Government of The Netherlands
Ministry of Foreign Affairs

Government of the Socialist Republic of Vietnam
Hydrometeorological Services

VIETNAM COASTAL ZONE VULNERABILITY ASSESSMENT and First Steps Towards Integrated Coastal Zone Management

REPORT No.I

INCEPTION REPORT
March 1995

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List of Abbreviations

ASLR	Accelerated Sea Level Rise
BP	Before Present
CIS	Coastal Information System
CCP	Climate Change Programme (of Vietnam)
CSRG	Center for Remote Sensing & Geomatics, Institute of Geology, National Center for Natural Science & Technology, Vietnam
CZM	Coastal Zone Management
CZMC	Coastal Zone Management Centre of RIKZ
CZMS	Coastal Zone Management Subgroup, Response Strategies Working Group 3, IPCC
DEM	Digital Elevation Modelling
DGIS	Directorate General for International Co-operation
DH	Delft Hydraulics
DSS	Decision Support System
FNIS	Framework National Implementation Strategy
GIS	Geographical Information System
GMS	Geomanagement System
HCZ	Hydraulic Condition Zone
HMI	Hydrometeorological Institute, Ho Chi Minh City
HMS	Hydrometeorological Service, Hanoi
IPCC	Intergovernmental Panel on Climate Change
IBW-PAN	Institute of Hydro-Engineering, Gdańsk, Poland
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel for Climate Change
IS	Impact Segment
LTRA	Long Term Resident Advisor
MHC	Marine Hydrometeorological Centre, Hanoi
MS	Mekong Secretariat
MSL	Mean Sea Level
MTVA	Medium Term Visit Advisor
MWR	Ministry of Water Resources (Vietnam)
NIAPP	National Institute for Agricultural Planning and Production, Ministry of Agriculture, Vietnam
RIKZ	National Institute for Coastal and Marine Management, Ministry of Transport, Public Works and Water Management of the Netherlands
RRMDP	Red River Delta Masterplan Development Project
RSWG	Response Strategies Working Group
SC	Steering Committee
SCS	State Committee for Sciences
SPC	State Planning Committee
STRA	Short Term Visit Advisor
STVA	Short Term Visit Advisors
ToR	Terms of Reference
UNCED	United Nations Conference on Environment and Development

UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
VA	Vulnerability Assessment
VMS	Vietnamese Mekong Secretariat
WCC'93	World Coast Conference 1993 (The Hague, The Netherlands)
WMO	World Meteorological Organization

1 INTRODUCTION

1.1 The International Response to Climate Change and Accelerated Sea Level Rise

The sea level rise phenomena is not new and a natural rate of sea level rise of about 10 to 20 cm per 100 years is presently being experienced. Due to accumulated man-made "greenhouse" gases in the atmosphere and the depletion of the ozone layer, climate change effects are expected to take place that will cause global warming and an accelerated rate of sea level rise over the coming century. By the latest predictions, the accelerated rate of sea level will be between 30 cm and 100 cm per 100 years. These facts have led to a mobilisation of the International Community to respond to the impacts of accelerated sea level rise and other climate change related phenomena.

In 1988, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) jointly formed the Intergovernmental Panel on Climate Change (IPCC) which in turn established three working groups. Working Group III, the Response Strategies Working Group (RSWG) set up four Subgroups to evaluate response strategies to limit or adapt to climate change. Of these, the Subgroup Coastal Zone Management produced the report "Strategies for Adaption to Sea Level Rise". Among the recommendations of the Subgroup was the call to implement comprehensive coastal zone management plans, to identify coastal areas at risk, and to provide technical assistance to developing nations in assessing vulnerability to accelerated sea level rise:

> By the year 2000, coastal nations should implement *comprehensive coastal zone management plans*. These plans should deal with both sea level rise and other impacts of global climate change. They should ensure that risks to populations are minimized, while recognizing the need to protect and maintain important ecosystems.
>
> *Coastal areas at risk* should be identified. National efforts should be undertaken to
> a) identify functions and resources at risk from a one metre rise in sea level, and
> b) assess the implications of adaptive response measures in them.
>
> *Technical assistance to developing nations* should be provided and cooperation stimulated. Institutions offering financial support should recognize the need for technical assistance in developing coastal management plans, assessing coastal resources at risk and increasing a nation's ability, through education, training and technology transfer, to address sea level rise and other climate change impacts.

As a first organizational step towards these goals, in March 1991, UNEP and a number of countries formed the "Interim Advisory Group on Assessing Vulnerability to Sea Level Rise" within the framework of the IPCC Response Strategies Working Group. The aim was that a consistent methodology of Vulnerability Assessment (VA) would be applied and further developed in a series of short duration national case studies, involving a representative sample of various categories of coastal environments. To provide a practical framework for the VA case studies, the Advisory Group took the initiative to develop and implement an operational "*Common Methodology*" with respect to vulnerability assessment to sea level rise, in the context of coastal zone management and planning.

Obvious effects of climate change are Accelerated Sea Level Rise (ASLR) and related extreme

events, such as storms and storm surges. Other climate change effects, such as temperature increase and changes in rainfall and evaporation, may also be important to the vulnerability of coastal areas, e.g. through impacts on ecological systems and agriculture productivity. The approach set forth in the *Common Methodology*, however, focuses on the vulnerability to ASLR.

During a meeting in Geneva in August 1991, guidelines were adopted (the so-called "Seven Steps") for the execution of national VA case studies (IPCC, 1991). Case study activities are being executed and coordinated through the IPCC Coastal Zone Management Subgroup, chaired by the Netherlands, with representatives of Argentina, Australia, Bangladesh, France, Gambia, Japan, Kiribati, the Netherlands, Saudi Arabia, United Kingdom, United States of America, Venezuela, and UNEP's Regional Seas Programme.

At the UNCED Conference in Rio de Janiero, Brazil in 1992, the UN Framework Convention on Climate Change (UNFCCC) was adopted by over 150 countries. Vietnam is a signatory to that convention and is preparing to meet its commitments. Specifically Agenda 21 of UNCED, in Chapter 17 "Oceans and Coasts", identifies Integrated Coastal Zone Management as a key activity for sustainable development of coastal areas and calls for states to adopt measures .....

" to cope with and adapt to potential climate change and sea level rise, including the development of globally acceptable methodologies for coastal vulnerability assessment, modelling and response strategies, particular for areas such as small islands and low lying coastal areas"

A global inventory made in preparation of the UNCED Conference in Rio de Janiero in 1992 showed that Vietnam is indeed one of the most vulnerable nations as regards the threat imposed by ASLR. More than 10 million inhabitants live in the direct risk zone, whilst many more will be affected indirectly. The impacts will be most apparent in the two major deltas, namely the Red River Delta in the North and the Mekong Delta in the South. The central coast is particularly vulnerable to extreme storms and typhoons which cross the coast at a rate of 5 or more per year. Master Plan studies are on-going for the two deltas (RRDMP, MS) but the specific impacts of accelerated sea level rise are not being addressed.

Vietnam's coastal zone is therefore identified as very vulnerable to the impacts of climate change. The vulnerability needs to be quantified and response strategies need to be developed.

1.2 The response of Vietnam to Climate Change and Sea Level Rise

As a participant of the UN Framework Convention on Climate Change, in order to comply, Vietnam is required to establish a Country Programme outlining its commitment and methodology to respond effectively to the limit and manage the impacts of man-induced climate change.

Assisted by the UN Agency UNITAR (United Nations Institute for Training and Research), the Government of Vietnam has set up a "Country Team" with the following aims:

- Organise national workshops and training seminars

- Develop a Framework National Implementation Strategy (FNIS)
- Publicise and promote consensus on the FNIS
- Study the potential and resources for implementation and identify UNFCCC related projects and assistance requirements.

The Country Team comprises representatives from key Ministries and operates via a Coordinator, Executives, a Core Team and 4 Working Groups.

The Hydrometeorological Service is a focal point in Vietnam for Climate Change issues and a leading member of the Country Team providing the Core Team Secretariat and with the Director General of HMS as Coordinator and Chairman.

In addition to the many other activities initiated by the Country Team and recognising the potential risks and the need to respond to threatened sea level rise impacts to the Vietnam coastal zone and its sustainable development, a specific request for assistance with "... a study on Vulnerability Assessment along the guidelines as set up by the Coastal Zone Management Subgroup of IPCC" was made by the Director General of HMS in his letter to the Netherlands Embassy in Bangkok on 2 March 1992.

Subsequent meetings and discussions both in the Netherlands and Vietnam culminated in a Pilot Mission to Vietnam by coastal specialists from Poland and the Netherlands in October 1993. As a result of this Pilot Mission an outline for an 18-month study in Vietnam was identified with the primary objective to provide Vietnamese counterparts with assistance in executing a vulnerability assessment (VA) to assess the impacts of accelerated rate of sea level rise on the coastal zone of Vietnam and in so doing to strengthen the capabilities of Vietnamese organisations in preparation for ICZM activities.

A Project Document outlining the details of the proposed project and the required timing and funding was presented to DGIS in mid 1994 and the project was initiated in November 1994.

1.3 The Vietnam VA Project

1.3.1 Terms of reference

The DGIS supported project that was initiated in November 1994 is entitled "Vietnam Coastal Zone Vulnerability Assessment and First Steps Towards Integrated Coastal Zone Management" (DGIS Project Activity Number WW039104).

The project terms of reference are described in the Project Document (DGIS, 1994) as follows:

> *With the primary aim to strengthen the capabilities for the implementation of ICZM activities in Vietnam, the project "Vietnam Coastal Zone Vulnerability Assessment and First Steps Towards Integrated Coastal Zone Management" must fulfil the following Terms of Reference:*
>
> *Specialist assistance must be given to the Vietnamese Government by conducting together with Vietnamese counterparts a Vulnerability Assessment to accelerated sea level rise along the lines of the IPCC Common Methodology for such studies. In so*

doing, the focus must be to support, guide and strengthen Vietnamese capabilities for the complex technical, institutional and organisational matters involved in effectively managing the Vietnamese coastal zone, particularly in view of the pending threats from accelerated sea level rise and climate change. Outputs from the project are therefore required as follows:

* *A Vulnerability Assessment document*
* *Workshops and seminars in Vietnam*
* *A strengthening of capability (staff and equipment), communication and inter-agency cooperation of Vietnamese counterpart organisations*

The project must not aim to design and implement a full programme for implementation of Integrated Coastal Zone Management (ICZM) in Vietnam but the programme of work and the listed outputs should be seen as providing important first steps towards this longer term objective.

Apart from project reports (Inception, Progress and Final), findings (impacts and responses) should be demonstrated using computer based storage, retrieval and graphical display/simulation techniques for further use and planning and as an aid to decision making. As a basis the WCC'93 approaches and guidelines should be used.

During the project, close cooperation and liaison with other relevant programmes underway in Vietnam must be maintained (eg UNITAR, Red River Master Plan Development, Mekong secretariat, Climate Change Programme etc.).

1.3.2 Objectives

The objectives of the Vietnam VA project, in accordance with the Terms of Reference in Chapter I are:

(i) To strengthen and upgrade the technical capacity of Vietnamese counterparts for the efficient management of the Vietnamese coastal zone in both the short and long term;

(ii) To encourage and strengthen the links and interactions between Vietnamese organisations involved in coastal management as a priority for effective CZM in the short term and as a first step toward the longer term goal of implementation of ICZM in Vietnam;

(iii) To arrive at a full VA for the Vietnamese coastal zone within the 18 month study period, consistent with the format and requirements of the IPCC;

(iv) To demonstrate, by working on specific local Pilot Studies, the application of techniques, tools and decision making systems for solutions to actual existing serious coastal problems;

(v) To conduct effective communication and synergy of effort with other on-going relevant projects and programmes such as UNITAR, RRMDP, VMS, CCP etc.

(vi) To work openly, interactively and closely in a trilateral team to cover all the stated project objectives and thereby build and bond effective working relationships between the local participants in Vietnam.

1.3.3 Project Summary

The production of the Vulnerability Assessment document is being achieved by undertaking the necessary steps to organise, coordinate and provide structure to the collection, analysis and interpretation of physical, environmental and socio-economic data pertaining to the Vietnamese coastal zone. This is being done in an 18 month study period from November 1994 to April 1996 inclusive. The project is being conducted in three phases by foreign (Polish/Dutch) and Vietnamese teams working closely together.

PHASE I : Inception Phase (3 months)

* establish Project Director HQ Office and Project Management Office;
* meeting in Europe to establish working methods, planning and linkages between Project Director, Project and Financial Management Office, Quality Assurance and The Client (DGIS);
* Initial visit (2 months) of the Long Term Advisor and preparations for long stay;
* inception mission by the foreign team to Vietnam;
* establish contacts and working relations between foreign and Vietnamese teams;
* establish contacts and interactions with other programmes in Vietnam (UNITAR, RRMDP, VMS, CCP etc.);
* preliminary scan of the VA in Vietnam with available data;
* detailed definition and planning of :
  - data collection requirements for the Vietnamese counterparts for the Interim Phase;
  - full VA activities for the Implementation Phase;
  - Pilot Studies (ToR, framework, planning) for the Implementation Phase;
  - hardware and software needs;
* publish Inception Report (Incl. Mission 1, Workshop 1 and detailed planning)

PHASE II : Interim Phase (3 months)

* data collection in Vietnam by Vietnamese counterparts;
* preparations for future project missions by the foreign team & LTRA;
* on-going liaison between Vietnamese and European teams;
* publish Report No 2 (Data Collection Report)

PHASE III : Implementation Phase (12 months)

* full VA activities in Vietnam;
* Pilot Studies (max 3) in Vietnam;
* support, stimulation, coordination and integration of VA and Pilot study activities in Vietnam by a (Dutch) LTRA in Hanoi (12 months);

* 3 missions by teams of Polish and Dutch specialists to support the full VA and Pilot Studies;
* provision of workshops and seminars during short missions;
* application of GIS and WCC'93 tools;
* hardware and software transfer as specified in PHASE I;
* interaction with UNITAR and other relevant programmes, including joint workshops etc.
* publish Report Nos. 3 to 6
* prepare draft Final Report (incl. VA Document)

In addition to the traditional VA activities outlined in the IPCC *Common Methodology*, the Vietnam VA Project described in this document covers the foundation and first steps towards ICZM implementation in Vietnam by incorporation of the LTRA Pilot Studies, workshops, seminars and other technology transfer activities.

The Pilot Studies are designed to demonstrate the application of sound ICZM techniques to real and short term problems. This will be done on a different area in each of the three missions in the Implementation Phase. In each mission 3 to 4 weeks will be spent on the specific pilot study that is identified for study in that mission and at the end of the mission a report will be drafted outlining the nature of the problem, possible workable solution methodologies and institutional and management arrangements necessary for effective solution. The Pilot Studies will not aim to solve the problem but to demonstrate methodologies.

The combination of the long term VA and the short term Pilot Studies provides a project that will result in a strengthening of technical and management capabilities of the Vietnamese counterparts to deal with the coastal zone management demands imposed by increased development and climate change related impacts on the Vietnamese coastal zone. Interagency cooperation will be encouraged, stimulated and assisted. These will be important first steps towards implementation of ICZM in Vietnam.

1.4 The Inception Report

This report, *Report No.1, Inception Report,* describes the project activities and decisions during the initial stages of the project and outlines in more detail the planned activities and methodologies for the VA analyses and Pilot Studies.

In Chapter 2, the organisational matters concerning the project team, the Steering Committee and operational logistics are described. Chapter 3 outlines the activities, decisions and progress made in Phase I of the project (refer to the Mission 1 Report in Appendix A and Workshop 1 Report in Appendix B). An important feature of Chapter 3 is the decision to conduct the VA using a full digitized data set of topography and land-use. This decision has a significant impact on the data collection and VA analysis methodologies for Phases II and III. Chapters 4 and 5 describe the planning for Phases II and III respectively and conclusions are included in Ch 6. A Project Schedule at the end of Phase I is shown in Figure 1-1.

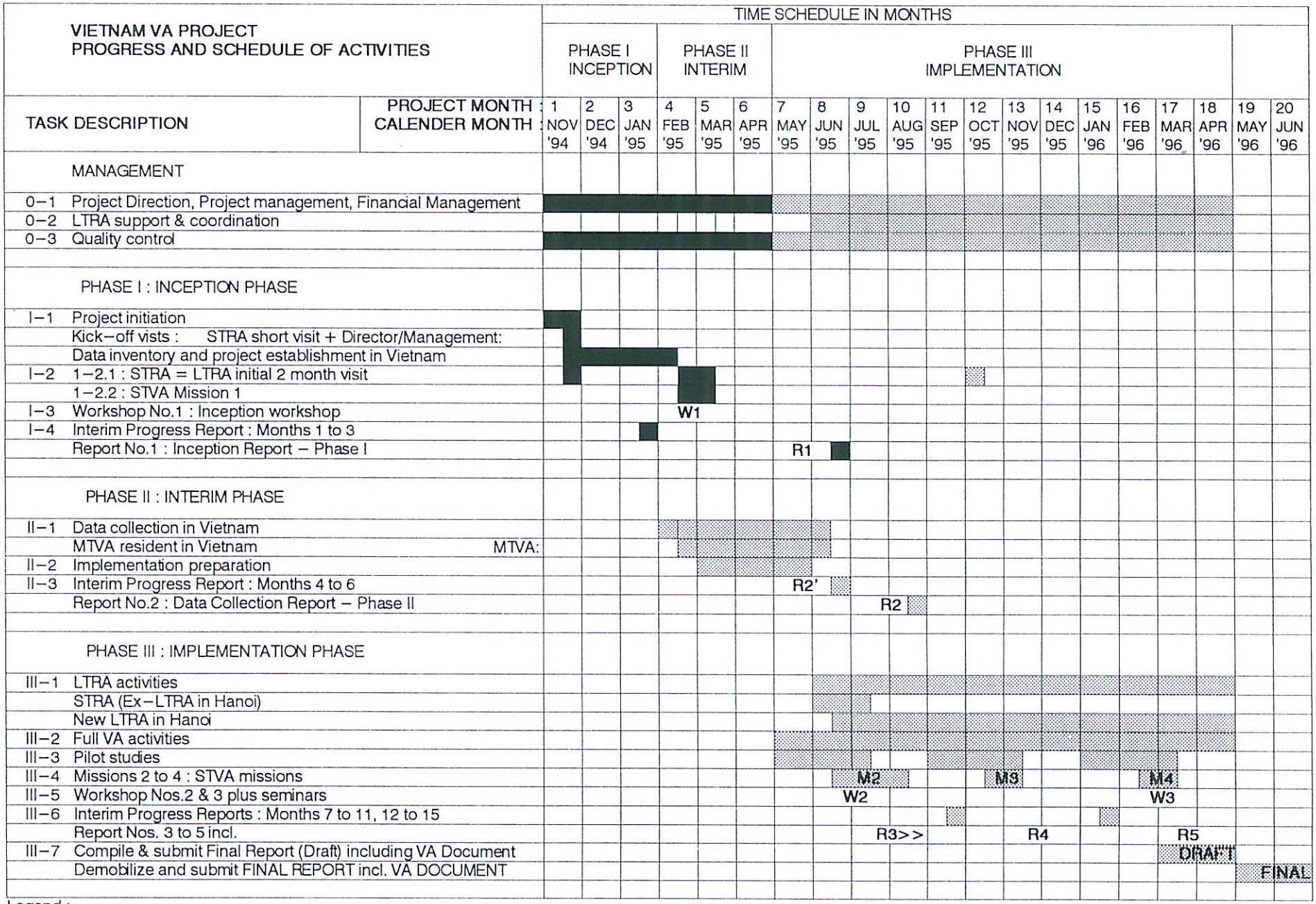


FIGURE 1–1 : PROJECT SCHEDULE ON COMPLETION OF PHASE I

2 Organisation and Project Team

2.1 The Project Team

Appointed and supported by the Netherlands Government, the project team comprises three parties Poland, The Netherlands and the Socialist Republic of Vietnam.

Between Poland and Vietnam, there exists close traditional scientific ties. Many high level officials of Vietnam received their university education in Poland, including experts in coastal zone management.

Between The Netherlands and Vietnam there is considerable momentum for increased assistance and cooperation and several important joint projects have been undertaken in Vietnam (eg RRMDP and Mekong Masterplan involvement). This is in part due to the traditional skills of the Dutch engineers and scientists in low-lying delta areas (eg flood studies and flood protection, water management, ecological engineering, integrated coastal planning etc.)

The trilateral co-operation offers an effective platform to tighten the existing bonds between partners and facilitate the project implementation.

Vietnamese Agencies

The Marine Hydro-meteorological Centre (MHC) of Hanoi is the main focal point for the project and in the south of Vietnam MHC will coordinate activities with the Center of Hydrometeorology, South Vietnam - Ho Chi Minh City. Both these organisations are within the Hydrometeorological Service of Vietnam (HMS).

The MHC is based in Hanoi and is responsible for the management of data from the network of marine hydro-meteorological recording stations along the coast and on offshore islands as well as deepsea oceanographical data collection.

MHC is staffed by about 45 people in Hanoi and is one over 10 units throughout Vietnam within the far larger Hydrometeorological Service (HMS). Specialists at MHC are mainly concerned with marine and coastal hydraulic disciplines such as sea level changes, tides, waves and oceanography.

The MHC office is situated in the SE suburbs of Hanoi (Dong Da District).

European Agencies

Contact point for the contract with The Netherlands Government (DGIS) as Client is Institute of Hydroengineering of the Polish Academy of Sciences, IBW-PAN, of Gdansk, Poland. IBW-PAN provide the Project Director and are providing specialist advisors for the Missions and Data Collection activities in Hanoi.

The Project and Financial Management will be conducted jointly by the VA Vietnam Joint Venture between Frederic R Harris B.V. (The Hague) and Delft Hydraulics (De Voorst), The

Netherlands. The Project and Financial Manager is provided by Frederic R Harris B.V.. The Long Term Advisor, resident in Hanoi for 12 months from May 1995, is provided by Delft Hydraulics from within the VA Vietnam Joint Venture. The Joint Venture will also provide Dutch coastal zone specialists for the short term missions.

The Coastal Zone Management Centre (CZMC) of National Institute for Coastal and marine Management (RIKZ) within the Ministry of Transport, Public Works and Water Management of the Netherlands, is participating as Quality Controller and as a representative from The Dutch Government.

The Project Personnel and contact details are given in Table 2-1.

2.2 The Steering Committee

The Steering Committee for the project has yet to be finally ratified (at the time of reporting - end March 1995). Prof.Dr Nguyen Duc Ngu, the Director General of HMS, is the Chairman of the Steering Committee.

The duties of the Steering Committee are to guide and control the Vietnamese contribution to the Project and to interact with the Project Team to facilitate inter-Ministry communications and accessibility to data sources. The Steering Committee will also provide important guidance to the Project Team in emphasising and prioritising specific project activities to ensure that the project is as meaningful, pertinent and helpful as possible to the aims of Vietnam in terms of managing the impacts of sea level rise on the Vietnam coastal zone.

Table 2-2 provides a list of the persons from important ministries represented at the inception gathering to discuss the Steering Committee composition and matters in Hanoi following Workshop 1 at the end of February 1995. The size of the eventually appointed Steering Committee will be much smaller than the list represented in Table 2-2. The details of the appointed Steering Committee can only be presented in a later report.

Table 2-1 : Vietnam VA Project Personnel and contacts (as at end March 1995)

IN VIETNAM

Project Office : Vietnam VA Project Office, 29A Nam Thanh Cong, Dong Da, Hanoi

Phone No.: Hanoi (+84 4) 340825
Fax No.: Hanoi (+84 4) 350606

Project Staff :

Mr Nguyen The Tuong, Acting Director, MHC
Mr Nguyen Ngoc Huan, Deputy Director, Project Leader Vietnam VA Project, MHC
Mr Tran Phuong Dong, Technical Coordinator Vietnam VA Project, MHC

Mr F van der Knaap, Long Term Resident Advisors, Vietnam VA Project, (Delft Hydraulics)
Mr T Okroj, Medium Term Visit Advisor - Data Collection Vietnam VA Project, (IBW-PAN)

*Note : Mr Okroj will be in Hanoi from February until mid-June 1995. Mr F van der Knaap, will take over as Long Term Resident Advisor in Hanoi from mid-June 1995.

IN EUROPE

Contact Office : VA Vietnam Joint Venture,
c/o : Frederic R Harris B.V., Badhuisweg 11, 2587 CA The Hague, The Netherlands

Phone No.: (+31 70) 3501181
Fax No.: (+31 70) 3524834

Project Staff:

Project Director : Prof.Dr.R B Zeidler, IBW-PAN, Gdansk, Poland
Phone (48) 58 522011 Fax (48) 58 524211
e-mail: zeidler@hapcio.ibwpan.gda.pl

Project Manager : Mr G Toms, Frederic R Harris B.V., The Hague, The Netherlands
Phone (31) 70 3501181 Fax (31) 70 3524834
e-Mail: frhbv@euronet.nl

Long Term Resident Advisor Coordination and support (Home Office):
Mr F Hoozemans, Delft Hydraulics, de Voorst, The Netherlands
Mr C H Hulsbergen, Delft Hydraulics, de Voorst, The Netherlands
Phone (31) 5274 2922 Fax (31) 5274 3573
e-Mail: frank.hoozemans@nldelft.nl

Quality Control : Mr A van Urk, CZMC-RIKZ, The Hague, The Netherlands

Table 2-2 : List of important ministries represented at Steering Committee formulation discussions after Workshop 1, Hanoi, 28 February 1995

Chairman and convenor of discussions:	
Prof.Dr. Nguyen Duc Ngu	Director General HMS
Participants to discussions:	
Dr. Nguyen Huy Mac	Director, Department of Science, Education, Culture and Social Affairs, Office of the Government of Vietnam
Dr. Nguyen Tien Thuan	Vice Director General, State Planning Committee
Prof. Vo Van Trac	Vice Minister, Ministry of Fisheries, General Director of Vietnam Fishery Development Programme
Prof.Dr.Dang Ngoc Thanh	National Center for Natural science and Technology
Mr. Nguyen Van Quang	Director, International Cooperation Department, HMS
Prof.Dr. Nguyen Van Gia	Sub-Institute for Information and Technology
Prof.Dr.Dang Hung Vo	Deputy Director General, General Department of Land Administration, Union of Geodesy and Cartography
Dr. Phan Van Hoac	Director, Center of Hydrometeorology South Vietnam, HMS
Dr. Nguyen Trong Hieu	Deputy Director, Institute of Meteorology and Hydrology, HMS (UNFCCC Core Team Leader)
Dr. Dao Duc Tuan	ODS Officer in Charge, Office Manager, Ozonation Office, HMS (UNFCCC / UNITAR Secretariat)
Dr. Vu Cao Minh	Head of Department for Geotechnical Engineering, Institute of Geological Services, Natl. Center for Science and Technology
Mr Tu Mao	Ministry of Water Resources (Dyke and Flood Control)
Dr. Nguyen The Tuong	Acting Director, MHC, Head, Vietnamese Team, Vietnam VA Project
Dr. Nguyen Ngoc Huan	Deputy Director, MHC, Overall Coordinator, Vietnamese Team, VA Project
Dr. Nguyen Thanh Vinh	Director, Vietnam Marine Science and Technology Foundation, HMS
Mr. Tran Phuong Dong	Senior Scientist and Technical Coordinator, Vietnamese Team, Vietnam VA Project

2.3 Operational arrangements and logistics

The operational arrangements that have been set up include the following :

(i) Establishment of Project Office in Hanoi, Vietnam

The Project Team, comprising both European and Vietnamese staff has established a Project Office in Dong Da District in the suburbs of Hanoi, very close to the offices of MHC (address in Table 2-1). A separate office was necessary as the MHC offices were too overcrowded to accommodate the Project Team and equipment. The Project Office comprises a three storey house which has been rented for the duration of the project. Apart from the ground

floor area there are four large rooms which are used for offices and meeting rooms with ample space for the necessary computers and other equipment.

(ii) Establishment of communication facilities in Hanoi

The Project Office has been equipped with a telephone exchange (multiple lines) and fax system. Direct dialling overseas is straightforward for international calls and faxes.

(iii) Planning and acquisition of computing facilities in Hanoi

Computing facilities are being established including the following:
- 486 PC for office use
- 486 PC extended capability for GIS use (alternatively Pentium PC)
- 486 PC for digitizing, scanning and plotting use
- Colour printer
- Colour scanner
- A2 digitizer
- Photocopier
- Lazer Printer

In addition, the following software purchases are being undertaken:

- Office software (word processing, spreadsheets, drawing packages etc.)
- GIS software (GIS SPANS EXPLORER package is planned)
- Data display software (GMS-DECIDE is planned)
- Digitizing, scanning and printing software

This will ensure the full local capability to conduct the necessary analyses for the VA and Pilot Studies. In particular the GIS analysis and mapping capabilities are important additions to MHC's capabilities.

(iv) Establishment of an Agreement concerning local transportation of Project Team

For transportation of the Project Team in Hanoi and surrounding areas a Transportation Agreement has been set up that ensures 24-hour per day and seven day per week access to a project car plus driver for the duration of the project. This has been necessary since due to licence and insurance regulations it is not feasible for visiting European personnel to drive cars in Hanoi.

For transportation outside Hanoi (eg Central coast, Ho Chi Minh City etc.) it is necessary to hire vehicle plus driver on a case by case basis.

(v) Access to data and information

Other logistical arrangements concern access to data. Data and services, such as maps, aerial photos, reports and recordings (raw data such as tides and water levels etc.) are all being obtained via MHC in direct negotiation with the data source. In particular maps and similar data need to be obtained by way of "contracts" for supply on a case by case basis between the Vietnamese agencies.

Administrative databases have been set up at the Project Office of such items as Project related references, maps, abbreviations, names and addresses etc. The UNDP Library in Hanoi has also been visited and holds extensive acquisition lists which have been obtained on disk at the VA Project Office (can be searched using ISIS software).

3 Progress and achievements in Phase I

3.1 General

The following activities have been completed in Phase I:

Project initiation in The Netherlands	01 - 14 November 1994
Inception visits by Long Term Resident Advisor	14 November 1994 - 03 December 1994 15 February 1995 - 04 March 1995
Mission No.1 (Part 1) - Inception Mission	14 - 25 November 1994
Mission No.2 (Part 2)	07 February 1995 - 04 March 1995
Workshop No.1 - Inception Workshop	27 February 1995

The Project initiation in The Netherlands, conducted in early November 1994, included negotiation and signing of Agreements between Dutch and Polish participants. The IBW contract with the Joint Venture and setting up of the Joint Venture Agreement between Frederic R Harris B.V. and Delft Hydraulics. The European project administration procedures were established.

3.2 Mission No.1

Mission No.1 - Part 1 : 14 November - 25 November 1994

The Inception Mission was curtailed to two weeks in November 1994, referred to here as Mission No.1 : Part 1. During this period, detailed discussions were held with the chief counterpart in Vietnam : the Marine Hydrometeorological Center (MHC) of the Hydrometeorological Service (HMS) in Hanoi. A detailed trip report is given in Appendix A and a summary is given in Table 3-1.

During discussions at MHC and HMS detailed contract issues were negotiated. This necessitated discussions with several other Vietnamese organisations to achieve project approvals. These included the International Cooperation Department of HMS and the State Planning Committee. The Netherlands Embassy in Hanoi was also briefly consulted for advice. A contract was finally signed with MHC during the second week in Hanoi. Due to the difficulties with achieving a smooth start up to the project and due to staff changes within MHC very little preparation for the project had been made in Vietnam and it became clear that time was needed for this prior to conducting the core business of Mission 1. For this reason the Mission was curtailed after two weeks and would be resumed in February.

During the mission the hydraulic boundary conditions were discussed for Step 1 of the 7-steps methodology but insufficient data was readily available to discuss technical issues required for this decision. Also, insufficient data was available to conduct the first scan of the VA or to make firm decisions about Pilot Study topics but some suggestions were made for possible options. Aside from visits and discussions with Vietnamese counterparts, exploratory visits were undertaken to UNDP, UNITAR, the Netherlands Embassy and the Polish Embassy.

Table 3-1 : Summary of Mission No.1 - Part 1 : November - December 1994

Mission personnel

Dr R B Zeidler	Project Director (Poland, IBW-PAN)
Mr G Toms	Project Manager, as STVA (Netherlands, FRH)
Mr M Pluijm	Director of Frederic R Harris as STVA, (Netherlands, FRH)
Mr C H Hulsbergen	STRA (Netherlands, DH)
Mr A van Urk	Quality control (Netherlands, RIKZ)

Itinerary and agenda

Mission 1 (Part 1) - November / December 1994

14 November	Mission leaves Europe
15-16 November	Mission personnel gather in Hanoi
17 November	Introductions and discussions with MHC, visit to Netherlands Embassy
18 November	Contract discussions MHC, visit to State Planning Committee (SPC)
19 November	Contract discussions and clarifications at MHC
20 November	- Sunday - Free day, mission planning
21 November	Visit to Polish Embassy (RZ), visit to UNDP
22 November	Contract discussions with MHC, signing of Contract with MHC
23 November	Project discussions at MHC, meeting with UNITAR representative
24 November	Seminar at MHC, visit to Dept.Geodesy & Cartography to view maps
25 November	Visit to UNDP library, STVA's depart, STRA remained
26 November	STRA Mission arrives in Europe

End of STRA MIssion 1

STRA remains for one week extra.....:

27 November	- Sunday - Travel to Ho Chi Minh City
28 November	Visits to HMI of HMS, to MHC Southern Region and to NEDECO Office
29 November	Visits to South. Inst. of Water Resources Research & Mekong Comm.
30 November	Return to Hanoi, Visit to Center for Information and MHC
01 December	Project discussions and planning with MHC
02 December	STRA departs Hanoi
03 December	STRA arrives Europe

A list of data requirements was identified and until the resumption of Mission 1 the Vietnamese partners would conduct an inventory of all listed data with details of what data exists, where it is held, in which organisation, contact persons, price, quality etc. This would then be used for detailed planning of the data collection activity in Phase II.

Several small seminars were held whereby the project aims and content were introduced to the counterparts using slide presentations (10 to 12 Vietnamese participants) with the emphasis on explaining the VA methodology in general.

The proposed composition and duties of the Steering Committee were discussed and agreed with MHC and HMS. It was agreed that the Steering Committee would be chaired by Dr Ngu (Director General HMS). The first meeting of the Steering Committee would take place about the time of the first Workshop in February 1995. It was also strongly recommended and agreed that the Steering Committee should be seen as a sub-committee acting within the umbrella of the activities of the Country Team which has been set up as a National Committee for all Climate Change related issues in Vietnam.

Mission No.1 : Part 2 - 07 February to 05 March 1995

This resumption and completion of Mission No.1 was successfully conducted as planned as shown in the summary of the mission, Table 3-2 and the mission report in Appendix A.

Important features of the resumed Mission No.1 were:

- setting up of Project Office in Hanoi and an Office Accommodation Agreement with MHC whereby a dedicated Project Office has been rented and equipped with furniture and computers in Hanoi, under the auspices of the Vietnamese counterpart, MHC, for exclusive use by the Project Team of the Vietnam VA Project;

- arrangement of the Local Transportation Agreement with MHC whereby the a Project Car plus driver will be rented from MHC for the full project duration for exclusive use by the Project Team;

- arrangement of data collection requirements, identification of data sources, decisions concerning data collection methodology and data bases. In principle, it was discovered that the primary data for the VA analysis, namely topography and land use, is available in Hanoi for the whole coast in detailed analog maps. The decision was made to conduct digitizing of these data for the whole coast (3,000 km) over the elevation range 0 to +6m above Mean Sea Level (MSL). Digitisation contracts with three large data-holding and digital data analysis agencies in Hanoi were discussed and negotiations were initiated;

- delineation of the study area and boundary conditions using available extreme water level recording (eg in typhoons). It was decided that based on a first estimate of the 1 in 100 year return period water level with some margin for areas at risk and run-up (and backwater) the landward extent of the study area must be set at the +6 m MSL elevation contour;

- execution of a rough first scan of the VA. This showed that the most vulnerable parts of the coast were the deltas with the Mekong delta suffering from a lack of dyke protection but a lower storm surge climate. The Central Coast also was critical due to the larger exposure to typhoons and low lying but smaller estuaries with poor protection. The most critical element will be the lack of funding for coastal protection improvements, the lack of well qualified staff in the correct disciplines, lack of tools and software for ICZM and the logistical difficulties of interactions at ministerial, institutional and local authority levels;

Table 3-2 : Summary of Mission No.1 - Part 2 : February - March 1995

Mission Personnel

Dr R B Zeidler	Project Director, as STVA (Poland, IBW-PAN)
Mr G Toms	Project Manager, as STVA (Netherlands, FRH)
Mr C H Hulsbergen	STRA (Netherlands, DH)
Mr F Hoozemans	STVA (Netherlands, DH)
Mr T Okroj	MTVA (Poland, IBW-PAN)
Mr A Naguszewski	STRA (Poland, IBW-PAN)

Itinerary and agenda

Mission 1 (Part 2) - February / March 1995

06 February	First STVA (Project Manager) leaves Europe
07 February	First STVA arrives in Hanoi, meets with MHC
08 February	Project Manager meetings with MHC, Netherlands Embassy
09 February	Arrangements for project car, project office and workshop
10 February	Transportation and Office Accommodation Agreements signed
11 February	Meetings with MHC, Workshop planning
12 February	- Sunday - Free day, mission planning
13 February	Mission planning & meeting at GIS Institute (Ministry of Agriculture - NIAPP)
14 February	Workshop planning, logistics discussions, visit to Forestry GIS Agency
15 February	Arrival of remaining Polish and Dutch delegations, incl.STRA
16 February	Meetings, introductions and data discussions, occupation of Project Office
17 February	Visits to GIS Institutes (3) and meeting at the Netherlands Embassy
18 February	Mission planning, data reviews, first scan of data with respect to VA needs
19 February	- Sunday - Site visit to Haiphong & Thai Binh, meeting with local met. station
20 February	Extreme water level discussions (MHC), lunch with Netherlands Embassy
21 February	Data base and hardware discussions, workshop planning with MHC
22 February	Digitization discussions and VA analysis planning, report drafting with MHC
23 February	Meetings with CSRG Geomatics Digitization agency to discuss capabilities
24 February	Visit to Polish Embassy, Discussions with South Vietnam HMS at MHC
25 February	Preparations for Workshop and further methodology discussions at MHC
26 February	- Sunday - Preparation of Workshop presentations and documents with MHC
27 February	Workshop No.1, Steering Committee Meeting, Dinner with Dr Ngu
28 February	Discussions with GIS Digitizing Agencies and drafting of contracts
01 March	Meeting with Country Team, planning with MHC, Project Manager departs
02 March	Negotiations for digitizing contract with CSRG, data collection planning
03 March	Last day of Mission, data collection handover to MTVA and MHC
04 March	STVA's and STRA depart for Europe
05 March	- Sunday - STVA's and STRA arrive in Europe

- identification of proposals for Pilot Study topics. Proposed topics and areas are Thai Binh Province (seawall/coastal protection), Hue City (flooding/tourism), Mekong Delta (salinity intrusion/flooding), Vung Tao (industrial development - petrochemical industries etc.). The firm decision was made to proceed with Thai Binh Province for the first Pilot Study area following a visit to the local authorities at Thai Binh Province

and agreement by the Workshop attendees but other subsequent sites will be confirmed after further consultation, early in Phase III.

- arrangement and participation in Workshop No.1 (see below)

- arrangement and participation in a formal meeting on 27 February 1995 as a planning meeting of the Vietnam VA Steering Committee Meeting. This comprised representatives of major involved ministries and was chaired by Dr Nguyen Duc Ngu. At this meeting it was decided that a small Steering Committee would be set up with selected persons (approximately 6 to 8) from those gathered. The formalisation of the Steering Committee will take place early in Phase III, in the meantime the HMS would oversee the work of MHC and the Project Team on behalf of Dr Ngu.

- meetings and contacts with Netherlands and Polish Embassies as well as with the Red River Delta Masterplan project and Mekong Secretariat

- meetings and contacts with the proposed Vietnam VA focal point for activities in South Vietnam, Center for Hydrometeorology, South Vietnam

3.3 Workshop No.1

In the context of the rescheduling of activities for the first 6 months of the project, as reported above, the workshop was not held during the curtailed first visit to Vietnam in November-December 1994. A provisional date was made for the workshop near the end of February well clear of the "Tet" New Year celebration (January 30 to February 4) and within the period planned for the resumption of Mission 1.

In November, the scope of the future workshop was also discussed and preliminary planning was undertaken. It became clear that the workshop would be a vital part of the Phase I activities and that a far larger workshop than originally planned would be necessary. It was initially envisaged (at the time of proposal preparation) that about 25 people should attend and that the venue would be small within the offices of the counterpart and consequently with no need for additional funding. It was agreed that a far larger workshop (up to 70 people) will be necessary to bring together the government and scientific bodies at a larger venue in Hanoi with appropriate funding. During Mission No.1 - Part 1, MHC were requested to make a proposed plan and budget estimate for the workshop.

During Mission No.1 - Part 2, a very successful first workshop was held in Hanoi on 27 February 1995 attended by 70 persons. The programme is summarised in Table 3-3. The Workshop was held in the Military Guesthouse in Hanoi and had the theme of "Sea Level Rise and Coastal Zone Management". Speakers from both the European and Vietnamese teams delivered informative papers introducing the VA study and the standard Common Methodology to the audience which largely comprised invited guests from Ministries, Institutes and Centers involved in coastal zone management and sea level rise issues.

Copies of some of the overhead slides used in presentations have been included in the Appendix B. A full version of all presentations was bound and is maintained at the Project Office in Hanoi. Immediately after the First Workshop, in the late afternoon a first gathering of the Steering Committee was convened as reported in Section 2.2.

Table 3-3 : Summary Programme : Vietnam VA Workshop No.1 in Hanoi 27 February 1995

Vietnam Coastal Zone Vulnerability Assessment and First Steps towards Integrated Coastal Zone Management
"Vietnam VA Project".

Workshop No.1: Sea level rise and coastal zone management

Military Guesthouse, Hanoi, 27th February 1995

09h00-09h15	Opening by Prof.Dr. Nguyen Duc Ngu - Director General of Hydrometeorological Service: Welcome and Introduction
09h15-09h45	Mr Nguyen The Tuong - Acting Director, Marine Hydrometeorological Center: Presentation of Vietnam Country Report, a brief review of the present state of coastal zone management and knowledge about sea level rise impacts in Vietnam.
09h45-10h30	Prof.Dr. R B Zeidler : Project Director - Vietnam VA Project: Project description and overall planning
10h30-10h45	Coffee break
10h45-11h15	G Toms : Project Manager - Vietnam VA Project: The VA and the 7 Steps Methodology
11h15-12h00	C Hulsbergen : Resident Advisor - Vietnam VA Project: Application of the VA to Vietnam
12h00-13h30	Lunch break
13h30-14h00	C Hulsbergen : Resident Advisor - Vietnam VA Project: Data management in the VA
14h00-14h45	Prof.Dr. R B Zeidler : Project Director - Vietnam VA Project: VA analysis tools and GIS
14h45-15h00	Coffee break
15h00-15h30	G Toms : Project Manager - Vietnam VA Project: Pilot Studies for the VA Project
15h30-16h15	Discussion and questions
16h15-16h30	Closing statements by Prof.Dr. Nguyen Duc Ngu

Close of Workshop at 16h30 , First Steering Committee Meeting follows.

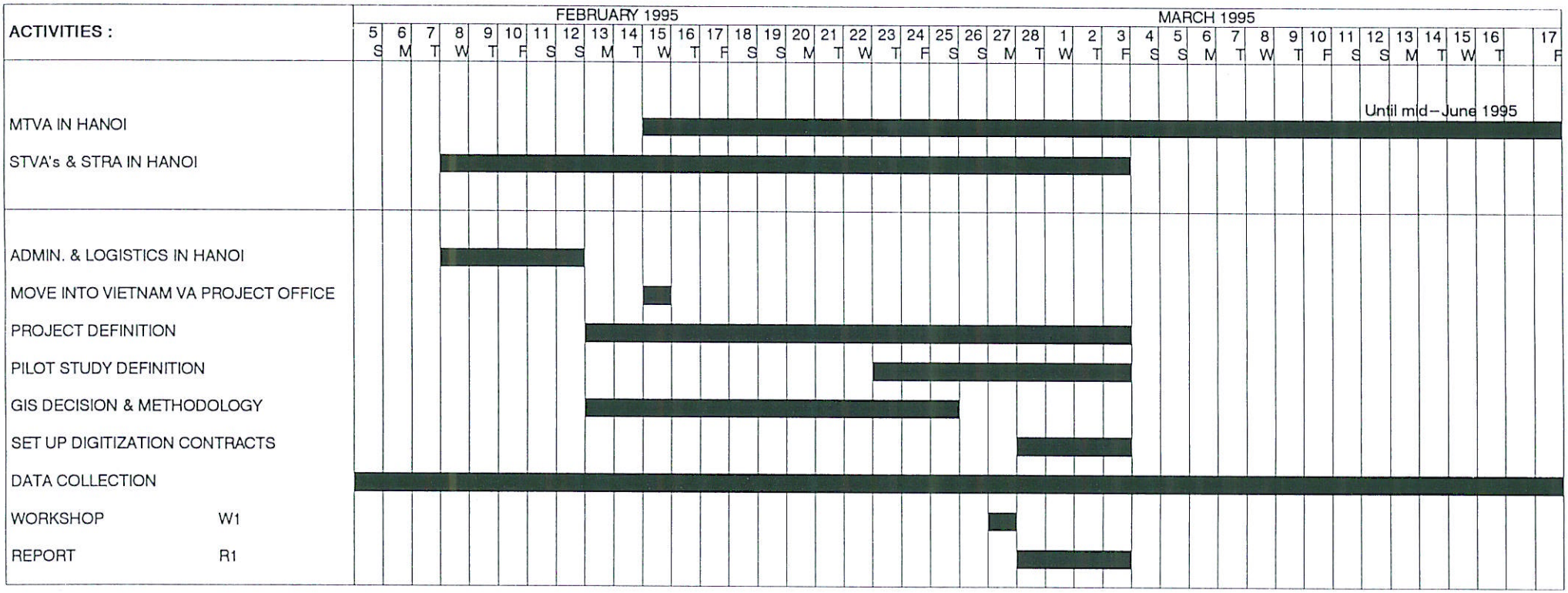
3.4 VA analysis and scoping

3.4.1 First-scan of the vulnerability of Vietnam's coastal zone to sea level rise

The coastline of Vietnam is about 3300 km long. In the north, the large delta of the Red River forms part of the coastal zone. The southern part of the country is a part of the huge delta of the Mekong River. In between these deltas, the coastal zone forms a narrow strip of land amidst the sea and the mountains, criss-crossed with a number of minor deltas and estuaries.

Socio-economic activities in Vietnam are concentrated in the coastal zones of the country.

FIGURE 3–1 : COMPLETED SCHEDULE – MISSION No.1



The pressures on the coastal zones are increasing rapidly and the resulting problems are evident: severe erosion, salt water encroachment, pollution and overexploitation of natural resources. Pursuing sustainable development is necessary to regulate the use of coastal resources in the short term such that they can also be relied on in the long term.

The delineation of the vulnerable low delta's and riveraine floodplains will be based on several criteria, one of them related to existing problems. The present and the anticipated problems in the coastal zones can be illustrated by the following examples, based on available information at the start of the VA study :

- The coastal zone of Vietnam is frequently stricken by typhoons, resulting in loss of lives, serious damage to houses and other structures, and water management problems. In 1985, for example, the damage caused by two major typhoons was reported to have cost 875 lives, whilst 400,000 houses were damaged and 375,000 ha of rice cultivation was destroyed. Over the last 100 years, Vietnam has been stricken by on average about 5 typhoons/year;

- Coastal erosion in Vietnam is severe. It is estimated that more than 600 km of coastline erode at an average rate of 10-15 metres per year. Locally, the erosion rate may even amount to 30 m/y (Red River and Mekong Deltas);

- Of the total population of Vietnam (more than 66 million), about 1.4 to 1.8 million people are living in areas subjected to flooding every year, and many more people are threatened by floods having lower frequencies of occurrence. If the sea level were to rise 30 to 100 cm over the next century, the number of people living in the risk zone would increase by a factor of 10;

- Coastal ecosystems (mangroves, intertidal areas, salt marshes) cover considerable areas in the coastal zone of Vietnam. In recent decades these vulnerable ecosystems are being threatened. This will not only be an ecological loss but a loss of the protection offered by these natural "buffers" will expose often weak sea defences to more severe and frequent attack and erosion. Accelerated sea level rise and increasing population pressure will only make these problems worse. Without proper protection measures about 8000 km^2 of ecosystems of national and international importance may be lost in the coming decades and extensive distances of coast will be at risk of breaching of exposed weak sea defences;

- More than half of the present rice production in Vietnam is located in areas which will be affected by an accelerated rise in sea level. With a sea level rise of one metre, about 20 % of the present rice production will be lost without response measures. Step 1 decisions

In terms of the 7 Steps Methodology, on the basis of the above (and after visits and discussions in Vietnam and reviews of previous work), it is possible to conclude this first scan of the VA with a summary of the "no measures" response option as in Table 3-1. It is emphasised that this is a first scan and is presented prior to the full analysis which will quantify the costs and risks

.The situation is generally very serious to critical in the case of a 100 cm sea level rise and

with no protection matters. This is not unexpected considering the low lying deltas, typhoon stricken central coast and high coastal population.

Table 3-1 : First-scan of the VA for the "no measures" response

(COMMON METHODOLOGY STEP 6 :) VA ASSESSMENT OPTION " NO MEASURES"	
IMPACT	DEVELOPMENT SCENARIO 1995 (100 cm/100 years)
People relocated	SERIOUS (HIGH)
Capital value inundated / relocated	SERIOUS (HIGH)
People at risk (incl. relocated)	CRITICAL
Capital value at risk (incl. inundation/relocation)	CRITICAL
Salinity intrusion problem (Mekong delta)	SERIOUS (HIGH)
Environmental concerns	SERIOUS (HIGH)

The full VA will extend this table to include the 30-year development scenario and the case of full protection measures. An intermediate strategy will also be assessed. The rate (ASLR) of sea level rise will not be reduced to 30 cm (ASLR1) as the impacts of this will be too difficult to predict on the scale of the whole coastline of Vietnam and with the accuracy of the available information (eg contours indicated on coastal maps are generally 1 to 2 m vertically spaced).

3.4.2 Boundary conditions and the delineation of the study area

This is an important part of STEP 1 of the 7-Steps methodology that has been addressed in Phase I since it has a strong influence on the areas for data collection and the accuracy of the information required.. According to the 7 Steps, the landward boundary of the study area should be chosen in such a way that, as a minimum, those areas are encompassed which will be physically affected by ASLR through changes in the probability of flooding, by erosion and sedimentation patterns, or by salinity intrusion. Land subsidence can also play a role in extending the study area to be considered.

Neglecting salinity intrusion and backwater effects, one way to fix the upper (inland) boundary of the study area is as the sum of the following :

Present 100-year return period water level
PLUS
Expected subsidence over the next 100 years
PLUS
Expected ASLR over 100 years

Early estimates of these values were as follows, based on discussions and meetings with

MHC and the Institute of Geology in Hanoi :

Present 100-year return period water level above MSL	2.5 m (highest in N Vietnam)
PLUS	
Expected subsidence over the next 100 years	0.5 m (in worst locations)
PLUS	
Expected ASLR over 100 years	1.0 m

The total elevation below which inundation occurs once in 100 years on an open unprotected sea coast would be therefore the sum of these values, namely + 4.0 m above the mean high water of spring tide.

Including the effects of backwater and salinity intrusion can increase the upper elevation of the study area. To cater for these effects and the possibility of including events more extreme than 1 in 100 years in the analysis requires an additional elevation of about 2.0 m. This has been selected without detailed modelling of saline intrusion which is beyond the scope of the report but rather by judgement and understanding of the joint Vietnamese and European Project Team and discussions with local experts. For this reason the upper boundary of the study area is the elevation contour at 4.0 + 2.0 = +6.0 m above MSL.

Choice of this elevation contour incorporates a large part of South Vietnam and in the Mekong Delta area this extends back to the Cambodian border. In North Vietnam the +6.0 m MSL level is the approximate elevation of Hanoi so the Red River Delta area downstream of Hanoi is also covered.

In terms of the IPCC terminology the area between 0 m MSL and +6.0 m MSL will be called the MHIZ (Maximum Hydraulic Impact Zone). For the purposes of this study the MHIZ will be used to define the "study area" for data collection and digitzation tasks etc.

When investigating the individual coastal river catchments more closely it may be decided to extend the MHIZ to +10.0 m MSL. The exact extent may also depend on the definition of the topography (accuracy) available from source and digitized topography data used for the analysis.

For practical purposes related to the execution of the study and the presentation of results, the study area will be subdivided into Impact Segments based on provinces. The final determination will be based on the result of the general data collection as part of Phase II and the choice of hardware and software to be used in the analysis as digitized data file sizes will be huge. It was also decided to include offshore islands in the study area where these were low lying with significant lands in the MHIZ.

Other effects of global warming such as increased storm intensity and changes in rainfall patterns will be introduced in a qualitative / descriptive way based on a review of available previous work in Vietnam on this subject.

3.4.3 VA Analysis methodology

The analysis for the VA is concentrated in Step 4 of the 7-Steps method, which deals with physical effects and natural system responses to ASLR. This requires quantification of

people, property (capital) and environmental values lost or at risk of flooding. In this study "lost" means subject to annual flooding since, in most cases, this will be the maximum frequency tolerance level before relocation of people or facilities.

This requires estimation of flooded (inundated) areas with an annual storm surge and then counting-up of the people and assets lost. This procedure over 3,000 km of coastline, needs to be repeated for various extreme storm events to calculate the "at risk" figures (eg "at risk" = return period multiplied by quantity lost for that water level).

The full methodology for estimation of risk and loss figures will be outlined in a later study report.

Due to the repetitions required and the enormous area and its diversity a quantitative estimate of the VA for Vietnam will only be feasible using a digital system that allows automatic overlays of the topography - land use - flooded areas. When population density and price per km^2 can be attributed to each land use category then these will be rapidly computed using a GIS (Geographical Information System). In turn this can only be done when there is sufficient good data available for entering into GIS (eg topography, land use etc.).

After the visits to GIS Institutes and upon viewing available topography maps the following was concluded :

(i) The local capability in Hanoi is high in GIS and digitization tasks (although this capability does yet not exist within MHC)

(ii) The available topography maps from the official Government sources show a large amount of detailed topographic information

(iii) There are sufficient land use maps already available for the study to use these but with some extra processing

These findings led to the conclusion that it will be feasible to conduct digitization of information from maps and then overlay analyses with GIS that will provide a rapid means of determining loss and risk quantities.

The chosen method may encounter practical problems which cannot be foreseen in Phase I. For this reason, meetings were held with DGIS and RIKZ in The Netherlands to discuss the analysis options. Options, aside from a "digital" VA of the whole coast were a digital VA of certain key areas or a rougher estimation method such as using a schematised coastal zone over large stretches of coast. A third option of quantifying the loss and risk areas and values by hand analyses was dismissed as not feasible due to the enormity of this task over 3,000 km of coast.

Practicalities that can cause difficulties are such items as :

- reliability of map data (coordinates, levels)

The reliability of the map data is considered to be good and within about 10 cm accuracy in

elevation. Different (inconsistent) projections and coordinate systems can aggravate this and can cause more significant deviations in horizontal accuracy. Within the scope of this study these inaccuracies are acceptable.

- digitization task timing and cost

The early discussions with 3 GIS agencies in Hanoi confirmed that some capacity was available to complete the work in the timing required for the VA analysis. This will require completion of digitization tasks by approximately August-September 1995. To meet this deadline will probably mean a splitting up of the work between 2 agencies. The costs of the work will be more expensive than originally intended but will be accommodated.

- availability of analog data on more than 500 small map sheets

The analog data on various sheets (topography and land use) is inconsistent from sheet to sheet and detailed editing and stitching of digitized data and derived surfaces will be required which will place time and cost demands on the work.

Despite these difficulties, on the basis of the information gathered in Phase I the full digital/GIS approach will be followed for the whole coast Vietnam VA project. This decision has far reaching impact on the project and has been approved by RIKZ / DGIS before proceeding.

3.4.4 Data management and analysis tools

Data management, whatever type or kind of data, consists basically of acquisition, preprocessing, storage, import/export (retrieval from other sources and transfer to external means of data storage), processing and analysis. All these activities require appropriate organizational and logistic arrangements within a certain system, possibly topic- or project-oriented.

Appropriate systems, such as GIS (Geographical Information System) can be used for data management and clear-cut database support. It is recommended to adopt a GIS system for these purposes as well as for the analyses of the VA. Once arranged, a GIS system can be employed for a good many destinations serving the purposes of both VA and future projects.

It is proposed that the data management required for the VA study is best served by a Coastal Information System (CIS). The system, being tailored for VA has been suggested as a compromise based on project goals to be achieved, the availability and cost of software and hardware, logistics and training requirements and other factors, supported by the best knowledge of the trilateral project team.

Coastal Information System

A Coastal Information System (CIS) can be described as a system which enables the systematic storage, compilation, interpretation, presentation and visualization of data of a specific set of coastal issues. Although simple data or maps for one site (segment) can assist the team members of the VA VIETNAM, such an ad hoc effort is not regarded appropriate for the creation of an effective CIS.

The proposed CIS will focus on the structure of the information stream of the already gathered data and data that will come available during the execution of Phases II and III. It has been decided that the Vietnam VA CIS should comprise two important software components :

CIS = "GIS SPANS EXPLORER" + "GMS-DECIDE"

These two software items and how they were applied are discussed in more detail in Report No.3 (ref 5) but brief descriptions are given below :

GIS SPANS EXPLORER

This is a low-end GIS package, developed as a part of the Canadian GIS SPANS software range and working under MS-Windows with good graphical capabilities but also with sufficient functionality (eg overlays) for the VA analysis.

GMS-DECIDE

The GeoManagement System (GMS) software will be used in this project for coastal data management. "GMS-DECIDE", a visualisation tool developed in Belgium, is recommended as a tool for systematic compilation, interpretation, and display of general and site specific information linked to a selected set of coastal issues. The proposed GMS will focus on the management of the information stream of the already gathered data and data that will come available during the execution of Phase II and III.

3.5 Nomination of Pilot Study areas and topics

In recognition that the present coastal zone of Vietnam is under serious pressure from coastal developments, agriculture demands, population growth and existing environmental conditions (typhoons, floods) short term needs exist for strengthening of response measures over a timescale of years rather than decades. These short term problems are often perceived to be of far greater importance than the long term VA issues and consequently the temptation (based on experience in previous studies) has been to include and concentrate on these at the expense of the VA. This will be avoided in the Vietnam VA, not by ignoring these needs but by conducting three Pilot Studies with specific timescales and objectives.

The Pilot studies will be conducted on specific local (scale 10 to 100 km) coastal stretches where present problems are serious and can be considered typical of the geographical area (eg north, south or central coasts) or typical of a specific type of threat (typhoon impacts, coastal erosion, flooding, salinity intrusion etc.). The intention will be to advise during these Pilot Studies on appropriate analysis and solution methods, decision making processes for response and especially to demonstrate the approach in terms of an integration of data, capabilities and involvement of a number of disciplines and organisations.

These Pilot Studies therefore provide an interaction with Vietnamese counterparts in an effective way demonstrating the value of the techniques and integrated approach that are so important for longer term planning and management.

In this way the VA will be enhanced both by demonstrating the application and demonstration of CZM in real problems in the Vietnamese context and by the incorporation of lessons learnt

during this experience in the final VA recommendations.

The Pilot Studies will be conducted with input from both the LTRA and short term missions and by working closely with Vietnamese counterparts. Care will be taken to ensure that the Pilot Studies, which will be conducted simultaneously with the VA do not hamper the planning and execution of the full VA which should be seen as the continuous mainstream activity of the Implementation Phase.

For each of the nominated Pilot Studies progress will be recorded in the series of 3-monthly Implementation Phase reports and a report will be presented as part of the Final Report.

Candidate areas for the Pilot studies are:

- Thai Binh - Nam Ha Province : Coastal protection study
- Central Coast : Hue City : Flooding, Tourism and coastal inlet problems
- Vung Tau : Coastal management, industrial pressures (oil industry), rapidly developing

Details of these areas are being gathered for clearer definition of the studies and this will be reported in Report No.2 of this project. The Thai Binh - Nam Ha Pilot Study will be tackled during Mission 2 in June and July 1995.

4 Planning for the data collection - Phase II

4.1 Objectives of data collection

The primary objectives of the data collection period are to provide the data necessary for the VA analysis and the conduct of the Pilot Studies. It is to be expected that some data collection will be done in Phase III, especially for the Pilot Studies but the project requires completion of the major part of the data collection in Phase II so as to enable analyses for the VA to proceed early in Phase III.

4.2 Types of data and data sources

Crucial data, without which no analyses can be carried out for the VA include topography, land use, land prices and population densities. In addition, planning scenarios are required for compilation of a 30-year development status for the Vietnamese coastal zone.

Boundaries (National, provincial, administrative, sea-land-river-dam boundaries etc.)
Land elevation - topography (elevation contours at 1 m intervals between 0 and +6 m MSL)

Within the zone from MSL to + 6 m MSL the following data are required for the present (1995) and a projection for 30 years' time (2025):

Population distribution
Land-Use: Classification and Patterns
Land Values
Groundwater characteristics
Coastal flora habitats and ecological types
Coastal fauna
Inventory of natural coast types
Inventory of coastal protection and river dikes
River characteristics
Exceedance frequency curves (incl typhoons)
(Local) subsidence rates
Storm characteristics
Demographic Developments Projection and Patterns
Economic development projections and patterns
Agriculture development projections and patterns
Aquaculture development projections and patterns
Legal and Institutional Framework

Additional data on the following is required for the hydraulic analyses:

Tide levels
Datum levels
Coastal erosion/accretion, sediment transport, etc.
Flood events and extents
Wave characteristics

The sources of the above data have been identified and this identification of additional

sources is continuing throughout the data collection phase as more data comes to light. A very high level of expertise in data collection and storage exists in Vietnam and a wealth of good data sources has been uncovered. In Report No.2 of this project, which deals with data collection sources and complete data lists will be described in detail.

Specifically important data sources for this project are MHC for marine and coastal boundary condition data (waves, winds, water levels, currents), Institute of Geology for subsidence and coastal erosion data, NIAPP for agricultural data (rice cultivation in the delta areas, land use maps), FIPI for forestry related data (vegetation, mangroves etc), CSRG for digitization and GIS expertise. Many more will be mentioned in Report No.2 (ref 4).

4.3 Data requests and contracts

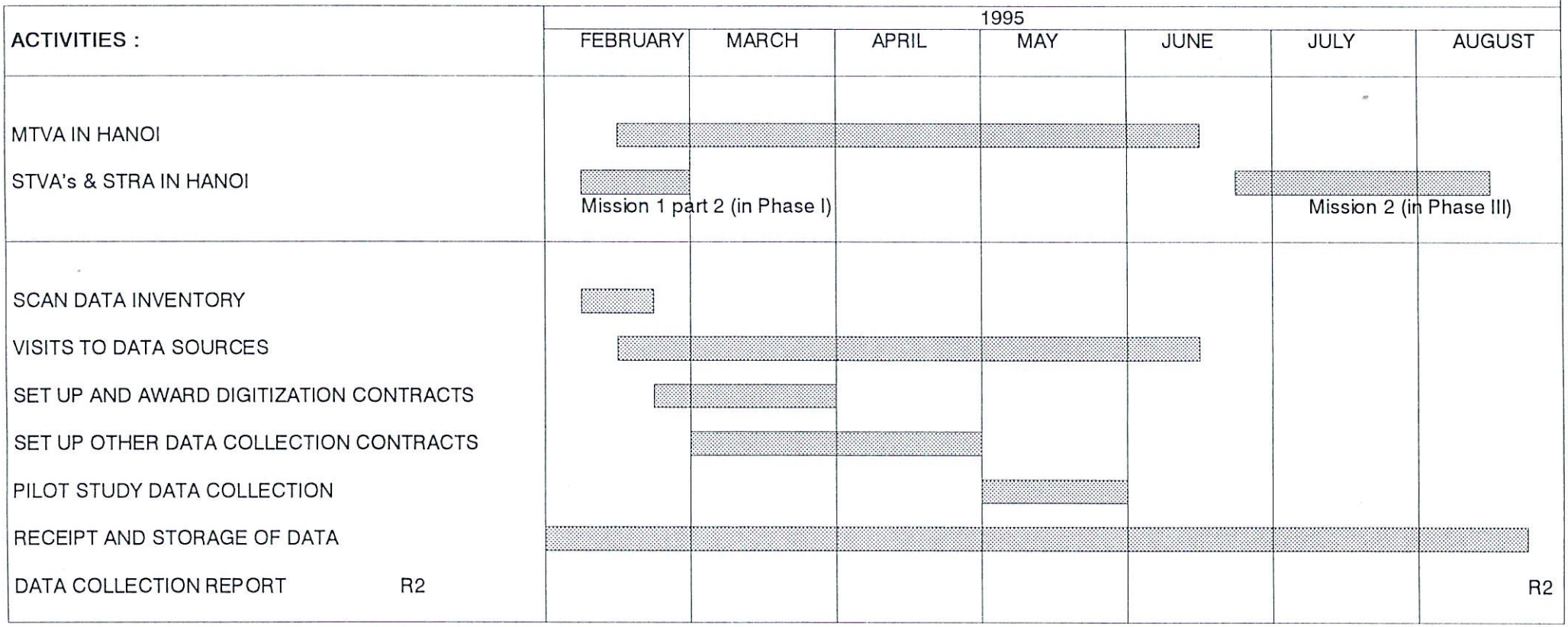
To manage the acquisition of data during Phase II, it was necessary to clearly specify the data required in a standard manner and to communicate this to MHC and colleagues undertaking visits and official requests for data from a wide range of Vietnamese Government Departments, Institutes and Universities. To do this in a structured way, a customized set of "DATA COLLECTION FORMS" is being used in the data collection procedure. While a good deal of room has to be made for iterative requests and negotiation of deliverables and other logistical problems, the example form described in Table 4-1 demonstrates a typical check-list of specifications being used :

Table 4-1 : Example of proposed Data Collection Sheet : "Extreme water levels"

1	Objective of this information request (refer to the relevant step in the 7 Steps for which the data will be used)
2	Information requirements to meet the objective (eg. various: water levels near the closed coast; water levels in river mouths and estuaries; water levels in upstream river sections)
3	Possible sources of information (eg. MHC, Institutes etc.)
4	Suggested approach to produce the information
5	Format of the deliveries (NB: present the data together with a "legenda": a small accompanying written "Internal Report" which describes the objective, the method used, the data sources, comments on accuracy, possible future additions and/or improvements, references, authors, etc.)
6	Organisation aspects: institute and persons responsible for this task, time schedule and deadlines, management and control, coordination
7	Status of data collection request (updated with time)
8	Action

It has been found necessary, in the context of data exchanges in Vietnam between Institutes and Departments, that for each data request a small "contract" is entered into which binds

FIGURE 4–1 : PLANNED SCHEDULE FOR DATA COLLECTION (PHASE II)



the provider of data to the deadline and quality of the deliverables but which enables a degree of remuneration to be negotiated. This latter is a matter for the Vietnamese counterparts to agree but the data requirements are to be specified by the joint Project Team.

Digitization contracts:

The digitization contracts for provision of digital files in GIS format deserve special mention. A Terms of Reference (ToR) was circulated to various Institutes in Hanoi in February and March. The ToR outlines the requirement for provision of the following in digital form suitable for GIS analysis by SPANS EXPLORER:

- all topographic information from available maps (1 in 25 000 scale) including spot elevations and digitized contours
- analysis of the above to provide (via Digital Elevation Modelling DEM) a contoured surface of the coastal zone from 0 to + 6 m MSL such that contours at 1 m intervals can be provided
- digitised land-water boundaries and dyke locations and types
- digitised land use map

In reviewing the replies to the Terms of Reference the following awards were made for the digitization contracts:
CSRG - North Vietnam (north of Latitude 16°N)
NIAPP - South Vietnam (south of Latitude 16°N)

Both contracts were awarded in April 1995 and are progressing well.

4.4 Schedule for Phase II

The schedule for Phase II is given in Figure 4-1. It will be important that the digitization contracts proceed according to the timing shown as these will be critical for subsequent items. Phase II activities are planned for completion by the end of June 1995 with a report submitted in August 1995.

5 Planning for the Implementation Phase - Phase III

The schedule for the Implementation Phase is given in Figure 5-1, showing a completion date as planned in April 1996.

The VA analysis method using the CIS (= GIS + GMS) will be applied (refer Section 4). The setting up of the analysis method will be done during the July-August period of Mission No.2 when European GIS experts will be advising MHC and other counterparts. The advice will include familiarisation with the software tools and training sessions and the software will be installed on the computers in the Project Office.

On receipt of the results of the digitization contracts (eg topography contours, land use areas, land-water borders, dyke types etc.) in SPANS EXPLORER format, these will be imported and arranged in the database for subsequent analyses. The analyses by querying overlays of flooded areas with land use and land price and population will be a lengthy process and will take 3 to 6 months to complete after receipt of the digitized products.

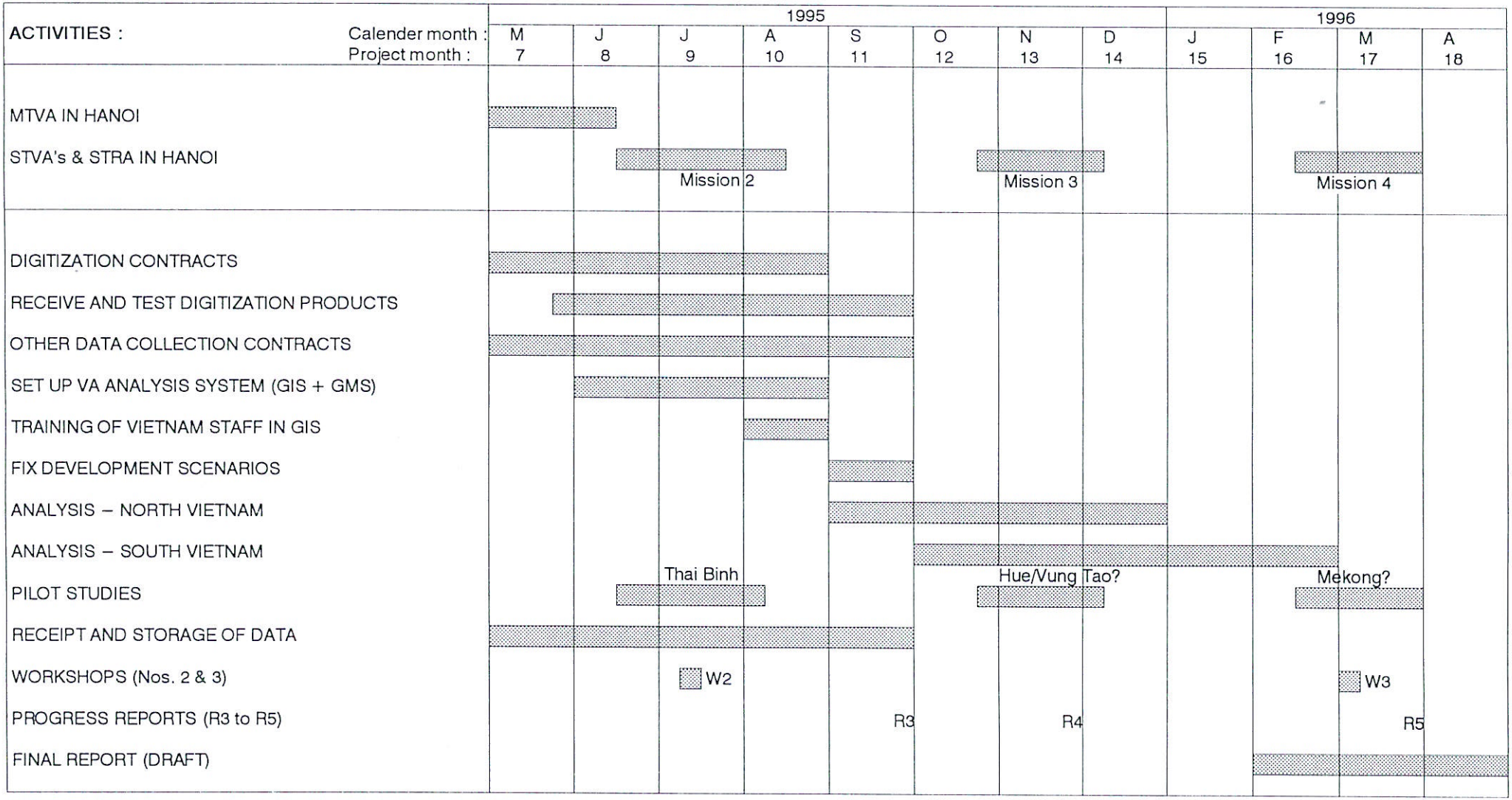
The data analysis for the VA will require definition of the 30-year development scenario for Vietnam well in advance of the analysis of various SLR and response scenarios. These scenarios and a great deal of socio-economic and planning data will be required to be interpreted and summarised for this purpose.

Interpretation of flooded areas for various combinations of SLR and protection (response strategy) will be required on local scales along the whole coast, taking into account the digitized dyke details and assessments of their long term stability under higher water levels and more frequent saturation by flood waters.

Missions 2 to 4 are planned during this period and the Pilot Studies will be conducted during the missions.

The project is due for completion in April 1995 when demobilisation will take place in Hanoi and project results will be presented to the Vietnamese counterparts. The planned schedule for Phase III is given in Figure 5-1, (although this is tentative, subject to developments in Phase II.).

FIGURE 5–1 : PLANNED SCHEDULE FOR IMPLEMENTATION (PHASE III)



6 Conclusions

The Vietnam VA Project has been successfully initiated and has gained considerable momentum during Phase I.

A sound administrative and logistics support has been established at a Project Office in Hanoi equipped with computing and full office communication facilities and with ready transportation arrangements.

The Data collection phase, Phase II of the project is scheduled and planned. Exciting developments include the possible award of coastal zone digitization contracts which will be carried out in Phases II and III and which will provide key data to the VA Analysis of the whole coastal zone of Vietnam from 0 m MSL to + 6 m MSL.

Planning and scheduling of the Implementation Phase, Phase III, has been conducted, including selection of the Pilot Study areas, the first of which will be Thai Binh coastal protection problems.

The project is becoming well publicised in Hanoi and Ho Chi Minh City and this has been assisted by a Workshop in Hanoi in February 1995 attended by over 70 persons from relevant Ministries and Institutes involved in coastal zone activities.

Interactions between the Vietnam VA Project and other similar projects and programmes in Vietnam has been established. In particular, joint Workshop activities are planned with the UNFCCC Country Team (UNITAR).

Finally, a strong Project Team has been established with joint Polish-Vietnamese-Dutch specialists working closely together. The foundations have been laid for a very successful project.

List of references

1 "Vietnam VA Project, Interim Progress Report No.1 : Months 1 to 3", Vietnam VA Project Office, Hanoi, Vietnam, March 1995

2 "Vietnam VA Project, Interim Progress Report No.2 : Months 4 to 6", Vietnam VA Project Office, Hanoi, Vietnam, June 1995

3 "The 7 Steps to the Assessment of the Vulnerability of Coastal Areas to Sea Level Rise - A Common Methodology", IPCC, Response Strategies Working Group, Advisory Group on Assessing Vulnerability to sea Level Rise and Coastal Zone Management, (Available at the Vietnam VA Project Office) September 1991

Planned references ...

4 Vietnam VA Project : Report No.2 : Data Collection, planned for June 1995
5 Vietnam VA Project : Report No.3 : Methodology, planned for September 1995

APPENDIX A : Mission No.1

A1 : Mission No.1 - Part 1 - November/December 1994

A1 : Mission No.1 - Part 1

CONTENTS :

1 Introduction and objectives

The mission was conducted from November 14 to November 26 by a Polish-Dutch group consisting of 4 project personnel and accompanied by the RIKZ quality control coordinator.

The aims of the Mission were to initiate the project and conduct detailed project definition activities in accordance with the Project Document.

The STRA attended the Mission and thereafter spent an extra week in Vietnam to define data inventory requirements and conduct additional meetings.

2 Mission personnel

The following personnel attended the 2-week mission:

Dr R B Zeidler	Project Director (BW-PAN, Poland)
Mr G Toms	Project Manager, STVA (FRH, The Netherlands)
Mr M Pluijm	Director (Joint Venture partner), (FRH, The Netherlands)
Mr C H Hulsbergen	STRA (DH, The Netherlands)
Mr A van Urk	Quality Control (RIKZ The Netherlands)

3 Itinerary and agenda

STRA Mission 1

14 November	Mission leaves Europe
15-16 November	Mission personnel gather in Hanoi
16 November	Introductions and discussions with MHC and visit to Netherlands Embassy
17 November	Contract discussions MHC, small VA seminar
18 November	Contract discussions MHC, visit to State Planning Committee (SPC)
19 November	Contract discussions and clarifications at MHC
20 November (Sun)	Free day
21 November	Visit to Polish Embassy (RZ), visit to UNDP
22 November	Contract discussions with MHC, signing of Contract with MHC
23 November	Project discussions at MHC, meeting with UNITAR representative
24 November	Mini-seminar at MHC, visit to Dept.Geodesy & Cartography to view maps
25 November	Visit to UNDP library, STVA's depart, STRA remained
26 November	STRA Mission arrives in Europe

End of STRA mission 1

STRA remains for one week extra:

26 November (Sun)	STRA preparations for visit to Ho Chi Minh City
27 November	Travel to Ho Chi Minh City
28 November	Visit to Hydrometeorological Institute of HMS Visit to MHC Southern Region, visit to NEDECO Office
29 November	Visit to South. Inst. of Water Resources Research, plus Mekong Committee
30 November	Return to Hanoi, Visit to Center for Information and MHC
01 December	Project discussions and planning with MHC
02 December	STRA departs Hanoi
03 December	STRA arrives Europe

4 Record of meetings, visits, discussions

In this record the following initials are used for abbreviation of names;

RZ Dr Ryszard B Zeidler, Project Director, Vietnam VA Project
MP Mr Marco Pluijm, Company Deputy Director, Frederic R Harris B.V.
GT Mr Geoffrey Toms, Project Manager, Vietnam VA Project
CH Mr C Hulsbergen, LTRA, Vietnam VA Project
AvU Mr A van Urk, Quality Controller, Netherlands Government, RIKZ

16 November *Introductions and discussions with MHC and visit to Netherlands Embassy*

am MP, GT and CH attended introductions in Hanoi to the MHC project team of Mr Nguyen The Tuong (Acting Director, MHC), Mr Tran Phuong Dong (Technical coordinator, MHC), Mr Nguyen Thanh Vinh (Administrative Coordinator, MHC) and Mr Le Xuan Lan (International Cooperation Department, HMS). The meeting was held at the MHC office in Dong Da District. During this introduction the agenda for the mission was discussed as well as the purpose. The proposed draft contract between MHC and the Frederic R Harris - Delft Hydraulics Joint Venture was discussed. It became clear that the issue of "classification" of the project by the State Planning Committee as an "ODA" or "non ODA" project would be crucial. "ODA", the "official overseas development aid" funds, if used for this project require a lengthy procedure to be followed in Vietnam for approvals. This procedure would definitely involve the State Planning Committee and could take 3 to 12 months. If the project was not ODA funded then approval to proceed could be given at the level of Dr Ngu, the Director General of HMS (HMS is the organisation responsible for MHC).

pm To try to clarify the ODA funds issue a meeting was held at the Netherlands Embassy in Hanoi on the afternoon . Unfortunately both the Ambassador (Dr Ader) and the First Secretary (Mr Embden) were out of town. Mrs Marieke Boot (First Secretary for Development Cooperation - Gender and Development Mekong Region) was able to provide valuable information and advice and background as to how to proceed. It was established that the project funds were considered to be ODA funds by the Netherlands Government but the situation was still not clear.

17 November *Contract discussions MHC and small VA seminar*

day Contract discussions continued at MHC with the same personnel as on 16 November but with the addition of RZ. Discussions centered on finding a way to arrange the project approvals. Details of the project background and aims were discussed at length. It was clear that because of the departure of Dr Nguyen Ngoc Huan from MHC (ex - Deputy Director, with whom all previous project discussions had been undertaken in 1992, 1993 and up to his departure in July 1994)) a large disruption to the continuity of the preparations in Hanoi for the project initiation and signing had occurred. This had resulted in a complete lack of awareness about the real project aims and budget allocations etc. at both the nominated counterpart (MHC) and, more importantly at the State Planning Committee. In the afternoon, a small seminar was held to introduce the schedule and content of the VA Project to MHC counterparts (8 persons). MHC outlined some of the key problems and vulnerable areas along the Vietnamese coastline. MHC also outlined a profile of their organisation and staff. The MHC comprises a total staff of 42 persons. At the Hanoi office about 20 persons were working, with the remainder in Ho Chi Minh City and some site offices in the field.

18 November *Contract discussions MHC, visit to State Planning Committee (SPC)*

am Contract discussions continued at the MHC offices. A detailed outline of the budget provisions and of the allocations to MHC and others was given by GT. This took most of the morning

and ensured a thorough understanding by MHC of the financial implications and expected MHC duties, commitments and deliverables. MHC raised the question of attention to training (in Europe), instrumentation purchases and follow-up studies. These were noted but it was explained that these were requests beyond the scope of the present project.

pm In the afternoon, a crucial meeting was held at the State Planning Committee Head Offices in Hanoi. The meeting was attended by RZ, MP, GT and CH together with MHC colleagues (Mr Tuong, Mr Vinh, Mr Dong) and Mr Lam of the International Cooperation Department of HMS. From SPC, Dr Nguyen Tien Thuan, Vice Director-General of SPC, hosted the meeting and Mr Bui Cong Khanh (Project Officer - Dept. of Foreign Economic Relations of SPC) was present. Mr Thuan expressed concern that the project was "too small" for real impact on improving Vietnam's coastal defences but was reassured that this was just a first step. He also confirmed that SPC sees this project as being "non-ODA" funded because there is no official agreement for development aid between the Dutch Government and the Vietnamese Government. This project was seen as a project whereby the European Project team (IBW-PAN and the Dutch Joint Venture) were paying for services from a Vietnamese Government Agency. Since the budget was small and the services were not exceeding the capabilities of MHC/HMS then the project was given a verbal go-ahead. Dr Ngu of HMS would be informed.

19 November *Contract discussions and clarifications at MHC*

day At the MHC offices detailed contractual discussions were held and a draft contract document was compiled. Emphasis was placed on ensuring a clear understanding of terms and commitments and some wording changes were agreed. Also much time was spent explaining that the project funds should be shared among a number of Vietnamese participants but with MHC/HMS as the focal coordinator of this activity. A preliminary list of proposed project participants and Steering Committee members was drafted. AvU arrived in Hanoi.

20 November (Sun) *Free day*

day Visits to some Hanoi temples and monuments were undertaken and further contractual discussions were informally conducted with MHC and among the project team. Contract documents were adjusted and redrafted.

21 November *Visit to Polish Embassy (RZ), visit to UNDP*

am RZ visited the Polish Embassy in Hanoi. Discussions were held about the VA Project and the project initiation difficulties. The rest of the team visited MHC for more contractual discussions.

pm In the afternoon a visit was undertaken by RZ, GT, AU and CH and Mr Dong to the UNDP in Hanoi for discussions with Mr Yannick Glemarec (Assistant Resident Representative - Programme) and Mr Dennis Fenton (Environment Advisor). The VA project was described to UNDP and in turn the activities of UNDP in Vietnam were outlined. UNDP advised cooperation with existing programmes such as Red River Masterplan and ADB work. Also advice was given that consultation with Provincial level authorities will become very important especially on the central coast. Other activities highlighted by UNDP were the dyke management project (Fenton), GEF (Global Environmental Fund, likely to approve a US$ 4.5 million study programme of environmental matters in Vietnam), IUCN Biodiversity action plan and others. The UNDP library was visited and will be open to use by the Project Team during the study. UNDP provided a report summarising all loan projects in Vietnam which is updated annually.

22 November *Contract discussions with MHC, signing of Contract with MHC*

am Further contractual discussions with MHC and arrangement of procedures for the signing ceremony.

pm In the afternoon a signing ceremony was held with members of MHC (Messrs. Tuong, Vinh, Dong) and HMS' International Cooperation Department present (Messrs. Quang, An, Lam, etc.). Chief signatories were Mr Tuong and Mr Pluijm for Vietnamese and European parties respectively. Following the signing, a dinner was held with all present.

23 November *Project discussions at MHC, meeting with UNITAR representative*

am Having signed the contract the focus shifted to practical arrangements such as detailed rescheduling of Phases I and II, data collection needs, participation of Steering Committee and other Institutes, workshop scope, office accommodation etc.

pm In the afternoon a meeting was held with UNITAR representatives Mr Gao Pronove (Programme Officer) and Country Team (for Climate Change) representative and Secretariat Member Mr Dao Duc Tuan (Ozone Action Office, HMS). UNITAR outlined the purposes of the programme and in return the VA was described to them. UNITAR (UN Institute for Training and Research) is assisting Vietnam with Climate Change training involving workshops and lectures etc. that will lead to enhanced development of the Vietnamese Government's response to the Framework Convention for Climate Change signed in Rio De Gainer in 1992 (UNFED) and followed up at Noordwijk (1993). It was clear that a lot of linkages between the two programmes exist and that significant advantage will be gained from interaction. This will be enhanced by recognising the Steering Committee for the VA Project as a sub-Committee of the Country Team. Dr Tuan will communicate with MHC to follow up on this suggestion and Dr Ngu will be advised and consulted. In favour of the linking is that Dr Ngu is Chairman of both the Country Team and the VA Project Steering Committee.

24 November *Mini-seminar at MHC, visit to Dept.Geodesy & Cartography to view maps*

am Discussions continued at MHC about implementation details, study teams (north - MHC, south - HMI under Dr Phan Van Hoac, central - Truong Ding Hung), workshop scope and extent etc. MHC noted that the workshop will need to be bigger and more "high profile" than originally intended so as to ensure information and cooperation (data release) from a wide variety of Institutes. A small seminar explaining the A study was held with the emphasis on MHC and HMS staff (approximately 15 people).

pm In the afternoon a visit was made to the Dept. of Geodesy and Cartography of the General Department of Land Administration and brief discussions were held with Mr Nguyen Tien Khang (Deputy Director). Some maps were viewed and available scales were discussed. Mr Dong will retrieve a catalogue of available scales.

25 November *Visit to UNDP library, STVA's depart, STRA remained*

am Further implementation and planning discussions at MHC. Planning of trip to Ho Chi Minh City and arrangements.

pm Visit to UNDP. Retrieval of library lists and references. Mr Dong of MHC was introduced to the library system. Several key reports copied or bought.

STVA mission ends, STRA stays one extra week:

26 November *STRA preparations for visit to Ho Chi Minh City*

day Arrangements for trip to Ho Chi Minh City and planning discussions with Mr Dong (MHC).

27 November *Travel to Ho Chi Minh City*

day Travel to Ho Chi Minh City. Met by Dr Gia of the Sub-Institute for Information and Technology of the Vietnam Centre for Natural Science and Technology.

28 November *Visits to HMS/MHC southern offices and NEDECO Office*

am STRA (Mr Hulsbergen) and Mr Dong visit to Hydrometeorological Institute (HMI) of HMS, for discussions with Dr Phan Van Hoac. Also discussions held with the waves expert Mr Ho Ngoc Sang, tides expert Mr Bao Thanh, sedimentation expert Mr Nguyen Huu Nhan and sea-hydrodynamics expert Mr Nguyen The Hao. This Institute is the proposed southern focal point for VA project. The Institute has a total of 30 staff; during measuring campaigns up to 100 people. Reorganisation is planned in a few months: upgrading from "Institute" to "Center", increasing to 50 staff. Organogram, names, expertise will be sent to Mr Dong. An outline of the VA project was presented. HMI is fully prepared to participate. Emphasis was placed on the great potential of the Mekong Delta, but also on its vulnerability especially due to risks stemming from oil exploration and production. A large oil spill occurred on 3 October 1994 on the Saigon River after a tanker collision. At MHI, a 2D flow model was applied to analyse and predict dispersion of oil. Other risks exist such as pipe breaking; land subsidence (land slides have been reported); oil companies are not thoroughly held responsible for the damage; legal and institutional problems. Increasing salinity is seen as a big potential problem. Also the need was expressed for an international hydro-meteo and water quality data bank for South China Sea. Dr Phan Van Hoac is national leader of the Gulf of Thailand Research Project (fisheries, aquaculture, water quality etc). The area of interest of MHI reaches from the Gulf of Thailand in the west to the city of Na Trang to the northeast. Wave data is especially poor or almost completely absent. MHI has no wave measuring instruments, apart from "Ivanov" visual observation stations. Some wave measurements are carried out at "White Tiger" oil platform, (Joint Venture Russia-Vt), but no data have been made available so far. Other platforms (Aus, Can) are planned. Visit concluded by lunch hosted by the Institute.

PM. CH and Mr Dong visited the Southern Region Hydrometeorological Center (19, Nguyen Thi Minh Khai Str., District 1, Phone 84-8-241446, Fax 84-8-296091) - NB Do not mix up with the other office at the same address (HMI). Meetings were held with the Director Dr Pham Duy Le and Dr Le Muc, Chief of Forecasting Services. The Center is responsible for a large number of monitoring stations in the southern part of Vietnam. The stations are mainly on land, and some five are located at the coast (for example at Vung Tau) or at sea (one station on offshore platform off the Mekong river, and one near Cambodia). Especially the monitoring and warning of typhoons is an important task. As an annual average, 32 typhoons originate over the western Pacific, of which 10 come over the South China Sea, out of which 4 or 5 hit the Vietnam coast, mostly north of the Mekong delta. In 1946 and 1952 the Mekong delta was hit. Monitoring is via hourly weather pictures received via HCMC satellite station (Japanese satellite); other satellite receiving stations are at Da Nang and Hanoi. General typhoon statistics have been analysed for the period 1932-1989. Reports and publications are mainly done in Hanoi (National Weather Forecast Center). The Center also serves oil companies with customized wave forecasting reports (estimated wave heights and periods) on a commercial basis.

A further visit was conducted to the NEDECO Office, run by Haskoning Engineering Consultants. A meeting was held with the Director: Mr Nguyen Mai Lam (33, Ly Van Phuc, District 1, HCMC
phone: 84-8-200087, fax: 84-8-200086). NEDECO has finished the work on the Mekong Delta

Master Plan, and has submitted the reports to the State Planning Committee. All information regarding the studies and associated recommendations must be applied for from SPC.

29 November *Visits to SIWR and Mekong Secretariat*

am CH and Mr Dong visited the Southern Institute of Water Resources Research (2A, Nguyen Bieu Street, 5th District, HCMC phone: 84-8-355027 fax: 84-8-355028) and held discussions with the Director: Prof Dr Nguyen An Nien and Vice Director: Assist Prof Cu Xuan Dong (ocean currents research; Ca Mau peninsula; 1991 Wageningen Staring Institute). Other staff include Assist Prof Le Ngoc Bich (dike protection, HCMC and ocean currents) and Dr Nguyen The Bien (oceanography; coastal morphologic modelling). Introduction to VA project was given by Mr Dong and Mr Hulsbergen. Prof Nien presented a brief overview of current concerns related to flooding of the Mekong. Since the 1991 flood there are indications of a possible sea level rise effect in that flooding seemed more severe than before. Another important aspect is the seasonal variation of the sea level: October shows 15 cm higher sea level than April. Difficult dike construction is experienced due to muddy subsoil. The Institute is very interested to participate in the VA project. Scale model investigations are carried out in the Institute.

pm A short visit was undertaken to the Vietnam National Mekong Committee (Ministry of Water Resources); Mr Pham Van Thiet, hydraulic engineer, Dept. of International Cooperation (11, Xo-Viet Nghe Tinh Street, HCMC phone: 84-8-996963 fax: 84-8-996962). Mr Thiet, (who coordinates many Mekong-related projects), showed much interest in the VA project, and presented the following information. The Mekong river mouth sedimentation poses many problems for inland navigation. Out of three options, the Bassac river via Can Tho seems the best possibility ("route B"). A feasibility study will start soon. Mr Ding Gia Khanh, former president of Mekong Committee, has written a good book in 3 volumes, concerning sea level rise problems and possible responses. It was recommended to get into contact with Mr Khanh via Mr Quang, Ministry of Water Resources. It was also recommended to contact Dr Le Huu Ti at the Mekong Secretariat in Bangkok, also to get full reports of Mekong delta Master Plan (Oct 1993).

A further short visit was made to the office of Prof. Gia, who provided some background publications, relevant for the VA project. Return to airport and to Hanoi.

30 November *In Hanoi, visits to inspect maps etc., discussions at MHC*

am CH and Mr Dong visit to the Center for Information of Storing Cartographic Documents, Lang Thuong, Dong Da, Hanoi. At the meeting, Ms Nguyen Thi Tuan demonstrated catalogues of all available topographic maps. A summary of scales, and indicated elevation contour lines follows:

scale	lowest elevation contour
1,000,000	100m
250,000	50m
100,000	25m
50,000	5m (in general 10m)
25,000	5m (plus individual points & water depth contours 5m & 10m
10,000 (survey 1980)	2m (in general every m)
5,000	?? (only available for very limited areas such as major cities)

A complete set of coastal maps with scale 50,000 or even 25,000 may be necessary in the VA..

pm At MHC office, CH held discussions with Mr Tuong and Mr Dong on practical matters and logistics in preparation of the project. Mr Dong explained the preparation and production by MHC of annual tide prediction tables (three volumes) for major ports of Vietnam (5000 copies produced for 1995). Analysis of non-astronomical effects are made by Mr Wu Nhu Hoan, (interesting material for statistical storm surge level analysis). Mr Dong, specialises in tidal analysis.

1 December *Final meetings at MHC, Hanoi*

day A concluding meeting was held at MHC at which memos were prepared with a summary of recommendations for Mr Tuong. A system of listing of publications, reports, and hydrographic maps was established as well as storing them in a cabinet in the MHC office to serve as a beginning of the project library. Last discussions were held with Mr Tuong and Mr Dong on preparation of the Steering Committee, inventory of data and information, project office and communication equipment. A document of tasks to be completed by MHC prior to the next visit in February 1995 was discussed and agreed in detail.

2-3 December ***Departure from Hanoi - Arrival Amsterdam***

APPENDIX A : Mission No.1

Mission 1 - Part 2 : February - March 1995

CONTENTS :

1 Introduction and objectives

Mission No.1 was begun in November 1994 but curtailed after 2 weeks (ref 1). The Mission was resumed in February 1995 and therefore is referred to as Mission No.1 - Part 2. The full report for Mission No.1 - Part 1 is contained in Appendix A.

Mission No.1 - Part 2 was conducted from 7 February to 5 March by a Polish-Dutch group. The size of the grouped peaked at 6 persons but was consistently more than 4.

The aims of the resumed Mission were to conduct detailed definition and planning of data collection and analysis activities in accordance with the Project Document and to hold a project workshop to introduce the project to as wide as possible an audience in Hanoi.

The STRA attended the Mission.

2 Mission personnel

The following personnel attended the 3 week mission:

Dr R B Zeidler	Project Director, as STVA (Poland, IBW-PAN)
Mr G Toms	Project Manager, as STVA (Netherlands, FRH)
Mr C H Hulsbergen	STRA (Netherlands, DH)
Mr F Hoozemans	STVA (Netherlands, DH)
Mr T Okroj	MTVA (Poland, IBW-PAN)
Mr A Naguszewski	STRA (Poland, IBW-PAN)

3 Itinerary and agenda

Mission 1 (Part 2) - February / March 1995

06 February		First STVA (Project Manager) leaves Europe
07 February		First STVA arrives in Hanoi, meets with MHC
08 February		Project Manager meetings with MHC, Netherlands Embassy
09 February		Arrangements for project car, project office and workshop
10 February		Transportation and Office Accommodation Agreements signed
11 February		Meetings with MHC, Workshop planning
12 February	(Sun)	Free day, mission planning
13 February		Mission planning & meeting at GIS Institute (Ministry of Agriculture - NIAPP)
14 February		Workshop planning, logistics discussions, visit to Forestry GIS Agency
15 February		Arrival of remaining Polish and Dutch delegations, incl.STRA
16 February		Meetings, introductions and data discussions, occupation of Project Office
17 February		Visits to GIS Institutes (3) and meeting at the Netherlands Embassy
18 February		Mission planning, data reviews, first scan of data with respect to VA needs
19 February		Site visit to Haiphong and Thai Binh, meeting with local met. station
20 February		Extreme water level discussions (MHC), lunch with Netherlands Embassy
21 February		Data base and hardware discussions, workshop planning with MHC
22 February		Digitization discussions and VA analysis planning, report drafting with MHC
23 February		Meetings with CSRG Geomatics Digitization agency to discuss capabilities
24 February		Visit to Polish Embassy, Discussions with South Vietnam HMS at MHC
25 February		Preparations for Workshop and further methodology discussions at MHC
26 February	(Sun)	Preparation of Workshop presentations and documents with MHC

27 February	Workshop No.1, Steering Committee Meeting, Dinner with Dr Ngu
28 February	Preparation of full data collection requirements in writing
01 March	Meeting with Country Team, planning with MHC, Project Manager departs
02 March	Negotiations for digitizing contract with CSRG, data collection planning
03 March	Last day of Mission, data collection handover to MTVA and MHC
04 March	STVA's and STRA depart for Europe
05 March	STVA's and STRA arrive in Europe

4 Record of meetings, visits, discussions

In this record the following initials are used for abbreviation of names;

RZ Dr R B Zeidler, Project Director (IBW-PAN, Poland)
GT Mr G Toms, Project Manager (Frederic R Harris, The Netherlands)
CH Mr C Hulsbergen, STRA, (Delft Hydraulics, The Netherlands)
TO Mr T Okroj, MTVA (IBW-PAN, Poland)
AN Mr A Naguszewski, STVA (IBW-PAN, Poland)
FH Mr F Hoozemans, STVA (Delft Hydraulics, The Netherlands)

07 February *First STVA arrives in Hanoi, meets with MHC*

day GT arrives in Hanoi and meets with MHC, introductions and planning of mission

08 February *Project Manager meetings with MHC, Netherlands Embassy*

am GT holds discussions with MHC about logistics and planning

pm GT meets Mr Grijns (Second Sec.) at Netherlands Embassy. Discussions about Project Car, Project Office, mission planning and other logistics

09 February *Arrangements for project car, project office and workshop*

am Meetings at MHC about the Project car and Project office. Project Office visited during preparations for rental arrangements. Met landlord of Project Office building. Lunch with MHC Acting and Deputy Directors

pm Test and further discussions about the Project car. Visit to and assistance from the Netherlands Embassy driver and logistics officers. Met car owner. Drafted Transportation Agreement. Evening visits to other car rental agencies in Hanoi and rental fee discussions.

10 February *Transportation and Office Accommodation Agreements signed*

am GT drafts "Project Team Transportation Agreement in Hanoi and surrounding areas" as well as "Project Office Accommodation Agreement". Decision to rent car from MHC, not to purchase. Tax issue (200%) and the fact that foreign nationals may not drive in Vietnam plus very poor insurance cover are major factors to rent and not to buy the car.

pm Negotiation and signing of Transportation and Accommodation Agreements (GT and MHC)

11 February *Meetings with MHC, Workshop planning*

day GT conducts Workshop and mission planning discussions at MHC with Acting Director

12 February (Sun) *Free day, mission planning*

day GT continues mission planning and administration for establishment of the Project Office and the documentation for Dr Ngu to obtain approvals of programme and date for Workshop No.1. Financial administration.

13 February *Mission planning & meeting at GIS Institute (Ministry of Agriculture -*

NIAPP)

am Mission and Workshop planning with MHC

pm Visit to Ministry of Agriculture GIS and digitizing agency (NIAPP) to view capabilities with Mr Tran Phuong Dong (MHC). Met Dr Hung and colleagues of the Center for Remote Sensing and Information at NIAPP. NIAPP operate several GIS packages (ArcInfo, SPANS, IDRISI, ILWIS, PCI etc.) and have good land use and agricultural data sets. Presently involved in a Canadian research programme.

14 February *Workshop planning, logistics discussions, visit to Forestry GIS Agency,*

am GT continues workshop, data collection and implementation planning with MHC

pm GT visits Ministry of Forestry GIS agency FIPI and meets Director Dr Nguyen Manh Cuong. Enthusiastically received and good capabilities including aerial photography sets over many years. Main GIS is ILWIS used for Forestry mapping but also operate others.

15 February *Arrival of remaining Polish and Dutch delegations, incl.STRA*

am Logistics planning and arrangements for the new Project Office. Administration and budget discussions with MHC

pm Arrival of Dutch and Polish STVA groups. Discussions and planning meetings at Hoa Binh Hotel

16 February *Meetings, introductions and data discussions, occupation of Project Office*

am Introductory meetings at MHC. Planning of mission. Review of the inventory of data prepared by MHC.

pm Scheduled meeting to Netherlands Embassy post-poned due to transport difficulties. Meetings at Hotel to coordinate analysis and data collection planning

17 February *Visits to GIS Institutes (3) and meeting at the Netherlands Embassy*

am Visit to GIS-related Institutes in Hanoi to review capabilities and capacity:

NIAPP, Ministry of Agriculture - met with:
Prof.Dr.Tran An Phuong, Director,
Dr Duong Minh Hung, Director CRSI
Mr Dinh Quoc Chien, Manager Aero Photogrammetry
(A0 digitizers, landuse data, PC ArcInfo, SPANS, IDRISI, PCI, etc.)

CRSG, Inst. of Geology, National Center for Natural Sciences and Technology, met with:
Dr Nguyen Xuan Dao, Dep.Director
Dr Pham Van Cu, GIS Specialist/Advisor/Professor
(SPANS, PCI, IDRISI, ERDAS, training courses, French MSc students & cooperation)

FIPI, Ministry of Forestry
Dr Nguyen Manh Cuong, Head Remote Sensing, Forest Resources & Environment
(ILWIS, good aerial photos, some landuse & population maps)

pm Visit to Netherlands Embassy, Second Secretary Mr Lambert Grijns for introductions and outline of mission.

18 February *Mission planning, data reviews, first scan of data with respect to VA*

am Meetings at MHC with extreme wave and water levels experts (Nguyen Doan Toan & Bui Dinh Khuoc) to pin down boundary conditions

pm Meeting at Institute of Geology (Dr Vu Cao Minh) to examine subsidence and coastline movement plots. Subsidence measurements almost totally lacking and subsidence is interpreted from geological formations (not sufficiently accurate for VA purposes). General indication is very low subsidence problems.

19 February *Site visit to Haiphong and Thai Binh, meeting with local met. station*

day - Sunday - Site visit to Red River delta area including Haiphong Port, Do Son Island area and Thai Binh City. Meeting at Thai Binh City with local HMS Observation Station Director, Mr Nguyen Duc Vuong. Main problem in Thai Binh is flooding due to lack of drainage of heavy rainfall rather than inundation from river or sea which is prevented by dykes. Discharge gates in Cua Lua River mouth to be expanded to prevent salinity intrusion but allow drainage. Some description of possible mangrove destructions and nature reserve areas in N & S Thai Binh resp. Both possible pilot study projects.

20 February *Extreme water level discussions (MHC), lunch with Netherlands Embassy*

am More discussions at MHC to confirm boundary conditions for water levels.

pm Lunch discussions with Netherlands Embassy Second Secretary, Mr Grijns and joint Vietnamese & European teams.

21 February *Data base and hardware discussions, workshop planning with MHC*

day Detailed discussions with whole Project Team at the Project Office concerning digitization contracts and methodologies. In particular levels of detail and technical procedures (how to handle dykes, whole coast, land use etc.). Also reviewed hardware requirements and decided strategy for hardware.

22 February *Digitization discussions and VA analysis planning, report drafting with MHC*

day Detailed terms of reference drafted for digitization contracts after detailed discussions with whole team at the Project Office. Planning of future mission and data collection procedures.

23 February Meetings with CSRG Geomatics Digitization agency to discuss capabilities

am Meeting with Geomatics (Dr Dao and Cu) to present digitization scope of work and discuss feasibility of execution by Geomatics. Some technical difficulties such as datums, accuracies and stitching of adjacent surfaces, file sizes etc.

pm Planning for Workshop and preparation of materials. Admin and management discussions with MHC.

24 February *Visit to Polish Embassy, Discussions with South Vietnam HMS at MHC*

am Visit to Polish Embassy by Polish project staff, visiting Ambassador K Kocel and 1st Secretary M Gajewski.

pm Discussions with Dr Phan Van Hoac of Center for Marine Hydrometeorology in ho Chi Minh City. He is nominated office for support in S Vietnam. Discussions about his role and facilities required etc. (fax machine, PC etc.). Discussions with Dr Dao of Geomatics again to clarify scope and timing issues plus availability of maps.

25 February *Preparations for Workshop and further methodology discussions at MHC*

am Preparations of Workshop presentations and planning discussions.

pm Continued Workshop preparations. Extreme water level discussions to pin down storm surge issue. Inland boundary of coastal zone chosen as +6.0 m (+2.5m water level + backwater + storm surge + etc...) Discussions with Dr Nguyen Van Gia of Nat. Center for Science & Technology of Ho Chi Minh City about land prices etc.

26 February (Sun) *Preparation of Workshop presentations and documents with MHC*

day - Sunday - Workshop preparations at the Project Office.

27 February *Workshop No.1, Steering Committee Meeting, Dinner with Dr Ngu*

am Workshop No.1 presentations at Military Guesthouse in Hanoi.

pm Continued Workshop plus Steering Committee Meeting discussions in late afternoon. All chaired by Prof.Dr. Nguyen Duc Ngu.

28 February *Preparation of full data collection requirements in writing*

am Preparation of data collection task descriptions and forms. Preparations for transfer of instructions and guidelines for data collection to MTVA.

pm Discussion about Workshop and Steering Committee outcomes with MHC.

01 March *Meeting with Country Team, planning with MHC, Project Manager departs*

am Meeting with Dr Hieu and Dr Tuan of the CCTRAN Country Team at the Institute for Hydrology of HMS. Discussion of interactions with UNITAR and exchange of documents and dates. Intention to join CCTRAN workshops and seminars is welcomed.

pm Meeting at Hotel with Dr CU and Dr Dao of Geomatics. Digitizing contract negotiations about scope and timing. Decided to split Vietnam due to cost and timing issues. Valuable data sets will result. Needs to formalised in contracts with MHC. GT departs.

02 March *Negotiations for digitizing contract with CSRG, data collection planning*

am Preparations for MTVA and data collection contracts etc. Discussions again with Geomatics regarding costs and scope. TO attends GIS seminar at Geomatics.

pm Finalisation of data collection task descriptions

03 March *Last day of Mission, data collection handover to MTVA and MHC*

day Handover to MTVA, all files, documents, scopes of work for data collection contracts etc. Final meetings with MHC about data collection and digitization contracts and discussions.

4-5 March ***Departure from Hanoi - Arrival Amsterdam & Gdansk***

APPENDIX B : Workshop No.1 - Documents

Vietnam Coastal Zone Vulnerability Assessment and First Steps towards Integrated Coastal Zone Management "Vietnam VA Project".

Workshop No.1: Sea level rise and coastal zone management

Hanoi, 27th February 1995

Programme of presentations:

09h00-09h15	Opening by Prof.Dr. Nguyen Duc Ngu - Director General of Hydrometeorological Service: Welcome and Introduction
09h15-09h45	Mr Nguyen The Tuong - Acting Director, Marine Hydrometeorological Center: Presentation of Vietnam Country Report, a brief review of the present state of coastal zone management and knowledge about sea level rise impacts in Vietnam.
09h45-10h30	Prof.Dr. R B Zeidler : Project Director - Vietnam VA Project: Project description and overall planning
10h30-10h45	Coffee break
10h45-11h15	G Toms : Project Manager - Vietnam VA Project: The VA and the 7 Steps Methodology
11h15-12h00	C Hulsbergen : Resident Advisor - Vietnam VA Project: Application of the VA to Vietnam
12h00-13h30	Lunch break
13h30-14h00	C Hulsbergen : Resident Advisor - Vietnam VA Project: Data management in the VA
14h00-14h45	Prof.Dr. R B Zeidler : Project Director - Vietnam VA Project: VA analysis tools and GIS
14h45-15h00	Coffee break
15h00-15h30	G Toms : Project Manager - Vietnam VA Project: Pilot Studies for the VA Project
15h30-16h15	Discussion and questions
16h15-16h30	Closing statements by Prof.Dr. Nguyen Duc Ngu

The Workshop will close at 16h30

Vietnam Coastal Zone Vulnerability Assessment and First Steps towards Integrated Coastal Zone Management "Vietnam VA Project".

Workshop No.1: Sea level rise and coastal zone management

Hanoi, 27th February 1995

Invitation to attend the Workshop:

You are hereby cordially invited to attend the Workshop No. 1 of the Vietnam VA Project:

Date	:	Monday 27 February 1995
Time	:	09h00 to 16h30
Venue	:	Army Guesthouse, 33A Pham Ngu Lao St., Hanoi
Subject	:	The Vietnam VA Project is an 18 month project to assess the vulnerability of the Vietnamese coastal zone to the impacts of accelerated sea level rise as a result of global warming. During the project 3 workshops will be held. Workshop No.1 is being held to introduce the Vietnam VA Project to the Vietnamese organisations active in coastal zone management and to present the project plan.

Coffee and lunch will be provided at the Workshop to all invited participants.

Vietnam VA Project Office :
Tel : Hanoi 340825

Army Guesthouse
Tel : Hanoi 265540

Vietnam Coastal Zone Vulnerability Assessment and First Steps towards Integrated Coastal Zone Management "Vietnam VA Project".

Workshop No.1: Sea level rise and coastal zone management

Hanoi, 27th February 1995

Invitation to the Workshop Dinner:

You are hereby cordially invited to the Dinner following Workshop No. 1 of the Vietnam VA Project:

Date	:	Monday 27 February 1995
Time	:	18h30 to 20h00
Venue	:	Army Guesthouse, 33A Pham Ngu Lao St., Hanoi

R.S.V.P.

Vietnam VA Project Office
Tel : Hanoi 340825

LỜI KHAI MẠC HỘI NGHỊ LẦN 1
MỰC NƯỚC BIỂN DÂNG VÀ QUẢN LÝ VEN BỜ
(DỰ ÁN VIỆT NAM VA)

GSTS Nguyễn Đức Ngữ

Kính thưa Chủ tịch đoàn,
Kính thưa các vị khách quí trong và ngoài nước,
Kính thưa toàn thể Hội nghị,

Trong không khí phấn khởi những ngày đầu xuân, chúng ta họp mặt tại đây để tiến hành Hội nghị lần thứ nhất " Mực nước biển dâng và quản lý ven bờ" thuộc dự án " Đánh giá khả năng thiệt hại đối với vùng ven bờ biển Việt nam và bước đầu tiến tới quản lý tổng hợp dải ven bờ"(Dự án Việt nam VA) do Chính phủ Hà lan tài trợ.

Như các vị đã biết, biến đổi khí hậu, tiêu biểu nhất là sự nóng lên toàn cầu với hậu quả nghiêm trọng nhất là sự dâng lên của mực nước biển đang là một thách thức to lớn đối với loài người. Năm 1990 Uy ban Liên Chính phủ về Biến đổi khí hậu (IPCC) đã khuyến nghị rằng, các nước ven bờ biển có vùng đất thấp có thể bị đe dọa bởi các tác động của mực nước biển dâng và những hậu quả khác của biến đổi khí hậu cần phải xây dựng và thực hiện các kế hoạch quản lý dải ven bờ trước năm 2000. Khuyến nghị này đã được khẳng định trong công ước khung của Liên hợp quốc về biến đổi khí hậu. Tại Hội nghị thượng đỉnh về môi trường và phát triển của Liên hợp quốc (UNCED) họp tại Braxin năm 1992 và Hội nghị ven bờ thế giới 1993 họp tại Hà lan khuyến nghị trên càng được khẳng định và nhấn mạnh. Dự án "Việt nam VA" như là một hoạt động thiết thực của Việt nam hưởng ứng và thực hiện khuyến nghị này.

Dự án " Việt nam VA" nhằm đánh giá những ảnh hưởng của nước biển dâng do biến đổi khí hậu đối với vùng ven bờ Việt nam và giúp tăng cường khả năng của các tổ chức trong nước trong việc chuẩn bị cho các hoạt động quản lý tổng hợp dải ven bờ. Trong dự án sẽ xem xét các kịch bản của hiện trạng phát triển và mức độ nguy hiểm của mực nước biển dâng và đánh giá những thiệt hại theo các chiến lược đáp ứng khác nhau. Dự án sẽ được thực hiện theo phương pháp luận

tổng quát 7 bước của IPCC có tính đến những đặc thù của Việt nam. Trong dự án cũng sẽ tiến hành 3 nghiên cứu điểm cho 3 vùng nhỏ thuộc đồng bằng Châu thổ sông Hồng, đồng bằng Châu thổ sông Cửu Long và ven bờ biển miền Trung.

Nội dung của Hội nghị lần này với tiêu đề "Mực nước biển dâng và quản lý ven bờ" gồm các báo cáo sơ bộ về thực trạng điều kiện tự nhiên dải ven bờ và tác động của mực nước biển dâng ở Việt nam, mô tả dự án và kế hoạch tổng thể, phương pháp 7 bước và ứng dụng đối với Việt nam, các phương pháp quản lý và phân tích số liệu trong hệ thống thông tin địa lý (GIS) và thảo luận về việc thực hiện dự án.

Sự hợp tác của các chuyên gia Hà lan và Ba lan trong việc thực hiện dự án này là một biểu hiện cụ thể và sinh động của tình hữu nghị và sự giúp đỡ quốc tế đối với Việt nam. Dự án cũng liên quan đến nhiều Bộ, Ngành khác nhau như Bộ khoa học, Công nghệ và Môi trường, Bộ thủy lợi, Bộ Nông nghiệp và Công nghiệp thực phẩm, Bộ thủy sản, Bộ Giao thông vận tải, Bộ lâm nghiệp, Tổng cục Địa chính, vv.. và nhiều địa phương cho thấy tính thiết thực của dự án đối với các ngành kinh tế quốc dân cũng như đối với việc bảo vệ tài nguyên môi trường sinh thái và phát triển lâu bền.

Tôi xin thay mặt Tổng cục KTTV và Ban tổ chức Hội nghị chân thành cảm ơn sự có mặt của quí vị đại biểu và tuyên bố khai mạc Hội nghị.

Integrated Coastal Zone Management

First Steps in **Poland** and Vietnam

Ryszard B. ZEIDLER

1 COASTAL ZONE : components, purposes, users, utilization ...

2 MANAGEMENT : (economic, social, cultural, environmental ... goals)

3 INTEGRATED + pro-active + sustainable development! + ...
- space & time
- disciplines
- policy, legislation, strategy (+ tactics?!) ...
- administration ...

4 CRITERIA of (sustainable) DEVevelopment:
- economic, social, cultural, environmental ...

5 STRATEGIES of development

6 Linkage to CLIMATE CHANGE (CC): SCEnarios ... ... (IPCC, IGBP-LOICZ, ...)

7 CRITERIA of choice

8 TOOLS and background THEORY :::
- COSMO, GMS-Coast, WCOAST, ASE ...
- Risk Analysis (incl. fault tree..), Decision Theory, DSS ...
- GIS (formatting ... macros!! ...)

9 CZM PLANNING

10 Ultimate GOALs:::
- roster of activities to create and update ICZMP vs CC
- fault trees
- strategies in the context of variable scenarios ...

1995.01.18

Vietnam VA Project

VA
and the
7-Steps Methodology

by

G Toms

Vietnam VA Project

FOLLOW-UP AND FOCUS ON

"INTEGRATED COASTAL ZONE MANAGEMENT"

Combine valuable resources
Share experiences AND DATA
Open up the discussion
Involve new disciplines ....

economists, planners, environmentalists, coastal engineers, legal specialists, oceanographers, architects, managers, administrators, meteorologists, etc....

To be demonstrated in the Pilot Studies

VIETNAM COASTAL ZONE VULNERABILITY ASSESSMENT

AND

FIRST STEPS TOWARDS INTEGRATED COASTAL ZONE MANAGEMENT

"Vietnam VA Project"

Project Summary

Marine Hydrometeorological Center of Hydrometeorological Service of S.R.Vietnam

with

Institute for Hydroengineering, IBW-PAN, Gdansk, Poland

and

VA Vietnam Joint Venture
Frederic R Harris B.V. - Delft Hydraulics, The Hague, Netherlands

Project Sponsor organisation :
Directorate of International Cooperation (DGIS),
Ministry of Foreign Affairs, Government of The Netherlands,

APPENDIX C : The 7 Steps Common Methodology

Framework of the Vulnerability Analyses; a *Common Methodology*

1 Introduction

The vulnerability of coastal areas to a predicted acceleration in sea level rise and other impacts of climate change will be exacerbated by degradation and unsustainable uses. In 1990 the IPCC called for assessments of vulnerability to climate change. Up to 1992, over 20 studies of different coastal areas had been conducted, and were analyzed in the report of the IPCC Coastal Zone Management Subgroup, *Global Climate Change and the Rising Challenge of the Sea* (IPCC CZMS 1992). The 46 studies initiated to date formed an important contribution to the WCC'93.

Sustainable development requires of the actors involved a comprehensive view, which, by definition, has a long time horizon. This is well understood in subsistence economies and societies that have survived for centuries by carefully exploiting their environmental resources. A long-term planning horizon and the associated way of thinking is typically the responsibility of governments in developing economies, but in many cases is outweighed by more pressing day-to-day problems in the decision making process.

Stimuli and catalysts can help to improve strategic thinking and planning by governments. It is acknowledged that hazardous events, such as potential climate change, can serve such a function and the Vulnerability Assessment of coastal areas to climate change offer a way of helping governments to review existing capabilities and performances in coastal zone planning and management. The *Common Methodology* for Vulnerability Assessment could therefore be regarded as one possibility to improve the planning and management process by introducing long-term thinking as a step towards sustainable development.
This appendix considers procedures for conducting Vulnerability Assessments (VAs), in particular using the IPCC *Common Methodology*. The results of VA studies, including the Global Vulnerability Assessment (GVA), are reviewed, and these experiences with the application of the *Common Methodology* are examined in light of future VA studies and their links with ICZM. Finally, possible improvements to VA studies are suggested.

2 Vulnerability assessments

The role of vulnerability assessment using the IPCC *Common Methodology* is to examine a coastal nation's ability to cope with the consequences of global climate change, including accelerated sea level rise. This includes identifying the populations and resources at risk, investigating the costs and feasibility of possible responses to adverse impacts, and examining the institutional capabilities of implementing those responses. Until a country assesses the costs and benefits of alternative responses, it has no way of knowing the possible long-term implications of climate change for the management and development of its coastal zone.

In collaboration with experts from other international bodies, the IPCC CZMS (1992) developed a seven-step *Common Methodology* for conducting Vulnerability Assessments, as shown in figures I.2.

The *objectives* of the IPCC *Common Methodology* are:

- to identify and assess physical, ecological, and socio-economic vulnerabilities to accelerated sea level rise and other impacts of global climate change on coastal zones;
- to understand how development and other socio-economic factors affect vulnerability;
- to clarify how possible responses can mitigate vulnerability, and to assess their residual effects; and
- to evaluate a country's capacity for implementing a response within an ICZM framework.

The IPCC *Common Methodology* includes three scenario variables: global climate change, local development, and response options. It considers national or local development extrapolated 30 years from the present situation. The *Common Methodology* encourages coastal nations to consider a full range of response options, but at least the extreme options of retreat and total protection. In assessing vulnerability to sea level rise, the *Common Methodology* considers potential impacts on population, on economic, ecological, and social assets, and on agricultural production. It uses the present sea level and global rises of 0.3 and 1.0 metres by the year 2100. These two climate change scenarios approximate the low and high estimates of the IPCC 1990 Scientific Assessment.

It was envisaged that each VA analysis would be completed in less than six months. Each VA study produces a vulnerability profile for the identified factors. This structure is suitable for aggregation of the results to regional and global scales. It also helped to summarize the available VA results for the UNCED conference in Brazil (June 1992).

There are important links between VA and ICZM. The identification of adaptation needs in a VA study may serve two roles. In countries without any formal ICZM, it may act as a trigger for efforts towards ICZM. In countries more actively engaged in coastal management, climate change is an additional long-term stress whose implications must be assessed. Hence, climate change provides a focus for addressing the key issues of long-term use and sustainability of the coastal zone.

The focus of the VA is on the assessment of the impact on the natural and socio-economic system as a consequence of the physical effects of ASLR and on the effects of response strategies. The VA provides a more operational, stepwise approach for the actual execution of the VA case studies. The following steps are proposed:

1 Delineation of case study area and specification of ASLR boundary conditions.
2 Inventory of study area characteristics.
3 Identification of relevant development factors.
4 Assessment of physical changes and natural system responses.
5 Formulation of response strategies and assessment of their costs and effects.
6 The assessment of the vulnerability profile and interpretation of results.
7 Identification of actions to develop a long term coastal zone management planning.

2.1 Step 1 Delineation of case study area and specification of ASLR boundary conditions

The case study area is defined as the area for which a vulnerability profile is to be determined. The study area may be a specific region within a country or an entire country. If parts of the study area are clearly different from others, there may be a need to distinguish different subregions within the study area in order to make a more realistic impact assessment.

It is advised to define the case study area in a broad sense for the following reasons:

- a strictly defined inland boundary, especially following for instance the 0.3 m and 1.0 m contour, is often not possible due to lack of sufficient topographic details;
- the projection of the future terrestrial, coastal and submarine morphology subject to impacts of climate change will contain a range of uncertainty;
- administrative boundaries, important for the data inventory, do not necessarily coincide with the impact area boundaries.

The inland extension of study areas should, at a minimum, encompass the areas which are physically affected by ASLR through changes in the probability of flooding, in erosion and sedimentation patterns or in salinity intrusion. The seaward extension should be based on the area which will be subject to

ecological impacts of climate change, such as coral reefs, salt water marshes and the living resources of coastal waters.

VA can be applied to different study areas in a country, in order to compare the vulnerability profiles of regions within a country or to compose an overall vulnerability profile of a country. In the same manner, vulnerability profiles of different countries can be used as a basis for more global observations and assessments.

The case studies will use two distinct sets of boundary conditions for ASLR to be reached in the year 2100: ASLR1 (0.3 m) which represents a low estimate of the changes and ASLR2 (1.0 m) which is based on high estimates of these changes. For these sets of boundary conditions the rates of change of the sea level are also defined. Other factors as frequencies of extreme events related to storm surges and river discharges, and possibly other climate conditions can be of importance. For this reason an (optional) additional, unfavourable, set of boundary conditions can be defined in order to investigate the coastal zone vulnerability to such changes. It is noted that the estimates of the frequency of extreme events, like storm surges are subject to large uncertainties, also because of their expected regional variabilities. Therefore, only rough orders of magnitude are suggested. In principle, boundary conditions used in the case studies should be in accordance with the specifications as established by IPCC WG-I in 1990.

Where data are available, the factors of tectonic uplift, glacial rebound and subsidence should be taken into account. Subsidence should be extrapolated and combined with the ASLR figures for the year 2100. Within the factor subsidence, distinction should be made between natural and man induced subsidence. It is noted that man induced subsidence can be influenced by the development scenario.

2.2 Step 2 Inventory of study area characteristics

This step is involved with the collection of all relevant study area data, such as:

- o physical characteristics (coast types, water levels, river discharges, sediment loads, location, nature and extent of coastal protection facilities, etc.);
- o habitats and species;
- o socio-economic information (GDP, population, subsistance values, etc.);
- o land use and values;
- o large scale (engineering) projects.

Special ecological areas are those areas or habitats which by nationally or internationally accepted standards may be defined as valuable from a nature conservation point of view. These standards include:

- wetlands of international importance according to the list of the RAMSAR convention;
- wetlands of international importance which are not (yet) included under the list of the RAMSAR convention, but which comply with the criteria set by the convention;
- areas or habitats having a protection status according to national law, e.g. National Parks, Nature Reserves, Game Management Areas, protected fish reproduction sites, etc.;
- World Heritage Sites.

Based on relevant differences in natural system characteristics, resources and uses present, it will be decided if and how the study area should be divided into different impact zones. If anticipated response options vary across coastal stretches, the case study area may have to be divided into different subregions, for which separate assessments should be made.

2.3 Step 3 Identification of relevant development factors

Within the concept of vulnerability, the nature and extent of human activities play a critical role. This poses the problem of development of human activities in time, as the judgement with respect to potential vulnerability can be greatly influenced by e.g. economic and demographic developments. In view of the time horizons involved in the effects of climate change becoming clearly manifest, it would not be realistic to make actual projections for economic, demographic or natural developments. Yet it is felt that ample consideration should be given to the possible consequences of such developments.

It is therefore proposed to consider the most relevant development factors as **scenario variables**. Such scenario variables pertain to autonomous developments as described above, which 'drive' the assessment of socio-economic and other impacts. They may include:

- o number of people (or population density);
- o land use and level of production activities, related to:
  - agriculture;
  - fisheries and aquaculture;
  - forestry;
  - mining;
  - tourism;
  - industry, ports.
- o capital investment levels, related to:
  - housing and urban development;
  - commercial buildings and utilities;
  - production facilities;
  - infrastructural facilities.
- o natural values: habitat types and areas;
- o man induced subsidence.

Based on a VA for the present situation, the procedure can be repeated for different 'scenarios' composed of different values for the various scenario variables. This can be done by e.g. assuming present development rates to continue for a reasonable (limited) time horizon. For the VA case studies it is proposed to use a time horizon of 30 years. Longer time horizons are not considered appropriate due to increased uncertainties. One has to consider that society at that time (30 years from now) will be faced with the implementation of measures, based on better insight in realized and predicted ASLR. That society, therefore, should have the capacity to bear the consequences.

Data on historic and recent developments should be collected in order to assess a realistic range of growth rates of the various scenario variables. It is once more emphasized that actual, long term projections will not be made. The information collected will merely be used to assess the relative sensitivity of VA results for potential future developments.

2.4 Step 4 Assessment of physical changes and natural system responses

The actual vulnerability analyses starts with a quantification of physical changes and natural system responses, followed by the assessment of impacts on socio-economic and ecological systems, resulting from these changes and responses.

The major potential physical changes imposed by ASLR include:

- o morphological development of the shore line and flood plain (erosion/accretion);
- o water levels and water level frequencies of coastal, tidal and inland waters, including the groundwater system;
- o salinity changes of surface water and groundwater bodies.

Basically, the above physical changes may result in three different types of natural system responses, eventually leading to socio-economic and ecological impacts, i.e.:

- o **direct loss** of economic and ecological values through loss of land and coastal habitats;
- o increased **flood risk** to people, capital and subsistence values, leading to higher expected losses of such values;
- o **other damages** and impacts related to changes in water management or salinity.

In general losses, risks and damages are assumed to occur gradually, in proportion with the rate of sea level rise. In the case of ecosystem response, however, a distinction is made between adaptive and non adaptive responses. Non adaptive responses may occur if the rate of sea level rise exceeds a critical threshold value, which will lead to a non gradual, irreversible loss of ecosystems.

2.5 Step 5 Formulation of response strategies and assessment of their costs and effects

The possibilities and effects of response options (within the main categories: retreat, accommodate and protect) are an integral part of the VA. Therefore, an estimate of the costs and an assessment of effects of such options should be included. For practical reasons, however, the VA approach should be based on a simplified procedure, only considering a number of illustrative options. In order to be able to make comparisons across different case studies, it is proposed to **at least** consider in each case study:

- o a situation without measures;
- o the (full) protection response option.

The above situations represent two extreme cases. The first case will show the maximum impacts of physical changes imposed by ASLR whereas, by definition, the cost of the response option is zero. In the IPCC terminology this is not a real response option, but merely a reference situation. The latter case, being the most far reaching option, presumably minimizes the effects of physical changes and is expected to reflect the maximum response option cost. Both cases have the merit of being well defined and relatively straightforward and are, therefore, good candidates to be considered in each case study.

To the extent possible, an illustrative example of the other two response options (retreat and accommodate) should be added, the level of detail depending on available time and data. It is expected that these response options will in most cases be quite specific for the case study area considered.

The notion is that the VA will show the need for a more detailed analysis and evaluation of a range of alternative response options. How-ever, this is clearly not within the scope of VA, but should be regarded as a main subject of coastal zone management and planning.

2.6 Step 6 Assessing the vulnerability profile and interpretation of results

The vulnerability profile of a coastal region or nation is assessed in two stages. The first stage considers the susceptibility to the physical changes imposed by ASLR and the related socio-economic and/or ecological impacts. The second stage is involved with the implementation feasibility of response options.

Table I of the CM contains the specific impacts to the socio-economic and ecological system, driven by physical changes and natural system responses. Socio-economic impacts are shown according to three impact groups, i.e.: 'values at loss', 'values at risk' and 'values at change'. During the process of estimating the economic value of capital equipment, assets and infrastructure, the age and depreciation over time should be taken into consideration.

Socio-economic values at loss are based on land area losses and their respective capital or subsistence values. The capital value expresses the economic value of the land in terms of economic production and/or capital investments. This value could be obtained from the per unit area purchase or replacement value of the land and the related assets. The capital value could also be approximated as the per unit area discounted net cash flow related to the economic production activity on the land, for a long time horizon. Subsistence value is expressed as the per unit area number of people that subsist upon the land. The latter type of land 'value' is based on the non-economic production of the land in terms of the self supply (food, shelter and other basic requirements) of local people.

Socio-economic values at risk are involved with people, capital values and subsistence values.

Values at risk will be expressed as the product of the specific value in a certain risk zone and the probability of a flooding event in the risk zone (flooding frequency), which products are to be summed over the risk zones. The resulting number can be interpreted as the annual expected value subject to flooding and would properly reflect the changes in both the values present and the flooding frequency. Moreover, this procedure would be able to deal with different safety levels adopted in different regions. For example, if 8 million people in the Netherlands are exposed to a flooding frequency of 1 in 10,000 years, the 'people at risk' value would be 800. If in Vietnam, 10 million people are exposed to a flooding frequency of 1 in 10 years, this value would be 1,000,000.

Socio-economic values at change relate to salinity intrusion and water management effects. Included are:

- agriculture production changed or adversely affected;
- financial damages resulting from investments in infrastructural adjustments and incremental cost of operation of infrastructural and other facilities (e.g. drinking water production plants, pumping facilities).

Ecological values at loss will be expressed in changes of habitat areas. Assessment of the ecosystem vulnerability is based upon the analysis of the response capacity of these land-water ecotones to changes in sea level rise. For instance, a mangrove ecotone is able to expand vertically in response to a certain trend in sea level rise; salt marshes are able to retreat inland if horizontal expansion possibilities (inward) are present. Ecosystems can be at loss if the rate of change of ASLR exceeds a certain threshold value, or if horizontal expansions is not possible, or if protection measures have directly or indirectly irreversible negative implications.

The arrangement in Table I allows for a comparison of impacts for the present socio-economic system (no development) and for a 30 years development situation combined with the response options 'No measures' and 'Protect' with a present situation. The first assessment is based on the ASLR1 set of boundary conditions. An additional table according to the format of table I can be easily created for the set of boundary conditions ASLR2. Other options could be added to the table, or put in separate tables of the same format.

It is suggested that all numbers related to financial values, costs and damages are expressed as present, undiscounted values.

7 Step 7 Identification of the needs and plan of action

Based on the work completed in the previous steps, the first steps to a plan of action should be developed. This plan should provide the country's decision makers with appropriate conclusions, recommendations and proposals in order to give an outline for immediate, medium and long term action in the framework of a nation's coastal zone management program. This plan of action should include the identification of:

- priority setting on vulnerable areas and economic sectors;
- types of coastal management tools needed to regulate coastal zone functional uses and the exploitation of resources;
- type of immediate and future information needed.

APPENDIX D : An Introduction to :

Coastal Zone Management

Introduction to Coastal Zone Management

1 History and definition of Coastal Zone Management

People have always favoured the coastal zone because of its unique resources. They were and still are attracted by the fertile lands in the coastal plains and abundant marine resources, and by the easy access to international markets. In Vietnam, the low lying coastal zone with the emphasize on the two main delta's, is a *focal point* in the national economy where a large number of social and economic activities and their impacts are concentrated. The importance of the coastal area will further increase in the future, due to the ever increasing number of people which should find a place here.

Vietnam's coastal zone is essentially a *multi resource system*. It provides space, living and non-living resources for human activities and it has a regulatory function for the natural and man-made environment. At the same time the coastal zone is a *multi user system*. Private and public bodies use the natural resources for *subsistence* (water and food), *economic activities* (space, living and non-living resources, energy) and *recreation* (beaches and water areas).

Industrialization, commercial development and steadily growing population pressure in many places have resulted in an increase of erosion and flooding, loss of wetlands, pollution, and over-exploitation of land and water resources in the coastal zone.

Growing awareness about the finiteness of resources, about environmental degradation and consequent problems to mankind, has triggered numerous studies to provide a long term solution of the resources problem. Such studies are based on the concept of carrying capacity in terms of guidelines for socio-economic activities to achieve long term conservation of vital elements and areas of the environmental system.

In 1972, the report of the *Club of Rome* addressed these problems for the first time in a systematic and consistent way, resulting in the well known book *'The limits to growth'* (Meadows et al., 1972). The political response to this challenge was formulated in 1987 by the World Commission on Environment and Development in the so-called *Brundtland report 'Our Common Future'* (WCED, 1987). They introduced the concept of *sustainable development*, as a means to guarantee acceptable living conditions for the present as well as for future generations.

The Brundtland report formulated the following objectives for a world conservation strategy:

- maintenance of essential ecological processes and life support systems;
- preservation of genetic bio-diversity;
- sustainable utilization of species and ecosystems.

In 1992, twenty years after the Club of Rome issued their alarming report, a special conference was convened in Rio de Janeiro, the United Nations Conference on Environment and Development (UNCED). *Agenda 21* was the action plan prepared for the nations willing to achieve sustainable development. It covers all the interrelated topics on environment and development. The need for such an integrated approach was underlined by an updated version of *Meadows'* book, now ominously called *'Beyond the Limits'* (Meadows et al, 1992).

It has become widely accepted that development of the coastal zone should be based upon a proper understanding of the processes in the coastal zone, supported by a sound engineering technology and socio-economic skills to obtain an *acceptable balance* between short term benefits and long term assets. Therefore, there is an urgent need for a controlled development of this area. Conflicts between the various user categories are becoming more and more manifest. These conflicts will grow in scope and size with increasing population density and related increase in the use of the earth's resources.

There is a need for a *Common Methodology* which can be used to describe the complex interactions between the resource system and its potential users. There is a need, therefore, *to plan and control this process in a systematic and sustainable way*. This process is called Coastal Zone Management (CZM). *Coastal Zone Management aims at solving present and future problems in the coastal zone, by finding a sustainable balance between economic welfare and environmental well-being. This may be achieved by using a careful analysis of the natural processes and socio-economic developments.*

In general, the main objectives of CZM are:

- to predict future demands for resources;
- to plan the supply of these resources;
- to control the usage of the resources.

Coastal Zone Management is a process. It integrates technical, political and social activities. Its success draws heavily upon the public awareness of the resource allocation problems and the political will to solve them. In this process, various *stages* may be identified, such as:

Stage 1	*Problem recognition* - Societal signals (e.g. calls from pressure groups) point out that there might be a problem: awareness is raised. For some period of time there may still be a difference of opinion between various groups within the society about the extent, the causes and the effects of the problem. Consensus about the necessity of government intervention (policy making) ends this stage.
Stage 2	*Policy formulation* - Although there is consensus about the fact that there is a problem, there still is difference of opinion how this problem should be solved. Attention is given to technological development to solve the problem. This stage is concluded when the government formulates an adequate policy and a corresponding set of measures. Policy analysis is part of this stage. The task of the Coastal Unit, which can be described as shoreline management, is embedded in this stage.
Stage 3	*Policy implementation* - The plan finally decided upon is actually implemented. Investments are made, project designs are implemented and the attention of society and politics fades out.
Stage 4	*Management and control* - Controlling the problem is the central item here. Routine-like tasks, such as monitoring, replace introduction of new technology and investments. Streamlining of initial regulatory measures becomes important. Vigilance is required as new developments, new societal values, knowledge and understanding of the situation may require additional measures: the process will typically show a cyclic nature.

There is no doubt that the management of the coastal zone is a complex and difficult task, which requires knowledge over a wide area. The intensification in the use of the coastal zone causes an increasing number of *problems*. These problems may present themselves on a variety of temporal and spatial scales, such as:

- deterioration of ecosystems due to urban development, aquaculture and water pollution;
- coastal erosion due to harbour development, river damming and sand mining;
- decrease in tourism due to pollution of beaches by algal growth as a result of nutrient loading from land-based sources;
- oil pollution due to accidental oil spills.

In many countries the above mentioned problems are handled on an ad hoc basis. But they are not isolated and are part of the total socio-economic development. Solutions to specific problems have to be attuned to each other.

Triggers for coastal zone management are various, such as changing boundary conditions (due to sea level rise, large scale erosion, land subsidence), changing socio-economic patterns (socio-economic activities move to the coastal areas and into the coastal seas at an increasing rate) and impacts in relation to sewage discharges, sand mining, etc.

In order to investigate to what extent a coastal area is *vulnerable* to changes, not only the individual impacts of these triggers on the system as a whole but also the interactions between the elements should be known. In general, *vulnerability* of a coastal area can be considered in the context of *sustainable development*, a notion which is referring to a nation's capability to cope with all kinds of stresses, problems and environmental damage in the coastal zone in a sustainable way.

Ecology and economy should come to terms in order to formulate strategies for such a sustainable development. This is complicated by the fact that environmental degradation is a slow - but irreversible - process. Remedial actions should be taken well before the symptoms of degradation are manifest.

Planning of coastal zone resources has technical, social, economical and environmental aspects. This requires the input of a wide range of *disciplines*. Some examples of the disciplines necessary in a planning study team are give below, the actual mix of disciplines depending on the nature of the study:

Technical	coastal engineering, coastal morphology, hydrodynamics, meteorology, geology;
Socio-economic	macro and project economy, demography, regional planning, sociology and expertise for various user categories such as fisheries, mining, transport, tourism;
Environmental	biology, ecology, chemistry.

Besides the inputs of specialized disciplines it is necessary to have the capacity of *policy or systems analysts*, who can integrate the contributions of the specialists into a coherent analysis and can generate the strategies to be presented to the decision makers.

2 A systems view of the riverain and coastal areas of Vietnam

2.1 Schematization of a complex system

It is appropriate to apply a flexible but consistent *'framework for analysis'* for coastal resources management problems, which has been developed in various management oriented studies. The coastal zone is a good example of an area where interacting, complicated problems should be addressed by means of systems analysis. At the highest level of abstraction, the coastal zone is in first instance schematically considered as being controlled by two dynamic sources of activity: the *natural boundary conditions* (everything else but human activities), and *socio-economic development plans* (the more or less authoritative and organised form in which the active human driving factor comes to work). As the next schematizing step, we distinguish three major *'systems'* in the coastal zone.

- The *natural system*, which encompasses all relevant non-human domains (atmosphere, lithosphere, hydrosphere) including their own dynamics and mutual interactions through *a*biotic, *b*iotic, and *c*hemical processes (abc-processes). This is the domain of the natural resources, which could very well exist without the presence of man.

- The *functions* (or, more clearly, *user functions*) represent the entire set of human interests in terms of the 'use' in the broadest sense which is or may be made of the natural resources.

- To actually make available and thus materialize the intended user functions, all kinds of *technical and organizational infrastructure* are needed, which in many cases have an intended as well as an unintentional effect on the natural system, and sometimes also - directly or indirectly - on other user functions, resulting in stresses and conflicts.

The three systems (natural system, user functions and infrastructure) interact in a physical way *which is in principle susceptible to scientific analysis and quantitative modelling.* All human activities by definition take place in close interaction with the natural system, partly through the mere physical presence of man, partly through direct effects of exploitation, partly through the physical infrastructure, and partly through pollution by waste products.
The small central triangle with its strategic position in between the three major systems, represents the crucial role of Coastal Zone Management. Here come relevant information lines together and are strategies for sustainable development prepared, based on a coherent knowledge basis, information systems, and policy analysis.

2.2 The natural system

In the system diagram of the coastal zone, the natural system refers to the system without human interference. The basic elements in the system are:

- *The air* (atmosphere).
- *The water* (hydrosphere), including dissolved matter, which may be described by its chemical, physical and resultant biological properties.

- *The sediments* (lithosphere), characterized by their physical, mineralogical and chemical properties and the related hydrodynamic and geo-technical parameters, such as settling velocity and critical shear stress.
- *The marine and land life*, characterized by the type and quantity of the various species.

In general, the properties of basic elements as such may be used as an input for the quantitative description of the natural processes active in the coastal zone. They represent focus points to monitor the ecological conditions in the coastal area.

The coastal system is actually the interface between atmosphere, hydrosphere and lithosphere. A more detailed description of this interface is required as a basis for numerical modelling. Such a description should include an inventory of the important system elements and their physical interactions, followed by a formulation of the governing equation for the interaction processes between these elements.

Another important issue is the definition of the system boundaries of the study area in question. There is no generally accepted definition for the coastal zone. The 1982 United Nations Conference on the Law of the Sea has delineated various juridical and legislative zones. In this context coastal science and engineering is confined to the territorial waters. For practical application, a further refinement is needed, which is often based upon schematization of the physical and ecological conditions. Boundaries of the study area are selected on a case by case basis, as studies can be performed at a variety of spatial and time scales. Boundaries of the system under consideration and the accuracy of the description of the relevant processes should be selected accordingly. The *longshore dimension* of the coastal system is dictated by the requirement that disturbances generated by activities within the system should not propagate beyond the system boundaries for the time-span under consideration.

This may result in system dimensions in the order of 100 km for long term processes. The coastal engineer is normally involved in smaller scale systems, with dimensions in the order of one to some ten kilometres.

If the impact of the system on water quality and ecology has to be studied, a larger scale coastal system should be used for the analysis. In that case the study often has to be extended even beyond the territorial waters, which sometimes calls for an international approach.

The *seaward boundary* of e.g. the morphodynamic system is often located at a depth, where the contribution to the coastal sediment budget is low, and where both cross-shore and longshore transports are small. This is normally the case for depths in the order 25 to 30 m. If deep offshore canyons are present their effect should be included as a sediment sink. Obviously, appropriate hydraulic boundary conditions have to be defined at the seaward boundary, to account for the effect of waves and currents, active in the larger coastal system.

The *landward boundary* is often selected somewhat landward of the high-water mark. In areas where coastal plains and dunes contribute to the sediment budget, their effect should at least be introduced as a boundary condition. The same applies for sediment transport from rivers or estuaries, which should be introduced as a sediment source. Again in those cases where water quality is at stake, the total catchment areas of rivers should be fully included.

The physical processes in the coastal zone are complex. Often interactions between two or more processes have to be taken into account. In general following types of processes can be identified:

- aerodynamic processes, such as air-sea interaction or aeolian (wind) transport of sediments;
- geodynamic processes, induced by geotechnical instabilities such as subsidence or uplift, earth-quakes, liquefaction, sliding etc.;
- hydrodynamic processes, such as waves, tides and resultant water levels and currents;
- morphodynamic processes, such as sediment transport and related changes in the bathymetry and shoreline geometry.
- ecodynamic processes, describing the resultant changes in the eco-system due to the foregoing processes and/or elements.

2.3 The user functions

Traditionally, the coastal zone has been an area of great social and economic activity, and a major production area of food. In general, the boundaries of the socio-economic system do not coincide with those of the natural system. The activities in an area wider than the coastal zone proper, may be affected by changes in this zone. Increased salt intrusion due to coastal erosion may for instance affect large agricultural areas in the low-lying hinterland. Loss of recreational beach may have an impact on related activities in the neighbouring areas.

No general guidelines are available to define the boundaries of the socio-economic system. They should be based upon an analysis of the present and future social and economic activities in the coastal zone and its hinterland, as described in national and regional development plans.

Depending on the hierarchy of the various user functions, the following functions or *user categories* can be identified:

- basic functions, such as - food production, water supply and energy

			supply
•	social functions, such as	-	housing and recreation,
•	economic functions, such as	-	transport, (sand)mining and industrial development
•	public functions, such as	-	defense and sewage/waste treatment

The present and future situation should be described in terms of the space used for the various activities, goods and services and their inherent economic and social values. Presently data-base systems are being developed which can be used effectively for the description of these data. An example of a result of a policy analysis study is the visualization of impacts of a chosen policy on user functions. The study area is situated in the south-western part of the Netherlands, on the ebb-tidal delta complex of three former major estuaries. Serious conflicts arise between the user functions recreation, fisheries and ecology (especially seal and bird life). The preferred policy aims at the conservation of ecological developments and indicates how recreation and commercial fisheries can fit into these developments. This is implemented by restrictions and zoning of the main functions.

2.4 The physical and institutional infrastructure

The notion *infrastructure* has various connotations. It refers to *physical elements* such as roads, bridges, sea walls, groynes or breakwaters, but also to the *institutional arrangement*.

Most of the activities in the coastal zone have to be supported by a *physical infrastructure*, and this is discussed first. Due to their impact on the natural system and their cost, coastal structures normally are an important element in coastal zone management studies. Depending on their effect on the coastal system, the following three *categories* of coastal structures may be identified:

- *Sacrificial structures*, often consisting of natural material such as sand and gravel. They are used as a buffer to protect coastal areas from erosion. Examples of such structures are artificial dunes, artificial shoals and sand suppletion or beach nourishment. These structures least interfere with the natural processes or may even take part in it.
- *Defensive structures*, which are made of more resistant material such as clay and rock or artificial elements like concrete. They are used to consolidate the present position of the coastline and to protect it in the event of extreme waves and tides. Examples are dikes and dune revetments. These structures normally do not interfere with natural processes, until an extreme condition occurs. In that case, its protective function is activated and it starts to affect the coastal processes.
- *Offensive structures* are designed to actively affect the coastal processes, in order to improve conditions for any or all of the coastal activities. They are, therefore, constructed of artificial material which can withstand the forces of nature. Examples are breakwaters and groynes. Obviously, this type of structure has a large impact on the coastal system.

Non-coastal infrastructure may also affect coastal dynamics, in an indirect way. The building of a barrier in a river for example will block the transport of water and sediment to the coast. The result will be that in course of time, part of the foreshore will be affected by erosion due to lack of sediment supply. This will result, with a certain time lag, in progressive erosion of the shoreline.

Next, some remarks are made with respect to the institutional infrastructure. For an effective coastal zone management environment, *a control system* is required, which formulates the objectives of coastal zone management, monitors the developments and which takes appropriate long term and short term actions, when needed. Basically, following four elements can be identified in this respect:

- the *political system*, which defines the long term objectives of coastal zone management and the criteria which should be applied for the analysis of various scenarios;
- the *legislative system*, the total of the governing international conventions, national laws and regional/local regulations to enforce this policy;
- the *financial system*, which provides the necessary funding;
- the *executional system*, which defines the scope of responsibilities for all activities related to coastal zone management.

Due to different historic developments, different social and administrative cultures and different financial conditions, each country has developed a different control system. As the efficiency of the control system is of vital importance for the success of coastal zone management, its particular characteristics and responsibilities should be acknowledged by the coastal manager.

3 System analysis of coastal zone problem solving

Coastal zone management is in fact a continuous process of decision-making, which aims to narrow the gap between the actual and the required situation related to coastal and marine resources. In general, this may be achieved by a set of decisions and/or measures. The problem formulation, the formulation of management objectives and the design of appropriate policies to achieve the management objectives, should follow a systematic procedure of generating, analyzing and evaluating alternative strategies by the use of system analysis.

Policy analysis may be described as a systematic process that helps the decision maker to identify, evaluate and select a preferred course of action among several feasible alternative strategies to reach his management objectives. It is a logic and systematic approach in which assumptions, objectives and criteria are clearly defined and specified. It can significantly aid a decision maker to arrive at better decisions by broadening his information base, by providing a better understanding of the system and by predicting the results of several alternative courses of action. The core of the policy analysis, the method of structuring the problems, consists of a *system analysis*. A policy analysis is a problem-solving activity that produces the knowledge and methods of modern science and technology, in combination with concepts of social goals and equities, elements of judgment and consideration of the larger contexts and inherent uncertainties. In the decision making process, three major phases may be identified:

- problem identification and analysis,
- development of optional solutions,
- evaluation, and selection of the best solution.

In practice this process is often of a cyclic nature. Many authors suggest more or less the same sequence of individual *steps* in the process of policy analysis, namely:

1 *problem formulation*;
2 defining the *objectives*;
3 defining the *criteria*;
4 defining *boundaries and constraints*, all part of formulation stage;
5 identifying, designing and screening of *alternatives*, part of research stage;

6 *evaluation* of alternatives;
7 *comparing and ranking* alternative policy options; and
8 presentation of the *results*, all part of evaluation and presentation stage.

The process of policy analysis generally is not a once-through event, but often evolves in different cycles of analysis. In this overview, we do not suggest to prescribe a rigid framework for analysis. Rather, we will try to specify to a limited extent the basic phases of analysis. By making these phases explicit in the analysis process, a tentative guideline may be obtained for structuring the analysis. However, the particular problem in question and the constraints for the study eventually dictate the desired approach for analysis.

The framework of quantitative analysis normally used consists of *four major phases*, that is:

1 inception phase;
2 data collection and analysis phase;
3 modelling phase;
4 policy designing phase.

The interaction with decision-makers is particularly important in the first and fourth phases. During the first phase (1), the inception phase, the objectives and procedures of the analysis must be defined. This stage results in a workplan for the next phases. The second phase (2), the data collection and analysis phase, and the third phase (3), the modelling phase, require a major input from the analyst. A typical feature of the second phase is the operation of disciplinary knowledge. This may be referred to as the design of a decision support system. Such a system will then be implemented in the third phase in case computational tools are to be developed. In the final phase (4) policy options are generated, evaluated and ranked. The result of this phase is possibly the formulation of one or more desirable policies, or strategies. Although it may be tempting to advocate a gradual transition between these respective phases, it is recommended to keep them well separated in order to be able to control the process.

For a design of the successive stages of a coastal management plan, several *tools and techniques* are required, such as:

- procedures for scenario formulation,
- data collection and processing techniques,
- procedures for generation and global screening of alternative strategies,
- system modelling,
- screening and evaluation techniques, and
- visualization and presentation techniques.

System modelling is possible only when system parameters are known and input scenarios are properly defined. The efficiency of the model simulation will be greatly enhanced if input data are presented in a suitable format. Practical applications will benefit from a user-friendly presentation. Modern GIS and database techniques offer the possibilities to support modelling, and pre and/or post-processing activities. It is useful, therefore, to integrate these components into an interactive Decision Support System.

The combination of the long term VA and the short term Pilot Studies will result in a strengthening of technical and management capabilities of the Vietnamese counterparts to deal with the coastal zone management demands imposed by increased development and climate change related impacts on the Vietnamese coastal zone. Interagency cooperation will be encouraged, stimulated and assisted. These will be important first steps towards implementation of ICZM in Vietnam.