

APPENDIX L : INITIAL ENVIRONMENTAL EXAMINATION

INTERIM REPORT

APPENDIX-L STRUCTURE DESIGN and COST ESTIMATE

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APPENDIX L INITIAL ENVIRONMENTAL EXAMINATION

PREFACE

This part of the report was prepared to shape the proposed projects into sustainable manner by incorporating environmental dimensions into project planning and to serve as a basis of Preliminary Environmental Impact Assessment Report that will be submitted by the Vietnamese side.

In the Master Plan study, 24 projects were proposed from several sectors ranging from Rural Infrastructure, Marketing, Post-harvest Processing to Farmer's Organizations. Among these projects, priorities were given to two projects, one is 'Small Scale Dike System Improvement Project' and the other is 'High Quality Rice Production/Distribution Improvement Programs', which will be studied in more detail in F/S period. This part specifically focuses on the Small Scale Dike System Improvement Project because no significant adverse environmental impact was identified in the latter project as discussed in the Main Report. This examines the environmental impacts of the whole project covering the Blocks numbered from '1' through '9', though priority was given to 'Block 4' of medium inundation area and 'Block 8' of shallow inundation area to be studied in F/S period.

During the first and second field study in Viet Nam, the following concerned parties and non-governmental organizations were consulted so as to take their views about the project's environmental aspects into account.

- 1) Department of Science, Technology and Environment (DOSTE) of Dong Thap and Tien Giang Provinces
- 2) IUCN, Vietnam Office in Hanoi
- 3) Tram Chim National Reserve
- 4) Sub-Institute of Ecology, resources & Environmental Studies
- 5) Dong Thap Department of Plant Protection
- 6) Settled farmers in Tan Cong Sinh commune of Tam Nong district

Examination given here basically follows the screening and scoping checklist jointly filled out by the counterpart personnel in charge of environmental study at Center for Water Quality & Environment and the member of the Study Team responsible for the study on 'Soil and Natural Environment' during the second field study. However, it was conducted from the middle of September to the beginning of October, 1999, when the Master Plan had not been concretely formulated. Therefore some parts of the discussion were additionally stated as new information became available and insight was obtained.

In this context, this part of the report requires further review of the concerned organizations and other stakeholders.

The following part begins with Background dealing with legislation, institutional issues etc., followed by 'Environmental Considerations for the Projects'.

L.1 Background

L.1.1 Environmental Legislation

In 1991, the Government approved “the National Plan on Environment and Sustainable Development for the period 1991-2000”. This plan served as a basis, leading to the drafting and later on the adoption of “the Law on Environmental Protection” in 1994. Subsequently, numerous decrees have been promulgated by the government for the implementation of the Law on Environmental Protection. The most significant of these is the Government “Decree No. 175/CP on Providing Guidance for the Implementation of the Law on Environmental Protection”, dated 18 October 1994.

The Law on Environmental Protection(LEP)

Law on Environmental Protection was passed by the National Assembly on 27 December 1993, and came into effect on 10 January 1994. The law is a very broad and general document, which sets out only a basic framework.

Chapter II describes for the prevention of and combat against "environmental degradation, pollution and incidents". Chapter III outlines the remedies to be adopted against these environmental threats. The state apparatus and institutions for environmental protection are set out in Chapter IV, and the country's international obligations with respect to environmental protection treaties are established by Chapter V. Chapter VI deals with breaches and violations of the law, and Chapter VII anticipates implementing provisions to enforce the law.

Decree No. 175/CP on Providing Guidance for the Implementation of LEP

This decree establishes in greater detail the responsibilities of the NEA in environmental management, and further clarifies many of the LEP provisions.

Chapter III of the Decree contains requirements for the submission of environmental impact assessment reports (EIA report) by investors and enterprises.

Reference is made to M3.1.1 for the International Conventions to which Viet Nam is a party. It includes the followings,

- 1) Convention on International Trade in Wild Flora and Fauna (CITES)
- 2) Convention concerning the Protection of the World Cultural and Natural Heritage
- 3) Convention on Wetlands of International Importance especially as Waterfowl Habitat (The Ramsar Convention)

L.1.2 Environmental Institutions

Ministry of Science, Technology and Environment (MOSTE)

The Ministry was established in the framework provided by the National Plan on Environment and Sustainable Development for the period 1991-2000. It performs a broad range of functions of State management from scientific research, technology development, standardization, and industrial property to environment protection throughout the country. The tasks, powers and responsibilities on State management of MOSTE are defined in Decree No.15/CP of the Government dated March 2nd, 1993.

Departments of ministry include followings.

- Administrative Office
- International Co-operation Department
- Planning and finance Department
- Patent & Trade Mark Department
- National Environment Agency (NEA)
- National Institute for Scientific, Technological forecast & Strategy
- General Department of Standards, Measures, Weights and Quality
- Supervision Board
- Personnel and scientific cadre Dept.

National Environmental Agency (NEA) is a specialized agency for protection of environment at the national level. Department of Science, Technology and Environment (DOSTE) is responsible for protection of environment at the regional level.

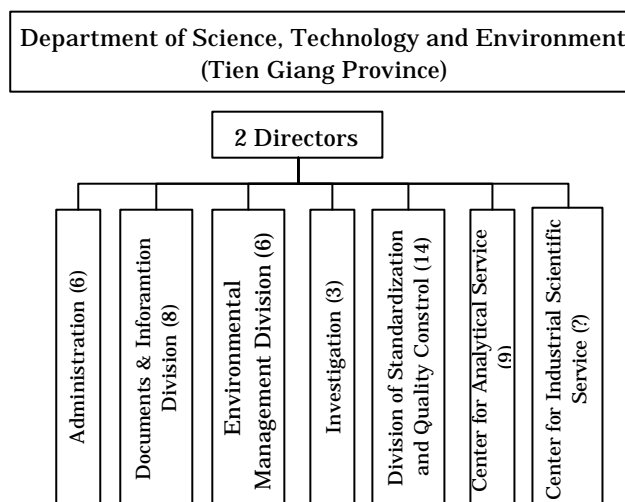
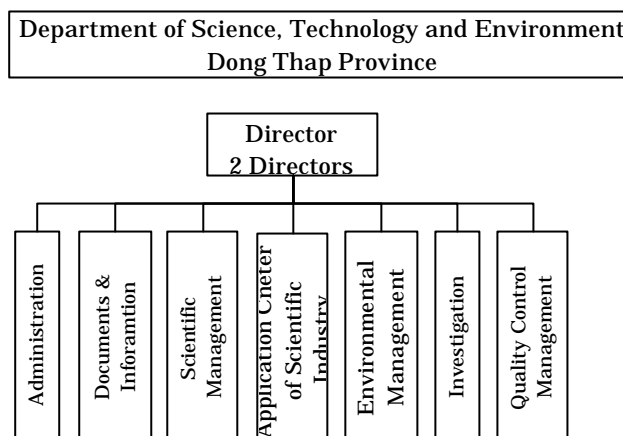
NEA

National Environmental Agency is responsible for environmental protection on nation-wide scale and bears responsibility to organize and direct activities of environmental protection within its functions and duties. The followings are the concrete tasks, powers of NEA.

- a. To draw up, submit to the Government to issue - in its jurisdiction - policies, rules, standards on environment protection,
- b. To organize the implementation of the national plans on environment approved by the Government,
- c. To organize the appraisal on environment protection requirement of important socio-economic development projects before submitting to the Government for approval,
- d. To guide the national industries so as to protect environment and
- e. To co-ordinate with other people's associations to organize and direct the people to protect the environment.

DOSTE

The provincial Department of Science, Technology and Environment (DOSTE) comes under the purview of the MOSTE only in relation to administrative matters and technical guidance. It is responsible to the People's Committees of the provinces for the implementation of LEP within its territory.



Apart from the above-mentioned hierarchy of MOSTE and DOSTE, the various Ministries have Science, Technology and Environment Divisions within their organizations. The Environment Divisions within these Ministries are entrusted with the environmental issues arising in the course of their respective Ministries' activities or jurisdiction. The Center for Water Quality & Environment is an environmental division of Sub-Institute of Water Resources Planning under Ministry of Agriculture and Rural Development. Sub-Institute of Ecology, Resources & Environment Studies is an institute investigating natural resources and environment in the south Viet Nam. In addition to these Ministries, there are a host of agencies, committees, general

departments and research centers which may have powers and jurisdiction equivalent to those of a conventional ministry. These do not normally come under the supervision of any particular ministry, though cooperation only among these bodies and with the ministries is very common. Several research centers situate in Ho Chi Minh City, among which dealing with environmental issues is Environmental Protection Center.

L.1.3 Non-Governmental Organization (NGO)

Several international NGOs are active in Viet Nam in the field of environmental protection including;

- the World Conservation Union (IUCN),
- the World Wildlife Fund (WWF) and
- The International Crane Foundation (ICF)

In the Study Area, the International Crane Foundation (ICF) is an active participant in the protection of the National Park.

All foreign non-governmental organizations (NGOs) are required to obtain permission for operation and establishment of representative and local offices from the Committee for Non-Governmental Organization Affairs, and required to have representative office in Hanoi (see Guidelines for the Implementation of the Regulations on the Operation of Foreign Non-Governmental Organizations in Vietnam). In addition, the permissions for the NGOs with specific environmental agendas should be sought from MOSTE that maintains a register of environmental NGOs and monitors their activities.

Please refer to M.3.1.2 for their positions and background.

L.1.4 Environmental Impact Assessment Process

The Process of Environmental Impact Assessment (EIA) is stipulated in

- Article 18 of the Law on the Environmental Protection and
- Chapter III of Decree 175/CP.

The article 9 of 175/CP requires the investors, project owners or directors of public offices and enterprises to assess the environmental impacts for the following projects.

- Master plans for regional development, the zoning and plans for development of branches, provinces and cities directly under the Central Government, the planning of urban centers and residential quarters;
- Projects on economic, scientific, medical, cultural, social, security and defense;
- Projects invested or funded by foreign organizations or individuals, or international organizations, or built with loans from them or as joint ventures with them on Vietnamese territory.

The article 11 of 175/CP states that the assessment shall be undertaken in two steps,

- Preliminary Assessment and

- Detailed Assessment

In line with these articles, project owners are required to assess environmental impacts (Preliminary assessment) for all the regional development plans and, prior to implementation of projects, they are required to conduct Detailed Assessment for any project that is defined in the article 9 of 175/CP.

This is the major difference with JICA's Guidelines, in which EIA is not conducted unless potential significant environmental impacts are identified in IEE.

The article 12 requires EIA be conducted by agencies and organizations that have qualified staff and necessary facilities. In most cases, EIA is entrusted to specialized agencies in the field of environmental study such as,

- *Center for Water Quality & Environment*
- *Environmental Protection Center* of Institute for Tropical Technology and Environmental Protection of Vietnam which is under Ministry of Military
- *Sub-Institute of Ecology, Resources & Environmental Studies* of Sub-Institute of Ecology, Resources & Environmental Study

The Center for Water Quality & Environment mainly deals with environmental studies of water resources development projects including dike construction, management and maintenance. The Environmental Protection Center is specialized in the field of industrial development and investment and the last one is specialized in biological studies.

The article 14 stipulates that EIA reports be appraised either by MOSTE or DOSTE. The distinction between them is determined by the project scale. The EIA reports dealing with water resources management, irrigation, dike management and flood control are submitted to the following departments of MARD and subsequently to MOSTE for appraisal.

- Department of Water Resources Management and Irrigation
- Department of Flood Control & Dike Management

L.2 ENVIRONMENTAL CONSIDERATIONS FOR THE PROJECTS

L.2.1 ENVIRONMENTAL EXAMINATION OF THE PROJECT

L.2.1.1 Introduction

This part begins with impacts in social environmental category and the impacts in natural environmental category follows. Please refer to the ‘Definition of Environmental Impact Categories’ attached in the following part of this section.

Detailed Project Description and Site Description is not given here. Please refer to the main text of ‘the Interim Report’ for the information

L.2.1.2 Social Impacts of the Project

1) Socio-economic Issues

(1) Social Issues

No significant environmental impact was identified in this category.

Intensive argument was made among experts to clarify whether the project deals with ‘Planned Residential Settlement’ when the idea to provide residential space on the elevated dike came up in the formulation process. It was concluded that the component does not fall into the category of ‘Planned Residential Settlement’ based on the following additional information.

- a. It is not a new land settlement. The project deals with up grading of dike system that has been constructed around paddy field.
- b. The target of the project will be only those who have farmland within or on the existing dike system.
- b. Space is to be provided only those who desire to possess residential area on the elevated dike.

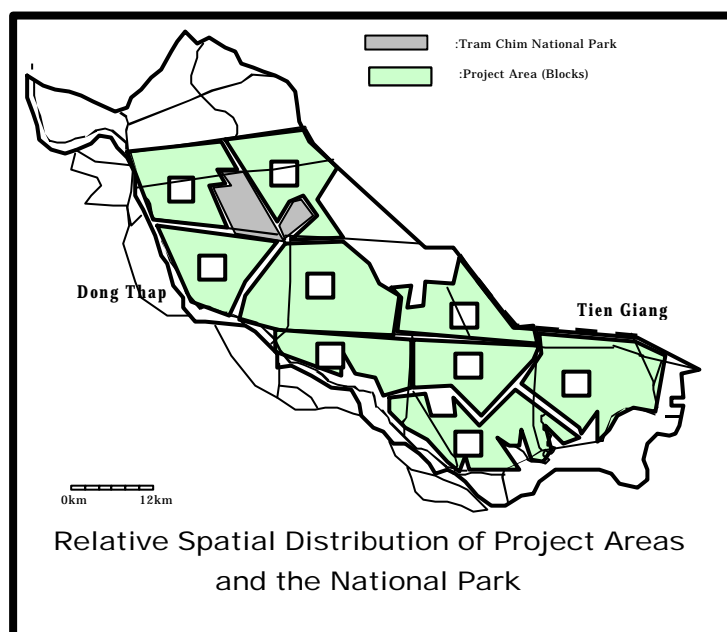
Past experience in the area:

It is noteworthy that outbreak of conflict between new settlers and host population has not been induced in the settlement program implemented by the local government. In addition, the settled farmers did not express any concern regarding the friction in an interview conducted in Tan Cong Sinh commune of Tam Nong district. Region’s ethnic homogeneity is supposed to contribute in this regard. (Please refer to Ethno-Linguistical Map downloaded from the homepage of IUCN.)

(2) Demographic Issues

Significant impact concerning rapid population growth caused by such incidence as 'Boom Town' is not anticipated. This judgement was made from observation of dike rehabilitation and road construction works that were being implemented in a similar scale during the field study. Relatively small-scale construction work and clear targeting of the project beneficiaries mentioned above would help reduce the problems associated with 'Induced Development'.

However it is strongly recommended that layout of road network be designed, particularly in the area adjacent to the Tram Chim National Park, so as not to trigger spontaneous migration into the area and changes in resources exploitation patterns.



In this context, particular attention should be paid when the project is implemented in Block 2. This Block situates adjacent to the Tram chim National Park. The Block 3 also situates adjacent to the Park, however, it is separated by a large canal thereby the impact deemed insignificant.

(3) Economic Activities

The Project is expected to contribute to increase farmer's income by stabilizing the harvest of spring-summer crop and enabling rice cropping once every three years in inundation period. This would provide increased employment opportunity for the landless farmers who provide work forces for land preparation, harvesting and other farming practices. On the other hand, farmers who spend inundation period by fishing in their paddy field would lose fishing opportunity once every three years. The change brought about in this respect is supposed to be insignificant and accepted by the farmers from the field observation that suggested negligible contribution of fishing activity to their annual income.

It is necessary to justify the said assumption by assessing net benefit of the project and confirming farmers' intention whether they are willing, instead of double cropping, to practice triple rice cropping by sacrificing fishing opportunity.

(4) Institutional and Custom Related Issues

The project does not encompass components that would adversely influence the institutional and

custom related issues.

However the primary concern on the project lies in capability of the local organizations which will be responsible for 'Rotational Inundation Control System'. The local organizations, farmers' organizations and/or the local government, will operate gates and other related structures of dike system, though not concretely designed at the moment.

The local farmers intentionally inundate their paddy field by opening the gate or cutting the dike even though the farmland is capable of protecting the land from inundation. They say they inundate aiming at replenishing fertile alluvium and reducing the problems associated with rats and other damages caused by insects and pests. An analogy of 'Rotational Inundation Control System' underlies in this local practice. However the former is not organized practice under systematic control of inundation and it is rather new approach.

An appropriate institution that enables organized control of inundation needs to be formed to manage the Rotational Inundation Control System, unless otherwise, the risk associated with increase in water level arises to such an extent that the region's environmental, economic and political problems might appear.

In this context, intentions and capability of the local organizations needs to be assessed. In addition, unanimous consensus among concerned parties, particularly of all beneficiaries deemed essential.

2) Impacts on health and sanitary issues

(1) Increased use of agrochemicals

The project would increase cropping intensity from 2.0 to 2.3 per year on average as discussed in the main report. It is thereby anticipated that this results in proportional increase in pesticides and fertilizer load on acreage of land in a year.

Additional rice cropping is to be practiced during the inundation period and it is designed once every three years. The impact on the environment was judged insignificant at the moment from the following facts.

- a) Double rice cropping has been practiced in the area thereby the increased load of agrochemicals would be negligibly small relative to the present load.
- b) The volume of flooding water in the period is large, thereby, the applied agrochemicals in this season would be fairly diluted by flooding water.
- c) Integrated Pest Management (IPM) has been intensively disseminated and a relatively large number of farmers practice IPM.

Degree of the problems associated with the increase in agrochemicals varies by proximity of the project area to the Tram Chim National Park, which is discussed in the 2.1.3. IMPACTS ON NATURAL ENVIRONMENT.

(2) Outbreak of endemic and epidemic diseases

Irrigation agriculture has been practiced over the decades in the area, thus, the project does not lead to problems associated with endemic and epidemic diseases.

(3) Residual toxicity of agrochemicals

The problem associated with residual toxicity of agrochemicals is not likely induced as suggested below.

Use of extremely and highly hazardous pesticides and pesticides with persistent characteristic are declining in general and the use of organochlorine insecticides is severely restricted (see M.3.2.8: The list of Pesticides those use has been banned). These general trends in crop protection policy enabled farmers to use less hazardous and less persistent pesticides. The top four insecticides, fungicides and herbicides preferably used by the farmers in the Dong Thap Province do not include any products that fall into the category of 'Ia:Extremely Hazardous' or 'Ib:Highly Hazardous' by WHO Recommended Classification of Pesticides by Hazard.

List of top pesticides in sales volume and their toxicity

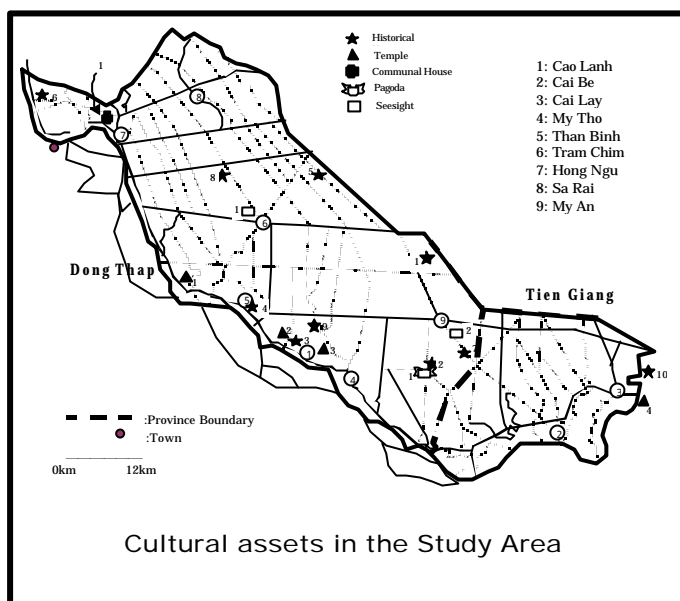
	Product Name	Active Ingredient	LD ₅₀	WHO's Classification	
Insecticides	Padan	cartap	325	II	
	Decis	deltamethrin	135	II	
	Fastac	alpha-cypermethrin	250	II	
Fungicides(%)	Anvil	hexaconazole	2180	Unlikely	
	Tilt	propiconazole	1520	II	
	Validacin	validamycin	10000	Unlikely	
Herbicides(%)	Sofit	fenclozim	5000	Unlikely	
		pretilachlor	6100	Unlikely	
	Serius	pyrazosulfuron-ethyl	5000	Unlikely	
	Butachlor	butachlor	3300	Unlikely	
	Tiller S	2,4-D		375	II
		MCPA		700	III
		fenoxaprop-ethyl		2350	Unlikely
2,4-D	2,4-D	375	II		

WHO's Classification:

Ia:Extremely hazardous Ib:Highly hazardous
II:Moderately hazardous III:Slightly hazardous
Unlikely:Unlikely to present acute hazard

In addition, the project inherently does not change farmer's preference of pesticides and application pattern. Therefore it is judged that the current conditions may not change.

3) Impacts on cultural asset issues



Cultural properties listed on UNESCO World Heritage Sites were not identified in the Study Area.

Several departments were contacted for information and expertise about the region's cultural resources and inventories were obtained. It was confirmed that most of the properties situated either on the natural levee, extending along the Tien River, or on embankment, which is

characterized by low risk of inundation. Based on the inventories, a map (See M.3.1.4 Cultural Assets in the Study Area) was prepared to exhibit the sites of the resources as shown in the box above. In addition, reconnaissance site visit was conducted for some of the resources to examine the probability of impacts of the project. It was concluded that further examination judged unnecessary, however, attention need to be paid during the course of the Feasibility Study.

L.2.1.3 IMPACTS ON NATURAL ENVIRONMENT

1) Biological and Ecological Issues

(1) Negative impacts on important or indigenous fauna and flora

Introduction

The project does not induce loss of natural habitat. But particular attention should be paid to the wetland ecosystem inside the Tram Chim National Park. The impacts of the project on the Tram Chim National Park are complicated because they are interconnected with other outcome of the project. Prior to getting into description of the impacts, this section reviews value of the Park.

Tram Chim National Park has wetland ecosystem, though not listed on the Ramsar, with diverse biological resources as described briefly below (see M.3.1.6/M3.1.7 for more detail).

The Tram Chim National Park has a particular importance as a habitat for the Eastern Sarus Crane (*Grus antigone sharpii*). The estimated population of the crane is 500 to 1500 and it distributes in Vietnam, Cambodia and Laos. Although seasonal movements of the subspecies

have not been well studied, it breeds during the monsoon season (May-October) in Cambodian or Laotian territory and move to its dry season habitats in the Mekong River delta. Apart from the crane, the vegetation such as *Melaleuca cajuputi* and *Eleocharis* whose tuber is a main food of the crane are prevalent and freshwater fish, turtles, shrimp and snakes are important bioresources with economic values in the Park. The National Park is currently protected from external environmental shocks by dike system with elevation of 1.5 –2.0 m in comparison with ground level or 2.5 – 3.0 m above sea level.

Nature of Impact

The ecosystem inside the park may be disturbed upon condition of the followings;

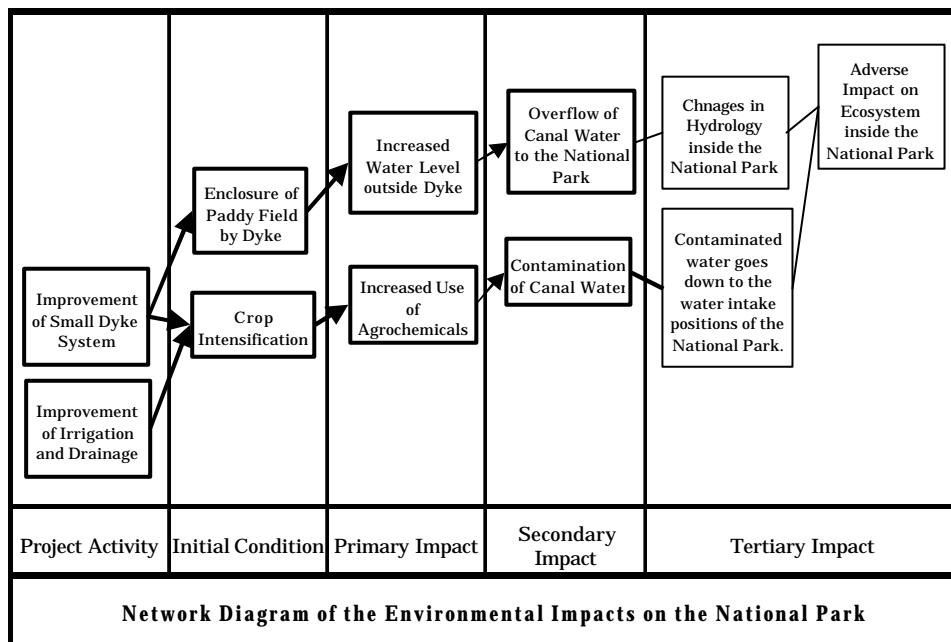
1) *Elevation of water level*

Water level is raised enough, though roughly estimated at 6cm at the moment, to overflow the present dike that surrounds the National Park.

2) *Aggravated water contamination*

Contaminated water, which is brought about by the increased use of agrochemicals, goes down to the water intake positions of the National Park.

These conditions are materialized through several steps as shown in the following diagram.

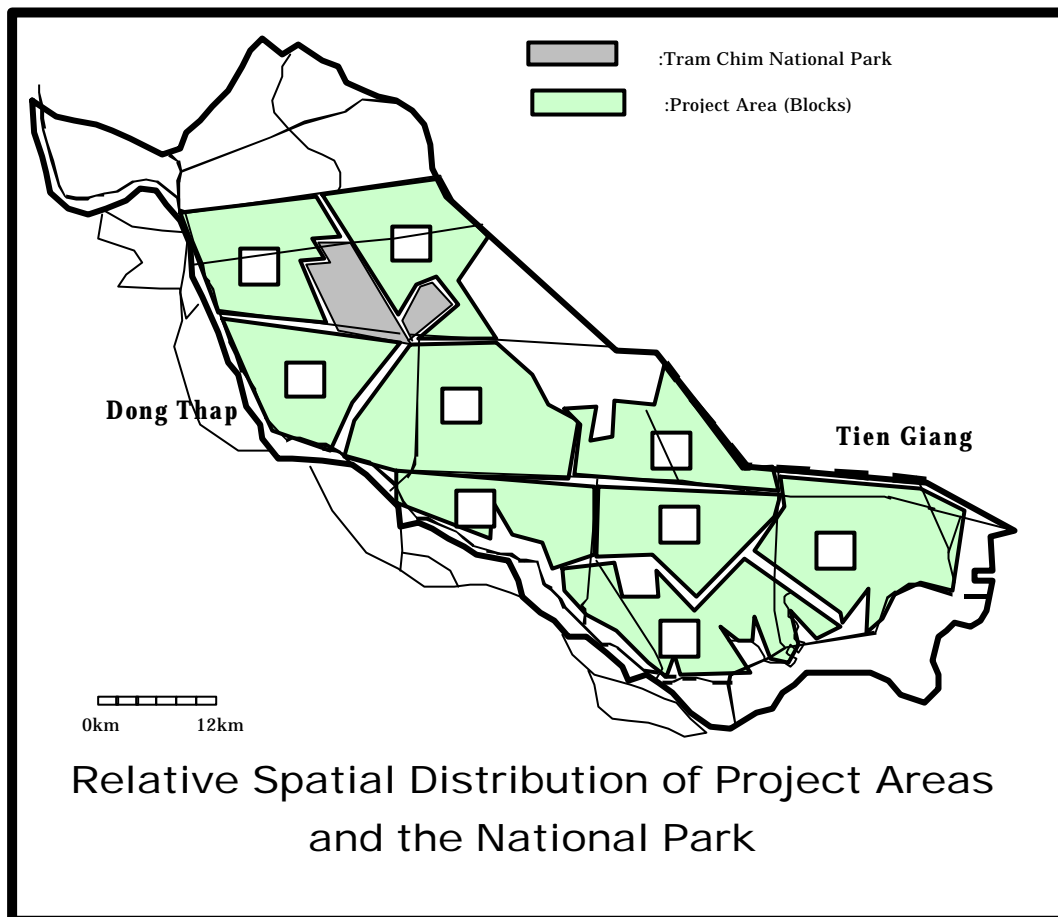


As for the latter condition, the followings are also the determinant of the impact.

- 1) Layout and design of such facilities as dike and gates that have been constructed and installed to protect the ecosystem inside the National Park
- 2) Geographical and hydrologic al relationship between the project area and the Park

Project Location

Proximity of the project areas to the National Park and relative position concerning hydrology need to be considered to assess the impact. The overlaid map is given below, in which the Tram Chim National Park is marked with stripe and project areas are shaded.



The Block 1 and 2 surround the National Park situating at the upstream of the canal system. The Blocks 3 and 4 situate adjacent to the National Park, but it is not at the upstream of the canal system and separated by a relatively large canal. The other Blocks numbered from 5 through 9 situate more than 10km apart from the Park at the downstream of the canal system.

Conclusions

Adverse environmental impacts on the Tram Chim National Park discussed above include;

- 1) Elevation of water level
- 2) Aggravated water contamination

Impact of water level elevation under the assumption that the project is implemented in all the blocks covering Block 1 thorough 9 should be predicted at the first Feasibility Study period. Rough estimation is given in 'Impacts on hydrology, Water Quality and Air' of this report.

As for the Impact of Water Contamination, detailed impact assessment is required for the Block 1 and 2.

(2) Other environmental impacts that fall into this category

Development activities of the project do not induce the following impacts because of the nature of the project and geographical settings.

- 1) Changes in vegetation
- 2) Proliferation of exotic and/or hazardous species
- 3) Encroachment into tropical rain forests and wild lands
- 4) Destruction or degeneration of mangrove forests
- 5) Degradation of coral reefs

2) Impacts on Soil and Land Resources

(1) Deterioration of soil fertility

Transportation of soil particle and nutrition is an important source of region's soil fertility. The local expert expressed concern about decreased volume of clay and nutrition transportation induced by enclosure of paddy field by elevated dike. The impact induced by the project is supposed limited because paddy field is inundated for two years, as practiced currently, during one rotation.

However, it need further study because information is not available to make a solid judgement.

The first focus needs to be given to inorganic nitrogen that is supplied in the form of NH_4^- or NO_3^- because it is the most important nutrient among essential elements for rice plant.

(2) Soil Acidification

Introduction

However some parts of the Blocks include ASS area as shown in the following overlaid map. To comprehend the impact of the project, this part briefly reviews nature of the impact and the project location in relation to distribution of ASS.

Nature of Impact

The cause of occurrence of 'acidification' largely lies in construction work operated in and around the area covered by acid sulfate soil. Because the project does not deal with new land development but up-grading of the existing dike system. The construction work may not include soil excavation and resultant soil oxidation, unless earth used for construction work is not taken from the land influenced by ASS. But, if not properly managed, it would result in exposure of pyrite to oxygen, which leads to acidification of soil and water.

Acid Sulfate Soil is broadly classified into two groups by the presence of either sulfidic material or sulfuric horizon. ASS with sulfidic material is called Potential ASS because it does not impose acidity unless the material is oxidized, while, ASS with sulfuric horizon has low pH and it is called Actual ASS in the Vietnamese classification. Further classification is made by the depth of the soil layer that includes either sulfidic material or sulfuric horizon. World Soil Reference is adopted in the nomenclature of soil in Viet Nam. The followings are the representative ASSs distributing in the Study Area.

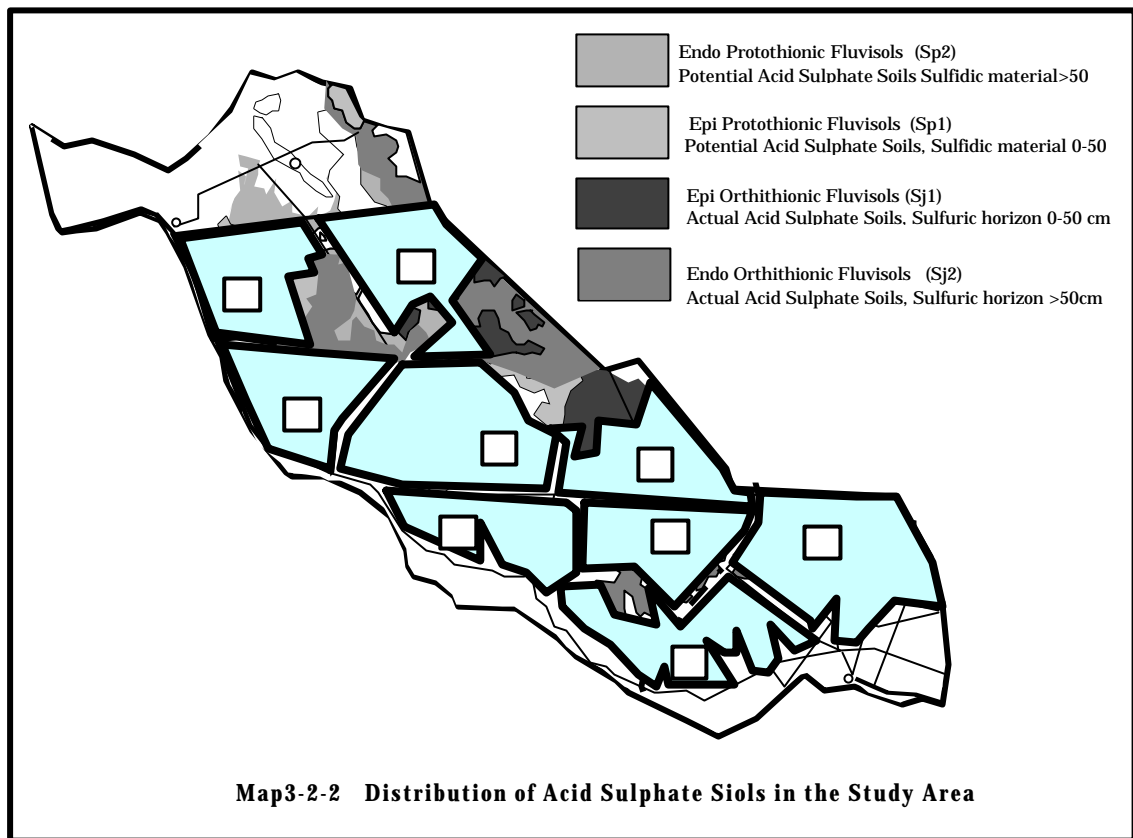
- 1) Endo Protothionic Fluvisols
Potential Acid Sulphate Soils Sulfidic material >50 cm
- 2) Epi Protothionic Fluvisols
Potential Acid Sulphate Soils, Sulfidic material 0-50 cm
- 3) Epi Orthithionic Fluvisols
Actual Acid Sulphate Soils, Sulfuric horizon 0-50 cm
- 4) Endo Orthithioni Fluvisols
Actual Acid Sulphate Soils, Sulfuric horizon >50cm

Project Location

A map of ASS distribution and Project Areas were overlaid as given in the following box. Please refer to the original soil map at the scale of 1/100,000 given in the Main report, which was prepared by the Integrated Resources Mapping Center of Sub-Institute of Agricultural Planning and Projection. The detailed description of the ASS is given in the Main Report and Appendix C.

Among 9 Blocks, 'Block 2' contains a large area of ASS, therefore, the area should be given lower priority. 'Block 1' includes a relatively large portion of ASS, and exhibit complex distribution of potential and actual acid sulfate soil, thus from environmental point of view lower priority should be given to the area.

As for another Blocks numbered from 3 through 9, they contain, to some extent, the area influenced by ASS, particularly '*Endo Orthi Thionic Fluvisol*'. It is Actual Acid Sulfate Soil with sulfuric horizon at 50cm or shallower below soil surface. Most of the soil are currently utilized for production of rice or Melaleuca.



Conclusion

Lower priority should be given to the Blocks 1 and 2 from viewpoint of environmental conservation, because they have a large area and complex distribution of ASS. Even in another blocks, ASS distributes in various forms, therefore, further assessment of the impact is required.

It is strongly recommended that earth which is used as construction material should be taken from the area other than acid sulfate soil.

(3) Other environmental impacts that falls in this category

The area is characterized by very gentle slope and the land is utilized for paddy production, thereby, not vulnerable against soil erosion.

As the region is endowed with abundant water resources all the year round, the Area is not vulnerable against soil salinization.

3) Impacts on hydrology, Water Quality and Air

(1) Impacts on Hydrology

The impact on Hydrology, particularly changes in surface water level, is the primary concern in the project including dike construction or elevation of dike height in general. It is meaningful to review the track of thought in getting the idea of 'Rotational Inundation Control System' (RICS)

into shape.

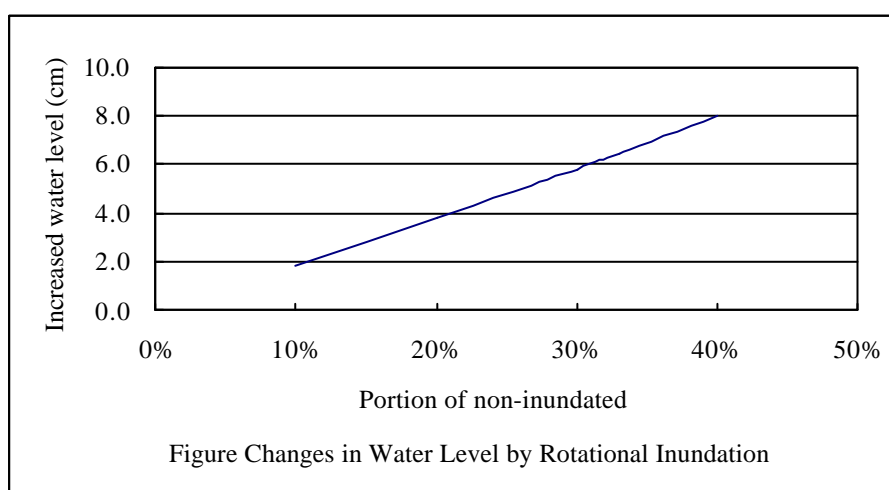
From financial point of view, enclosure of paddy fields by dike for all the year round may be a preferable option. However this idea of ‘Complete Inundation Control’ was judged unacceptable because it induces significant increase in water level outside of the project area.

In this context, the idea of RICS came up to mitigate the impact to such an extent which is acceptable in the region’s environmental context. Focus of the discussion between local officials and Japanese experts shifted to quantitative judgement of the impact based on the meteorological and hydrological data. Based on the water level record at Tan Chau, Cao Lanh and Cay Lay stations, water level in the past was analyzed and the results are summarized as shown below.

Return period	Probability	Maximum Water Level (m)			Minimum Water Level (m)		
		Tan Chau	Cao Lanh	Cai Lay	Tan Chau	Cao Lanh	Cai Lay
1/2	50.00	4.09	2.08	1.23	-0.17	-0.86	-1.13
1/5	80.00	4.57	2.26	1.48	-0.29	-0.96	-1.27
1/10	90.00	4.89	2.38	1.65	-0.34	-1.01	-1.32
1/20	95.00	5.20	2.50	1.81	-0.38	-1.04	-1.36
1/25	96.00	5.29	2.54	1.86	-0.39	-1.05	-1.38
1/50	98.00	5.59	2.65	2.02	-0.42	-1.08	-1.41

Differences between the maximum and minimum water level at 50years probability ranges from approximately 4.3 m at the Tan Chau station to 2.4 m at the Cai Lay station.

Taking the said analysis into account, a rough simulation was made to assess the changes in water level with assumptions of 10 % to 40 % inundation coverage.

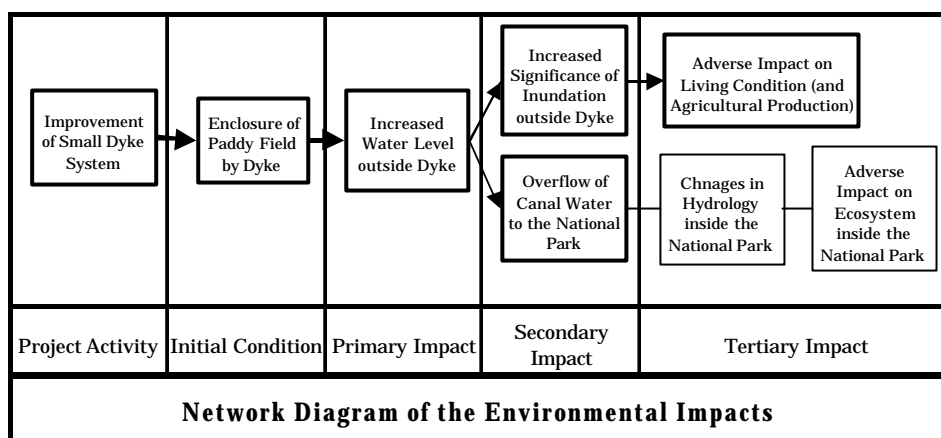


It indicated that change in water level is approximately 6 cm under assumption of 30 % of non-inundation of the areas. Changes in water level at 6 cm is supposed to be insignificant at the moment in comparison with naturally occurring the fluctuations.

Result of assessment varies depending on the assumptions such as affected area and portion of

non-inundation.

In addition, it was assumed that rotational inundation control is maintained as designated (30 %). This is the pivotal assumption of the project and it substantially depends on the capability of local organizations which are responsible for gate operation as discussed in ‘Institutional and Custom Related Issues’.



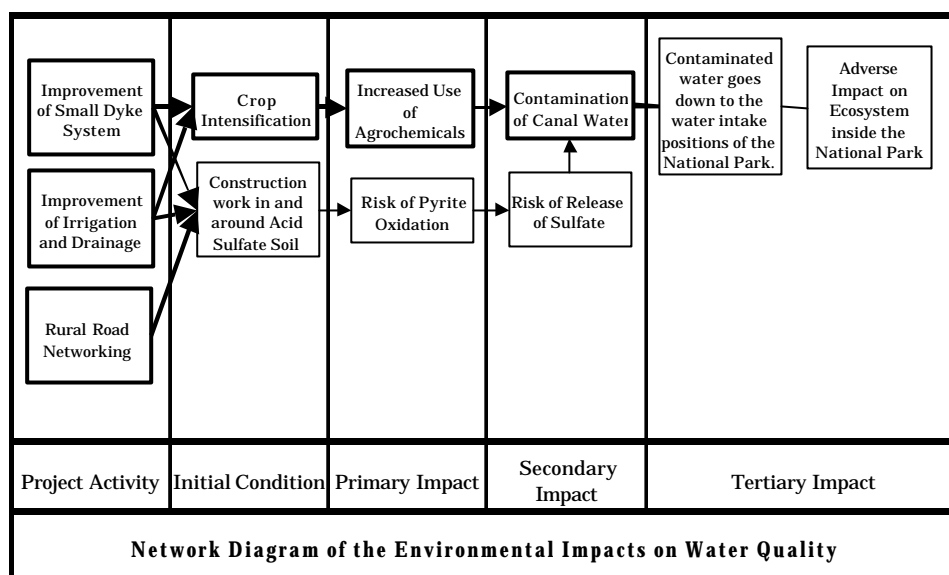
As shown above, the receptor of the impact may be categorized into two or three groups. It would adversely influence the living conditions outside the project area, agricultural production and wetland ecosystem of the National Park.

(2) Water contamination and deterioration of water quality

Contamination of water by increased use of pesticides and fertilizer for the Block 1 and 2 need to be studied with particular emphasis on the impacts on the National Park.

If sulfidic material that underlies the present soil surface is exposed to atmosphere by construction work, release of sulphate (SO₄²⁻) may be accelerated resulting in acidification of soil and water in the area.

See the former part for more detail.



(2) Other environmental impacts that falls in this category

Water eutrophication: Substantial cause of eutrophication lies in increased nutrient content in water. Although the project has a probability to cause increased use of fertilizer, it does not alter application pattern of fertilizer. Therefore the project does not induce increased load of nutrient in one cropping season and it does not increase nutrient content in water.

Sea water intrusion: The problem associated with sea water intrusion is taking place in the downstream of the river. However, geographical settings of the project areas and the area influenced by sea water does not establish enough question. *Changes in temperature of water:* Irrigation water is to be taken from surface water, thereby, such negative impact is not anticipated.

4) Impacts on Air Quality

No significant environmental impact was identified.

Given the area's environmental setting, air pollution may be induced by pesticide spray drift*. Although a number of factors influence drift, application equipment and methods, among others, are the major determinants followed by weather conditions, topography and the crop or area being sprayed.

The farmers in the Study Area currently adopt small scale manual sprayer for application of pesticides. It is sprayed early in the morning when temperature of ground surface is lower than that of air above the field, thereby, downstream of airflow prevents drift of pesticides.

Engine sprayer will not be introduced during the project life and large scale aerial spray of pesticides will not be adopted.

*'Pesticide Spray Drift' is defined as the physical movement of a pesticide through air at the time of application or soon thereafter, to any site other than that intended for application (often referred to as off-target).

5) Landscape and Mining Resources

Large-scale construction works are not planned, thereby, *damage to landscape* is not anticipated. Deposits of mineral resources are not present.

L.2.2 CONCLUSIONS AND RECOMMENDATIONS

L.2.2.1 CONCLUSION AND RECOMMENDATION

Detailed assessment of environmental impacts was judged necessary for the ‘Small Scale Dike Improvement Project’ through the examination of anticipated outcomes of the project. It was suggested that nature and significance of environmental impacts vary among nine (9) Blocks because of relative geographical proximity to the National Park and localized distribution of ASS. In this context, the conclusion and recommendation given in this section may not be applied to a specific project area or block. Please refer to the following part for the priority project area that will be subject to feasibility study in the succeeding study period.

SOCIAL ENVIRONMENT

1) Capability and intentions of local organization and concerning ‘Rotational Inundation Control System (RICS)’

The primary concern of the project lies in capability of the local organizations which will be responsible for RICS.

Intentions and capability of the local organizations needs to be assessed. In addition, unanimous consensus among concerned parties, particularly of all beneficiaries deemed essential.

2) Farmers intentions concerning loss of fishing opportunity during the inundation period

Farmers who spend inundation period by fishing in their paddy field would lose fishing opportunity once every three years. It is necessary to assess net benefit of the project and confirm farmers’ intention whether they are willing to practice in triple rice cropping.

3) Demographic Issues

It is recommended that layout of road network be designed, particularly in the Block 1 and 2, so as not to trigger spontaneous migration into the area and changes in resources exploitation patterns.

NATURAL ENVIRONMENT

1) Changes in Surface Water Level

Changes in surface water level is also the primary concern which may be induced by the elevation of dike surrounding paddy fields. Rough estimate indicated that changes might be 6 cm in the assumption that rotational inundation control is maintained as designated (30 %). This is the pivotal assumption of the project and it substantially depends on the capability of local organizations that are responsible for RICS as mentioned above. It would adversely influence the living conditions outside the project area, agricultural production and wetland ecosystem of the National Park.

2) Soil Acidification

Lower priority should be given to the Blocks 1 and 2 from viewpoint of environmental conservation, because they have a large area and complex distribution of ASS. As for another blocks, ASS particularly potential ASS distributes in various forms, therefore, further assessment of the impact is required. It is strongly recommended that earth used as construction material should be taken from the area other than acid sulfate soil.

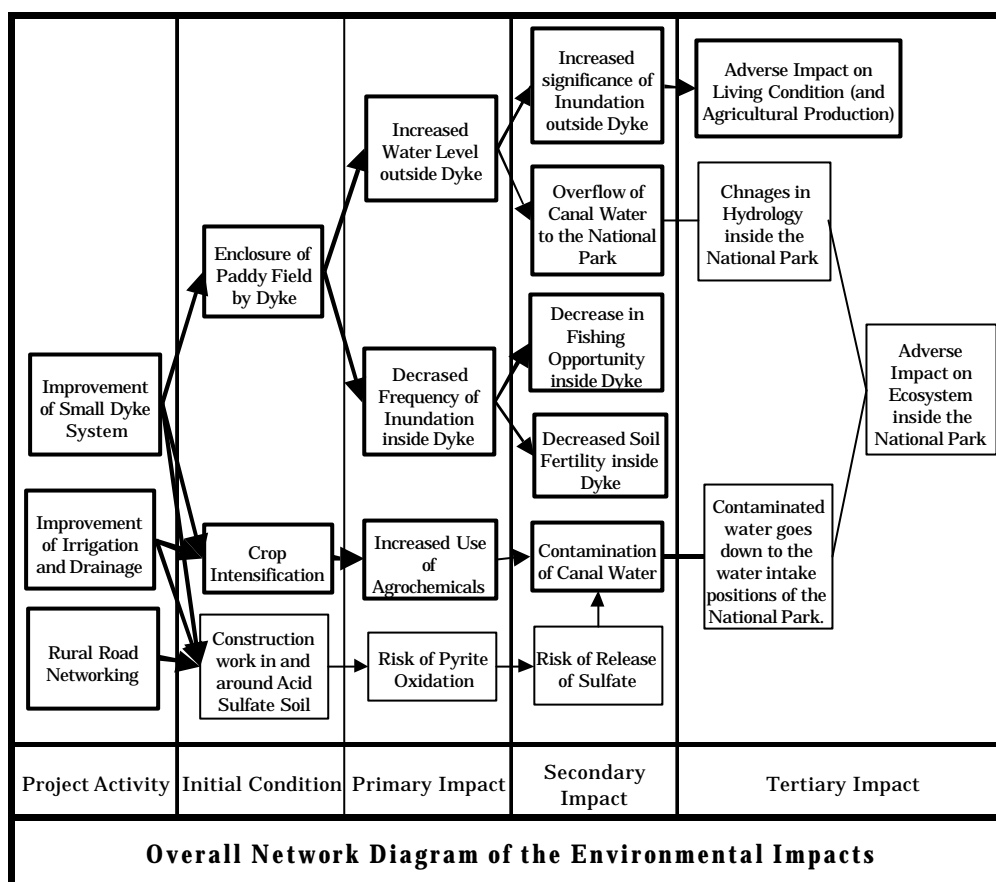
3) Deterioration of soil fertility

Transportation of soil particle and nutrition is an important source of region's soil fertility. The local expert expressed concern about decreased volume of clay and nutrition transportation induced by enclosure of paddy field by elevated dike. The impact induced by the project is supposed limited because paddy field is inundated for two years, as practiced currently, during one rotation. However, it need further study because information is not available to make a solid judgement. The first focus needs to be given to inorganic nitrogen that is supplied in the form of NH_4^+ or NO_3^- because it is the most important nutrient among essential elements for rice plant.

4) Water contamination and deterioration of water quality

Contamination of water by increased use of pesticides and fertilizer for the Block 1 and 2 need to be studied with particular emphasis on the impacts on the National Park. If sulfuric material that underlies the present soil surface is exposed to atmosphere by construction work, release of sulphate (SO_4^{2-}) may be accelerated resulting in acidification of soil and water in the area. See the former part for more detail.

The following diagram summarizes the potential adverse environmental impacts that were identified in the course of examination.



L.2.2.2 Recommendation for the Feasibility Study

Feasibility study will be conducted from the middle of February 2000. As discussed in the Main Report, the study area will be classified tentatively into two parts, one covering the blocks 4 and 8 with a total land area of 33,000ha and the other with an area of 1,500 ha. EIA is recommended to be conducted as an integral part of the former with particular emphasis on the issues given below. A study concerning Consensus Building is deemed difficult to conduct in a limited time of 2-3 months covering 33,000ha, thus, it should be conducted in the latter one.

SOCIAL ENVIRONMENT

Social analysis should to be conducted to examine the intended beneficiaries, such as the identification of their needs, their social background, the willingness and capacity to get involved in the projects with particular emphasis on the following two issues,

- 1) Capability and intentions of local organization and concerning the RICS
- 2) Farmers intentions concerning loss of fishing opportunity during the inundation period

Detailed description of the study approach will be given in another set of document.

NATURAL ENVIRONMENT

Environmental Impact Assessment should be conducted with the focus of the following issues.

- 1) Changes in Surface Water Level
- 2) Soil Acidification
- 3) Deterioration of soil fertility
- 4) Water contamination and deterioration of water quality

Suggestions for Study Approach

Approaches of the study on environmental impact of the project will be discussed in more detail. Suggestions for the study approach are given below for reference.

1) Changes in Surface Water Level

- (1) Determination of the degree of changes in water level induced by the elevation of dike height based on the design of facilities of the project.
 - 1) the area of influence,
 - 2) frequency,
 - 3) timing,
 - 4) depth and
 - 5) duration.
- (2) Assessment of the significance of the said impact by determining the following category of potential outcome.

Living conditions

- 1) Changes in the number of households at risk of inundation, frequency of inundation; length of time the households are under water,
- 2) Changes in the number of structures at risk (e.g. factories, warehouses, etc.); public facilities in the hazard area (e.g. water services, health services, roads); the number of people served by these facilities.

Production condition

- 1) Changes in acreage planted, their economic value,
- 2) Assess the degree of dependence of local communities upon their agricultural output; severity of damage,
- 3) The impact of inundation (frequency, timing, depth and duration) on the intensity of cropping and on other ways in which the land may be productively used

National Park

- 1) Describe the facilities that protect the ecosystem inside the park from external impacts.
- 2) Describe the natural characteristics of the Tram Chim National Park, which include an inventory of biological resources with particular emphasis on endangered species, water quality inside the park with description of seasonal changes.
- 3) Assess the impacts of the Project based on the said description.

2) Soil Acidification

Influences of Construction Work in and around the acid sulfate soil may be clarified through the following examination.

- 1) Examination of the distribution of acid sulfate soil inside the study area with particular emphasis on pyrite distribution.
- 2) Examination of the probability of soil acidification based on information of layout and design of facilities and construction work

If the occurrence of soil acidification is anticipated by the said examination, appropriate management plan of sulfate effluent should be proposed.

3) Deterioration of soil fertility

Estimation of the amount of nutrients that is supplied by flood deposits for such cations as Ca, Mg and nitrogen in the form of NH_4^+ and NO_3^- based on the available water monitoring data over years. Percolation rate, concentration of the elements and data on behavior of the elements in water and soil would be necessary. Attention should be paid to behavior of specific substances such as nitrogen which is subject to denitrophication upon the downward movement from oxidative surface to reductive subhorizons.

4) Water contamination and deterioration of water quality

Determination of the significance of increased use of chemicals and fertilizer

- 1) Assessment of the changes in use of pesticides and fertilizers and impact on water quality
- 2) Layout of facilities of dike surrounding the national park
- 3) Examination of the existing or anticipated problems associated with increased use of crop chemicals and fertilizers

Project Description (PD) Form

- 1 Study Title (Project Name)
The Study on Integrated Agricultural Development Plan in the Dong Thap Muoi Area
- 2 Background Information and Objectives of Project
The Dong Thapu Muoi is a flood stricken area and includes an area of acid-sulfate soil. These constraints renders the agricultural production unstable, resulting in modest farm income. The objective of the study includes (1) Inundation mitigation, (2) Improvement of storage, processing and marketing system of agricultural products. and (3) Improvement of irrigation and drainage svstem.
- 3 Brief Description of Project
 Outline of Project Area : Flood plain lying in the north-eastern part of the Mekong delta with an area of 285,000 ha
 Beneficiaries and Benefited Are : About 1,600,000 persons About 3,300 ha.
 Major Project Component : Rehabilitation of dike surrounding paddy field, Improvement of irrigation, drainage and road network
 Executing Agencies : Ministry of Agriculture and Rural Development
 Environmental Agencies concern : National Environmental Agency under the Ministry of Science, Technology and Environment

4 Major Components and Development Scale of Project

1) Main Project Components (Development activity)	(2) Type of Project		(3) Scale of Project		(4) Remarks
	New Project	Rehabilitation	Area, etc.	Dimensions of major facilities	
a. Irrigation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____ ha.	_____	_____
b. Drainage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____ ha.	_____	_____
c. Land clearing and leveling	<input type="checkbox"/>	<input type="checkbox"/>	_____ ha.	_____	_____
d. Sea / swamp reclamation	<input type="checkbox"/>	<input type="checkbox"/>	_____ ha.	_____	_____
e. Land consolidation	<input type="checkbox"/>	<input type="checkbox"/>	_____ ha.	_____	_____
f. New land settlement	<input type="checkbox"/>	<input type="checkbox"/>	_____ households	_____	_____
g. Dam and reservoir	<input type="checkbox"/>	<input type="checkbox"/>	Number of reservoirs; _____ reservoirs;	Reservoir area _____ ha. Storage capacity _____ m3	_____
h. Substantial changes in farming system	<input type="checkbox"/>	<input type="checkbox"/>	_____ ha.	Name of new crops _____	_____
i. Other	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____ ha.	_____	Rehabilitaion of dyke system

Site Description Form (SD)

- 1 Study Title (Project Name)**
The Study on Integrated Agricultural Development Plan in the Dong Thap Muoi Area
- 2 Present Socio-Economic Status of Project Area**
- (1) Land ownership and land use, etc..
: The government has transferred landownership to individuals. Thus land is owned by private individuals.
- (2) Economic Activity in and around the project area
: Agricultural sector contributes more than 60% of region's GDP with approximately 90% of land devoting to paddy production.
- (3) Customs (riparian right, water right, etc.)
: Unknown
- (4) Host people or community
: The 'Kinh' is the predominant ethnic group in the Study Area. No other ethnic groups were identified in the Study Area.
- (5) Public health conditions
: Generally health conditions are very poor. There are 4 provincial hospitals in DT and at least one hospital at the district level. Some communes have one clinic but the others don't have.
- (6) Population
: The total population in the Study Area is 1,613,095 , 60% of which resides in the Dong Thap Province and the rest in the Tien Giang Province.
- (6) Others
:
- 3 Natural Conditions of Project Area**
- (1) Climate
: Annual rainfall ranges from 1,000 to 1,600 mm/year, of which more than 90 % is concentrated in rainy season (from May to November)
: Flat land of 0.3 to 4.0 m a.s.l. with a gentle slope from North-West to South- East.
- (2) Topology
:
- (3) Hydrology and drainage conditions
: Water depth during inundatio period ranges from 0.5 m in the southern part and 4.0 m in the northern part. Inundation occurs from August to November.
- (4) Soils
: Fluvisols and Cambisols are the predominant soil groups. The central and northern parts of the Study Area are covered by acid sulphate soil.
- (5) Vegetation
: About 74 % of the Study Area is devoted for paddy production with an small area (4%) of forest.
- (6) Rare species or fragile ecology
: The area is the floodplain, thereby there still exists wetland ecosystem. 7,612 ha of the ecosystem is maintained as a national park where several rare species of birds and animals are recorded.
- (7) Others
:

4. Environmentally Sensitive Area in Project Site or Vicinity	Environmentally Sensitive Area					
	In Project Area		Applicable or Not Applicable		Vicinity of Project Area	
	Appl.	N.A	Unknown	Appl.	N.A	Unknown
I. Area under specific designation						
1. Habitat of fauna and flora listed in CITES	x	—	—	x	—	—
2. Wetland designated under the Ramsar Convention	—	x	—	—	x	—
3. Heritage sites listed in the World Heritage Convention	—	x	—	—	x	—
4. National parks, nature reserves, etc.	x	—	—	x	—	—
5. Others ()	—	—	—	—	—	—
II. Socio-economically sensitive area						
6. Area inhabited by indigenous people, ethnic minorities, nomads	—	x	—	—	x	—
7. Historical remains, cultural assets, aesthetic sites	x	—	—	x	—	—
8. Area likely to suffer from significant negative economic impact	—	x	—	—	x	—
9. Others ()	—	—	—	—	—	—
III. Environmentally sensitive natural land						
10. Arid and semi-arid land (including savane, tangeland, etc.)	—	x	—	—	x	—
11. Tropical rainforest and wildlands	—	x	—	—	x	—
12. Wetlands or peatlands	x	—	—	x	—	—
12-1. Wetlands	x	—	—	x	—	—
12-2. Peatlands	—	—	—	—	—	—
13. Coastal Zones	—	—	—	—	—	—
13-1. mangrove forests	—	x	—	—	x	—
13-2. Coral reefs	—	x	—	—	x	—
14. Mountainous, steep-sloped, erodible or devastated lands	—	x	—	—	x	—
15. Closed water bodies such as lakes, swamps or reservoirs	x	—	—	x	—	—
16. Others ()	—	—	—	—	—	—
5. Other Information :						

5 Checklist for Initial Screening

Environmental Issues	Potential SEI	Evaluation	
I. Social Environment			
1. Socio-economic Issues The Project significantly affects socio-economic activities in and around the Project site, such as daily human life, economic activities, transportation and customary practices.	1. Planned residential settlement 2. Involuntary resettlement 3. Substantial changes in way of life 4. Conflict among communities and peoples 5. Impact on native peoples 6. Population increase 7. Drastic change in population composition 8. Changes in basis of economic activities 9. Occupational change and loss of job opportunity 10. Increase in income disparities 11. Adjustment & regulation of water of fishing (riparian) right 12. Changes in social and institutional structures 13. Changes in existing institutions and customs	yes no <input type="checkbox"/> unknown	
2. Health and sanitary issues The Project significantly affects hygiene in and around the Project area or induces water-related disease.	1. Increased use of agrochemicals 2. Outbreak of endemic diseases 3. Spreading of epidemic diseases (Schistosomiasis, Malaria, onchocerciasis, elephantiasis) 4. Residual toxicity of agrochemicals 5. Increase in domestic and other human wastes	yes no <input type="checkbox"/> unknown	
3. Cultural asset issues Some historically, culturally, aesthetically or scientifically important assets may be located in the Project site.	1. Impairment of historic remains and cultural assets 2. Damage to aesthetic sites 3. Impediment of mining resources exploitation	yes <input type="checkbox"/> no unknown	
II. Natural Environment			
4. Biological and ecological issues Some habitats for rare species or ecologically sensitive area are located in the Project or surrounding area.	1. Changes in vegetation 2. Negative impacts on important or indigenous fauna and flora 3. Degradation of ecosystems with biological diversity 4. Proliferation of exotic and/or hazardous species 5. Destruction of wetlands and peat land 6. Encroachment into tropical rain forests and wildlands 7. Destruction or degeneration of mangrove forests 8. Degradation of coral reefs	yes no <input type="checkbox"/> unknown	
5. Soil and land resources The project significantly induces land devastation, soil erosion, soil contamination, etc.	1. Soil erosion 2. Soil sanitization 3. Deterioration of soil fertility 4. Soil contamination by agrochemicals and others 5. Devastation or desertification of land 6. Devastation of hinterland 7. Ground subsidence	yes no <input type="checkbox"/> unknown	
6. Hydrology, water quality and air The Project significantly affects hydrological regime of river, lake and swamp, groundwater hydrology, and air or water quality.	1. Changes in surface water hydrology 2. Change in ground water hydrology 3. Inundation and flooding 4. Sedimentation 5. Riverbed degradation 6. Impediment of inland navigation 7. Water contamination and deterioration of water quality 8. Water eutrophication 9. Salt water intrusion 10. Change in temperature of water 11. Air pollution	<input type="checkbox"/> yes no unknown	
Overall evaluation		<input type="checkbox"/> Yes No Unknown	

Checklist for Scoping

- 1) Applicable development activities :
Irrigation; Drainage; Land clearing and leveling; Sea/swamp reclamation; Land consolidation; New land settlement; Dam and reservoir; Substantial change in farming system
- 2) Applicable development type :
New project or Rehabilitation
- 3) Applicable environmental sensitive area :
Arid and semi-arid lands; Tropical rain forests; Wild lands; Wetlands; Peatlands, Coastal zones; Mangrove forests; Coral reefs; Mountainous, steep sloped, erodible or devastated lands; Closed water bodies in upstream or downstream

I. Social Environment

Category of Environmental Impact		Evaluation *1				Evaluation Basis*2
		A	B	C	D	
1. Socio-economic Issues						
(1) Social Issues						
1	Planned residential settlement			X		Not applicable
2	Involuntary resettlement			X		Not applicable
3	Substantial changes in way of life			X		From the survey on similar projects.
4	Conflict among communities and peoples			X		From the survey on similar projects.
5	Impact on native peoples			X		From the survey on similar projects.
6	Others			X		None
(2) Demographic Issues						
1	Population increase			X		Careful design of road network in the area adjacent to the National Park is necessary.
2	Drastic change in population composition			X		
	Others				X	
(3) Economic Activities						
1	Changes in bases of economic activities			X		Not applicable
2	Occupational change and loss of job opportunity			X		Not applicable
3	Increase in income disparities			X		Not applicable
4	Other				X	Farmers Intentions need to be confirmed.
(4) Institutional and Custom Related Issues						
1	Adjustment & regulation of water or fishing (reparian) rights			X		There is no clear water use right.
2	Changes in social and institutional structures			X		Not applicable
3	Changes in existing institutions and customs			X		Not applicable
4	Others				X	Study concerning RICS is necessary.
2. Health and Sanitary Issues						
1	Increase use of agrochemicals				X	Further study is necessary .
2	Outbreak of endemic diseases			X		No SEI is foreseen for the project.
3	Spreading of epidemic diseases			X		No SEI is foreseen for the project.
4	Residual toxicity of agrochemicals			X		The project does not change application pattern of pesticides.
5	Increase in domestic and other human wastes			X		Not anticipated
6	Other			X		None
3. Cultural Asset Issues						
1	Impairment of historic remains and cultural assets			X		Distribution of the sites was identified and careful consideration will be given to the assets.
2	Damage to aesthetic sites			X		
3	Impairment of buried assets			X		None
4	Others			X		None

*1: Applicable columns with the following impact degree are marked with "X".

A: The Subject SEI is unquestionably induced by the Project.

B: The subject SEI is likely to be induced by the Project.

C: There is no possibility of the SEI being induced by the Project.

D: The SEI is not fully known.

**THE STUDY ON INTEGRATED AGRICULTURAL DEVELOPMENT PLAN
IN THE DONG THAP MUOI AREA VIET NAM FINAL REPORT**

II. Natural Environment

Category of Environmental Impact		Evaluation				Evaluation Basis
		A	B	C	D	
4. Biological and Ecological Issues						
1	Changes in vegetation			X		Not applicable
2	Negative impacts on important or indigenous fauna and flora				X	Habitat for Eastern Sarus Crane
3	Degradation of ecosystems with biological diversity				X	The National Park is rich in biological resources.
4	Proliferation of exotic and/or hazardous species			X		Not applicable
5	Destruction of wetlands and peatlands			X		The area of the National Park(wetland9 is excluded form the project area.
6	Encroachment into tropical rain forests and wild lands			X		Not applicable
7	Destruction or degeneration of mangrove forests			X		Not applicable
8	Degradation of coral reefs			X		Not applicable
9	Others			X		None
5. Soil and Land Resources						
(1) Soil Resources						
1	Soil erosion			X		Very gentle slope
2	Soil salinization			X		Not applicable
3	Deterioration of soil fertility				X	Impact of elevated dike height needs to be clarified.
4	Soil contamination by agrochemicals and others			X		The project does not change application pattern of pesticides. Thus the load of agrochemicals in an area of land will not be altered.
5	Others				X	Careful planning of construction work is required because acid sulphate soil is distributed.
(2) Land Resources						
1	Devastation or desertification of land			X		Not applicable
2	Devastation of hinterland			X		Not applicable
3	Ground subsidence			X		Drying of wetland may not occur.
4	Other			X		None
6. Hydrology and Water Quality and Air						
(1) Hydrology						
1	Changes in surface water hydrology		X			Construction of dike may cause elevated water level.
2	Changes in groundwater hydrology			X		Not applicable
3	Inundation and flooding		X			Poor water management may induce raised water level.
4	Sedimentation			X		Substantial change in sediment load would not be altered by the project.
5	Riverbed degradation			X		
6	Impediment of inland navigation			X		Construction of bridges needs to be carefully designed.
7	Others			X		None
(2) Water Quality and Temperature						
1	Water contamination and deterioration of water quality				X	Release of sulphate may take place if pyrite layer is oxidized. Contamination by agrochemicals if use of them increases.
2	Water eutrophication			X		
3	Sea water intrusion			X		Gate are installed to prevent sea water intrusion.
4	Changes in temperature of water			X		Not applicable.
5	Other			X		Acidification of water may be induced.
(3) Atmosphere						
1	Air pollution			X		Ariel application of pesticides will not be introduced in the short and long run.
2	Other			X		None
7. Landscape and Mining Resources						
1	Damage to Landscape			X		Not applicable
2	Impediment of mining resources exploration			X		Not applicable

Definition of Environmental Impact Categories

I. Social Environment

Category	Definition
(1) Socio-economic issues	
(1)-1 Social issues	
1. Planned residential settlement	(1) New land settlement implemented in agricultural and rural development projects such as land clearing and leveling, sea/swamp reclamation and irrigation development. (2) New land settlement exemplified by the estate project approach with settlement schemes for nomad, landless farmers or shifting cultivator
2. Involuntary resettlement	Forced resettlement to move inhabitants away from their original dwelling places in area that will be inundated as part of development projects Change in the way of life of the affected people, and in particular changes in the role of women in family and society brought about by agricultural and rural development
3. Substantial changes in way of life	Friction due to conflicting interests between beneficiaries and non-beneficiaries, people in favor of and those against development, new settlers and host people, people involved in development and outsiders, people in a project area and those affected in the surrounded area
4. Conflict among communities and peoples	Adverse effects of development on local communities composed partly or entirely of indigenous peoples (including tribal groups), low-caste groups, ethnic minorities, or nomads
5. Impact on native peoples	
(1)-2 Demographic issues	
6. Population increase	Significant population increase in a project or surrounding area due to development
7. Drastic change in population composition	Drastic change in population composition in a project or surrounding area due to development
(1)-3 Economic activities	
8. Changes in bases of economic activities	Forced or involuntary relocation of economic bases or means such as farmland, fishing grounds, etc., under a project due to land acquisition, changes in land use regulation, and deterioration or depletion of bases or means for economic activities
9. Occupational change and loss of job opportunity	Forced or involuntary occupational change due to land acquisition and loss or deterioration of means or bases of economic activities ; it includes loss of job opportunities due to farm mechanization
10. Increase in income disparities	Increase in income disparities among groups brought about by development ; it implies relative impoverishment of the economically weak

I. Social Environment (continued)

Category	Definition
(1)-4 Institutional and custom related issues	
11. Adjustment and regulation of water or fishing (riparian) rights	Adverse development effects on water or fishing (riparian) rights and necessary adjustments or regulations to rectify the same
12. Changes in social and institutional structure	Changes in social and institutional structures as a result of establishment of new, or modification of existing, rural organizations caused by development
13. Changes in existing institutions and customs	Changes in existing institutions and customs involved in or induced by development activities
(2) Health and sanitary issues	
14. Increases use of agrochemicals	Increases use of chemical pesticides due to intensification of agriculture ; introduction of high-yielding varieties and new crops and irrigation development
15. Outbreak of endemic diseases	Spreading of endemic diseases as a result of the adverse effects of development
16. Spreading of epidemic diseases	Spreading of epidemic diseases attributable to the adverse effects of development
17. Residual toxicity of agrochemicals	Accumulation in the natural environment (soil, water, etc.) of agrochemicals or chemical substances with high residual toxicity such as organo-chloric insecticides, etc.
18. Increase in domestic and other human wastes	Increase in domestic and other human wastes due to the consequences of development such as population increase
(3) Cultural asset issues	
19. Impairment of historic remains and cultural assets	Direct or indirect impairment or destruction of sites, structures, and remains of archaeological, historical, religious, cultural, or aesthetic value as result of development
20. Damage to aesthetic sites	Direct or indirect negative effects on aesthetic features as a result of development
21. Impairment of buried assets	Impairment or destruction of buried assets due to development activities

II. Natural Environment

Categories	Definition
(4) Biological and ecological issues	
22. Changes in vegetation	Direct or indirect deterioration or degradation of vegetation due to development activities including removal of vegetation cover, alteration of land use, encroachment on forest, alteration of environmental conditions, etc.
23. Negative impacts on important or indigenous fauna and flora	Adverse effects on important or indigenous animal and plant species due to destruction of or changes in habitats
24. Degradation of ecosystems with biological diversity	Degradation of ecosystems with biological diversity refers to the varieties of biological resources and living organisms. Biological diversity is the characteristics of wild species and natural ecosystems that allow them to withstand external stress
25. Proliferation of exotic and/or hazardous species	Introduction of pathogenic agents or spreading of hazardous species due to creation of environment condition to their propagation
26. Destruction of wetlands and peatlands	Extinction of wetlands or peatlands due to direct destruction caused by development activities such as large-scale earth filling ; or extinction due to indirect effects such as drying and decomposition due to changes in hydrological regime
27. Encroachment into tropical rain forests and wild lands	Decrease or disappearance of tropical rain forests due to direct and indirect effects of development
28. Destruction or degradation of mangrove forests	Disappearance of mangrove forests attributable to direct destruction or deterioration of supporting environmental conditions
29. Degradation of coral reefs	Encroachment due to direct destruction, or damage to and deterioration of the supporting environment caused by sedimentation, etc.
(5) Soil and land resources	
(5)-1 Soil resources	
30. Soil erosion	Washing or blowing away of soil from the earth surface by the action of water or wind
31. Soil salinization	Phenomena in which soluble salts accumulate in the surface layer of soils and crop growth is consequently adversely affected
32. Deterioration of soil fertility	Deterioration of soil productivity due to leaching and decomposition of nutrients, nutrient absorption by plants, surface soil erosion, salinization, failure in soil management, etc.
33. Soil contamination by agro-chemicals and others	Accumulation of agrochemicals in soil with high residual toxicity

II. Natural Environment (continued)

Category	Definition
(5)-2 Land resources	
34. Devastation or desertification of land	Deterioration of land productivity or desertification caused by artificial or natural impacts
35. Devastation of hinterland	Devastation of area surrounding a project area as a result of secondary or indirect impacts of development
36. Ground subsidence	Settlement of ground caused by the dehydration or drying of wetlands, peat swamps, or reclamation lands, or excessive exploitation of groundwater
(6) Hydrology, water quality and air	
(6)-1 Hydrology	
37. Change in surface water hydrology	Alternation of river discharge or water level as the effects of reservoir construction, irrigation water intake, or drainage
38. Change in groundwater hydrology	Change in groundwater recharge mechanism or groundwater table caused by infiltration of irrigated water and exploitation of groundwater
39. Inundation and flooding	Overflowing of a river onto the surrounding land or the surfing of sea water on to the coastal land. Inundation or flooding are caused by increased river or run-off discharge or poor water management
40. Sedimentation	Settlement of transported sediment in rivers, estuaries, and reservoirs
41. Riverbed degradation	Degradation of riverbeds in lower basin areas due to insufficient sediment load to maintain riverbed level
42. Impediment of inland navigation	Adverse impacts on navigation due to development activity
(6)-2 Water quality and temperature	
43. Water contamination and deterioration of water quality	Deterioration of water quality due to development activities
44. Water eutrophication	Accumulation in water of nutritive soluble salts such as nitrate and phosphate
45. Sea water intrusion	
46. Change in temperature of water	Intrusion of a salt water wedge along a riverbed
Adverse impact of low irrigation water temperature on crops	
(6)-3 Atmosphere	
47. Air pollution	Diffusion of agrochemicals and sand dust and odoriferous particles such as exhaust from vehicles and machinery into the air

L.3 Relevant data and Information

L.3.1.1 List of International Conventions to which Vietnam is a party

List of the International Conventions to which Viet Nam is a party (1)

Date Entered into	Date of Signature	Title
29-AUG-91		International Convention for the Prevention of Pollution from Ships as modified by the Protocol of 1978
		International Convention for the Prevention of Pollution from Ships (MARPOL)
02-JUL-56		Plant Protection Agreement for the Asia and Pacific Region
	01-OCT-63	Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water
20-APR-94		Convention on International Trade in Endangered Species of Wild Fauna and Flora
26-MAY-65		International Convention for the Safety of Life at Sea
19-JAN-88		Convention concerning the Protection of the World Cultural and Natural Heritage
20-JAN-89		Convention on Wetlands of International Importance especially as Waterfowl Habitat
16-NOV-94	10-DEC-82	United Nations Convention on the Law of the Sea
26-APR-94		Convention for the Protection of the Ozone Layer
26-APR-94		Protocol on Substances that deplete the Ozone Layer
11-JUN-95		Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
26-APR-94		Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer
11-JAN-90		Agreement for the Establishment of the Network of Aquaculture Centres in Asia and the Pacific
14-FEB-95	11-JUN-92	Framework Convention on Climate Change
14-FEB-95	28-MAY-93	Convention on Biological Diversity
14-JUN-94		Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer
28-JUL-96		Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982
18-DEC-90		Convention on the International Regulations for Preventing
12-JAN-93		Protocol relating to the International Convention for the Safety of Life at Sea (SOLAS Prot.)
18-MAR-91		International Convention for the Safety of Life at Sea (SOLAS)
24-DEC-82		International Covenant on Civil and Political Rights
26-AUG-80		Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques
24-DEC-82		International Covenant on Economic, Social and Cultural Rights
02-NOV-53		Convention on Road Traffic
22-FEB-51		International Agreement for the Creation of an International Office for dealing with Contagious Diseases of Animals at Paris
26-OCT-80		Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of
02-JUL-76	12-JUL-76	Agreement of the International Bank for Reconstruction and
20-JUN-80	27-JAN-67	Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other
14-JUN-82		Treaty on the Non Proliferation of Nuclear Weapons
	22-MAY-68	Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects launched into Outer Space
20-JUN-80		Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil thereof
20-JUN-80	10-APR-72	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction
06-JUL-51	06-JUL-51	Constitution of the United Nations Educational, Scientific and Cultural Organization
20-MAY-83		Constitution of the International Labour Organisation

List of the International Conventions to which Viet Nam is a party (2)

Date Entered into	Date of Signature	Title
24-SEP-57		Statute of the International Atomic Energy Agency
12-APR-80		Convention on International Civil Aviation Annex 16 Aircraft Noise
16-AUG-76		Convention of the World Meteorological Organization
20-SEP-77		Charter of the United Nations
12-JUN-84		Convention on the International Maritime Organization
26-MAR-56		Agreement concerning the organization of a Joint Institute for Nuclear Research
22-SEP-66	28-JAN-66	Agreement establishing the Asian Development Bank
22-OCT-75	22-OCT-75	Constitution of the World Health Organization
11-NOV-50		Constitution of the Food and Agriculture Organization of the United Nations
24-SEP-60		Articles of Agreement of the International Development Association
03-JAN-51		Agreement for the Establishment of the Asia Pacific Fishery Commission
26-JAN-68		Agreement establishing the Southeast Asian Fisheries Development Center
07-AUG-72		Statutes of the International Centre for the Study of the Preservation and Restoration of Cultural Property
18-MAR-91		International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
30-OCT-87		Convention on Early Notification of a Nuclear Accident
30-OCT-87		Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency
19-APR-82	12-DEC-77	Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Protocol I)
20-APR-94		Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (art.XI)
	13-JAN-93	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and their Destruction
19-JUL-85	16-JUN-81	Constitution of the United Nations Industrial Development Organization
05-APR-95	05-APR-95	Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin
	15-DEC-95	Treaty on the Southeast Asia Nuclear Weapon Free
	15-DEC-95	Protocol to the Treaty on Southeast Asia Nuclear Weapon Free Zone

Treaty status information downloaded from IUCN homepage and last updated as of "0

L.3.1.2 NGOs in the field of Environmental Protection

1. THE WORLD CONSERVATION UNION (IUCN)

The world Conservation Union is one of the world's largest international conservation organizations with its headquarter in Switzerland. It was originally established in France as the "International Union for the Protection of Nature" "IUPN" in 1948. It advises and assists governments, organizations and local communities in devising conservation strategies and in their implementation. The activities include helping to save endangered animal and plant species, the creation of national parks and other kinds of protected areas; and assessing the status of ecosystems.

In Viet Nam, IUCN, having its representative office in Hanoi, has been actively working under the following objectives and strategy.

- To assist Vietnam in developing an agenda of priorities for conservation and development
- To provide government economic procedures and community initiatives with scientific and institutional support
- To establish and demonstrate the linkages between environmental management and economic development
- To collaborate with key donors and international organizations in developing environmentally sound support programmers and strategies for financial and technical assistance

The followings are the major initiatives that have been taken,

- Development of the Vietnam Biodiversity Action Plan and National Plan for Environment and Sustainable Development
- Technical advices on biodiversity conservation, natural resource management and environmental law for the Ministry of Science Technology and Environment
- Non-timber forest products development
- Support to Local Environmental Initiatives Committee (LEIC)

2. WWF (the World Wildlife Fund)

WWF was the first international non-governmental conservation organization to work in Vietnam. Its involvement dates back to 1985. Together with IUCN, the organization helped to develop a National Conservation Strategy for Vietnam. A draft version was published in 1986 and endorsed by the Prime Minister.

In 1991, the organization decided to expand its activities in Vietnam and an office was set up in Hanoi. Headed by a country representative, the office coordinates the growing portfolio of WWF projects in the country, establishes relations with the various government agencies and local research institutes involved in nature conservation, and facilitates provision of funds and technical expertise. It also scouts for new initiatives in the other three countries in the Indochina biogeographic region - Cambodia, Laos, and Myanmar.

The strategies of WWFs for its Vietnam program are

- to help the government to develop a functional network of well-managed protected areas,
- to attain sustainable resource use,
- to minimize the negative environmental impacts of economic development,
- to promote conservation awareness, and
- to build local expertise in nature conservation.

3. The International Crane Foundation (ICF)

The International Crane Foundation (ICF) works worldwide to conserve cranes and the wetland and grasslands communities on which they depend.

ICF is dedicated to providing experience, knowledge, and inspiration to involve people in resolving threats to these ecosystems. To accomplish this mission, the International Crane Foundation relies on a wide range of education and conservation activities directed toward many countries where cranes inhabit. ICF is concerned with habitat protection and restoration. Cranes are excellent indicators of the health of wetland and grassland ecosystems worldwide. ICF strives to alert scientists, government officials, and the public to the dependence of cranes on their habitats, the causes and remedies for habitat destruction, and the importance of wetlands and grasslands for both wildlife and people.

ICF supports research, serving primarily as a catalyst for research, by making available its facilities and bird collection to scientists, by sponsoring workshops and publications, and by fostering a network among conservationists, biologists, and managers around the world.

Habitat protection and restoration are other important factors in preserving crane populations, thus it assists governments and biologists in preserving wetlands and grasslands where cranes were found.

In respect to the Study Area, ICF has involved in preservation of the Tram Chim National Reserve. Since 1987, ICF biologists have helped the Vietnamese develop restoration and management plans for the National Reserve. During the dry season, this reserve hosts all of the known Sarus Cranes in Southeast Asia, and is an important migratory stopover for many other birds.

**L.3.1.3 Report on Assessment of “New Economic Zone Program” (773/Ttg)
Final, Purpose and Planning for the Year 2010**

The new economic zone program, initiated in 1992, has been implemented aiming at economic development by means of investment in infrastructure in the area of wasteland converting the area to agricultural land, then resettlement of farmers residing outside of the area, creating employment opportunities.

Ownership of wasteland inside the zone is transferred from the communal government to farmers who wish to settle in the zone.

The financial sources of the programs are from farmers, provincial and central government.

- The central government is responsible for infrastructure investment.
- Provincial government is responsible for water resources development.
- Farmers are responsible for land reclamation.

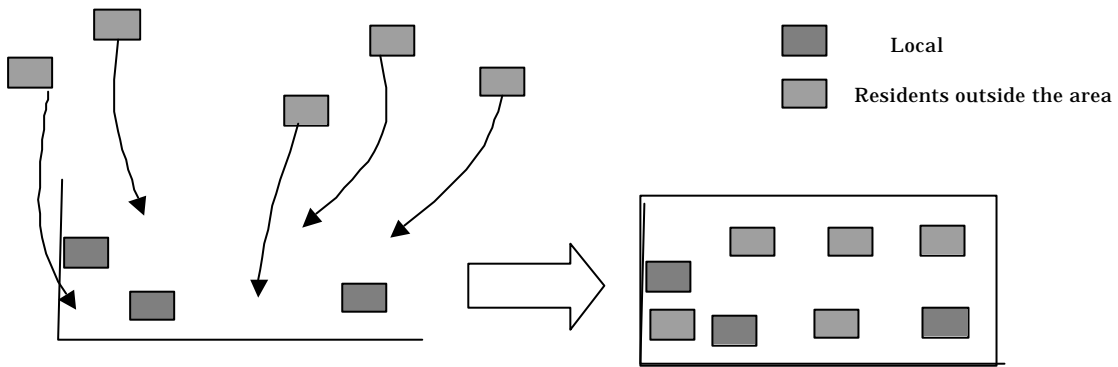
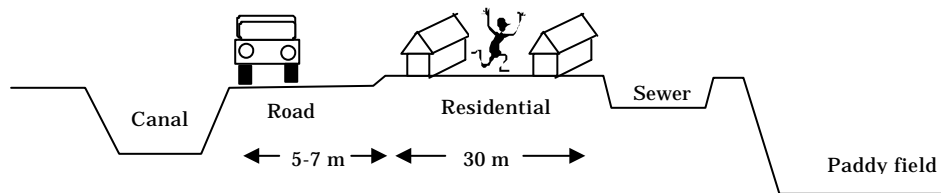


Figure Resettlement in the new economic zone program

The following figure schematically depicts the model design of the new economic zone.



Model Design of New Economic Zone

- 3 programs were implemented in Tan Hong, Tam Nong, Thanh Binh, Cao Lanh and Thap Muoi
- As of 1995, Dong Thap Province had 23,683 ha of wasteland.

Project assessment 1991 – 1999

Land reclamation

An area of 13,565 ha was reclaimed and converted to double cropping cultivation by the year 1998. Annual rate of reclamation declined because;

- The remaining wasteland is more scattered.
- Local residents lack capital to cover the expenses for reclamation.
- Reclamation requires a larger amount of investment capital because of the poor properties of the land (mainly due to the acidity of the land).

Resettlement

Resettlement component also faces some difficulty recently.

- Wasteland became scarce, while number of farmers who wish to resettle is steady.
- Some settlers quitted farming and shifted to trading business because of poor fertility of the allocated land.

At the beginning of the project, some farmers resided outside the zone and moved to the zone for cultivation, then they started to move inside the zone.

Infrastructure investment

127 construction works have been implemented including;

- 19 schools
- 4 health care stations
- 8 wells
- 27 bridges
- 34 sluice gates
- water resource developments
- road construction

Economy and life

Cultivated land area expanded.

Annual income of farm household increased from 3million VND/ha /household in 1996 to 6million VND/household in 1998.

Farmers don't have income source for 98 – 144 days a year.

Each village has one school, health care station, and electricity.

Transportation conditions were improved.

Land accumulation poses a problem, which, in other words, means some farmers need to sell their allocated land. Some farmers own lands with an area of 100 ha.

There is an argument (conflict) over land ownership among successors.

Some farmers fail to earn enough money by farming to cover the household expenses. In such a situation they need to sell their land and maintain their living standard by selling their labor force.

District communes try to settle the matter by providing loan to the farmers.

*THE STUDY ON INTEGRATED AGRICULTURAL DEVELOPMENT PLAN
IN THE DONG THAP MUOI AREA VIET NAM FINAL REPORT*

Plan for the period from 2000 to 2010

Reclaim the remaining wasteland in Tan Cong Sinh, Hoa Binh, Thanh Hoi and Phu Thanh B.

Table 1 Budget for Resettlement program

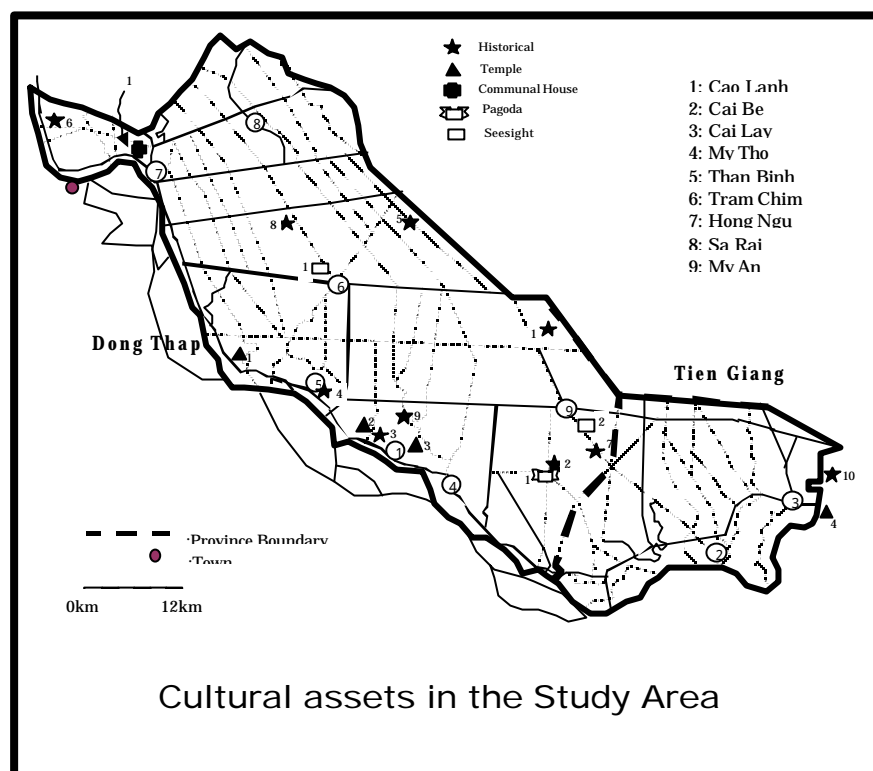
	Plan	1991-1998	1999	2000	2001 - 2010
Total	104,787	25,149	5,094	12,800	61,744
I Resttlement	17,208	6,160	1,094	2,800	7,154
II Infrastructure	87,579	18,989	4,000	10,000	54,590
1 Water Supply	3,850	76	42	200	3,531
2 Medical	1,800	340		500	960
3 Education	2,664	1,921	310	433	
4 Water resources	36,308	3,954	1,665	4,717	24,879
5 Transportation	39,567	3,254			21,355
6 Bridges		2,906	184		
7 Embankment		6,160	1,709	4,000	
8 Sluice		793	77		
9 Electricity	3,390		89	150	3,151

Unit: million VND

Table 2 Achievement and Plan of Resettlement program

	Plan	Achievements 1991-1999								Plan 2000-2010					
		1991-1999		1996-1998		1999		2000		2001-2005		2006-2010			
		H/H	H/H	H/H	Heads	H/H	Heads	H/H	Heads	H/H	H/H	Heads	H/H	Heads	
Total	13.133	3.898	2.750	12.374	1.913	9.085	1.048	4.925	11.151	3.516	16.282	6.200	26.000	1.435	7.175
I Program I	1.254	646	514	2.421	66	296	66	349	608	300	1.500	308	1.540		
II Program II	4.273	1.604	824	3.638	686	3.203	99	432	2.669	500	2.500	1.369	6.845	800	4.000
Outside the Province			210	821	111	413			0						
III Program III	3.806	1.648	1.202	5.494	403	2.017	41	185	2.158	200	1.000	1.323	6.615	635	3.175
IV Program IV	3.800								3.800	600	3.000	3.200	11.000		
V Di dan sat					647	3.156	842	3.959	1.916	1.916	8.282				

L.3.1.4 Cultural Assets in the Study Area



Cultural Assets in the Study Area

Historical Vestige ★	
1	Go Thap, My Hoa Tan Kieu in Thap Muoi District Phu Nam Archeological Site(IV– VIII century)
2	Xeo Quy, My Hiep, My Long inn Cao Lanh district Revolutionary base in the Vietnam-U.S.war 1959
3	Nguyen Sinh Sac Grave, Cao Lanh town, Patriot Confucian, Ho Chi Minh’s Father
4	Mass Murder, Binh Thanh 1954, Than Binh District, Quisling troops killed 30 farmers
5	Bx1, Arms workshop, Hung Thanh, Thap Muoi District, 1947-1950
Temple ▲	
1	Tran Ngoc General Temple (1987), Tan Thanh, Than Binh District Rebuild in 1965
Communal House ⊕	
1	Thuong Lac communal house, 1847-1852, Thuonc Lac, Hong Ngu District, Rebuilt in 1955
Pagoda 🗽	
1	Buu lamtu pagoda, Binh Hang Trang, Cao Lanh District, Built in Middle of XVII century
Sightseeing □	
1	Tram Chim National Park, Tram Chim
2	My An Stork Park, My An, Thap Muoi district, 5ha, 30,000 storks

L.3.1.5 List of Parks and Reserves in Viet Nam

List of Parks and Reserves in Vietnam Part 1

Protected area (province)	Category	Location	Elevation (m)	Area ha	Proposed Extension	Buffer ha
Cat Ba (Hai Phong)	II	20° 48'N 107°	0-300	15,200		4,000
Do Son (Hai Phong)	HCR	20°40'N 106°48'E	0-10	267		
Phong Quang (Ha Giang)	IV	22°50'N 104°55'E	900-2600	20,000		
Tay Con Linh (Ha Giang)		22°50'N 104°45'E		30,000		
Bac Son (Cao Bang)	IV	21°53'N 106°25'E	500-900	4,000		
Nui Pia Hoac (Cao Bang)	IV	22°36'N 105°52'E	900-1900	10,000		
Pac Bo (Cao Bang)	HCR	22°58'N 106°03'E	700-800	3,000		
Trung Khanh (Cao Bang)	IV	27°36'N 106°30'E	600-900	3,000		10,000
Muong Nhe, Muong Cha (Lai Chau)	IV	22°16'N 102°28'E	500-2000	180,000	390,000	100,000
Muong Phang (Lai Chau)	HCR	21°25'N 103°00'E	520-550	1,000		
Hoang Lien Son (Lao Cai)	IV	22°15'N 103°48'E	1000-	29,845	50,000	20,000
Chiem Hoa Na Hang (Tuyen Quang)	IV	22°20'N 105°23'E	500-1509	20,000		
Na Hang (Tuyen Quang)		22°16'N 105°22'E		21,000		
Tan Trao (Tuyen Quang)	HCR	21°43'N 105°30'E	150-800	1,081		
Ai Chi Lang (Lang Son)	HCR	21°38'N 106°40'E	220-400	1,000		
Huu Lien (Lang Son)	IV	21°40'N 106°20'E	200-300	10,640	20,000	5,000
Ba Be (Bac Thai)	II	22°24'N 105°37'E	250-1000	7,610	50,000	2,000
Ho Nui Coc (Bac Thai)	HCR	21°35'N 105°42'E	150-250	6,000		
Khu Dao Thac Ba (Yen Bai)	IV	21°53'N 104°50'E	150-170	5,000		
Nam Don (Son La)	IV	21°40'N 103°45'E	600-1300	18,000		
Nui Ba Ra (Song Be)	HCR	11°40'N 107°10'E	250-260	940		
Sop Cop (Son La)	IV	20°42'N 103°42'E	900-1845	5,000		
Tay Cat Tien - Cat Loc Rhinoceros Reserve (Song Be)	IV	11°32'N 107°12'E	150-450	10,000		
Xuan Nha (Son La)	IV	20°41'N 104°43'E	600-1500	60,000		
Den Hung (Vinh Phu)	HCR	21°20'N 105°20'E	100-250	285		
Nui Tam Dao (Vinh Phu)	IV	21°35'N 105°39'E	100-800	19,000	36,883	10,000
Xuan Son (Vinh Phu)	IV	21°00'N 105°06'E	150-450	4,585		
Ba Mun (Quang Ninh)	IV	21°04'N 107°32'E	0-100	1,800		
Bai Chay (Quang Ninh)	HCR	21°00'N 107°00'E	300-3100	582		
Cac Dao Vinh Ha Long (Quang Ninh)	HCR	20°52'N 107°10'E	0-60	1,000		
Ha Long Bay (Quang Ninh)	VIII	20°50'N 107°10'E		150,000		
Nui Yen Tu (Quang Ninh)	IV	21°10'N 106°40'E	299-800	5,000		
Ho Cam Son (Ha Bac)	HCR	21°33'N 106°35'E	15-250	5,000		
Ba Vi (Ha Tay)	II	21°25'N 105°30'E	400-1500	7,200		4,000
Con Son-Kiep Bac (Hai Hung)	HCR	21°10'N 106°20'E	150-300	1,477		
Chua Huong Tich (Hoa Binh)	HCR	20°42'N 105°40'E	150-400	2,900		
Dao Ho Song Da (Hoa Binh)	HCR	20°47'N 105°12'E	450-500	3,000		
Pa Co Hang Kia (Hoa Binh)	IV	20°42'N 104°56'E	200-450	1,000		
Thuong Tien (Hoa Binh)	IV	20°40'N 105°26'E	150-400	1,500		
Xuan Thuy - Red River Estuary (Nam Ha)	migratory bird reserve	20°10'N 106°20'E	0-10	12,000		
Ben En (Thanh Hoa)	II	19°36'N 105°30'E	100-1000	16,634	50,000	5,000
Den Ba Trieu (Thanh Hoa)	HCR	19°55'N 105°50'E	130-260	300		
Hon Me (Thanh Hoa)	IV	19°22'N 105°55'E	0-60	500		
Lam Son (Thanh Hoa)	HCR	10°58'N 105°25'E	130-260	300		
Ngoc Trao (Thanh Hoa)	HCR	20°10'N 105°35'E	150-350	300		
Tam Quy (Thanh Hoa)	IV	20°00'N 105°50'E	30-200	350		

List of Parks and Reserves in Vietnam Part 2

Protected area (province)	Category	Location	Elevation (m)	Area ha	Proposed Extension	Buffer ha
Cuc Phuong (Ninh Binh)	II	20°19'N 105°22'E	200-637	22,500		5,000
Anh Son (Nghe An)	IV	18°50'N 105°05'E	130-140	1,500		
Bu Huong (Nghe An)	IV	19°42'N 104°45'E	900-2500	5,000		
Cao Veu (Nghe An)		19°32'N 104°20'E		100,000		
Khe Thoi (Nghe An)		19°50'N 104°50'E		100,000		
Pu Mat (Nghe An)	IV	19°10'N 104°10'E		-93,500		20,000
Thanh Thuy (Nghe An)	IV	18°40'N 105°15'E	150-1000	7,000		
Ho Ke Go (Ha Tinh)		18°10'N 105°50'E		20,000		10,000
Vu Quang (Ha Tinh)	IV	18°15'N 105°22'E	300-700	16,000	60,000	15,000
Dong Phong Nha (Quang Binh)	IV	17°50'N 105°52'E	300-1100	2,000	41,132	5,000
Bach Ma (Thua Thien - Hue)	II	16°12'N 107°58'E	300-1500	22,500	87,000	20,000
Ba Na Nui Chua (Quang Nam - Da Nang)	IV	16°00'N 108°00'E	300-1500	5,217		
Ban Dao Son Tra (Quang Nam - Da Nang)	IV	16°09'N 108°16'E	0-500	4,439		
Cu Lao Cham (Quang Nam - Da Nang)	IV	15°58'N 108°30'E	0-500	1,535		
Ngu Hanh Son (Quang Nam - Da Nang)	HCR	15°58'N 105°15'E	120-450	400		
Nui Thanh (Quang Nam - Da Nang)	HCR	15°45'N 108°00'E	120-450	1,500		
Ba To (Quang Ngai)	HCR	14°50'N 108°42'E	100-300	500		
Mom Ray (Kon Tum)	IV	14°25'N 107°35'E	500-1780	45,000	80,000	5,000
Ngoc Linh (Kon Tum)	IV	15°06'N 107°57'E		20,000	50,000	5,000
Kon Cha Rang (Gia Lai)	IV	14°33'N 108°35'E	600-1200	16,000		2,000
Kon Kai Kinh (Gia Lai)	IV	14°19'N 108°22'E	600-1700	28,000	80,000	2,000
Deo Ca Hon Ron (Phu Yen)	HCR	12°55'N 109°25'E	300-700	10,000		
Suoi Trai (Phu Yen)	IV	13°05'N 108°50'E	150-300	28,000		
Chu Yang Sinh (Dak Lak)	IV	12°25'N 108°25'E	1000-	20,000	40,000	2,000
Ho Lac (Dak Lak)	HCR	12°15'N 108°12'E	300-350	10,000		
Nam Ca - see: Quang Xuyen (Dak Lak)	IV	12°25'N 108°00'E	300-900	24,550		5,000
Nam Lung (Dak Lak)	IV	12°16'N 107°45'E	500-1500	24,550		
Quang Xuyen - see: Nam Ca (Dak Lak)	IV	12°25'N 108°00'E	300-900	15,000		5,000
Tieu Tao-Easup (Dak Lak)		13°20'N 107°38'E		20,000		
Yok Don (Dak Lak)	II	12°46'N 107°40'E	150-520	58,200	100,000	5,000
Bao Loc - Blao High Pass (Lam Dong)		11°32'N 107°42'E		10,000		
Bi Dun (Lam Dong)		11°52'N 108°37'E	1000-			5,000
Cat Loc (Lam Dong)		11°42'N 107°27'E		30,000		
Deo Ngoan Muc (Lam Dong)	IV	11°50'N 107°45'E	500-1400	2,000		
Nui Ba (Lam Dong)		12°00'N 108°20'E		6,000		
Nui Ba - Lang Bian (Lam Dong)	IV	12°05'N 108°25'E	900-2150	6,000		
Nui Dai Binh (Lam Dong)	IV	11°25'N 107°47'E	500-1400	5,000		
Thuong Da Nhim (Lam Dong)	IV	11°52'N 108°37'E	1000-	25,000	40,000	5,000
Bu Gia Man (Song Be)	IV	12°08'N 107°10'E	500-900	22,300		
Rung Kho Phan Rang (Ninh Thuan)	IV	11°46'N 108°57'E	50-1500	1,000		
Chien Khu Boi Loi (Tay Ninh)	HCR	11°05'N 106°35'E	100-200	2,000		

List of Parks and Reserves in Vietnam

Protected area (province)	Category	Location	Elevation (m)	Area ha	Proposed Extension	Buffer ha
Duong Minh Chau (Tay Ninh)	HCR	11°17'N 106°20'E	100-200	5,000		
Lo Go Sa Mat (Tay Ninh)	IV	11°42'N 106°00'E	12-30	10,000		
Nui Ba Den (Tay Ninh)	HCR	11°22'N 106°10'E	100-960	2,000		
Bien Lac-Nui Ong - Tanh Linh (Binh Thuan)	IV	11°10'N 107°30'E	100-320	35,400		5,000
Kalon Song Mao (Binh Thuan)	IV	11°26'N 108°28'E	50-200	2,000		
Nam Cat Tien (Dong Nai)	II	10°56'N 107°20'E	100-200	37,900	80,000	10,000
Tram Chim (Dong Thap)	II	10°30'N 105°40'E	5-10	5,500		
Nui Cam Chau Doc (An)	IV	10°30'N 105°00'E	200-700	1,500		
Binh Chau Phuoc Buu (Ba Ria-Vung Tau)	IV	10°30'N 107°30'E	30-150	11,293		
Con Dao (Ba Ria-Vung Tau)	II	8°42'N 106°38'E	0-600	6,000	20,000	5,000
Hon Chong (Kien Giang)	HCR	10°10'N 104°37'E	30-150	3,000		
Phu Quoc (Kien Giang)	IV	10°20'N 104°00'E	0-550	5,000	14,500	5,000
Cac San Chim #1 (Minh Hai)	IV	08°55'N 105°15'E	0-10	300		
Cac San Chim #2 (Minh Hai)	IV	09°02'N 105°05'E	0-10	300		
Dat Mui - Nam Can (Minh Hai)	IV	08°35'S 104°46'E		4,460		
Minh Hai Melaleuca Forest (Minh Hai)	IV	9°19'N 105°05'E		163,000		
U Minh (Minh Hai)	IV	9°33'N 105°00'E	0-10	2,000		

II - national park, IV - reserve, HCR - Historical or cultural reserve, VIII - managed resources area
Information is taken from the Ministry of Agriculture and Rural Development of Vietnam, World Conservation Monitoring Centre and the draft Biodiversity Action Plan (December 1993).
THE AUSTRALIAN NATIONAL UNIVERSITY

L.3.1.6 WETLAND ECOSYSTEM IN THE STUDY AREA

Brief History of Tram Chim National Park

The Dong Thap Muoi area, in the pre-war era, was a vast depression with an area of 1.3 million hectares supporting tremendous diversity of fauna and flora with predominant vegetation of sedges (*Eleocharis ochrostachys*). The area was sparsely inhabited with only 110 thousands people in 1928.

However, the natural ecosystem of the area was extensively devastated during the Vietnamese War converting the wetlands to agricultural land by way of burning and draining the wetland. This led to immigration from other provinces to replace the Viet Cong force.

In the post-war era, expanded demand for food incurred further development of the area. The development efforts dealing with canal excavation disturbed the original hydrological regime.

The area of the present national reserve was originally delimited as a plantation zone for Melaleuca trees, on a commercial scale, with concomitant purposes of preservation of the site of a battle during the war and that of the last piece of wetland representative of the original vast expanse of fresh water tidal marsh.

The rediscovery of the Eastern Sarus Crane in middle of 1980's draw the world's attention to the area. The International Crane Foundation commenced its assistance to the Dong Thap Province in preservation of the cranes, as well as complex ecosystem of other fauna and flora that support the life of the cranes. The area was designated as a district-level reserve in 1986, and upgraded as a national reserve in 1994.

Plans to identify and protect 3-4 additional areas used by cranes during the dry season in the Plain of Reeds are progressing under the direction of the Institute of Forest Management and Planning in Vietnam's Ministry of Forestry.

Unique Biological Resources

The reserve is rich in biological diversity with unique bioresources. The Eastern Sarus Crane (*Grus antigone sharpii*) is, among others, of great importance in respect to its rarity.

Apart from the crane, the vegetation such as Melaleuca cajuputi and Eleocharis whose tuber is a main food of the crane are prevalent and freshwater fish, turtles, shrimp and snakes are important bioresources with economic values.

The Eastern Sarus Crane (*Grus antigone sharpii*)

Estimated Population: 500 to 1500

Distribution: Cambodia, Vietnam and Laos

IUCN Red List Category: Endangered under criteria Aac, d,e

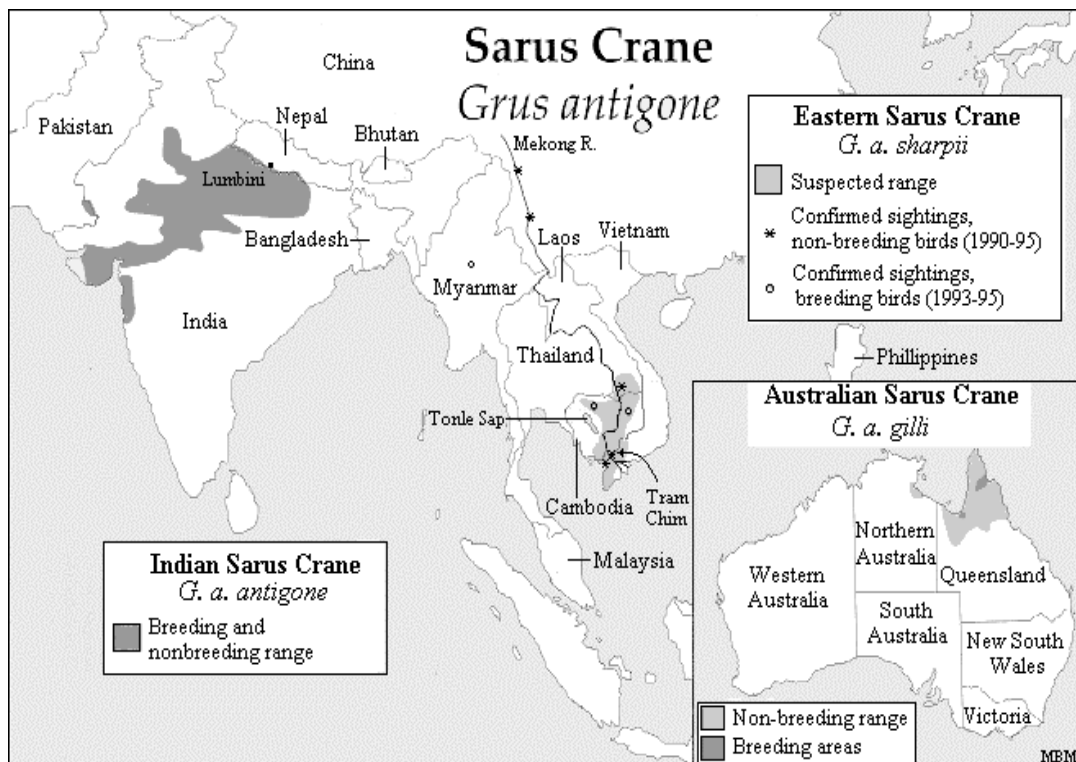
Meine *et al.* reports the status of the Eastern Sarus Crane. The BOX in the following page is the excerpt from the report.

The Eastern Sarus Crane (*Grus antigone sharpii*)

The Eastern Sarus Crane survives in Vietnam, Laos, and Cambodia (Duc 1991) throughout the Mekong River delta. It was presumed to have gone extinct in the area during the devastation of the Vietnamese War. However, in 1984, local officials in Vietnam reported that the species had reappeared. In 1986, ornithologists from the University of Hanoi confirmed that a flock had spent the dry season (December-April) on the Plain of Reeds. The flock was discovered in Vietnam at a 7500 ha impoundment, the Tram Chim wetland (Brehm Fund 1987, Duc 1987, Harris 1987, Duc et al. 1989). The exact location of this population's breeding grounds have yet to be determined, but Eastern Sarus Crane nests have recently been confirmed at three sites in northeastern Cambodia (Barzen 1994). Seasonal movements of the subspecies have not been well studied. They may entail distances of up to several hundred kilometers within the Mekong River basin (R. Beilfuss pers. comm.).

The Eastern Sarus Cranes breed during the monsoon season (May-October). Of three nests recently found in northeastern Cambodia, all were located in isolated wetlands less than 150 ha in size and surrounded by dry, open dipterocarp forests (Barzen 1994). As the dry season progresses, the birds gradually concentrate, form flocks, and move to their dry season habitats in the Mekong River delta.

Source: Meine, Curt D. and George W. Archibald (Eds), 1996. The Cranes: - Status Survey and Conservation Action Plan. IUCN, Gland, Switzerland, and Cambridge, U.K. 294pp. Northern Prairie Wildlife Research Center Home Page.
[Http://WWW.NPWRC.USGS.Gov/Resource/Distr/Birds/Cranes/Cranes.Htm](http://WWW.NPWRC.USGS.Gov/Resource/Distr/Birds/Cranes/Cranes.Htm)(Version 02mar98).

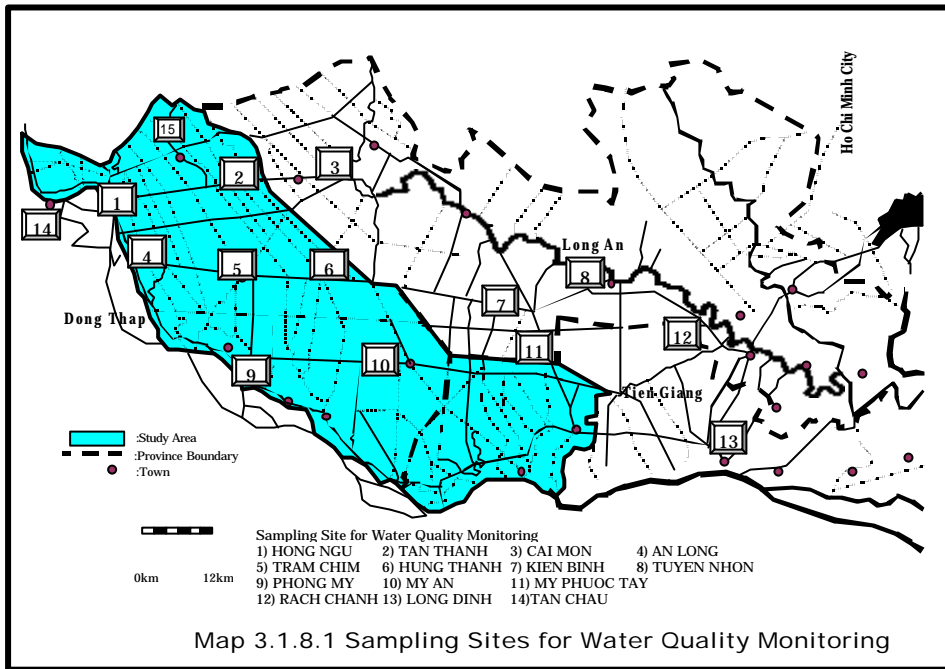


L.3.1.7 Threatened or endangered species found in the Tram Chim National Reserve

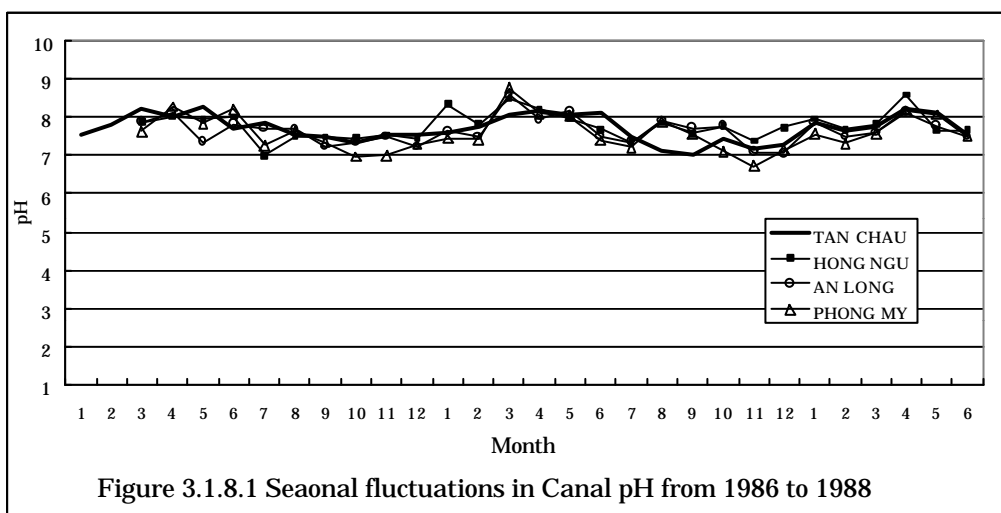
1	<u>Cairina scutulata</u> AVES ANSERIFORMES	<u>White-winged Duck</u>	Endangered
2	<i>Eupodotis bengalensis</i> AVES GRUIFORMES	Bengal Florican	Endangered
3	<u>Grus antigone sharpii</u>		Near Threatened
4	<i>Charadrius peronii</i>		Near Threatened
5	<i>Vanellus cinereus</i>		Near Threatened
6	<i>Aquila clanga</i>		Vulnerable
7	<i>Anhinga melanogaster</i>		Near Threatened
8	<i>Egretta eulophotes</i>		Endangered
9	<i>Ardea sumatrana</i>		Near Threatened
10	<i>Threskiornis melanocephalus</i>		Near Threatened
11	<i>Platalea minor</i> AVES CICONIIFORMES	Black-Faced Spoonbill	Critically Endangered
12	<i>Pelecanus philippensis</i> AVES PELECANIFORMES	Spot-billed Pelican	Endangered
13	<i>Mycteria leucocephala</i>		Near Threatened
14	<i>Anastomus oscitans</i>		Near Threatened
15	<i>Leptoptilos javanicus</i> AVES CICONIIFORMES	Lesser Adjutant	Vulnerable
16	<i>Leptoptilos dubius</i> AVES CICONIIFORMES	Greater Adjutant	Endangered

L.3.1.8 Influence of Acid Sulphate Soil to Water Quality

This part deals with surface water quality in and around the Study Area for Master Plan. Data presented here is based on the water quality monitoring work conducted since 1986 by SIWRP. The sampling sites for the monitoring are given below.

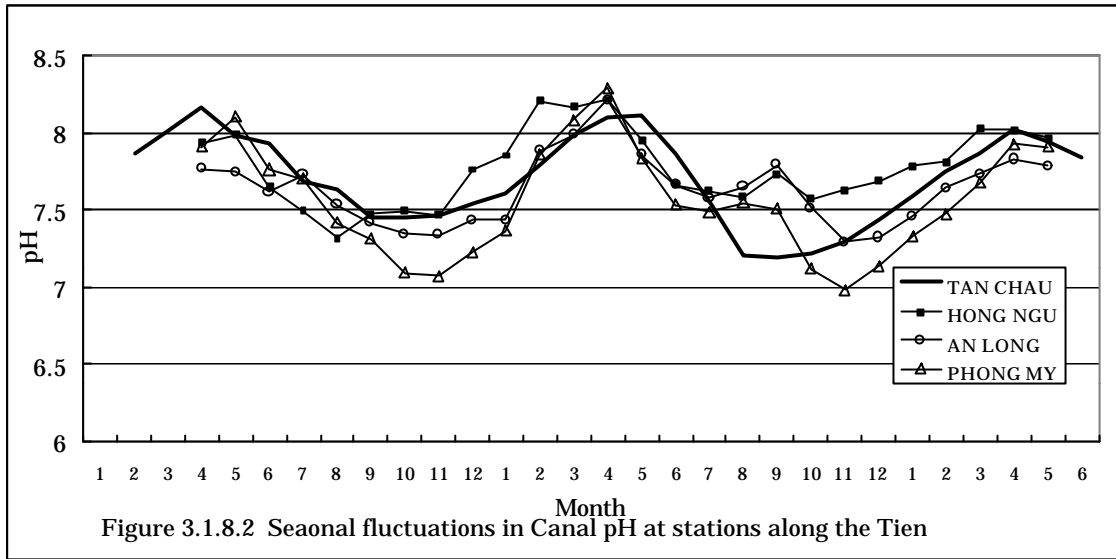


From the beginning of 1986 water quality was monitored regularly once every month for three year. Seasonal fluctuations in canal pH are given in Figure 1 to Figure 6.



At the stations along the Tien River, fluctuations in pH are fairly small in comparison with that of another stations. It is suggested from Figure 3.1.8.2, the same data in different span of y-axis, that pH of the Tien river become alkali during of dry seasons and tend to decline, but above 7, during flooding

seasons.



At another stations, pH of canals generally declines at the beginning of inundation season (June) when sulfate generated during non-inundation period is washed out.

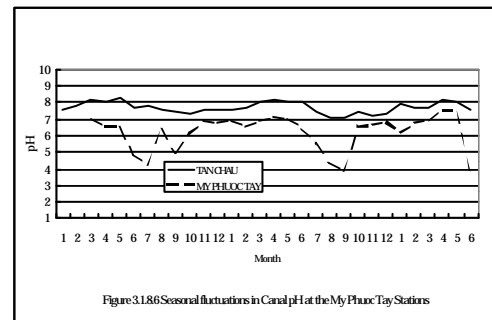
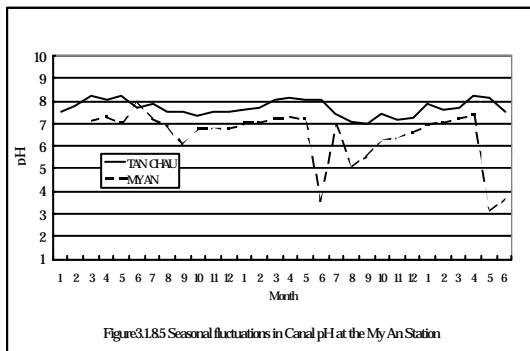
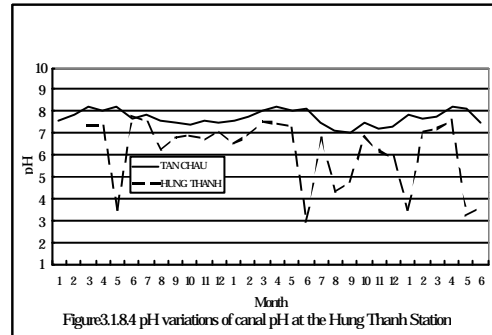
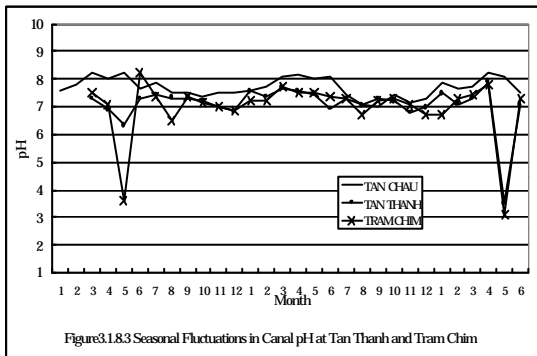


Figure 3.1.8.7 gives Isoline at pH 4 in June from 1986 to 1996. pH 4 is the threshold for rice growth and below pH 4 rice growth is inhibited. It goes without saying that pH of canal adjacent to the area influenced by acid sulfate soil poses severe acidity.

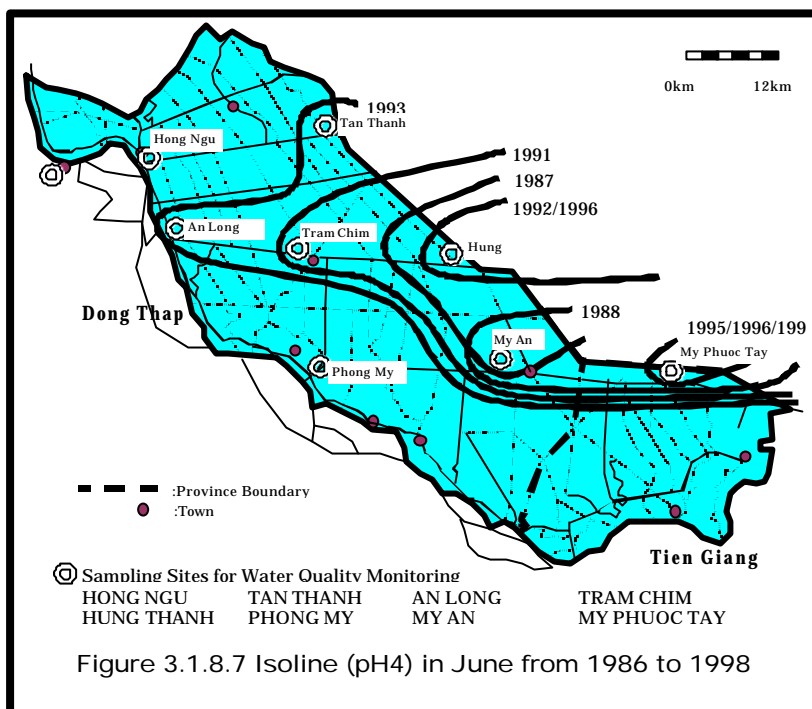
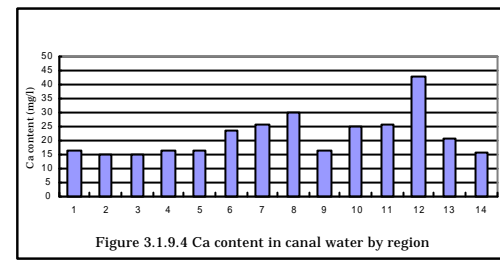
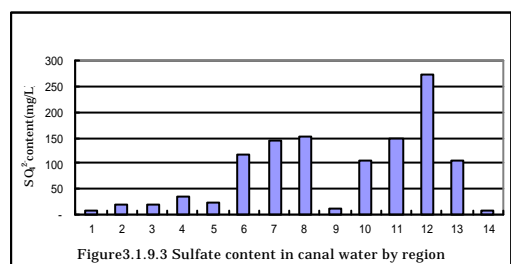
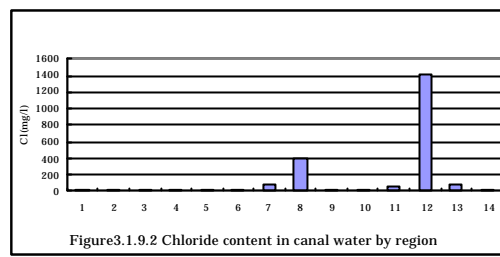
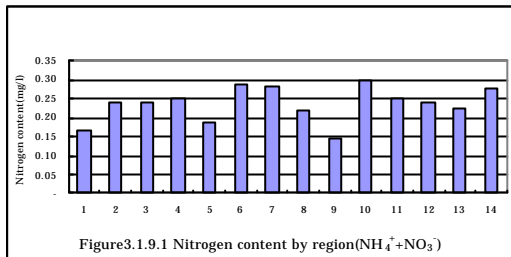


Table3.1.8.1 pH of Canal Water in June from 1986 to 1998

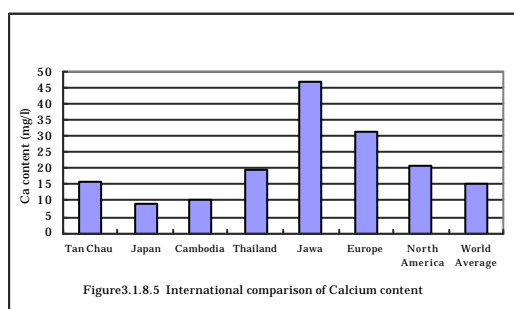
	1	2	3	4	5	6	7
Year	HONG NGU	TAN THANH	CAI MON	AN LONG	TRAM CHIM	HUNG THANH	KIEN BINH
1986	8.01	7.30	7.76	7.81	8.21	7.81	7.48
1987	7.68	6.93	7.16	7.49	7.38	2.96	
1988	7.66	7.05	7.07	7.47	7.30	3.58	4.07
1989	7.48	7.41	7.37	7.60	7.46	7.09	6.71
1990							
1991	7.61	7.06	6.86	7.48	3.37	3.01	3.05
1992	6.29	6.48	6.46	4.15	4.16	3.00	3.36
1993	4.46	3.62		3.86	3.83	3.17	3.29
1994	7.31	7.58	6.87	6.87	6.48	4.41	4.19
1995	7.50	6.85	6.78	7.54	7.06	7.01	3.37
1996	7.01	6.26	6.31	7.28	4.05	3.99	3.55
1997	7.24	7.22	7.07	7.56	7.31	7.20	3.22
1998	7.65	7.99	7.05	7.85	7.26	7.21	6.54
	8	9	10	11	12	13	14
Year	TUYEN NHON	PHONG MY	MY AN	MY PHUOC TAY	RACH CHANH	LONG DINH	TAN CHAU
1986	6.91	8.20	7.96	4.89	4.39	3.65	7.67
1987	3.71	7.37	3.60	6.46	5.20	5.21	8.09
1988	4.06	7.50	3.64	3.62	3.82	6.73	7.52
1989	6.65	7.57	6.76	3.53	3.57	7.13	7.68
1990							7.10
1991	3.05	7.10	3.13	3.56	3.49	6.14	7.91
1992	3.27	7.59	6.12	5.67	3.81	6.18	7.71
1993	3.44	4.63	3.45	4.49	3.07	6.47	7.78
1994	3.94	7.46	6.69	4.06	3.04	3.56	7.51
1995	3.49	7.50	3.64	3.87	3.47	3.35	7.15
1996	3.72	7.22	4.22	3.24	3.74	3.92	7.62
1997	3.22	7.14	6.61	3.49	3.37	3.68	7.32
1998	5.07	7.07	6.99	6.55	5.96	6.64	7.75

L.3.1.9 Water Quality in the Dong Thap Muoi Area

The following figures gives data on water quality of canal in the area. Sea water intrusion



is taking place in the area adjacent to the Vamco River, thus excessive water intake would result in further intrusion of sea water. However, the project does not induces further sea water intrusion because it does not include the component to induce excessive water intake. Variations in Ca content in canal water is supposed to occur by application of Ca as soil amendment. The following figure gives calcium content of the Tien River in comparison with the rivers in other countries.



L.3.2 Relevant information concerning the Environmental Regulations

L.3.2.1 The Contents of Report for the Preliminary Environmental Impact Assessment

I. Introduction

1. Objective of the Report
2. Document, Data Base of the report
3. Brief project decryption

II. Data of the Environmental Situation

Qualitative, quantitative assessment, in the case where there is no quantitative data then classing according to degree: Heavy, medium, light, unknown by each natural factors (water, soil, air...)

III. Environmental Impact Assessment during Project Implementation

General assessment according to the main factors:

1. Air
2. Water
3. Noise
4. Rock
5. Ecosystem
6. Solid waste
7. Historical landscape
8. Infrastructure
9. Transportation
10. Community Health's
11. Other factors.

IV. Conclusions and Recommendations

1. Conclusion on the Environmental Impact of the project.
2. Recommendation to the problems that need to have detail assessment.

L.3.2.2 Content for Detailed Environment Impact Assessment Report

I. Introduction

1. Objective of the Report
2. Document, Data Status of the Report
3. Selection of the Assessment Method
4. Organization, members, method and the process used in preparing report

II. Brief Description of the Report

1. Name of the project.
2. Name of the Holder, the agency implement the setting up feasibility study or documents equivalent to the project value.
3. Socio-economic objective, the political significant of the project.
4. The main contents of the project. The socio-economic benefit that project can provide.
5. Project progress, plan for project exploitation.
6. Project cost, cost process.

III. Environmental Status at the Project Location

1. General description of the geographical, socio-economic conditions related to the project location.
2. Forecast of the conditions if the project is not implemented.

IV. Impact of the Project Implementation to the Environmental and Natural Resources Factors

1. Description of the Impact to the project implementation to each Environmental factor at the project locations.

Presenting the characteristics, degrees, and occurrences at each time of the impact. Compare to the circumstance of not implementing project.

A. Impact of the physical environmental forms water quality, air quality (Hydropheres, airpheres...)

B. Impact to the Biological resources and ecosystems

1. Aquatic ecosystems
2. Terrestrial ecosystems

C. Impact to the Natural Resource and Environment

1. Water supply
2. Transportation
3. Agriculture
4. Irrigation
5. Energy
6. Exploration

7. Industry
8. Small Industry
9. Land use to other objections
10. Creation, Heals protection

D. Impact to the direct condition that impact to the people living quality

1. Socio-economic condition
2. Cultural condition
3. Aesthetic

2. **General environmental assessment in the case of the project implementation.** Analysis of the synthetic Environmental development for each alternative for project implementation. The damages to natural resources and environment resulting from each alternative. The measures overcoming.

In this part, it needs to avail.

- The material inputs to production
- The waste of the production
- The products
- Impact forecast of these materials to environment

3. **The mitigating measles to limit negates impact of the project on the environment.** Presenting in a detailed manner the technical measures, technology, management for overcoming the negative impact on the environment of the project.

Comparing the resulting benefits and the costs for each alternative of the project.

4. **General assessment.** General assessment of the degree of condense of the forecast of the environmental impact assessment. The study, investigation, survey that would be required for more confident conclusion and further adjust of the forecast of the environmental impact assessment in the future.

V. Recommendations on the Alternative for Project Implementation

1. Recommendation for alternative selection to implement the project base on the environmental point of view.
2. Recommendation for the Environmental protection measures associated with the approved alternative.

L.3.2.3 Responsibility of MOSTE and DOSTE on appraisal of EIA-REPORT
APPRAISAL DECENTRALIZATION OF EIA-REPORT

Operating projects and enterprises		MOSTE	DOSTE
1	Mining	Big and medium mine	Small
2	Oil exploring and refinery, oil chemicals and gas, Oil	All	
3	Chemical plant	All	
4	Steel plant	All	
5	Non-ferrous metal plant	All	
6	Leather plant	Over 1000 T/year	Rest
7	Textile plant	Over 30 mil m/year	Rest
8	Plant protection chemical plant	All	
9	Rubber and paint plant	All	
10	Plastic plant	Over 1000 T/year	Rest
11	Radiation plant	All	
12	Airport	All	
13	Export processing zone	All	
14	Hydropower dam water	Over 100 mil m ³ /year	
15	Reservoir	Above limitation	Rest
16	Irrigation system	Over 30 MW	
17	Thermal and other kinds of power plants	Over 500,000 T/year	Rest
18	Cement plant	Over 40,000 T/year	Rest
19	Paper and paper pulp mill	Central	Rest
20	Pharmaceutical plant	Over 100,000 T/year	Rest
21	Fertilizer plant	Over 1,000 T/year	Rest
22	Food processing factory, Sugar plant	Over 100,000 T/year	Rest
23	Hospital	Over 500 beds	Rest
24	Railway, Motorway of grades 1,2,3	Over 50 kms	Rest
25	Power transmission station	Over 110 kV	Rest
26	Tourism and entertainment	Over 100 ha	Rest
27	Resort	Over 3000 m ³	Rest
28	Oil and gasoline store	All	
29	Poisonous chemicals store	Over 2000 ha	Rest
30	Plantation	Over 3000 ha	Rest
31	Wood exploiting farm	Over 2,000 ha	Rest
32	Industrial forestation farm	Over 200ha	Rest
33	Aquaculture farm	Over 100,000 T	Rest
34	Port	Over 500,000 m ² /year	Rest
35	Ply-wood factory	Over 500 households	Rest
36	Migration area		
37	Alluvial plain	Over 500 ha	Rest
38	Engineering factory, Telecommunication stations Radar station and central broadcasting station		Rest
39	Freezing plant	Large and medium scale	Small
40	Construction materials factory	Large and medium scale	Small
41	Hotel and business sector	Large and medium scale	Small

L.3.2.4 QUALITY STANDARD GROUND WATER QUALITY TCVN 5944-1995

1. Scope
 - 1.1 This standard specifies parameter limits and maximum allowable concentrations of pollutants in ground water.
 - 1.2 This standard is applied to evaluation of quality of a ground water source and to monitoring of pollution status of the ground water in a specific area.
2. Limitation Values
 - 2.1 Parameters, pollutants and limitation value of those in ground water are shown in the table 1.
 - 2.2 Standard methods of analysis of parameters and concentrations of pollutants in ground water are specified in available current TCVNs.

Table 1 Parameter Limits and Maximum Allowable Concentrations of Pollutants in Ground Water

N°	Parameter and Pollutant	Unit	Limitation Value
1	pH		6,5 - 8,5
2	Colour	Pt – Co	5 - 50
3	Hardness (as CaCO ₃)	mg/l	300 - 500
4	Total solids	mg/l	750 - 1500
5	Arsenic	mg/l	0,05
6	Cadmium	mg/l	0,01
7	Chloride	mg/l	200 - 600
8	Lead	mg/l	0,05
9	Chromium (VI)	mg/l	0,05
10	Cyanide	mg/l	0,01
11	Copper	mg/l	1,0
12	Fluoride	mg/l	1,0
13	Zink	mg/l	5,0
14	Manganese	mg/l	0,1 - 0,5
15	Nitrate	mg/l	45
16	Phenol compound	mg/l	0,001
17	Iron	mg/l	1 - 5
18	Sulphate	mg/l	200 , 400
19	Mercury	mg/l	0,001
20	Selenium	mg/l	0,01
21	Fecal coli	MPN/100 ml	Not detectable
22	Coliform	MPN/100 ml	3

**L.3.2.5 WATER QUALITY: SURFACE WATER QUALITY STANDARD
(TCVN 5942-1995)**

1. Scope
 - 1.1 This standard specifies parameter limits and maximum allowable concentrations of pollutants in surface water.
 - 1.2 This standard is applicable to control of quality of a surface water source.
2. Limitation Value
 - 2.1 Parameter limits and maximum allowable concentration of pollutants in surface water are specified in the table 1.
 - 2.2 Standard methods of analysis of parameters and pollutant concentrations of surface water are specified in available current TCNVs.

Table 1 Parameter Limits and Maximum Allowable Concentration of Pollutants in Surface Water

N°	Parameter and Substance	Unit	Limit A	Limit B
1	pH	--	6 - 8.5	5.5 - 9
2	BOD ₅ (20°C)	mg/l	<4	<25
3	COD	mg/l	<10	<35
4	Dissolved oxygen	mg/l	³ 6	³ 2
5	Suspended solids	mg/l	20	80
6	Arsen	mg/l	0.05	0.1
7	Barium	mg/l	1	4
8	Cadimium	mg/l	0.01	0.02
9	Lead	mg/l	0.05	0.1
10	Chromium (VI)	mg/l	0.05	0.05
11	Chromium (III)	mg/l	0.1	1
12	Copper	mg/l	0.1	1
13	Zinc	mg/l	1	2
14	Manganese	mg/l	0.1	0.8
15	Nickel	mg/l	0.1	1
16	Iron	mg/l	1	2
17	Mercury	mg/l	0.001	0.002
18	Tin	mg/l	1	2
19	Ammonia (as N)	mg/l	0.05	1
20	Fluoride	mg/l	1	1.5
21	Nitrate (as N)	mg/l	10	15
22	Nitrite (as N)	mg/l	0.01	0.05
23	Cyanide	mg/l	0.01	0.05
24	Phenol compounds	mg/l	0.001	0.02
25	Oil and grease	mg/l	not detectable	0.3
26	Detergent	mg/l	0.5	0.5
27	Coliform	MPN/100 ml	5000	10000
28	Total pesticides (except DDT)	mg/l	0.15	0.15
29	DDT	mg/l	0.01	0.01
30	Gross alpha activity	Bq/l	0.1	0.1
31	Gross beta activity	Bq/l	1.0	1.0

Note Values in the column A are applied to the surface water using for source of domestic water supply with appropriate treatments. Values in the column B are applied to the surface water using for the purposes other than domestic water supply. Quality criteria of water for aquatic life are specified in a separate standard.

L.3.2.6 SOIL QUALITY

MAXIMUM ALLOWABLE LIMITS OF PESTICIDE RESIDUES IN THE SOIL (TCVN 5941-1995)

1. Scope

1.1 This standard specifies maximum allowable concentrations of pesticides in soil. In this standard, Pesticide means: herbicide, fungicide, insecticide as specified by Ministry of the Agriculture and Foods industry in the list of pesticides permitted to use in Vietnam.

1.2 This standard is applied to control and to evaluation of pesticide contaminant level in soil.

2. Limitation Values

Names and maximum allowable concentrations of pesticides in soil are shown in the table 1.

Table 1 Pesticide Residue in Soil: Maximum Allowable Concentrations (MAC)

N ^o	Common and Trade Names	Chemical Formula	Use	MAC (mg/kg)
1	Atrazine	C ₈ H ₁₄ ClN ₅	Herbicide	0.2
2	2,4 - D	C ₈ H ₆ Cl ₂ O ₃	Herbicide	0.2
3	Dalapon	C ₃ H ₄ Cl ₂ O ₂	Herbicide	0.2
4	MPCA	C ₉ H ₉ ClO ₃	Herbicide	0.2
5	Sofit	C ₁₇ H ₂₆ ClNO ₂	Herbicide	0.5
6	Fenoxaprop-ethyl (Whip S)	C ₁₆ H ₁₂ ClNO ₅	Herbicide	0.5
7	Simazine	C ₇ H ₁₂ ClN ₅	Herbicide	0.2
8	Cypermethrin	C ₂₂ H ₁₉ Cl ₂ NO ₃	Herbicide	0.5
9	Saturn (Benthiocarb)	C ₁₂ H ₁₆ ClNOS	Herbicide	0.5
10	Dual (Metolachlor)	C ₁₅ H ₂₂ ClNO ₂	Herbicide	0.5
11	Fuji - One	C ₁₂ H ₁₈ O ₄ S ₂	Fungicide	0.1
12	Fenvalerate	C ₂₅ H ₂₂ ClNO ₃	Insecticide	0.1
13	Lindane	C ₆ H ₆ Cl ₆	Insecticide	0.1
14	Monitor (Methamidophos)	C ₂ H ₈ NO ₂ PS	Insecticide	0.1
15	<i>Monocrotophos</i>	C ₇ H ₁₄ NO ₅ P	Insecticide	0.1
16	Dimethoate	C ₅ H ₁₂ NO ₃ PS ₂	Insecticide	0.1
17	<i>Methyl Parathion</i>	C ₈ H ₁₀ NO ₅ PS	Insecticide	0.1
18	Triclofon (Clorophos)	C ₄ H ₈ Cl ₃ O ₄ P	Insecticide	0.1
19	Padan	C ₇ H ₁₆ N ₃ O ₂ S ₂	Insecticide	0.1
20	Diazinone	C ₁₂ H ₂₁ N ₂ O ₃ PS	Insecticide	0.1
21	Fenobucarb (Bassa)	C ₁₂ H ₁₇ NO ₂	Insecticide	0.1
22	<i>DDT</i>		Insecticide	0.1

Note: Sampling of arable soil for determination of pesticide contaminant level should be taken just after the harvest.

L.3.2.7 AIR QUALITY

MAXIMUM ALLOWABLE CONCENTRATION OF HAZARDOUS SUBSTANCES IN AMBIENT AIR TCVN 5938-1995

1. Scope

1.1 This standard specifies maximum allowable concentration of some organic and inorganic hazardous substances in ambient air.

1.2 This standard is applied to evaluation of ambient air quality and to monitoring of ambient air pollution status.

1.3 This standard is not applicable to the workplace air quality.

2. Limitation Values

Maximum allowable concentrations of the hazardous substances in ambient air are shown in the table 1.

Table 1 Maximum Allowable Concentrations of Some Hazardous Substances in Ambient Air (mg/m³)

N°	Substances	Chemical Formula	Average over 24hrs	Maximum One Occasion
1	Acrylonitrile	CH ₂ =CHCN	0.2	-
2	Ammonia	NH ₃	0.2	0.2
3	Aniline	C ₆ H ₅ NH ₂	0.03	0.05
4	Anhydrious vanadium	V ₂ O ₅	0.002	0.05
5	Arsenic (inorganic compound, as As)	As	0.003	-
6	Hydrogen arsenic	AsH ₃	0.002	-
7	Acetic acid	CH ₃ COOH	0.06	0.2
8	Hydrochloric acid	HCl	0.06	-
9	Nitric acid	HNO ₃	0.15	0.4
10	Sulfuric acid	H ₂ SO ₄	0.1	0.3
11	Benzene	C ₆ H ₆	0.1	1.5
12	Particles containing SiO ₂			
	-dianas 85-90% SiO ₂		0.05	0.15
	- diatomic brick 50% SiO ₂		0.1	0.3
	- cement 10% SiO ₂		0.1	0.3
	- dolomite 8% SiO ₂		0.15	0.5
13	Particles containing asbestos		none	none
14	Cadmium (metal and oxide) as Cd		0.001	0.003
15	Carbon disulfide	CS ₂	0.005	0.03
16	Carbon tetrachloride	CCl ₄	2	4

Table 1 Maximum Allowable Concentrations of Some Hazardous Substances in Ambient Air (mg/m³)
Part 2

N°	Substances	Chemical Formula	Average over 24hrs	Maximum One Occasion
17	Chloroform	CHCl ₃	0.02	-
18	Tetraethyl lead	Pb(C ₂ H ₅) ₄	none	0.005
19	Chlorine	Cl ₂	0.03	0,1
20	Benzidine	NH ₂ C ₆ H ₄ C ₆ H ₄ NH ₂	none	none
21	Chromium-metal and compound	Cr	0.0015	0.0015
22	1,2 -Dichlorethane	C ₂ H ₄ Cl ₂	1	3
23	DDT	C ₈ H ₁₁ Cl ₄	0.5	-
24	Hydrogen fluoride	HF	0.005	0.02
25	Formaldehyde	HCHO	0.012	0.012
26	Hydrogen sulfide	H ₂ S	0.008	0.008
27	Hydrogen cyanide	HCN	0.01	0.01
28	Manganese and compound (as MnO ₂)	Mn/MnO ₂	0.01	-
29	Nickel (metal and compound)	Ni	0.001	-
30	Naphthalene		4	-
31	Phenol	C ₆ H ₅ OH	0.01	0.01
32	Styrene	C ₆ H ₅ CH=CH ₂	0.003	0.003
33	Toluene	C ₆ H ₅ CH ₃	0.6	0.6
34	Trichloroethylene	ClCH=CCl ₂	1	4
35	Mercury (metal and compound)	Hg	0.0003	--
36	Vinylchloride	ClCH=CH ₂	-	13
37	Gasoline		1.5	5.0
38	Tetrachloroethylene	C ₂ Cl ₄	0.1	-

Note: Standard analysis methods of concentration of the substances are specified in available current TCVNs.

L.3.2.8 The list of Pesticides those use has been banned (February 1999)

No	Common Name	Trade Name
Insecticides		
1	Aldrin	Aldrex, Aldrite
2	BHC, Lindane	Gamma-BHC, Gamma-HCH, Gammatox 15EC/20EC, Lindafor, Carbadan 4/4 G; Sevidol 4/4G..etc
3	Cadmium compounds	
4	Chlordane	Chlortox, Octachlor, Pentichlor
5	DDT	Neocid, Pentachlorin, Chlorophenothane, etc.
6	Dieldrin	Dieldrex, Dieldrite, Octalox, etc.
7	Eldrin	Hexadrin etc.
8	Heptachlor	Drimech, Heptamul, Heptox, etc.
9	Isobenzen	
10	Isodrin	
11	Lead compounds	
12	Methamidophos	Dynamite 50SC, Filitox 70SC, Master 50EC/70SC, Moniter 50EC/60SC, Isometha 50DD/60DD, Isosuper 70DD, Tamaron 50EC
13	Methyl Parathion	Danacap M25/M40, Folidol M50EC, Isomethyl 50ND, Methaphos 40EC/50EC, Methyl Parathion 20EC/40EC/50EC, bMilion 50EC, Proteon 50EC, Romethyl 50ND, Wofatox 50EC
14	Monocrotophos	Apadrin 50SL, Magic 50SL, Nuvacron 40SCW/DD, 50SCW/DD, Thunder 515DD
15	Parathion Ethyl	Alkexon, Orthophos, Thiophos
16	Phosphamidon	Dimecron 50SCW/DD
17	Polychlorocamphene	Toxaphene, Camphechlor
18	Strobane	Polychlorinate of camphene
Fungicides		
1	Arsenic compounds	(except NeoAsozin, Dinasin
2	Captan	Captane75WP, Merpan 75WP
3	Captafol	Difolatan 80WP, Folcid 80WP
4	Hexachlorobenzene	Anticarcin, HCB
5	Mercury compounds	
6	Selenium compounds	
Rodenticides		
1	Talium compounds	
Herbicides		
1	2,4,5-T	Brochtox, Decamine, Veon