitled *Natural Disaster Lessons Learned Workshop* was held in Da Nang city in March 2000. The main purpose of the workshop was to gather grassroots experience and to understand grassroots needs for the mitigation of natural disasters in Central Vietnam. It was attended by all relevant stakeholders, including members of the Fact-finding Mission and relevant officials from the Central Government, provinces and districts. Each of the flood-affected provinces presented papers at the workshop detailing their own specific experiences and lessons learnt as a result of the floods of 1999.

Many of the points and issues raised at the workshop confirmed the findings of the Fact-finding Mission. The workshop emphasised the need to raise public awareness and to enhance the adaptability of the local community to natural disasters and proposed amongst other measures the following:

- The communities life should be organized in such a way that it can adapt readily to disaster development. It should, for example be prepared at all times during the flood season to receive forecasts and to maintain all necessary contingency measures and activities at a state of alert such as adequate food supplies and evacuation plans in case of impending floods.
- Flood inundation maps should be compiled and water gauging stations in each area should be built to raise people's awareness, so that they can actively prepare for possible disasters.
- As a matter of urgency it is necessary to implement new projects to upgrade and reconstruct schools and clinics in flood-prone areas to at least two storey levels, to ensure their function continues during times of flooding. These schools and clinics would have a dual purpose and serve as safe havens for people to go to during floods.
- It is necessary to further disseminate knowledge about floods and typhoon storms through audio visual aids such as mass media,

seminars and leaflets, so that people can understand and take initiatives in effective flood control and flood damage mitigation. Top priority should be given to improvement of infrastructure to create the most favourable conditions to receiving weather information, in order to pass accurate forecasting warning messages to the community and give guidelines for storm and flood control and emergency response in the areas, from the provincial level to local levels and vice-a-versa.

(C) Multi Donor Mission

The Terms of Reference prepared by the Fact-finding Mission was used by the Ministry of Agriculture and Rural Development (MARD) in joint co-operation with the United Nations Development Programme (UNDP) and the Royal Netherlands Embassy, to plan and co-ordinate a multi-donor mission. The mission was fielded to the Central Provinces in May 2000 with the overall purpose of assisting the Government of Vietnam and the international donor community in identifying natural disaster mitigation projects and programs that could be supported to provide timely natural disaster mitigation, including floods and storms. A significant amount of proposed natural disaster mitigation project information was made available and in excess of 230 projects were in the end discussed, recommended or otherwise identified during the course of the mission. A delineation between non-structural and structural programs was made and the following table indicates how projects were clustered into comprehensive programs.

Program Classification for Non-Structural and Structural Natural Disaster Mitigation Programs

Non-Structural Programs	Structural Programs
1. Disaster Management Planning	1. Reservoirs (Rehabilitation/Construction)
2. Disaster Preparedness	2. River Control
3. Flood and Inundation Mapping	3. Rural Infrastructure
4. Relocation Planning	4. Irrigation and Drainage Systems
5. Environmental Sustainability	5. Water Supply
6. Floodplain Management	6. Sandy Area Development
7. River Basin Management	7. Coastal Facilities
8. Port Authorities	8. Salinity Dams and Dykes
9. Watershed Management & Reforestation	9. Coastal Structures
10. River Basin Master Planning	10. Aquaculture, Fisheries and Agriculture

The project clustering scheme given in the above table provided a practical framework to group projects into programs. It is compatible also with the national disaster mitigation policy of the Vietnamese Government mentioned previously.

A donor meeting and briefing on the Multi-donor Mission was held in

June 2000 to introduce the Partnership to donors and the mission report was prepared in September 2000 giving details of the Partnership. The report has since been widely disseminated to all relevant parties and is currently available to the public via the Internet.

(4) NDM–Partnership (Natural Disaster Mitigation)

To make the name more appropriate, in early 2001 the CPI-Partnership changed it's name to the NDM-Partnership and although it still refers to a Natural Disaster Mitigation Partnership for Central Vietnam, it is an important step in preparation for the time when the Partnership will encompass the whole of Vietnam. Any reference made previously to the CPI-Partnership in this report should be read as the NDM-Partnership.

The Multi-donor Mission final report, discussed in the preceding section, identified programs and projects that should be implemented to mitigate natural disasters in Central Vietnam. These included disaster preparedness, disaster warning capabilities, response-relief-rehabilitation measures and included both structural and non-structural projects and programs. As discussed, to implement these an institutional framework was required which would be provided by the NDM-Partnership. The Partnership would create the opportunities for Government, Donors and NGO's to work together to solve one of the most pressing development issues in Central Vietnam, that of how to mitigate natural disasters that are preventing sustainable development, in what is one of the poorest regions of the country.

During 2001 the Multi-donor Mission final report was to form the basis for the Government, Donors and NGO's to partner together to mitigate natural disasters. It resulted in a Memorandum of Agreement (MOA) for a Natural Disaster Mitigation Partnership for Central Vietnam being drawn up, as recommended by the final mission report. The MOA was later endorsed by the Government, Donors and NGO's at the Consultative Group (CG) meeting in Hoi An on 19th June 2001.

To date (March 2002) most of the recommendations made for the future of the NDM-Partnership by the Multi-donor Mission have been successfully completed or are in the process of being executed, including the establishment of a project office in central Vietnam (Da Nang City), to allow programs to be implemented at the regional level.

All natural disaster mitigation (NDM) activities are now successfully focussed through the NDM-Partnership, working under the umbrella of the MOA ratified by the Government, Donors and NGO's and seven of the central provinces including that of Thua Thien-Hue province. Each of these provinces have selected three priority projects for natural disaster mitigation to be considered by the Donors and NGO's for Partnership

implementation. For Thua Thien-Hue province, projects concern upgrading of dykes and canals and the relocation of flood-affected communities including the provision of infrastructure. The projects were selected on the basis of urgency, reasonable small size and readiness for implementation. This current project for the preparation of a comprehensive management plan for the Huong River Basin was one of the many projects originally selected by the partnership for implementation.

The recently completed Asian Development Bank Water Resources Investment Strategy for the Central Region (CVWRIS) also gave a ranked list of potential water resources projects proposed by the provincial authorities. It used as a criteria poverty reduction, economic growth and environmental considerations and compared the CVWRIS selected projects with those identified by the NDM-Partnership and found most of the structural NDM projects appearing. Although selection criteria are different, with the NDM projects targeting urgent disaster mitigation measures, the basic philosophy of both are similar with poverty alleviation taking prime importance. The NDM objectives are based on the consideration that natural disasters have the most impact on the poorest section of the community and any projects that would assist in the mitigation of these disasters would in turn assist in poverty alleviation.

3 FORESTATION PLAN

3.1 General

Generally forest has the following functions related disaster mitigation.

- to conserve the water
- to reduce soil yield by leaf or branch protecting from the impact of raindrop
- to prevent collapsing the slope of mountain by root expanding on the earth

Huong river basin have forest 40%, grassland and shrub 30% as the result of satellite image analysis. As most of land covered with some vegetation in Huong river basin, it is expected to effect flood control for changing land use from grassland to forest. According to the orientation of flood control planning in the middle of Vietnam (code:4241 QD/BNN-KH) issued on December 2001 by MARD, afforesting on the bare hills is recommended one of the solutions to flood control in Thua Thien Hue province. On the one hand Vietnam government is carrying out afforestation scheme named "Program 661", forestation plan can contribute to Program 661.

3.2 Objectives

To contribute for reduction of runoff and other function by planting the tree or care the forest.

3.3 Present Condition of Huong River Basin

Huong river basin is divided three catchment area which are Bo river basin, Huu Trach river basin and Ta Trach river basin. (see Figure C.1, Figure C.2) Present condition of vegetation in Huong river basin can be grasped by using vegetation map or satellite image of current and past.

(A) Satellite image

Satellite image on Jan.1989 and Jan.2001 are shown Figure C.3. Most of hilly area is covered with some vegetation. It can be seen to expand village area in headwaters of Ta Trach river basin and boundary of LAO. In other river basin drastic changes can't be seen except some small reservoir.

(B) Vegetation map

Vegetation map in 1969 and 2000 are shown Figure C.4. It shows the reduction of the dense forest in 30years and Ta Trach river basin covered with shrub with scattered wood trees conspicuously. Generally the reason of reduction is caused by the war(usage of chemical weapon), cutting for firewood by the

villager, fire in mountain, and land reclamation for agriculture. In the vegetation map 1969, the area along the national road 1 has already been covered with brush wood, it can think influence of chemical weapon. But chemical weapon sprayed whole of the hilly or mountain area in Huong river basin as shown Figure C.5, it is not clear. In 1920's Bach Ma national park was known deserted forest, climate reason such as drought, influence of dry hot wind from west can think. It is difficult to found out the reason. Anyway current condition of mountain area is covered with any kind of forest.(see Figure C.6) and bare land can not be seen, therefore soil erosion doesn't occur terribly. But Ta Trach river basin is mainly covered with shrubs with scattered wood trees, runoff is expected to the river from the mountain promptly.

(C) Forest map

Forest map in 1999 given from Forest Development Department in province are shown Figure C.7. Bare land are expanded at middle and headwaters of Ta Trach river which are Huong Thuy, Nam Dong district and middle reaches of Bo river which are Huong Tra, Phong Dien district. Bare land and capable area by district made by DARD in Thua Thien Hue are shown Table C.1. In Thua Thien Hue province there are 132 million hectare of bare land, department estimated that 103 million hectare is capable forest.

(D) Climate

According to the result of study by Forest Development Department, Huong river basin shall be divided several zone.(see Figure C.8)

Ia : This area consists of plain and low hills in Phong Dien, Quang Dien, Huong Tra, Phu Vang, Huong Thuy district and Hue city.

Climate characteristic: Temperature is high and rainfall is low in province. Average temperature is 24 to 25 degree, in summer it reach up to more than 40 degree, in winter it is under 10 degree. Annual rainfall is from 2600mm to 2800mm.

Ib : This is plain area from Phu Bai to Truoi and located transition zone between Ia and Ic. So characteristic is similar with Ia except rainfall and humid. Annual rainfall is from 2800mm to 3200mm.

Ic : This is plain and lagoon area in Phu Loc district. Temperature is similar with Ia, but rainfall is much. Annual rainfall reached up to 3200mm.

IIa : This is hilly area. Temperature is lower than area I and annual rainfall is 2800mm to 3200mm. Rain season is from May to December.

IIb : This zone located in Nam Dong valley. Average temperature is 24 degree and annual rainfall is from 3200mm to 3600mm. This area is influenced

strongly by the dry and hot west wind. Highest temperature reached up to 41 degree in summer, lowest is under 10 degree in winter

IIc : This zone located in Bach Ma mountain. Average temperature is 18 to 22 degree and annual rainfall is over 3600mm. This area is highest rainfall in Vietnam and annual rainfall is up to 8500mm(by Mr. Huynh Van Keo, 1999).

IId : This zone located in A Luoi. Average temperature is under 20 degree and annual is over 3400mm.

IIe : This area consist of high mountain area in Dong Ngai. Characteristic is similar with IIc and average temperature is 18 to 22 degree and rainfall is 3400 to 3600mm.

3.4 Organization and Management

Forest classified three type which are production forest, protection forest and special use forest as below.

Classification of forest

forest	function
Production forest (SX)	wood, bamboo, worthy trees
Protection forest (PH)	water conservation, prevention sand erosion of beach by wind
Special use forest (DD)	national park, nature conservation, enviromental preservation

Basically DARD is engaged to management and development of the forest, special use forest are managed by MARD. Forestry organization chart related Ta Trach river basin are shown as Figure C.9. There are 11 forest farm in province.(see Figure C.10) Forest farm grasp the condition of each forest by forest management map and list as shown Figure C.11.

3.5 Past Executed Forest Project

Program 661 (5 Million Hectare Reforestation Program)1998-2010

Target of this program is to recover the forest area to 14.3 million hectare in 1943 from1998 to 2010. It is necessary for reaching target to afforest 5 million hectare which consist of productive forest and preventive forest or special usage forest 3million hectare and 2 million hectare each.

Aim to afforest are as below:

- Afforestation are contributed to environmental preservation, disaster mitigation, water conserve and preservation of biological hereditary

resources.

- Afforestation works create opportunity to job, which connected with eradication of starvation, exclusion of poverty and improvement of income of inhabitants in mountain area.
- The supply of raw material which are pulp and wood contribute to social economic development in mountain area.

100,000 hectare are assigned to Hue province.

Program 327 (1993～1998)

This is the past program of Program 661, which consist of preservation of existing forest and afforestation. About preservative forest state trust the management to local inhabitants, afforestation were executed by private company, public corporation, farmer, international organizations, non-government organization, and official development aid.

Aim to afforest are as follows:

- To improve the farmer's living level
- Effective use of land
- Strength of state security
- Mitigation of huge disaster
- Contribution to the protection of the ecosystem
- Continuously protection of the water source by state

Others

PAM(4603), which is forestry program executed by UNDP from 1993 to 1996 planted various kind of tree total 7,700ha. VIJACHIPS, which is also forestry program cooperated between Vietnam and Japan planted eucalyptus and acacia 2,400ha area in Hue province. NAV(Nordic Assistance to Vietnam) implemented rural development project at Nam Dong district.

3.6 Existing Scheme

According to the information of forestry development department and BirdLife, there are some project under going in province as below.(see Figure C.12)

A Sap river basin forest project (tentative name)

Study area is expanding to A Luoi district and along the national road 49. Detail information such as title of project, exact location, purpose, kind of

trees is not clear, but project area estimated 5,000ha and donor is expected JBIC.

Phong Dien Nature Reserves

Feasibility study of Nature Reserves was executed by Forest Inventory and Planning Institute(FIPI) and BirdLife International Vietnam Programme on May 1999. Project area(34,400ha) located west of province, which belongs to Phong Dien district.

Bach Ma national park

In 1925, a proposal was made to create a 50,000ha national park in the Hai Van region, in order to protect Edwards' Pheasant. In 1990, an investment plan was prepared, which defined a 22,031 ha national park and approved by decision of chairman of the council of ministers, dated 15 July 1991. BirdLife and FIPI proposed a 22,500ha extension to the east in order to extend the conservation coverage of the national park.

5Million Ha Reforestation Program (5MHRP) partnership

Before the 5MHRP partnership established, aid was disturbing without adjustment. For example some organization or country executed similar project at same place. Considering above situation, Vietnam government agreed the Partnership with 19 donor community, international organization and non-governmental organizations, which are UNDP, EC, FAO, WB, ADB, JBIC, JICA, WFP, WWF, IUCN, the Netherlands, German, Finland, Sweden, Switzerland, Bird Life, Care International, Oxfam GB and SNV) Principle shows Table C.2.

3.7 Recommendation

Plantation area

Basically whole area of river basin should be covered with protection forest except inhabitants area and place to plant with difficulty. It means that shrub indicated vegetation map 2000 change to forest as shown Figure C.13.

Kind of tree

Kind of tree shall be selected to refer to the trees planted before in Hue province or decision, which are shown as Table C.3, Table C.4 Mainly, pine tree, eucalyptus and acacia were planted before.

3.8 Future Subject

- Proposed reforest area or kind of tree should be decided to confer with Hue university, related ministry, people's committee and the 5MHRP

Partnership.

- Actual place in reforestation plan shall be made under the rural development plan, resettlement scheme and plan related land use, if they exist.
- Proposed reforestation area are recommended bare land, agricultural field unused by resettlement or natural, the slope less than 30 degree and the place without difficulty.
- Kind of tree to be planted shall be selected considering harmful effect of mono forest which plant only one kind of tree and nature regeneration.
- Soil investigation such as soil surface thickness, shall be carried out at the several point of proposed reforestation area.
- Care forest, monitoring are also important works continuously.
- As mine placed under the ground during the war still exist, ask dangerous place for district people's commune and village people when investigation or project are carried out.
- As chemical weapon such as agent orange was used during the war(1961-1975), related information shall be collected, if there are.

Table C.1 Statistic data of capable forest and bare land in Thua Thien Hue province in 2001

unit : ha

district	capable forest	bare land total	Ia	Ib	Ic	sand land
total	**103,637.9**	132,055.2	**19,685.7**	**53,908.5**	**48,475.2**	**9,985.8**
H.Phong Dien	29,035.2	**36,465.6**	2,898.4	19,275.2	6,275.6	8,016.4
H.Quang Dien	317.4	**352.7**				352.7
TP Hue	9.7	**9.7**	9.7			
H. Phu Vang	1,095.5	**1,226.6**		290.5		936.1
H. Huong Tra	15,260.7	**19,734.5**	4,863.0	9,811.6	4,999.9	60.0
H. Huong Thuy	8,606.4	**11,269.8**	2,629.3	5,607.3	3,033.2	
H. Phu Loc	6,421.5	**7,498.2**	1,274.5	2,746.2	2,856.9	620.6
H. A Luoi	28,215.4	**38,312.9**	4,420.7	15,262.7	18,629.5	
H. Nam Dong	14,676.1	**17,185.2**	3,590.1	915.0	12,680.1	

note : I a grass, banana forest

I b bamboo, scattered wood trees

I c reborn forest (heght >1m, density >1000trees/ha)

Table C.2 Principle for Forest Sector Co-operation including Partnership (sighned on 12th November 2001)

1. Work towards harmonization of FSSP(Vietnam Forest Sector Support Programme) goals, objectives and implementation direction with wider Government policies, plans and programs in a mutually beneficial dialogue.
2. Work towards an effective decentralization of the planning, programming and implementation of activities.
3. Ensure optimum representation of all stakeholders and beneficiaries.
4. Take practical measures to ensure equitable program implementation.
5. Support strategic approaches to implementation that rely on maximum use of market based mechanism and restrained, responsible and strategic use of subsides and grant-based inputs.
6. Support the integration of biodiversity and environmental values into the forest sector and other economic development sectors.
7. Development effective management of forest based on the principle of sustainable use.
8. Establish effective linkages with economic/rural development, poverty alleviation and natural disaster mitigation program and policies.
9. Development and apply joint working mechanisms allowing optimum transparency in FSSP implementation.
10. Use the fora and other means of communication available to it generate a continuous and open dialogue in relation to FSSP goals, objectives, implementation direction and progress.
11. Retain flexibility and learn from shared experience within the FSSP.
12. Work through existing Government of Vietnam implementation mechanism.
13. Operate joint review, reporting and auditing systems.
14. Support development of both progress and impact-orientated monitoring and evaluation system.
15. Utilize optimal mechanisms and tools for effective administrative and information management.

Table C.3 Trees planted in Hue province

capital	Total (ha)	planted trees (ha)											
		・resin pine	pine	・caribean pine	・resin pine ・acacia	eucalyptus	・eucalyptus ・acacia	acacia	casuarina	cinnamon	・native tree ・acacia	・native tree	・fruit tree
State owned 1976-1992	**4,635**	3,610	501			472		33			19		
Non-state owned 1976-1992	**14,837**	4,132	18	19	52	4,562		3,923	1,630	203	299		
PAM (4306) 1993-1996	**7,559**				234		3,542	3,136	579			40	27
forestry, agricuture, industry 1993-1996	**4,273**	237	198	209	1,100	11	109	1,156			691	557	4
VIJACHIP 1993-1996	**2,401**					588	1,813						
Forest farm	**168**				52			73		23		21	
Bach Ma national park 1993-1996	**768**							344			203	221	

Table C.4 Sample of planted tree in Vietnam

(decision 03/2001/QD-TT dated 5/1/2001)

growth speed		Scientific name	Local name
15years	slow	Chukurasia tabularis	Lat hoa
		Pelthphorum tonkinensis A.Chev.	Lim xet
		Erythrophl oeum fordii oliver	Lim xanh
		Hopea sp.	Sao da
		Dipterocarpus baudii Korth	Dau bao
10years	medium	Syzygium jambos Alston	Gioi
		Liquidambar formosana Hance	Sau sau
		Khaya senegalensis Juss.	Xa cu
5years	fast	Manglietia glauca Bi.	Mo
		Pinus dalatensis De Ferre	Thong Da lat
		Cunninghamia lanceolata Hook.	Sa moc
		Casuarina equisetifolia Forst.	Phi lao
3years	very fast	Eucalyptus citriodora Hook.f.	Bach dan
		Styrax tonkinensis Pierre	Bo de
		Leucaena leucocephala De Wit	Keo dau
		Pygeum arboreum Endi.	Xoan dao

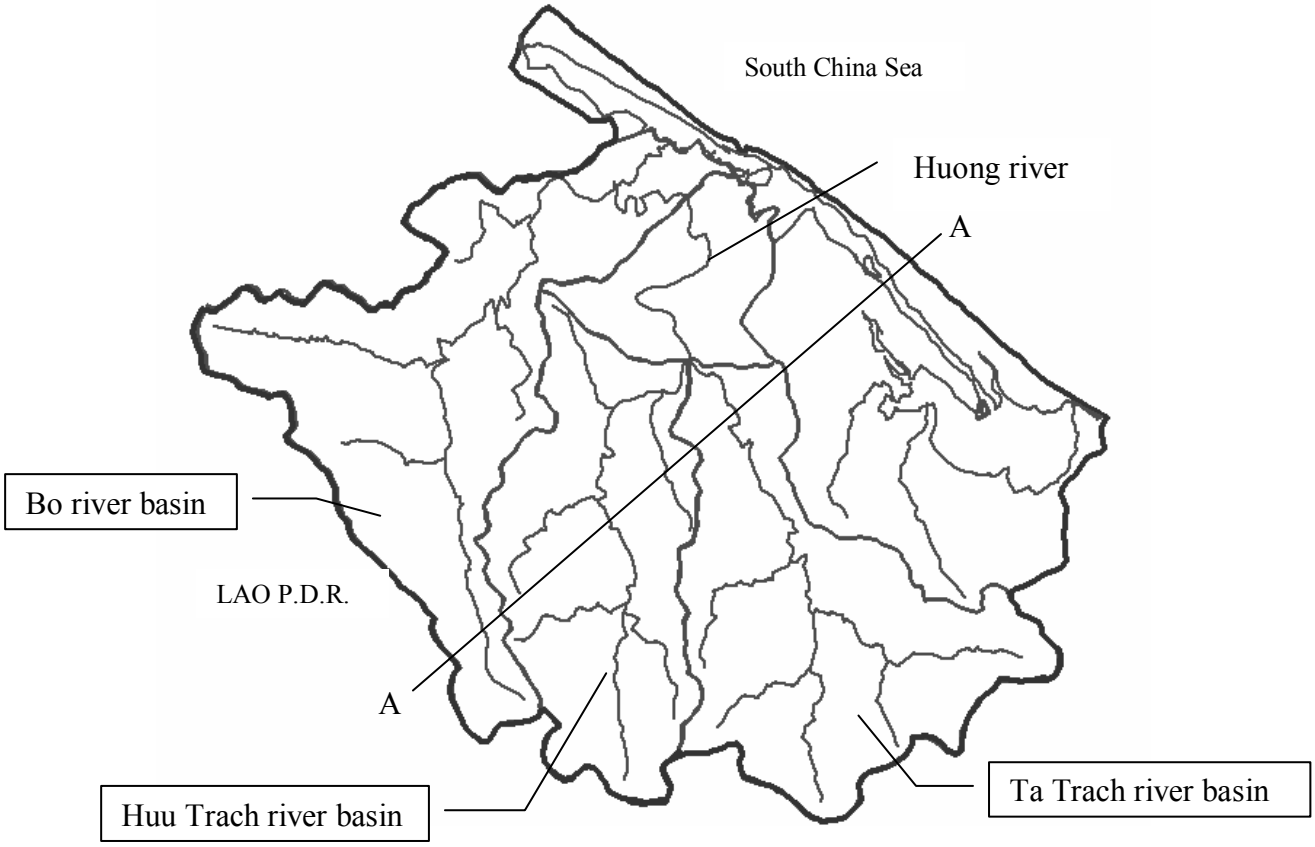


Figure C.1 Huong river basin

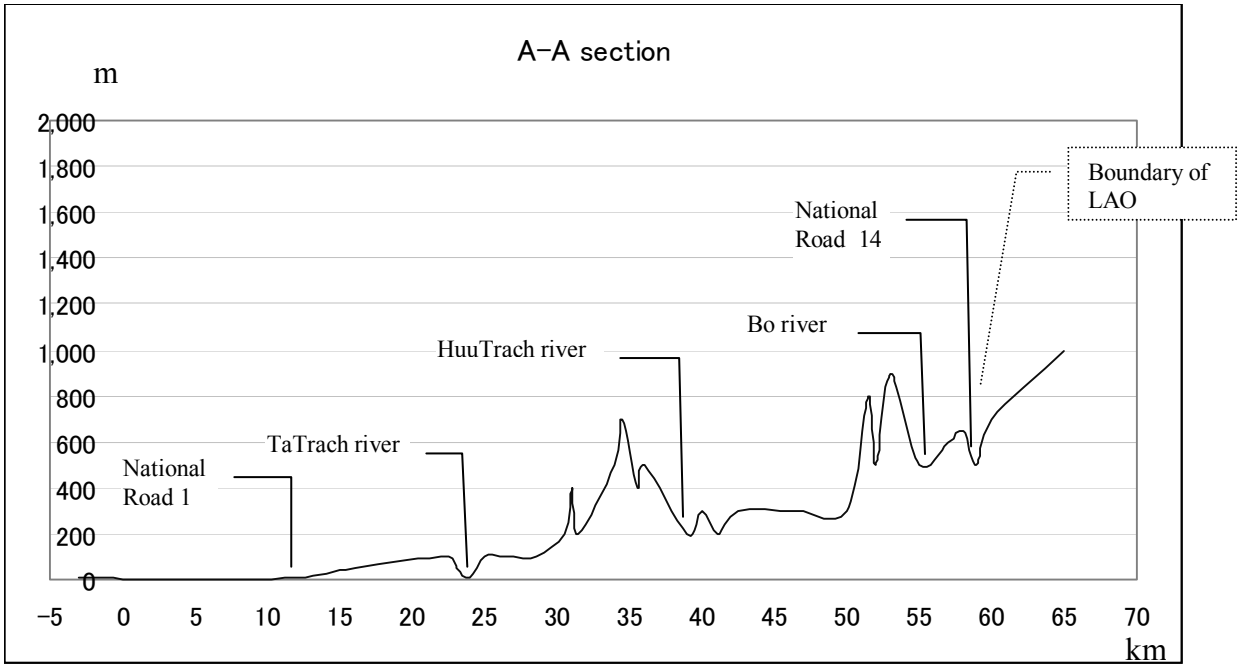
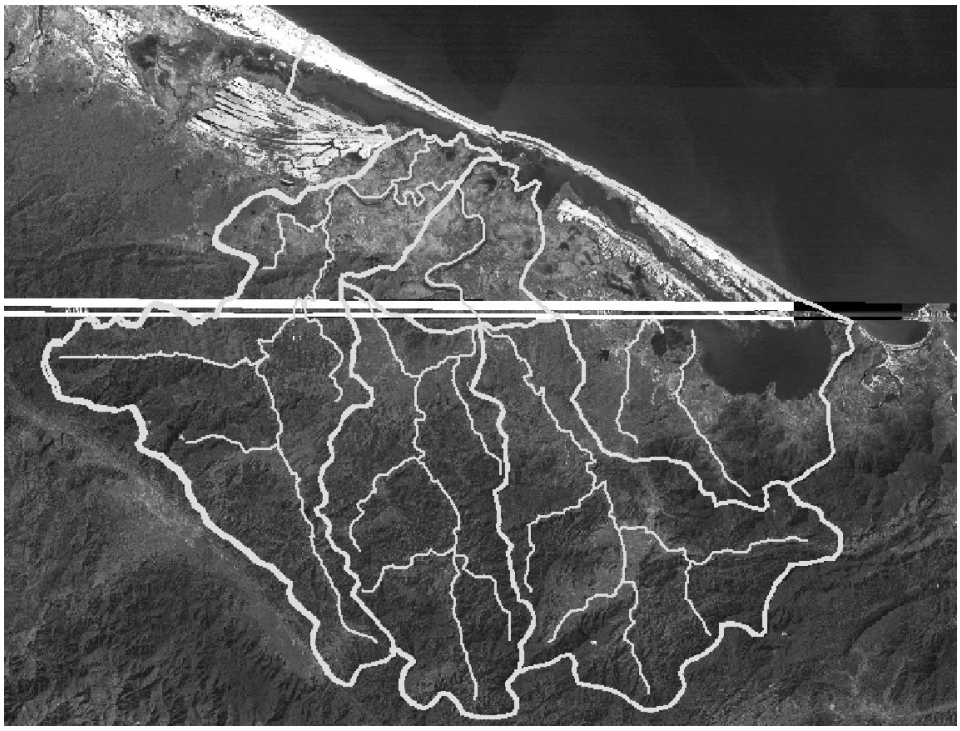
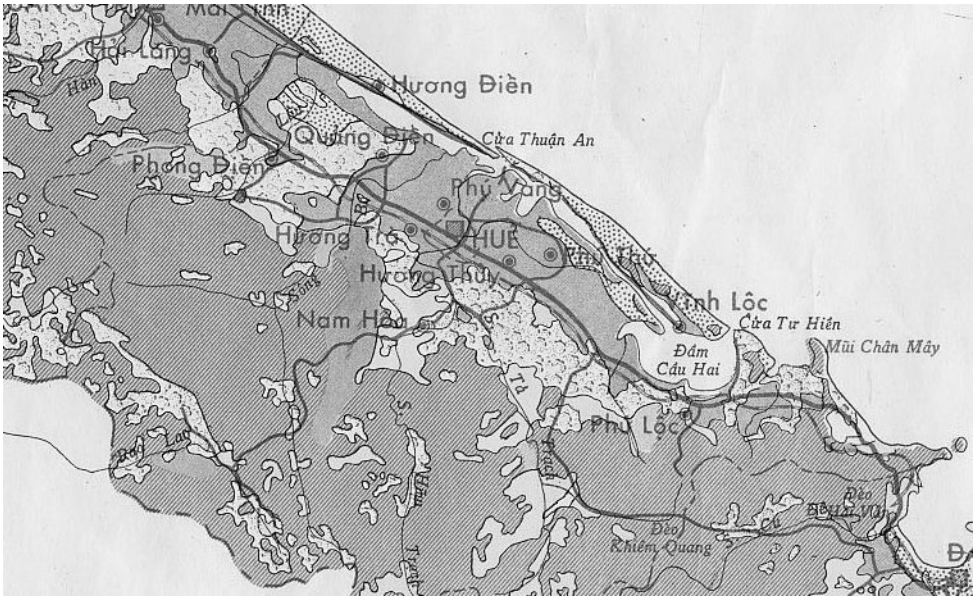
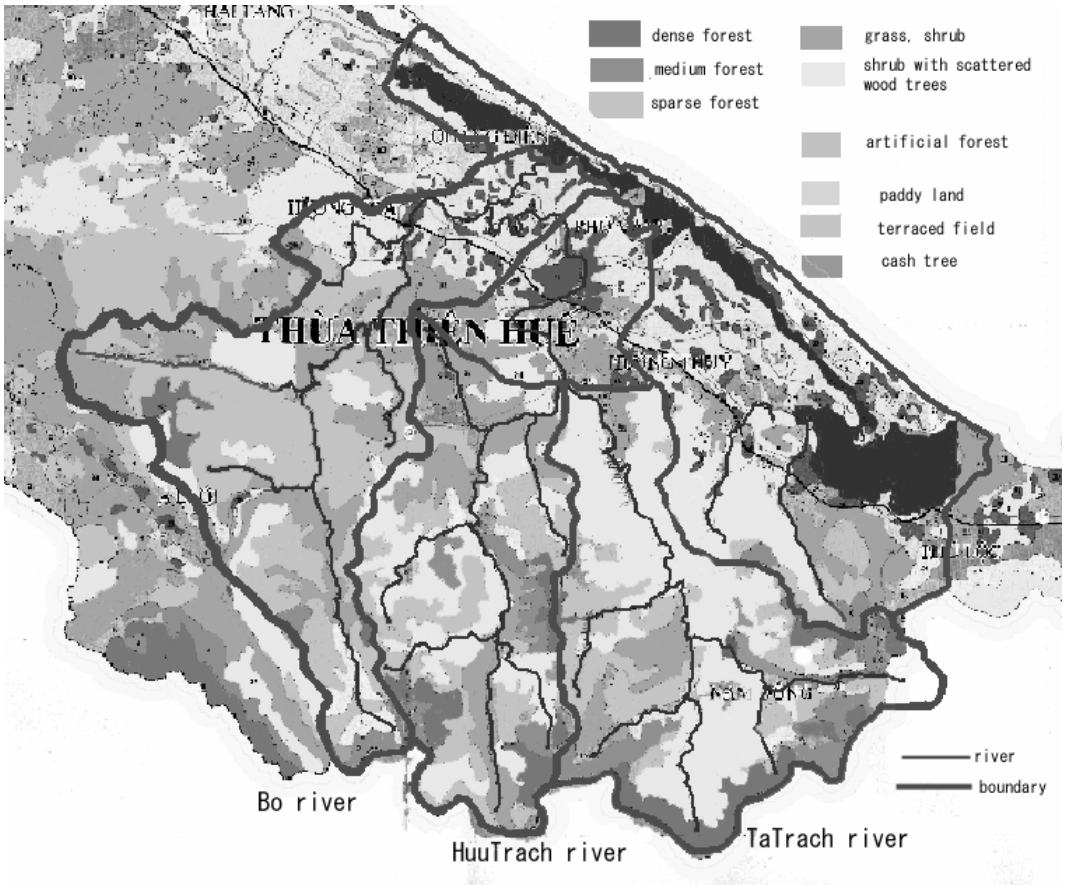


Figure C.2 Cross section of Huong river basin



The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam	**Figure C.3** **Satellite image of Huong river basin on Jan.1989 (above) and Jan.2001 (down)**
JAPAN INTERNATIONAL COOPERATION AGENCY	





The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam JAPAN INTERNATIONAL COOPERATION AGENCY	**Figure C.4** **Vegetation map of Huong river basin on 1969(above) and 2000(down)**

The Study on Nationwide Water Resources Development and Management in the Socialist Republic of Vietnam JAPAN INTERNATIONAL COOPERATION AGENCY	**Figure C.5** **Usage of chemical weapon during the war**