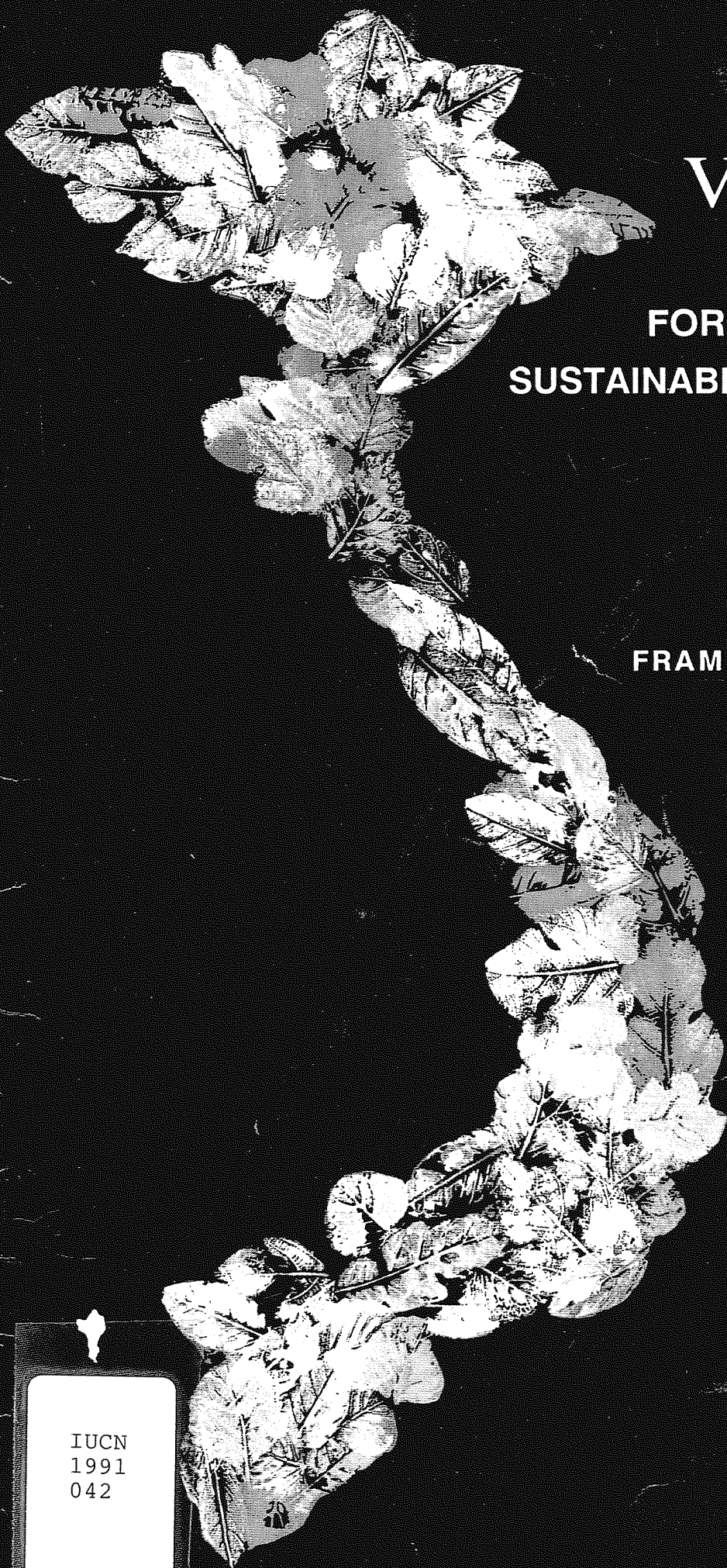


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VIET NAM

NATIONAL PLAN
FOR ENVIRONMENT &
SUSTAINABLE DEVELOPMENT
1991-2000

FRAMEWORK FOR ACTION

IUCN
1991
042

AUGUST - 1991



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(PROJECT VIE/89/021)

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Prepared

FRAMEWORK FOR ACTION

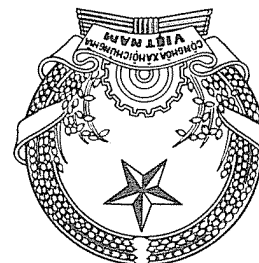
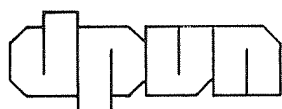
1991 - 2000

ENVIRONMENT & SUSTAINABLE DEVELOPMENT

FOR

NATIONAL PLAN

VIETNAM



PREFACE

The issue of natural resources and environmental protection is an important one in Vietnam. In September 1985 the Council of Ministers of the Socialist Republic of Vietnam adopted Resolution No. 246 under the title "Activities on Basic Investigation, Rational Utilization of Natural Resources and Environmental Protection" which paved the way for various other policies and directives for the protection of the environment.

Concerned about the future demands that economic development would place upon the environment, the Government requested UNDP assistance for holding an international conference on Environment and Sustainable Development. As a prelude to the conference, a preparatory meeting was held by the State Committee for Sciences (SCS) and the United Nations Development Programme (UNDP) in Hanoi in late 1988 which agreed that the international conference should help formulate a National Environmental Action Plan.

During the preparatory discussions it was decided that UNDP-assistance would be formalized in the form of a project. Given the importance of the issue and their prior involvement in this area, the Swedish International Development Authority (SIDA) expressed an interest in participating in the process, as did the United Nations Environment Programme (UNEP). The project document VIE/89/021 - National Environmental Action Plan and Conference on Environment and Sustainable Development was signed on 5 September 1990 with the State Committee for Sciences as the implementing body.

The draft Environmental Action Plan was formulated under the overall guidance of the State Committee for Sciences with assistance from UNEP and a SIDA-funded consultant provided by the International Union for the Conservation of Nature (IUCN) and in association with relevant Government bodies.

The draft was presented for comments at the International Conference on Environment and Sustainable Development held in Hanoi from 3-6 December 1990. Participants included national and international experts as well as representatives of embassies, bilateral, multilateral and non-governmental organizations. The conference approved the submission to the Council of Ministers of a National Plan for Environment and Sustainable Development: A Framework for Action.

On 12 June 1991, the National Plan for Environment and Sustainable Development was approved by the Chairman of the Council of Ministers. This decision is reflected in Document No. 187/CT. The Chairman of the State Committee for Sciences has been entrusted with the responsibility for all activities pertaining to the implementation of the Plan.

The State Committee for Sciences and UNDP Hanoi would like to acknowledge the invaluable contributions made by the international and national organizations, experts and others concerned as well as convey their thanks to all those who have been involved in the preparation of such an important document.

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EXECUTIVE SUMMARY

Vietnam is a developing country with limited resources to address environmental concerns. Yet it has critical environmental problems. Its forests, watersheds and waterways, marine resources, land and air are in a degraded state due to years of war, and are currently experiencing severe pressure from a rapidly increasing population. Since the majority of the population depends on these various resources for their livelihood it is imperative that actions be undertaken to promote the sustainable development of the country. Through a creative framework which need not be particularly elaborate or expensive, the additional institutional and technical expertise to address these problems can be developed with a minimum level of resources. This document, outlining a national framework for action in the area of Environmental and Sustainable Development for the Socialist Republic of Vietnam, provides the basis for developing the required inputs that will enable Vietnam to address its environmental challenges.

The objectives of this plan, which has taken the issues raised in the National Conservation Strategy as its point of departure, are to:

1) provide for the gradual development of a comprehensive framework for national and sub-national environmental planning and management; and

2) lead to specific actions that are required in the short term to address priority problems at their very roots.

The overall framework is one which the Republic should strive to develop within the next ten years. This framework ultimately would include a wide variety of components, including appropriate organizational structures, well-integrated environmental policies at the sectoral level, environmental legislation, priority projects and programs, improved methods of data collection and management, environmental impact assessment procedures and monitoring systems. Priorities and an agenda have been identified for two five-year periods: 1990-1995, and 1996-2000.

For 1990-95 high priority items include several management components, with highest priority being given to: the establishment of a single environmental authority; the development of programs in population control; watershed management programs, which include reforestation, control of soil erosion, management of problem soils, and

stabilization of shifting agriculture; agricultural pollution control; and estuary protection. From 1996 to 2000, population control and watershed management should continue to be top priorities, along with the protection of reefs, wetlands, and inland waters. Priority actions for the two time periods are summarized in the Matrix of Priority Actions, below.

Sustainable development with equity is the major theme of this Environmental Action Plan upon which the plan's goals and objectives are formulated. The goals are:

- To satisfy the basic material, spiritual and cultural needs of all the people of Vietnam, both present and future generations, through the wise management of natural resources.
- To define and establish policies, action plans, and institutional structures to ensure that the sustainability of natural resource use will be fully integrated into all aspects of Vietnam's social and economic development process.

The specific objectives of the Plan are to:

- maintain essential ecological processes and life-support systems upon which human welfare in Vietnam is dependent;
- maintain Vietnam's wealth of genetic diversity of both domesticated and wild species of current and potential benefit;
- ensure the sustainable use of Vietnam's natural resources by managing intensity and patterns of use;
- maintain overall environmental quality, necessary for the well being of human existence.

- achieve a population level and distribution that is in balance with natural sustainable productivity at a dignified standard of living.

Sustainable development requires that resources be developed and utilized in an integrated manner. This entails taking into account broader national objectives, regional differences in income and endowment, the effects of one sector, or industry on another, and the impacts of activities in one area on another location. In developing sustainable development strategies it is necessary to ensure that a given strategy does not conflict with those of other sectors or industries, and that development strategies serve to reinforce each other and form part of a broad, coordinated program for sustainable development.

Strategies and recommendations which form the basis of this action plan are founded on the above premises. Draft recommendations for action were discussed and finalized at the Conference on Environment and Sustainable Development, held in Hanoi in

from 3-6 December 1990. These include sectoral, industrial, human resource development, and institutional/legal strategies which should be promoted more actively and effectively in all regions of Vietnam. A summary of these strategies and recommendations are provided in the following pages.

SUMMARY OF RECOMMENDED ACTIONS BY SECTOR

Population Policy

- * Implementation of effective population stabilization programs, especially in the midlands.
- * Reinforcement of population policy by other sectoral policies, especially for rural areas.

Agriculture

- * Support of agricultural efficiency through the removal of market disincentives and the implementation of other sectoral reforms such as maximizing benefits from multi-cropping, improving farmer incentives, and minimizing post-harvest losses.

- * Development and promotion of sustainable cultivation and agronomic systems for hillside areas. Activities should consider agro-forestry, contour planting, tree cropping and terracing, and be adapted to specific site conditions, farmer preferences for crops, and feasible soil and water conservation technologies.

- * Agricultural practices should emphasize intensified cultivation to increase productivity, crop rotation, control of agricultural chemicals, popularization of organic farming and irrigation practices to avoid water logging, and soil salinization.

- * Research and extension work related to agro-forestry systems should receive top priority, with a view to future replication in areas where shifting cultivators from the uplands are being resettled. In addition, men and women should be involved in planning and implementing these activities and their individual needs should be incorporated at all stages of project development.

Forestry

- * An intensified program of reforestation and afforestation should include the establishment of forest buffer zones and economic forest plantations to provide both fuelwood and timber. Planting efforts should aim to develop mixed forests of indigenous species most suitable to local conditions and climate, rather than monocultures and the use of exotic species.

- * The involvement of local people, women, men and children must be incorporated into these activities as rural employment and rural income generation projects; and the needs of the people for forest products must be thoroughly assessed.

- * To reduce pressure on forest exploitation for rural firewood supply, community level fuelwood plantations should be established, and more fuel efficient ovens must be popularized.
- * Stronger programs for forest area protection, both to conserve existing forest and reforested areas, and to allow for natural regeneration of degraded areas. Where catchment protection is the primary objective, passive use of natural reforestation is more efficient than plantations. Protected areas thus should include forests set aside as hydrological reserves, national parks and nature reserves, cultural sites and recreation areas.
- * Measures to control forest fires and disease and stricter enforcement of forest regulations. The success of such programs will likely be greater if land tenure systems are established to ensure that local communities have a direct interest in protecting and managing forests on a sustainable basis.
- * The promotion of agro-forestry, as part of a joint program with the forestry and agricultural department staff. This program could focus on adapting the traditional systems of agro-forestry which already exist in Vietnam.
- * A review of all forest policies and laws should be undertaken to ascertain if current rules and regulations are being enforced, if realized government revenues approach economic values, and to ensure that protection and conservation measures are adequately secured within these policies. Issues to be reviewed include allowable cuts, harvesting cycles, stumpage fees, etc.
- * The banning of large-scale commercial logging in the remaining areas of natural forest. A ban is needed both for watershed conservation and for habitat protection. Commercial logging should be focused on plantation forests that have been established for such use.
- * Development of an accurate inventory of Vietnam's forest resource base and development of forest land use allocation programs based on this information.
- * Education, training and workforce development in a wide range of forest management and conservation topics. To the extent possible, women should be encouraged to participate in these programs.
- * Development of programs to assist in the promotion, marketing and distribution of forest related products. Emphasis should be placed on products grown by local people in agro-forestry systems or products that can be harvested from the forest on a sustained yield basis without disturbing the natural vegetation.

Water Resources

- * Integrated watershed management should receive high priority.

* Development of water pollution standards and controls on industrial effluent, integrated pest management (IPM) in the agricultural sector, and proper systems of sewage treatment, solid waste management and recycling. The strategy should also develop and adopt water quality standards in relation to particular uses including drinking, recreation and industrial uses.

- * The development of new water supplies focusing on sources that are unlikely to become polluted in the future.

Watershed Rehabilitation and Management

* Integrated watershed management should emphasize multi-purpose utilization of water resources, soil erosion control through appropriate soil stabilization measures, forestry rehabilitation by large scale reforestation, land use and human settlement planning, waste management, focused on recycling, and flood control measures.

* Intensification of cultivation in areas that are in fact suited to sustainable agricultural use. Special attention must be paid to improving and promoting techniques and systems, such as agro-forestry, aimed at sustainable hillside cultivation.

* Protection of existing forested watersheds and the rehabilitation of denuded watersheds. This will require a system of protected areas, enforcement of forestry regulations, fire and disease protection measures, and reforestation.

* Development of alternative, non-agricultural means of employment for the Vietnamese people. Obviously, this objective is already being pursued through ongoing national programs of economic restructuring and modernization. Priority should be placed on creating such opportunities for groups that presently are inflicting severe damage in a given forest or watershed area and shifting cultivators in resettlement schemes.

Coastal Zone Management

* Sustainable coastal zone management should emphasize rational utilization of aquatic resources, coastal land use zoning, beach stabilization by vegetation, establishment of wind-breaker forests, control of pollution from both marine and land based sources, oil spill contingency planning and necessary coastal resource conservation measures, including wetland protection.

* Sustainable fisheries practices should promote environmentally sound fishing methods, cessation of environmentally damaging methods such as dynamite fishing and poisons, prevention of over-fishing, mesh size regulation, minimum size limitation, protection of breeding grounds & spawning areas and ecosystems, and fishing ban during breeding seasons.

* Promotion of coastal aquaculture, without mangrove destruction, as a means to increase protein intake and income. As a means to reducing fishing pressure, a wide variety of sea products such as shrimp can be cultivated along the coastline. However, coastal aquaculture initiatives should be designed with an understanding that destruction of mangroves to make fish and shrimp ponds results in a loss in marine fishery approximately equivalent to the apparent gain in pond fishery.

* Development of sustainable offshore fishery capabilities. This will require the development of new capabilities among fishermen, backed up by investments in larger boats and new gear. This may need to be supported by new or larger fisheries cooperatives.

* Protection, conservation and rehabilitation of mangroves, estuaries, lagoons and reefs which are critical spawning grounds for many commercial fish species. The mining of live coral for making lime and building materials should be banned.

* The drafting of guidelines which would provide the framework for assessment of seashore developments.

* Emphasis should be placed on integrated disaster planning and mitigation; and the coordination of this responsibility should be assigned to the Environmental Authority that is to be established.

Industry

* The role of the people of Vietnam in choosing the type of desired socio-economic development should be emphasized; thus public awareness should be promoted to enhance value judgement capabilities.

* If maximum economic growth is the goal of the Vietnamese people, pricing mechanisms should be introduced to tackle environmental problems by making the polluter pay for the pollution, so that the cost of resources are regulated by the market.

* Integrated urban development strategies should be prepared in order to address waste management and water supply issues, health and social impacts, and ensuring long-term urban sustainability.

* Land use zoning should be developed immediately for new industries with the provision for pollution control, rather than replacing, at great cost, existing polluting plants.

* In planning for sustainable industrial development emphasize the development of light industry. Where possible light industry should be located in areas where it will draw people away from areas where pressure on the land by cultivators is excessive.

Transport

* Minimization of the use of private motor vehicles and promotion of public transportation to avoid air pollution (and a host of other critical problems). The existing reliance on bicycle transportation should also be maintained and encouraged within all transportation policies.

Energy

* All energy projects should undergo an Environmental Impact Assessment (EIA) during their planning stage, in order to integrate environmental considerations into the engineering design of the projects and to ensure that mitigation measures are employed.

* The efficient use of energy should be established through the development of Energy Efficiency Standards for all end uses of energy.

* Maximization of energy use efficiency, and planning for expansion of electricity supply should be conducted through integrated planning and policy development in all sectors. Energy efficiency and conservation can help to reduce the need to expand energy supplies, a desirable objective as increases in energy consumption can be accompanied by significant environmental costs.

* Reliance should focus, to the extent feasible, on clean, renewable and decentralized energy sources. When comparing the costs and benefits of these energy sources with the traditional, non renewable, and/or centralized sources, it is important to ensure that the full environmental and social costs of the latter are given the weight they deserve.

* All development projects including buildings, tourism, road building, industrial facilities and land use planning should also be reviewed with an Energy Efficiency Assessment (EEA).

Pollution Control

* The development of standards and systems for industrial pollution control and waste management. As Vietnam is only now beginning to rebuild its industrial

base it can develop these standards and systems up front, avoiding the large environmental rehabilitation costs that many other countries will have to pay.

* Standards for smokestack emissions and liquid effluent discharges for industry should be established and enforced.

* Priority should be laid on control of pollution from point sources, before tackling non-point source pollution, as it is more difficult to manage.

* Emphasize waste reduction, re-use, and recycling in pollution control. However, reduction, re-use, and recycling alone will not solve the pollution problem. Strategies will be required to address the flow of wastes from households, industries and farms.

* The promotion of "waste exchange" or re-use in both formal and informal sectors. Efforts to create industrial waste exchanges should be made between industries and an information centre could be created to support this activity.

* The proper treatment of household pollutants, primarily sewage and solid waste. This will require some form of treatment system in the case of sewage, and, in the case of solid waste, incineration and/or disposal in a suitably designed and located sanitary landfill.

* Encouragement of the use of organic fertilizer to reduce agricultural pollution, which makes maximum use of intercropping, crop rotation, natural pesticides, and other traditional pest control methods should be promoted. Regulations on the use, handling and disposal of pesticides should also be developed, including restrictions on the types of pesticides that can be used in Vietnam.

* The enforcement of pollution measures to control the discharge of organic and industrial wastes into fresh waters and into the sea. The use of potentially harmful agro-chemicals should be actively discouraged in favour of other pest control systems, particularly in areas where freshwater fisheries are important.

* A ban on the dumping of oil or radioactive wastes in Vietnamese waters. Measures should be taken to prevent oil leaks from marine oil exploration platforms. Furthermore, Vietnam should adhere to international conventions relating to the use of marine resources, for example the Law of the Sea, the International Convention on Dumping of Wastes at Sea and the International Whaling Convention.

Hazardous Wastes

* Regulations on the use, handling, and disposal of toxic and hazardous substances should be developed and tightly enforced.

- * Development of hunting regulations. These may include a total ban on hunting in some critical areas. Vietnam should implement measures to control trade in
- * Development of practical programs to protect particular endangered species.
- * Involvement of international assistance in the initial stages of planning and training for the management of a few model reserves, since the establishment of nature reserves is a rather new idea in Vietnam and the country has little experience in this field.
- * Involvement of local people at the design and planning stage and the distribution of various direct or indirect benefits to local people through the establishment of such reserves. This involves considerable skill in socio-economic evaluation and the development of extension services for the reserves.
- * In addition, the development of new skills for the management of such areas will have to be encouraged among the staff of the Ministry of Forestry through an intensive training programme. Legislation for the establishment and management of these reserves will need revision and enactment. Knowledge of such new legislation will have to be disseminated among the regional judiciary and police authorities.
- * The costs of maintaining National Parks and Protected Areas should be reduced by the development of such income generating projects as conducted wildlife safaris, both for tourism promotion and as a tool for awareness raising.
- * The Division of Special Use Forests should be upgraded to a Division of Nature Conservation to manage a National system of protected areas of all natural living communities of the country, not only forests. Such a division should be enlarged and provided more independence.

National Parks and Forest Reserves

- * Necessary action should be undertaken to strengthen and maintain biodiversity and stimulate nature conservation in the Country.

Maintenance of Genetic Diversity

- * A special body should be formed to address problems relating to hazardous substances and to develop a program for their management and disposal. Regulations should be developed pertaining to the use, storage, handling, transport and disposal of hazardous substances.
- * The development and promotion of alternative methods, or the use of non-hazardous materials in industries that presently employ or generate hazardous substances should be emphasized.

endangered species. These measures should include becoming an active member of the Convention on International Trade in Endangered Species (CITES) and establishing controls along Vietnam's borders.

* Help rare populations to recover especially through *in situ* conservation; for plant species, initiate programs aimed at *ex situ* conservation through seed banks and botanical gardens.

Protection of Wetlands

* Focus should be placed on supporting and implementing objectives of the Ramsar Convention on Wetlands, by establishing and managing wetland protection areas.

* A National Wetlands Conservation Programme for Vietnam should be developed within a coastal zone management framework, along with a series of demonstration projects dealing with the sustainable utilization and rehabilitation of critical wetland ecosystems.

* Cooperative sub-regional projects and activities for the protection and development of such shared resources as the watersheds of the Red River and of the Mekong River should be strengthened.

Environmental Education

* Development of an integrated environmental and sustainable development curriculum. This curriculum should specifically focus attention on the basic concepts of sustainable development. It should also establish the need for specialized degree courses in the field of environmental sciences within a framework for sustainable development and the training of teachers in this field. Both men and women should have equal access to all training programs.

* Development of curricula, syllabus and textbooks should be given high priority for the introduction of environmental education at all levels and the establishment of specialized degree courses in various fields of environmental sciences.

Training

* Development of national expertise in the field of environmental management through specialized training on the most urgent environmental issues in Vietnam.

* International assistance should be sought and urgently utilized for training of educationalists, authors, teachers and other resource persons for the establishment of an educational system in the field of Environment: focus on overseas training and experience through fellowships, international conferences,

* This Central Environmental Authority should be supported by an integrated institutional network at the provincial, district and commune level.

* Regional, provincial and district levels should develop appropriate environmental organizations and efficient mechanisms to integrate national objectives on both the conservation and sustainable development of natural resources. Central and grass-roots level planning has to be part of the consultative process that brings the two levels of government together, and which will ensure both a global approach and grass-root implementation and benefit from a more integrated sustainable development approach.

Local Environmental Organization

* A single Environmental Authority should be established, on an urgent basis, at a supra-ministerial level. Its mandate should include Policy Planning and Legislation, development of an Integrated Process of Implementation, Environmental Standards and Impact Assessment, Pollution Control, Monitoring, Coordination of Disaster Management, Information Management, Setting of Research Priorities, and Environmental Awareness Promotion.

Development of a Central Environmental Authority

* Sustainable rural development will require the establishment of an extension network with an appropriate pay structure for the dissemination of environmentally sound practices.

* Training of extension workers and NGO's involved in rural development and environmental protection activities should be undertaken on a massive scale to enhance the acceleration of environmental protection work as part of integrated rural development.

Extension Services

* Promotion of environmental awareness should be given high priority. Production of environmental awareness materials should be stressed in order to provide the tools for extension work and the raising of awareness of the masses; the assistance of mass media, volunteer groups and NGOs should be sought for the widest dissemination of these materials.

Environmental Awareness

and professional exchange programs of experts for technology transfer and exchange of experience.

Development of Environmental Policy and Legislation

* Development of appropriate environmental policies and legislation including consideration of environmental factors in laws governing the planning of development projects in such sectors as transport, mining, energy, fisheries, development of new settlements, and tourism.

* Legislation and mechanisms which provide for integrated land use zoning should accompany all industrialization. Such zoning should be developed to ensure that industrial, as well as other land uses, are sited in a manner which helps to minimize impacts on sensitive environmental features and on adjacent land uses.

* The legislative framework that is developed should also provide the necessary legislative authority for the implementation of this Action Plan, along with other action plans to be developed by the appropriate national and sub-national authorities. The legislative framework should also make provisions for the establishment of Protected Areas.

* A training program in environmental law for Vietnamese lawyers, such as that being followed in Indonesia, should be developed.

* The Draft Environmental Law should be developed and related to other existing legislation dealing with environmental matters, with provision for periodic updating of regulations. Parallel socio-economic policies should be developed for economically under-developed areas in order to facilitate the implementation of the Environmental Law. Promulgation of the Law should be preceded by a comprehensive public awareness campaign.

Environmental Standards and Impact Assessment

* The establishment of Environmental Standards should be initiated immediately.

* A policy and set of procedures, including EIA regulations should then be developed on an urgent basis to screen and evaluate all public and private sector investment projects.

* EIA should be undertaken during the planning phase.

* EIA should be incorporated into regional development planning.

* EIA centres should be established in Universities for the development of national expertise in Vietnam.

- * Immediate priority areas to undergo EIA are water reservoirs and dams; oil refineries; and plantations.

* Given that the development of a workable framework for EIA in Vietnam will likely take some time, the country should immediately institute a requirement that all proposed foreign assistance projects be subject to an environmental screening, and if warranted, to an EIA. The EIA would be conducted (or sponsored) by the donor organization, but would require the involvement of local trainees, in order to help develop Vietnam's capability in EIA.

Monitoring Frameworks and Strategies

- * A requirement should be instituted that a national monitoring system be designed and capabilities be developed on the basis of guidelines to be established by the Central Environmental Authority.

* The design of the monitoring system should focus on the end user and stress standardization of data collection.

* Roles of contracting agencies responsible for data analysis, and that of providers of services, or monitored data, should be clearly separated.

* As some types of monitoring will require access to equipment and/or laboratory facilities these should be provided.

Research

* Research in the field of Environmental Science should be developed as a basis for the establishment of policies, strategies and legislation in the field of environmental protection; scientific and technological support activities for the realization of environmental protection objectives in the various sectors should be simultaneously developed down to the provincial, district and commune level to incorporate the grass roots level.

* Research activities as well as International Assistance & Cooperation must be properly planned and must focus to address the most urgent problems of conservation, environmental protection, enhancement of natural resources, and pollution control, particularly emphasizing inter-disciplinary problem areas concerning sustainable development.

International Cooperation

* Further action is needed to establish and/or strengthen linkages with international programs and activities offered by the United Nations system and other multinational organizations.

* Some international conservation aspects that Vietnam should consider are the management of migrant species, shared transfrontier resources, resources of international concern, and transfrontier watersheds, the control and organization of international trade, participation in international cooperative efforts, and international measures to preserve Vietnam's cultural heritage.

* Strong support should be given to Vietnam's contribution to international conventions such as RAMSAR (Vietnam is the first South East Asian member country), Biodiversity, CITES, Migratory Species, etc.

TABLE 1: TABLE OF HIGHEST PRIORITIES

1991-1995 1996-2000

INSTITUTIONAL, LEGISLATIVE & POLICY FRAMEWORK

2.1	Establishment of Environmental Authority	X	
2.1.1	Central		
2.1.2	Regional		
2.1.3	Provincial		
2.2	Development of Environmental Policy & Law		
2.2.1	Development of Environmental Policies	X	X
2.2.2	Development of Environmental Legislations	X	X
2.3	Data Collection, Information Management and Networking	X	
2.4	Integrated Planning of Resource Development	X	X
2.5	Sustainable Development Strategies at Sectoral level		
2.5.1	Agriculture	X	X
2.5.2	Forestry and Wildlife	X	X
2.5.3	Fisheries & Other Aquatic Resources	X	X
2.5.4	Water Resources	X	X
2.5.5	Mining	X	
2.5.6	Energy	X	
2.5.7	Transportation	X	
2.5.8	Industry	X	
2.5.9	Tourism and Recreation	X	X
2.5.10	Land Use Planning & Zoning	X	X
2.6	Environmental Impact Assessment Process	X	X
2.7	Environmental Disaster Management Strategies		
2.7.1	Oil Spill Contingency Planning	X	X
2.7.2	Flood Control	X	
2.7.3	Typhoon Damage Control	X	X
2.8	Monitoring Framework & Strategies	X	X

ACTION PROGRAMMES

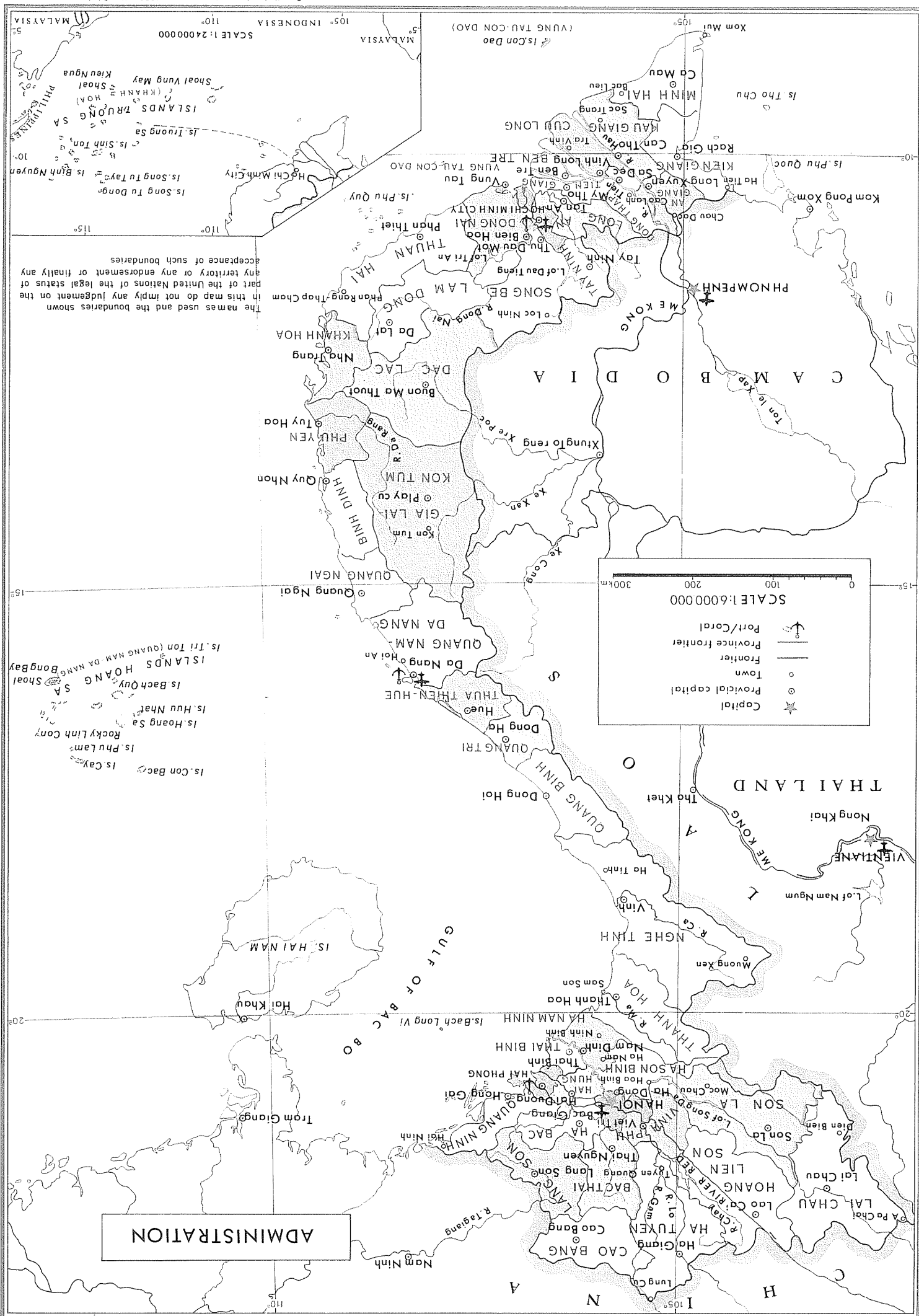
1991-1995 1996-2000

3.1	Urban Development and Population Control		X
3.1.1	Urban Development		X
3.1.2	Population Stabilization	X	X
3.1.3	Quality of Life	X	X
3.2	Integrated Watershed Management		
3.2.1	Present Land and Water Management	X	X
3.2.2	Management of the River Catchment areas	X	X
3.2.3	Management of the specific kinds of soil in the Mekong Delta	X	X
3.3	Pollution Control & Waste Management		
3.3.1	Appropriate Technologies for Waste Reduction, Reuse & Recycling		X
3.3.2	Control & Treatment of Air, Water & Soil Pollution	X	X
3.3.3	Control of Toxic Chemical & Hazardous Substances	X	X
3.4	Integrated Coastal Zone Management & Planning		
3.4.1	Coral Reefs		X
3.4.2	Mangrove Forests & Seagrass ecosystems	X	
3.4.3	Estuarine Ecosystems	X	
3.4.4	Coastal Erosion Control and Coastal Protection Measures		X
3.5	Maintenance of Genetic Diversity	X	X
3.6	Protection of Wetlands		X
3.7	National Parks, Protected Areas & Wildlife Reserves	X	X

1991-1995 1996-2000

PROGRAMME SUPPORT ACTIVITIES

4.1	Education, Training, Extension & Awareness Promotion		
4.1.1	Development of Formal Environmental Education	X	X
4.1.2	Technical Training	X	X
4.1.3	Promotion of Environmental Awareness	X	X
4.1.4	Extension Service Network and Training		X
4.2	International Cooperation		
4.2.1	Information Exchange	X	X
4.2.2	International Implications	X	X



CHAPTER I

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Concepts and Goals of NPESD

This report outlines the framework of a National Plan for Environment and Sustainable Development (NPESD) for the Socialist Republic of Vietnam. The broad objective of the plan is to further address the issues raised in the National Conservation Strategy. This Plan will :

- 1) provide for the gradual development of a comprehensive framework for national and sub-national environmental planning and management; and
- 2) lead to specific actions that are required in the short term to address priority problems at their very roots.

The overall framework mentioned in (1) above, is one which the Republic should, to the greatest degree possible, strive to develop within the next ten years. As discussed in the following pages, such a framework ultimately would include a wide variety of components, including appropriate organizational structures, well-integrated environmental policies at the sectoral level, legislation, priority projects and programs, improved methods of data collection and management, environmental impact assessment procedures, monitoring systems, etc.

Vietnam is a developing country with limited resources available to address environmental matters. It is therefore important to emphasize that the framework outlined above does not need to be particularly elaborate and expensive in order to be effective. Through the use of well-organized thought and creativity, and with a major emphasis on efficiency, a minimum level of resources can be utilized to develop the level of institutional and technical capability that are needed to get the job done.

In addition, it will be imperative that priorities be identified and focussed upon. Funds and other scarce resources should not be allocated to projects or programs that are not of utmost importance while other problems or needs are virtually crying out for attention. In light of this fact, a schedule for developing the framework described is suggested, and the more specific actions alluded to in (2) above, are emphasized.

The plan described in the following pages is not intended as a detailed blueprint for action, but more as a list of activities that need to be attended to attain environmental sustainability. It is beyond the scope of this assignment to provide details on budgetary requirements, staffing, site-specific land uses, etc. More work will be needed to develop

the specific components and actions identified. However, the plan can and should be carried out by both Vietnamese and international organizations. And hopefully, it will serve to attract the latter's interest in specific initiatives that need to be carried out. If the program described is followed, the result will be a nation that possesses a more solid foundation for ensuring that socio-economic changes are positive and desirable, that quality of life is improved, that the country's basic life support systems are protected or enhanced, and thus that the transformations which occur in the society constitute true 'development' that can be sustained.

Although the situation regarding air and water pollution from industrial sources is still good as compared to some other Asian countries, Vietnam is presently faced with serious environmental problems such as deforestation, soil erosion, overexploitation of coastal resources, threats to ecosystems and depletion of genetic resources. This Framework for action is therefore most timely as the country can now foresee the environmental problems development will inevitably bring, and take the necessary precautions in advance to mitigate them by developing an environmentally sustainable development strategy. The country can thus avoid the drastic mistakes been made by many other nations.

1.2 Environmental Situation and Current Activities

A broad National Conservation Strategy was developed for Vietnam with the assistance of IUCN/WWF. The strategy included an evaluation of national environmental conditions that led to the conclusion that "what Vietnam faces today is a grave ecological crisis." Rapid population growth was identified as the greatest environmental threat. Vietnam presently has one of the highest population densities (200 persons/sq. km) of any agricultural country.

The continuation of current trends in environmental degradation will lead to the total elimination of the nation's forests by the early part of the next century. This, in turn, will intensify a variety of problems related to watershed degradation, including soil erosion, siltation, seasonal water shortages, flooding and other natural disasters. It also will destroy the wood fuel supply and contribute further, along with overhunting, to the already rapid decline in the country's wildlife.

Additional problems highlighted include overfishing in inshore marine areas as well as the contamination of some freshwater fisheries by agrochemicals and by the by-products of chemicals sprayed during the Second Indochina War.

A variety of activities are being carried out in Vietnam in relation to the environment. However, these activities are generally being conducted in a compartmentalised manner, that is, in isolation, rather than as part of a coordinated program aimed at developing

Vietnam has no environmental ministry and no coordinating body to pay due attention to environmental affairs. As a result, each sector has made its own plans for maximising production with no concern for the effects of such utilization on other neighbouring or even distant sectors. Some sectors have paid due attention to their own depleting resources but have only shown concern in so far as it affects their own sector. Much

Lack of a Suitable Organization

Conservation has been seen as necessary and is advocated in policy documents but there have been no clear directives about how it is supposed to be applied. Too many sectors have failed to see the advantages of including conservation as an integral part of sound development. Development has been measures in terms of production levels achieved, with no attention being paid to costs in terms of resource depletion.

Lack of Integration between Conservation and Development

Although the principles of rational use of resources have been included in sectoral policies and have been stated in party decisions and directives, these principles have not been clearly incorporated into the development process. The emphasis of development in all sectors has been on trying to meet the production goals laid down by the Government. There is need for better integrated land-use planning. Long-term consequences must be taken into account when planning resource use and the principles of sustained yield must be observed in the future planning process.

Lack of Environmental and Natural Resources Planning

Although for a number of years, there has been tremendous awareness among governmental planners about the environmental problems facing Vietnam, and although a good deal of information has been gathered and research conducted, there has been little satisfactory improvement in the use of resources. This has been due to a number of obstacles that have severely handicapped our efforts, namely:

1.3 Obstacles to Conservation

In addition, much of the natural scientific and environmental research being conducted is not focused specifically on environmental problems. Given the critical problems which do exist, the emphasis should be on research activities that can contribute to addressing these in as practical a manner as possible. If such an emphasis is not achieved, there probably will be no remaining 'natural' environments to study that are not severely degraded.

the informational and institutional base that is necessary to address the roots of the prevailing problems. In short, there are few coordinated efforts in pursuit of specific goals.

better integration of plans must be achieved and this requires a new cross-sectoral coordinating agency.

Lack of Environmental Legislation

Although there are a number of sectoral laws and regulations and a number of directives from the party on environmental issues, these laws are hardly known let alone implemented. There is still no overall law of the environment (a draft of such law has been prepared and is still under consideration) and no legal requirement to ensure that development is planned in a way that minimises or avoids doing damage to the environment or to other production systems.

Lack of Reliable Information

Vietnam, a long narrow country with many remote regions, has a poorly developed communications system. It is difficult to collect detailed information about the environmental conditions in many areas and to disseminate information to remote places. There are insufficient financial resources to check on the accuracy of existing information. Information on environmental conditions is not a luxury, but is a vital ingredient in sound resource-use planning. Therefore, more effort must be put into the collection, storage, analysis and dissemination of relevant information.

Lack of Conservation Awareness

As a result of difficulty of collecting environmental information from many parts of Vietnam and the inability to make such information generally available, there is an overall lack of public awareness on environmental problems confronting the country. Those scientists who are well aware of the environmental problems are not being adequately heard by either the public or government planners. One of the main functions of the NCS is to tackle this lack of conservation awareness.

Shortages of Experienced Manpower and Investment

Although the government has been aware for some years that the problem of increasing wastelands is a matter of considerable concern, and that large-scale reforestation must be carried out, the country is not well equipped to tackle such an enormous task. This is not only because the country is poor and lacks the financial resources, but also for want of experienced manpower in the environmental field. While considerable training investments and land management changes will be difficult for Vietnam to finance, they are nevertheless vital to the restoration of a stable, productive environment for the future welfare of the country.

Population Growth

In spite of the fact that the Government realises that the population is too large and has therefore introduced a major birth control programme, population continues to rise rapidly. Producing food and fuel for this uncontrolled population puts severe pressures

on the resource bases. Every small improvement in land use is quickly overtaken by additional people to support.

Lack of Cultural Taboos

The people of Vietnam are not restrained in their consumption of natural resources for food and other purposes by the dictates of religious, moral or traditional taboos. The great respect which previous generations showed for the balance of natural forces and all living things including the forest spirits, has been lost or forgotten as a result of the terrible social upheavals that took place during thirty years of war and because of the sheer demands of the growing population for more immediate production.

CHAPTER II

INSTITUTIONAL, LEGISLATIVE AND POLICY FRAMEWORK

2.1. Establishment of Environmental Authority

All countries have to grapple sooner or later with the challenge of institutionalizing Environment under One Authority; international experience suggests that this is the most effective way to ensure that environmental concerns are given appropriate consideration in national planning for development. The objective is for this institution to have enough power to realize the pursuit of national environmental goals, effect a horizontal integration of different relevant sectors for the planning and management of natural resources, and monitor vertical implementation of environmental legislation, without being too cumbersome.

2.1.1. Establishment of Environmental Authority

a. Central Environmental Organisation

In parallel with the rise in value put on environmental quality, both as a long term economic guarantor, as a scientific, aesthetic and spiritual focal point, and as a global necessity for survival, an appropriate central institutional form is required.

In South East Asia, several institutional models have been tried for the environmental "cross-sector", and together they offer valuable lessons: first of all, most fail in effectiveness because (i) the institution is not given enough power, nor status; and/or (ii) it is too cumbersome and self-contained like a ministry or large department, with resulting inability to effect a cross-sectoral mandate.

It is therefore recommended that Vietnam establish a special administrative body at a supra-ministerial level (such as a State Committee for Environment and Sustainable Development) with full decision-making powers on all environmental matters. However, the establishment of such a body will depend upon several factors which need to be discussed in detail. This body should have an organizational set-up as outlined below:

Position & mandate of the State Committee for Environment and Sustainable Development (SCESD)

SCESD should be directly under the Council of Ministers, and be invested with full decision-making powers on all environmental matters. The mandate of the SCESD

should be to develop environmental policies and legislation; to facilitate and monitor its implementation; to manage environmental information; to promote environmental awareness; to establish research priorities; and to fund them.

Structure of SCESD

The Chairman of the SCESD should have ministerial status, and be a member of the Council of Ministers. The membership of the SCESD should consist of ministers of relevant sectors and of professional staff selected from both the main ministries involved, and from national experts in different fields of the environment.

The permanent staff of the SCESD should consist of around 32 professionals and 7 managers in the following divisions: Integrated Planning and Policy Development; Legislation; Implementation, facilitation and monitoring; Information, Communication and Publication; and a Research Council.

The SCESD would also utilize, as required, any number of environmental experts from different disciplines via ad hoc committees and working groups. Furthermore, the SCESD should be supported by an Applied Environmental Research Unit (AERU), staffed with around 5 managers and 50 professionals, with responsibility in five areas: Monitoring; Integrated Techniques for Sustainable Development; Ecosystems Dynamics; Pollution Control & Waste Management; & Education/Training/Awareness Raising.

Terms of Reference of SCESD

Integrated Planning and Policy Development Division:

Design and lead an integrated cross-sectoral horizontal planning process, via multi-sectoral planning committees, for

- the sustainable development of natural resource sectors:

- environmental land zoning at:

central

provincial

district

commune levels

Develop Environmental Policies that will aim at

improving the quality of life of the people,

- restoring and preserving natural ecosystems,

- ensuring a sustainable development of the renewable resources

Environmental Legislation Division:

Develop environmental legislation, with guidelines and procedures regarding:

- suitable environmental quality standards
- environmental impact assessment procedures
- protected areas and wildlife
- land zoning

Implementation Division:

Design a vertical implementation process (to complement the bottom upwards planning) from the central government to:

- provinces
- cities
- districts
- communes

Facilitate the initial implementation of the process;

Monitor the implementation on a regular basis.

Information, Communication and Publication Division:

Design and coordinate a national information management system:

- information network design and coordination
- information storage and retrieval

Communicate & publish on environmental issues and initiatives:

- national information exchange management
- international information exchange management

Environmental Research Council:

Establish and fund research priorities (listed in Annex I) through direct contracts with various research centres and institutes; the AERU should be funded separately.

Develop environmental research management guidelines to promote cooperation among researchers from different centres and institutes, increase exchange of information, minimize duplication of effort, and increase interdisciplinary integration by:

- establishing of mandatory exchanges of Vietnamese researchers, for a few months to a year, between Vietnam's research centres, institutes and universities;
- providing multi-disciplinary research contracts that must be shared among a few research institutions;
- organizing both uni-disciplinary and pluri-disciplinary regional and national workshops;
- organizing international workshops;
- fostering the utilization of the Environmental Information Centre for both national and international information exchange;

Terms of reference of AERU:

Environmental Monitoring Section:

Design and manage a comprehensive national environmental monitoring system;

- planning stage:

- establishment of precise objectives
- design of data collection and standardization

- data collection:

- GIS

- remote sensing, etc.

- data analysis:

- translation, analysis & synthesis

Sustainable Development and EIA Section:

Develop appropriate technologies, based on sound environmental principles, for the sustainable development of all sectors;

Develop environmental guidelines for each development sector;

Develop, where necessary, integrated sustainable development plans for different regions;

Review EIA reports, recommend mitigation measures and provide guidelines and terms of reference for relevant EIA studies and preparation of reports.

Pollution Control and Waste Management Section:

Develop appropriate techniques for solid waste collection and disposal or recycling/reuse;

Develop waste recycling and reuse techniques;

Develop pollution control technologies.

Ecosystems Dynamics Section:

Develop baseline data for terrestrial, freshwater, coastal and marine ecosystems; such data should focus on the most necessary information essential for management purposes;

Study ecosystems dynamics, and identify indicator species for monitoring purposes;

Develop rare, endangered and threatened species lists;

Recommend priority areas for habitat protection;

Education, Training, Extension and Awareness Raising Section:

Oversee Environmental Education, training and extension;

Promote and coordinate environmental awareness raising campaigns.

Condition of success of the Environmental Institution Proposed:

The success or failure of the recommended State Committee for Environment and Sustainable Development and of its Applied Environmental Research Unit, depends entirely on the level of expertise and capability of the professional and managerial staff assigned to it, not to mention the political will to follow its recommendations.

b. Regional Environmental Organization

Although there is no tradition in Vietnam of any regional government authority, it is strongly recommended that the SESDC establish regional intersectoral advisory committees to coordinate and monitor the implementation of environmental legislation by the provinces, for the proper implementation of EIA regulations, guidelines and recommendations.

Regions should be delineated according to ecological and socio-economic areas; provinces that suffer from non-sustainable development patterns of neighboring provinces would have a mechanism to attempt to solve a conflict of interest;

Such regional committees would provide an early warning system to the SCESD.

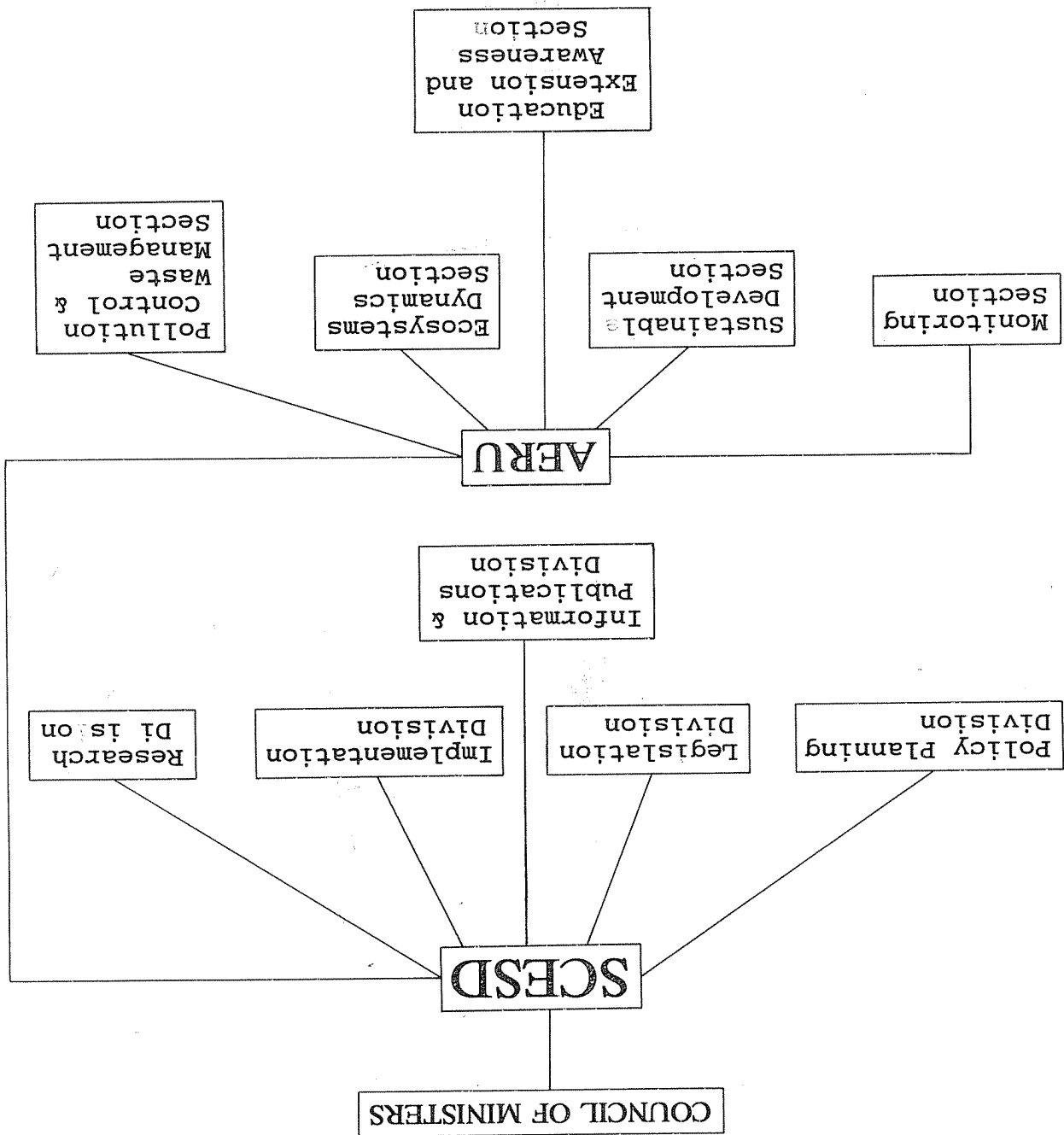
c. Provincial Environmental Organization

At the provincial and district levels, an appropriate environmental organization will also have to be developed. Since the provincial, district and city People's Committees are powerful and autonomous as implementation authorities, they are the crucial focal point for the integration of the central top-down planning with the grass-root bottom-up planning.

Districts are the prime tax recipients from grass-root revenues, which provides them with decision-making power for selecting and funding land-use proposals submitted by the people. The province, on the other hand, has the power to approve or reject the pre-selected proposals on technical basis; as technological guidelines are developed by the research institutes, it is the responsibility of the central government to communicate them to the provinces. The crucial issue at this level as well as for village/commune level is the promotion of environmental awareness, training and a solid extension system (See Section 4.1 4 for recommendations on Extension).

It is thus essential that at both the provincial and district levels, an appropriate environmental organization and efficient mechanism be developed to integrate national objectives regarding the conservation and sustainable development of natural resources, with the grass-root planning by individuals and communes.

ORGANIZATION OF THE ENVIRONMENTAL AUTHORITY



2.2. Development of Environmental Policy and Law

2.2.1. Development of Environmental Policies

An important function of environmental policies is that they help stimulate political will in support of environmental objectives. In doing so, they can pave the way for the integration of sustainable development objectives into the strategies and programs of each sector and thereby serve to integrate the sectors themselves.

A general policy on the environment has already been framed.

Additional, more specific, policies will also be necessary, to provide guidance in preparing legislation and developing strategies, programs and standards for specific sectors or problem areas, e.g. agriculture, transportation, energy, hazardous waste, etc. Among other goals, these policies should seek to provide explicit direction on the relative weight to be placed on environmental concerns when preparing strategies and programs within the sector in question.

2.2.2. Development of Environmental Legislation

A mission on environmental law in Vietnam was undertaken to study the status of legislation on the environment, including its enforcement, and to prepare recommendations and assist the country in formulating a comprehensive system of environmental legislation. The mission concluded that the existing legislation does not form a major obstacle to promoting conservation for sustainable development; in fact, certain extant elements actually provide for conservation, in particular by preventing the loss, damage or waste of land, vegetation and wildlife.

In addition, a draft Environmental Protection Law has been prepared which pertains directly to environmental protection and which emphasises on conservation as an aid to development. More specifically, the proposed law gives the Council of Ministers the right to require that environmental impact assessments be carried out on planned development projects. However, several weaknesses can be identified in the proposed legislation.

a. Environmental Impact Assessment (EIA)

The requirement for an EIA in relation to a given project remains entirely subject to the discretion of the Council of Ministers. This likely will foster a situation in which the application of EIA is commonly disregarded when other objectives are considered of higher priority.

There should instead be provisions requiring consideration of environmental factors in the laws that govern the planning of development projects, for instance, in mining, energy, fisheries, development of new settlements, etc. The Land Law of 1988, for example, could specifically require some degree of evaluation of the likely impacts of a new factory prior to its approval.

Ideally, EIA also should be required in relation to broader, forward planning programs, such as five-year development plans. This will help guard against the application of EIA on an *ad hoc* basis, as is so common elsewhere. Simplified systems for EIA can and should be adopted.

b. Environmental Standards

The legislative framework which ultimately is developed also should address environmental standards, for example on acceptable pollution loads. The level of environmental quality in Vietnam with respect to pollution is presently good, primarily because little industrial development has occurred to date. However, there already are traces of groundwater pollution in certain areas. Nevertheless, the country remains in a uniquely good position to learn from experience elsewhere by ensuring that environmental standards be developed before rapid industrialization takes place. This suggestion is particularly worthy of attention at this time because Vietnam is on the threshold of rapid industrial development; it should actively prepare itself to manage the effects of such a process.

c. Establishment of Protected Areas

Legislation for the establishment and management of reserves will need revision and enactment. Knowledge of such new legislation, well in advance of its enactment, will have to be disseminated not only among the regional judiciary and police authorities, but a mass media campaign should also inform the public at large. Following the recommendation of a FAO review (1990), the existing system of protected areas should be enlarged by the Ministry of Forestry to 2.5 million ha. Priority for the selection of protected areas should be given to those areas containing a concentration of endemic species, rare species and those habitats that are most seriously threatened by current patterns of land use. There is a serious back-log in the production of feasibility studies which must be completed and approved for each area before a development budget can be released by government, this planning process must be accelerated. In addition, the development of new skills for the management of these areas will have to be encouraged among the staff of the Ministry of Forestry through an intensive training programme.

d. Integrated Land Zoning

The development of an Environmental Law should incorporate provisions for enacting a National Land Zoning Plan for specific types of targeted development, such as light

e. **Action Plan Implementation**

and heavy industry, tourism, residential areas and nature conservation. As it is essential to restrict polluting industries to a pre-determined site, development has to be carefully controlled and regulated through the development and enforcement of such an integrated zoning plan. Such regulations should be revised every three to five years.

The legislative framework that is developed should also provide for legislative authority to implement the Action Plan described within these pages, along with other plans as developed by appropriate national and sub-national authorities.

f. **International Law**

In terms of international law, SRV should become party to some additional international conventions (See Section 4.2.2 for further details). These would provide some of the basic standards to be legislated.

A Working Group on Environmental Protection Law has been convened and is based in Hanoi. But in light of the needs described above, an effort must be made to hasten the process of developing appropriate environmental legislation, including regulations. A qualified lawyer should be hired as a full-time secretary to the Working Group. A training program in environmental law for Vietnamese lawyers, such as that being followed in Indonesia, would also be useful in this regard.

2.3. **Data Collection, Information Management & Networking**

In an era of information explosion, comprehensive, reliable and timely information and database on environment and its resources is crucial for establishing policies, decision-making and planning of the development and management of natural resources, and there is a great dearth of information in Vietnam which could be used for this purpose. Lack of information and data also affect promotion of environmental awareness so that it becomes difficult to fully involve and integrate the common man in environmental protection activities.

Even in those cases where information is available, such as in the case of forestry, there are serious questions regarding the reliability and accuracy of the available data. This is caused partly for lack of accurate surveys, but mainly because of the confusion about the exact definitions of the resource sub-classifications in question, e.g., the types of forests. Before any attempts to improve the database, it is therefore very essential to give exact technical definitions of the resource on which data is to be collected. Although more accurate techniques such as remote sensing technologies have been introduced for resource evaluations, they have so far been tried mostly on a pilot basis and are yet to be applied on a country-wide basis.

Information is even more important in the case of the environment, to estimate the gravity of the problems, to forecast its trends, to plan mitigatory measures to tackle the same and last but not the least, to accurately estimate the costs for environmental rehabilitation. Usually, it is the environment that suffers for lack of proper planning for this reason. The need for information is also the greatest in this area.

Quality of the limited available data is another problem area, as it is almost impossible to check its accuracy in most cases, because of the weak information collection system, which is mostly not standardised and systematic. The mode of storage and retrieval of the available data also leaves much scope for improvement. The institutional set-up for efficient dissemination of the data is also weak, to say the least, mainly for shortage of trained personnel in this field. Altogether, there is a great need and scope for improvement in the field of environmental data collection, storage and dissemination.

The National Information and Documentation Centre (NIDCST), as the main body of the national science and technology information system, is one of the country's major information centres, and performs the functions of coordinating and managing the country's science and technology information activities and information services. NIDCST operates two special networks in the field of environmental information, namely, Vietnam INFOTERRA Centre and ENSICNET - Vietnam, an information network on environmental sanitation and water supply.

NIDCST has two information centres at the national level, more than 40 information centres at the ministerial level, about 40 provincial and city information organizations, more than 140 information units and more than 500 libraries located at various research institutes, universities and colleges. Activities of this network cover all diverse aspects of environmental information in Vietnam. The bibliographical database of many environmental and closely related areas are also stored at NIDCST. The Vietnam INFOTERRA Centre was established over ten years ago and is presently operating under the State Committee for Sciences. The Centre has recently been improving its capabilities for the development of a national information database and enlargement of information network, as well as improvement of the quality of data. Sixty three information sources have so far been developed throughout the country. The Centre is expanding its information dissemination capabilities and two conferences on environmental information management have been held so far.

NIDCST is also the national focal point of ENSICNET, which is a regional network for information exchange on environmental sanitation and water supply. The network is composed of 20 participating institutions working in related areas, such as water and wastewater treatment, waste management, reuse of domestic and industrial wastes, biogas production, agriculture, irrigation etc.

Considering the crucial importance of information to the entire development process, policies are needed to strengthen the information collection and management system as a whole, including the following:

- a. Establish a nation-wide comprehensive network of reliable environmental information and data sources, to collect and relay qualified and quantified data on the present status of natural resources, their utilization trends and its impacts, as well as its socio-economic significance to the local community;
- b. Develop a standardised scientific methodology for the collection of environmental information suitable to the situation and characteristics of the resources in the country and establish a training programme for the above sources;
- c. Develop a system for testing the accuracy and reliability of the collected information and data through ground truth check etc., and adopt a standard database framework for processing and managing the same;
- d. Improve the efficiency of the evaluation, assessment, analysis, storage and retrieval of the information and data by adopting appropriate and modern information technologies;
- e. Improve the information dissemination system, particularly focusing on decision and policy makers, and planners, to ensure that environmental concerns are given appropriate consideration in the development process;
- f. Develop environmental awareness promotion campaigns for the public to maximize the use of the collected information, and to achieve the participation of the public in environmental protection;
- g. Provide training to the national environmental information managers to improve upon their performance and develop national expertise in this field;
- h. Strengthen, reinforce and upgrade the existing environmental information networks so as to improve upon their overall efficiency and performance; and
- i. Strengthening of collaboration with international and regional environmental information sources and to facilitate free flow of environmental information in both directions.

2.4. Integrated Planning of Resource Development

The system of resource (including land) planning and management in Vietnam is, in practice, strongly decentralized. Provinces and District organizations maintain a substantial degree of authority over how resources are developed and utilized, with little effective influence of the national government.

The current process of economic reform can be expected to further intensify such decentralization. Among other initiatives the reform process has already involved the restoration of a system of 'family farms' and will lead to greater decision making power over production, as well as employment, by enterprises (in the state-owned industrial sector) and households (in agriculture and private industry).

Decentralized management and planning in relation to resource use clearly offers some advantages. In particular, it allows for decisions and strategies to be made on the basis of more direct, local familiarity with the constraints and opportunities of a given area, as well as with the needs of the local population.

However, sustainable development requires that resources be developed and utilized in an integrated manner. This entails taking into account broader national objectives, regional differences in income and endowment, the effects of one sector on another, and the impacts of activities in one area on another area (e.g. upstream-downstream effects). Some form and degree of effective centralized influence over resource use patterns is therefore needed. This need will become increasingly important if privatization programs intensify; hopefully it can be met through development of the planning and management framework proposed in the present document.

2.5. Sustainable Development Strategies at the Sectoral Level

Pursuant to the above-described need for an integrated approach to planning and management of resource use, this section deals with how such integration can actually be achieved. Required in this regard are: (1) strategies within each sector that do not conflict with those of other sectors; and (2) sectoral strategies that serve to reinforce each other and thereby form part of a broad, coordinated, program in pursuit of key objectives of sustainable development.

The following sub-sections contain guidelines for developing strategies in each sector which will meet these requirements, and which should be promoted more actively and effectively in all regions of the country.

It is worth emphasizing at this juncture, however, that regardless of how well such resource management strategies are formulated and implemented, the degree to which most of them can achieve positive results will depend completely on whether population

control programs are effective. If the latter remain ineffective, sustainable development has little chance of taking place. This point is covered in greater detail in section 3.1.

2.5.1. Agriculture

The need for improvement in the agricultural sector cannot be overemphasized, for a variety of reasons. First, the importance of the sector is such that it accounts for 49% of national income and 62% of employment. Increased food production therefore is critical as a means to improving presently inadequate nutritional levels and overgrowth of life.

Second, current cultivation practices in many areas are destroying the resource base on which agricultural development depends. In part this stems from the policy of encouraging the migration of Kinh people (the ethnic Vietnamese majority) from lowlands, to "new economic zones" in the highlands, but without an effective shift in the cultivation systems used.

In addition, agricultural improvement is needed to relieve pressure on upland areas; essentially, it forms a prerequisite to sustainable rehabilitation and protection of the country's watersheds and forest lands.

The strategies in the agricultural sector should be based on the following primary objectives: 1) The intensification of agriculture in lowland areas and other prime lands; and 2) the development of sustainable hillside cultivation systems.

Agricultural Intensification

Agricultural intensification will help reduce the need to cultivate in areas less suited to such use and thus more prone to degradation. There is room for substantial increases in production through removal of disincentives, along with other mechanisms and reforms, as proposed by a variety of agencies. Land tenure reforms that have been implemented since early 1980's have already helped to stimulate production.

However, efforts to increase production should, to the greatest degree possible, avoid the use of harmful agrochemicals and other inputs (See Section 3.3.2). Among other effects, chemical use in lowland areas poses a considerable risk to freshwater and coastal fisheries and to aquaculture. Other approaches clearly exist, where sectoral rehabilitation, rather than expansion is clearly the priority need. These alternative approaches would seek to maximize benefits of multicropping and other such techniques to improve farmer incentives, and to minimize post-harvest losses and other structural inefficiencies. According to the World Bank, for example, "attention to small-scale processing promises the greatest overall improvements in productivity."

Given the high capita/land ratio in Vietnam, the low level of industrialization, and the rapid population growth, the need to cultivate in hillside areas is not going to entirely disappear even with substantial production increases on prime lands. A great deal of attention therefore must be paid to developing and promoting sustainable cultivation systems for hillside areas. Some combination of agroforestry, contour planting, tree cropping, and terracing will be involved, depending on the prevailing specific conditions. Traditional systems of agroforestry already exist in Vietnam, such as the taungya system and the gardening component of the VAC land use system which involves the integration of gardens, fish ponds, and cattle rearing (lyon, ao, chung). These and other traditional methods can be transformed with a view to increasing their productivity. Among other functions, the systems developed and promoted must serve to accommodate some of the groups involved in resettlement programs by offering them a better and more sustainable alternative to returning to shifting cultivation and other destructive practices.

2.5.2. Forestry and Wildlife

Forests of Vietnam have suffered severe damage over the last 50 or so years. According to one account, some 60% of Vietnam's total land base was covered with forest in 1943, while this figure had dropped to well below 30% in 1987. Clearing occurred first in coastal and lowland areas and then progressively extended into the hills and mountains. The process has been accelerated as a result of war damage to both agricultural and forest areas, and by rapid population growth. At present, only about 9.6 million ha of the total of 19 million ha classified as forest actually remain under forest cover. A description of the country's natural vegetation types and of the extent of deforestation in different areas is provided in the National Conservation Strategy Report.

The current loss of forests is estimated at about 200,000 ha per year. Some 50,000 ha of this deforestation stems from unplanned agricultural clearance. Another 50,000 ha is lost to forest fires, while the remainder is destroyed through the collection of both fuelwood and timber. Current reforestation efforts of 50,000 to 100,000 ha per year are not keeping pace with the rate of deforestation.

It is clear from the above that in order to improve this situation, a variety of measures are required, only some of which pertain directly to forest management *per se*. For example, population control is a critical requirement to relieve pressure on the forest resources, as is the intensification and improvement of agriculture, and the development of alternative energy sources and improved energy efficiency.

But in terms of forestry measures, the following sectoral strategy objectives are critical and thus in need of further attention:

Marine fish production currently stands at about one million tonnes annually while that of shrimp at 40-50 thousand tonnes. However, inshore fisheries in the north and south

Vietnam has an extensive and well-distributed system of rivers, streams, lakes, and ponds with great potential for fishery development, estimated at 20-30 thousand tonnes per year. Given the significant potential for increased production and thus dietary (protein) improvements, freshwater fish culture is being encouraged, particularly in the midland and mountain regions where no seafood are available. Inland fisheries presently are closely integrated with rice and other farming systems. Unfortunately this has led to adverse effects on some of the fisheries from agrochemical use. The by-products of herbicide spraying during the war has also resulted in negative impacts.

2.5.3. Fisheries and Other Aquatic Resources

Ministry of Forestry has begun a program to allocate the country's forest lands on the basis of the following classifications : Special Use Forest (including national parks, conservation areas, etc.), Protection Forest, and Production Forest (for commercial logging purposes). The production forest classification has been applied to 64% of the country's total area of forest land, but only about half of it is actually forest-covered at present. In the interest of watershed conservation and habitat protection, no commercial logging should be permitted in this zone, until such time that the area of forest within it has been expanded significantly through reforestation efforts.

- The discouragement of large-scale commercial logging in remaining areas of natural forest; commercial logging should be focused only in plantation forests that have been established for such use.
- The promotion of agroforestry, as part of a joint program with agricultural staff.
- Stronger programs for forest area protection, both to conserve existing forest and reforested areas, and to allow for natural regeneration of degraded areas. In many cases, the success of such programs will depend on the establishment of tenure systems which ensure that communities have a direct interest in protecting and managing forests on a sustainable basis.
- An intensified program of reforestation and afforestation, including the establishment of forest plantations to provide both fuelwood and timber. For environmental reasons, planting efforts should aim for the development of mixed forests of indigenous species, rather than monocultures and the use of exotic species. Experience in Vietnam indicates that a number of local species are well suited for reforestation, plantation, and agroforestry programs.

are likely being overfished as the catch per unit effort is decreasing. Some of the fishing techniques employed are extremely damaging to the resource base, e.g. dynamiting of reefs.

In light of the above, the following are suggested as key elements of the strategy in the fisheries sector:

- Expand efforts aimed at promoting freshwater fish culture, as a means to increase protein intake and income.
- The use of potentially harmful agrochemicals should be actively discouraged in favour of other pest control systems, particularly in areas where freshwater fisheries are important.

- Implement measures to prevent the use of destructive fishing techniques and to reduce fishing pressure where it is excessive.

- As a means to reducing fishing pressure in inshore areas in the north and south, develop the capability among fishermen (e.g. gear, navigation skills, fishing technology) to harvest the relatively unexploited deep sea fisheries and those of the reefs further offshore. In doing so, it should however be ensured that the level of such exploitation will be sustainable, based on reasonable stock assessments, which are yet to be made. The presence of several zones of water (and thus nutrient) upwelling suggests the existence of several areas with high fishery potential.

- As another means to reducing fishing pressure, develop the significant potential which exists to culture a wide variety of sea products along the coastline. Conservation of mangroves, estuaries, lagoons and reefs will be important in this regard, as well as in protecting the country's natural marine fisheries (See Section 3.4 on coastal zone management).

2.5.4. Water Resources

A reliable supply of freshwater is a critical factor in relation to human health and overall quality of life, particularly for domestic use, agriculture, industry, transportation, hydro-energy and the supply of edible aquatic products. The country's hydrological regime is dependent upon all other life support forms. Development of water supplies is thus an ongoing effort in Vietnam, and one which has made significant progress, both in urban and rural areas.

However, several trends in the country manifest a growing risk to the supply of reliable and safe water in certain areas. These include, in particular: watershed degradation

- Ensure that water resources planners remain informed about future land use plans (e.g. for industrial development, mining, etc.) so that the development of new water supplies can focus on sources that are least likely to become polluted in the future.
 - Adopt water quality standards in relation to particular uses, e.g. drinking, recreation and fishing etc.
 - Promote the prevention of water pollution via standards and controls on industrial effluents, proper systems of sewage treatment, (See Section 3.3 for details).
 - Ensure that a high priority is placed on integrated watershed management (See Section 3.2 for details).
- The strategy in the water resources sector should therefore seek to:
- Water pollution from biological wastes is a very serious problem in some areas. For instance, Hanoi city releases several thousand cubic metres of untreated sewage, containing organic toxins, bacteria and parasites directly into sewage and ponds every day. Ho Chi Minh city discharges hundreds of thousands of cubic metres of sewage into the Mekong river and canals system. It is estimated that as population and industries develop in these cities over the next 15 years, the water demand will rise to 8 thousand million cubic metres per year and the amount of wastewater will rise to 5-6 thousand million cubic metres per year.
- Current use of water resources is often inefficient and many water resources have been allowed to dry up owing to mismanagement of the catchment areas. For example, high levels of sedimentation reduce the efficiency of irrigation canals and shorten the lifespan of dams and reservoirs. Thac Ba reservoir receives about 2.5 million tons of silt per year. Da Nhim reservoir has recently dried up with not enough water in the dry season to produce electricity. The reservoirs of Cam Son, Song Hieu and Boc Nguyen dried up within ten years of their construction. Water levels of many rivers and streams in Diliuh, Tay Nguyen and Vinh Phu have markedly decreased against their former levels and water tables have dropped steeply in many areas. The investment for tapping the large hydro-electric potential in the country is thus being wasted by poor management of the catchment areas.
- from deforestation and unsuitable cultivation practices; and the pollution of surface and ground water resources from sewage, industries, and agrochemical use.

2.5.5. Mining

Due to its geological and geographical position, Vietnam has a wide range of minerals, including many rare and valuable deposits. More than 80 mineral types have been evaluated and classified at different levels.

ENERGY MINERALS:

- Anthracite coal has the reserve of millions of tons
- Brown coal in the Red River basin has reserves of a hundred million tons.
- Fat coal and peat have reserves of a hundred thousand tons.
- Uranium Ore has good prospects
- Oil and Natural gas have been found and should be given appropriate investment for exploration and exploitation

METAL MINERALS:

- Iron Ore has reserves greater than one milliard tons, Thach Khe is the largest deposit site.
- Coastal titanium placer has deposits of ten million tons.
- Manganese Ore in Cao Bang, Ha Tuyen has reserves of a million tons.
- Chromite Ore in Thanh Hoa, has reserves of ten million tons.
- Copper Ore in Hoang Lien Son, Son La has reserves of one hundred thousand tons
- Tin and Wolfram Ore in Cao Bang, Ha Tuyen, Bac Thai, Nghe Tinh, Lam Dong has reserves of one hundred thousand tons.
- Bauxite Ore in the South Plateau has the reserve of millions of tons.
- Rare Metal Ore in Hoang Lien Son, Lai Chau has the reserve of about ten million tons

In addition there are also deposits of Mercury, Molybdenum, Gold and Silver. Non-metal minerals are diverse. There are more than one milliard tons of Apatite in Lao Cai, ten million tons of Quartzite, and Graphite etc. Construction materials have good prospects, especially clay for brick making, sand for glass making and limestone for cement making. Decorative stones and fire resistant material have further potential.

Prospects for mining precious and semi - precious stones especially Sapphire and Ruby should also be given appropriate investment.

There are hundreds of sources of thermal and mineralized waters. At present, there are only 300 deposits of more than 30 mineral types which have been exploited or introduced into exploitation projects. During the past 30 years, there has been more than 100 million tons of minerals of different types which have been exploited (excluding ground water and construction materials).

In the process of exploration, exploitation, processing and consumption, the losses of minerals have exceeded the permitted norms: Tin: 22% - 24%, Cromite: 46% - 48%, Iron: 16% - 24%. Many mines of gold, wolframite, tin, and coal are being exploited illegally. Many rare minerals are used wastefully. The sites for discharged rocks are unsuitably located and have caused modification of reliefs, natural landscapes and pollution of the water sources. An example is the mining of tin and coal deposits. Inefficient processing of minerals, pollutes the environment, as well as wastes many accompanied elements.

ACTION PLAN

1. Development and promulgation of a Mining Law.
2. High priority should be given to develop the mineral exploitation and processing sectors.

3. Selection and application of the appropriate mining technology, diversification, of the modes and forms of mining and mineral processing in order to rationally utilize mineral resources and protect the entrails.

4. Promotion of the fundamental principals and application of the mining economic science according to the market economy.

5. All mining projects should include environmental protection policies.

2.5.6. Energy

The energy use patterns have substantial implications for the environment. A key broad objective for a sustainable energy policy is efficiency maximization or energy conservation e.g. maximization of benefits derived from a given unit or source of energy. In a large measure the achievement of energy efficiency is a function of the degree to which it is considered in the planning and policy development of all sectors such as transportation, community planning, industry, and tourism. Through an integrated approach to energy planning, the need to expand energy supply can be reduced, which

Vietnam has a large, albeit largely untapped, hydro-power potential. This potential derives essentially from the water resources of the two river delta systems which dominate the country's hydrology; the Red River Delta in the north and the Mekong Delta in the south. Power potential from hydro-energy in Vietnam is estimated at 260 billion kwh per year. The Red river system has the highest proportion of this total (37 per cent), followed by the Da river system (19 per cent) and Dong Nai river system (14

per cent). Offshore oil was found in 1983 and exploitation began in 1986 with production of 40,000 tons. There are also deposits of oil and natural gas to be explored in the Mekong Delta and the continental shelf of Nam bo. Production rose to 280,000 tons in 1987 and 680,000 tons in 1988. Outputs in 1989 was 1.5 million tons, or around 30,000 barrels per day, and the 1990 target of 2.5 million tons has already been achieved. Vietnam imports about 2.5 million tons of oil products annually. Consumption is around 50,000 barrels per day.

Coal is the main mineral being exploited currently, of which Vietnam has proven reserves of between 3 and 3.5 billion tons and potentially larger total reserves. The output is sufficient to meet domestic demand and leave a surplus of between 500,000 and 700,000 tons for export.

Vietnam's energy reserves consist of (1) the extensive coal reserves located in Quan Ngai in the north-east; (2) the offshore oil and gas field located approximately 200 km off the south-east coast; as well as a small gas field of indeterminate size in the province of Thai Binh, 80 km south of Hanoi; (3) considerable and widespread hydro-power sources; and (4) fuelwood.

The major sources of energy in Vietnam are oil, coal, hydro-power and timber (charcoal). Wood and charcoal are important sources of fuel for the vast majority of the rural population, as mentioned above, and for much of the urban population. For the urban industrial sector, coal is the dominant source of energy at present. Since 1975, electricity generation has received a high priority.

At present, Vietnam is among the world's smallest consumers of energy on a per capita basis compared to countries at a similar stage of development. Seventy (70) per cent of the Vietnamese population living in the rural areas suffer from chronic problems of development caused by shortage of energy supplies. Fuelwood harvested from natural forests is the main source of rural energy (60% of total) which brings about environmental destruction. This harvest is, however, only a small percent of the bio-energy that could potentially be exploited. Domestic fuel needs in areas with no access to forests are met largely through burning rice stubble and other agricultural wastes, a process which removes a potential source of minerals from the soil.

is very desirable because an increase in energy consumption tends to carry with it the potential for significant environmental costs. Hydro projects, coal or oil-fired generating plants, nuclear power stations, and increased fossil fuel use, are all cases in point. Thus the key is to minimize the need for such projects and trends in the first place.

Finally, all energy projects must also incorporate an Environmental Impact Assessment (EIA) during their planning stage, in order to integrate environmental considerations

proposed project. During the planning stage, all development projects including buildings, tourism, road construction, industrial facilities and land use planning should undergo an Energy Efficiency Assessment (EEA). EEA will determine the energy related impacts of projects and analyze the potential for increasing the efficiency of energy use in the

Standards (CAFE) for the U.S. vehicles. established for all vehicles, such as, for example, the Corporate Average Fuel Economy to all equipment which uses electricity, and fuel economy standards should be efficient use of energy should be established through the development of energy efficiency standards for all end uses of energy. The

A key objective for a sustainable energy policy must be maximization of efficiency. The latter be given due consideration. As a rule, planning for expansion of electric supply should be conducted through an integrated resource planning process. This process will require an analysis of all potential sources of efficient use of electricity. New investments should follow the following general list of priorities: (i) conservation through efficiency of use such as more efficient cooking stoves; (ii) renewable resources; (iii) cogeneration; and (iv) thermal power stations. In comparing the costs and benefits of clean, renewable and decentralized energy sources with the traditional, non renewable, and/or centralized sources, it is important to ensure that the full environmental and social costs of the

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Energy planning in Vietnam has focused primarily on expanding conventional energy supplies rather than on improving energy efficiency. With some help from the industrialized world, however, Vietnam should apply technical energy-efficiency solutions to promote economic growth while keeping energy demand relatively low. This will mean adopting a host of energy-efficient technologies that are either already available commercially or could be commercialized in the near future.

Extraction of firewood in recent years has been estimated at 30 million tons per year, two-thirds in the north. The sustainable yield from various sources, including forests, woods, brush and grass lands, garden trees and agricultural wastes, is estimated at over 80 million tons per year. Nevertheless, since fuelwood collection has contributed to serious deforestation, it is recommended that only fuelwood plantations be utilized for this source of energy.

and in some coastal areas of Vietnam. Wind energy is used to a very limited extent in the Mekong delta

An environmentally sound management of transportation is a precondition for development. Environmental impacts of transportation, besides its energy consumption, are related to air pollution by exhaust emissions, noise pollution, impacts on land consumption, effects on water quality, soil contamination, deterioration of built environment and visual intrusions, which affect human health, senses and comfort, natural ecosystems and quality of life. Appropriate policies, formulated on a sectoral basis, such as industrial, energy, regional development and land use, financial and fiscal policies should thus all be integrated with transportation policies.

2.5.7. Transportation

Regarding oil and gas exploration and exploitation projects, it is essential that an EIA be carried out during their planning stage to ensure adequate protection of commercially important and endangered ecosystems. Furthermore, an oil spill contingency plan should be in place to look after emergencies of oil well blow ups.

The existing and proposed hydro-power projects are located in watersheds which are deforested or inadequately forested. This is a problem because soil erosion which silt up the reservoirs reduces their generating capacity, to control floods, and to provide irrigation water. Reforesting the watersheds of major hydro-electric projects will therefore extend their useful life significantly by reducing the rate of sedimentation.

The incidence of nose, throat and lung diseases is significantly higher in the affected communities. In the past, the Government provided a 10 per cent bonus to the workers and farmers in the vicinity of the plants as compensation for their hardships. Higher smoke stacks need to be built, electrostatic precipitators or scrubbers need to be installed, and other investments in pollution control equipment are required.

The coal-fired power plants throughout the country contribute considerable quantities of ash and sulphur dioxide into the air surrounding the plants. Even the plants constructed within the last twenty years have only minimal pollution control facilities. In addition to air pollution, no measures have been taken to properly dispose of the waste coal and ash from the burners.

The existing thermal plants are also major sources of pollution. The plants are polluting the surrounding countryside to the extent that agriculture is suffering. The only plans for the thermal stations in the north are to upgrade their performance and attempt to overcome some of the infrastructure and pollution problems. It is also hoped to upgrade the gas turbine and diesel facilities in the north.

into the engineering design of the projects and to ensure that mitigation measures are employed. Failure to do so will not only lead to negative effects, but will also undermine the feasibility of the project. The Hoa Binh Hydro project on the Da river is a case in point.

The transport system consists of about 105,500 km of roads, 2,630 km of railroads, 19,500 km of navigable inland waters, seven main ports, two international airports and several smaller domestic airports.

It is estimated that the country has about 74,000 motor vehicles and about 350,000 motor cycles (mid-1989). Bicycle is the main mode of passenger and goods transport. About one million bicycles ply in Hanoi alone contributing to over 90% of the total traffic and causing traffic congestion in some areas. Use of motor and rail transport is remarkably low because of low personal mobility. The transportation system in the country is presently in a poor state. Roads, railroads and bridges need to be upgraded in order to provide a more integrated transport system to link the urban centres more efficiently with their hinterlands.

The main inland waterways comprise about 2,500 km in the north mainly in the Red river system and 4,500 km in the south mainly in the Mekong river system. The major constraints are siltation and seasonal fluctuations in depth.

The major sea and river ports in the country are in a poor condition because of heavy siltation, antiquated equipment, outmoded management information systems and poor operational handling and warehousing facilities. The major sea port of Haiphong requires about 7 million cubic metres of dredging. The expansion of ports are also constrained by the surrounding high density urban development.

Water transport causes problems of water pollution in the rivers, estuaries and coastal areas, and is most severe in the harbour areas where traffic is densest. Polluted water often contributes to loss of productivity in aquaculture farms. In addition, there is a constant threat of oil pollution caused by collisions and oil spills, especially in the harbours and narrow navigation channels. Details of oil spill contingency planning is described under section 2.7.1.

The problem of increasing siltation is becoming serious in the rivers and coastal areas, and particularly in harbour entrances and navigation channels. This area needs urgent attention and large investments for dredging, considering the fact that maintenance and development of maritime navigation is crucial as a relatively cheap mode of goods transport for sustaining the commerce and economics of the country.

The transportation sector is one of the propellants of industrialisation. But without carefully integrated planning, it can lead to environmentally destructive and economically non-sustainable development. A strategy for the sector should therefore include the development of an integrated set of national policies; these should incorporate, among other things, enforcement of emission standards for vehicles and management of transportation demand, as well as land use zoning plans and environmental guidelines specifically developed for this sector. Socio-economic criteria should also be applied to all decisions regarding the modes of transport, considering the types of fuel, improved energy efficiency, propagation of environment-friendly substitutes for gasoline and diesel gas, adjustment of traffic density and efficiency to an acceptable

loading capacity of the environment, generation of funds for the development of environment-compatible transportation systems etc. As land transportation is an integral part of urban development and planning, the problems caused by noise and particulate air pollution (dust) also need to be taken into consideration. Research and development efforts for finding new energy to substitute petroleum fuels and reduce the level of pollutant emissions should also be enhanced.

Although aquatic pollution in Vietnam is mainly caused by land-based sources, pollution from water transport activities exacerbates the problem. This would best be tackled by the prevention of dumping of wastes (including solid wastes and engine oil) from the water craft and the construction of receiving and treating facilities for such wastes on land. Various actions and regulations to prevent water pollution from maritime activities have been detailed in the Conventions of the Inter-Governmental Maritime Organization, and the Government of Vietnam should become a signatory to these Conventions.

The problem of siltation in the rivers and coastal waters is getting worse mainly because of increasing deforestation and non-sustainable agricultural practices. This problem could therefore not be solved by periodic dredging only, but should be tackled through long-range integrated multi-sectoral action, involving oceanography, forestry, agriculture, energy and construction sectors, including, among other things, a detailed survey of siltation and current flow patterns, prevention of onshore constructions that could alter the natural current flow, stabilization of river banks and beaches with plant cover, massive reforestation especially in the upper watershed areas, soil conservation and stabilization through shifting cultivation with sustainable agricultural practices, etc.

2.5.8. Industry

In 1988 industry accounted for 30% of Vietnam's GDP and 14% of employment. The sector consists of centrally owned state enterprises, locally-owned (provincial) state enterprises, and the non-state sector made up of cooperatives and private firms. The emphasis of industrial development generally has favoured heavy industry. In the first half of the 1980's, about 80% of public investment in industry went to the heavy sector (including energy). Nevertheless, light industry continues to dominate. For example, textiles and food processing alone together account for about half of total industrial output and employment.

Information on industrial pollution has not been identified, but for several reasons it can be assumed that, in general, little attention is paid to pollution control. For one thing, it is noted that the industrial development focus has been on large, new projects, while little investment has gone to replacement and maintenance of equipment. This in turn would imply the existence of leaky systems and an absence of pollution control devices.

The following are strategy priorities suggested for Vietnam's industrial sector, as a means to contributing to sustainable and integrated development:

- Emphasize the development of light industry. According to the World Bank, past investment in heavy industry has been uneconomic and a higher return, particularly in the near term, will be achieved through light industry and export industries. Furthermore, light industry tends to be less polluting as well as more conducive to employment generation.
- In planning for the development of light industries, make an effort to locate such industries in areas where pressure on the land by cultivators is excessive and is thus resulting in land degradation. Such land pressure frequently results from population densities which exceed the land's carrying capacity (See Section 3.1), thus an important means of relieving this pressure is the creation of alternative employment opportunities for those who presently have no choice but to rely solely on cultivation for their subsistence.

- Develop legislation and mechanisms which provide for integrated land use zoning. Carry out such zoning to ensure that industrial, as well as other land uses, are sited in a pattern which helps to minimize impacts on sensitive environmental features and on adjacent land uses (e.g. residential areas, recreation areas, etc.).

- Develop standards and systems for industrial pollution control and waste management (See Sections 2.2.2 and 3.3). As noted earlier, since SRV is not yet too industrialized relative to many other countries, it is in the fortunate position of being able to develop such standards and systems before it is too late. This is a unique opportunity which should not be neglected, particularly because the country may well be on the threshold of a period of rapid industrialization, a process which must be managed in order for it to be non-destructive and thus sustainable.

2.5.9. Tourism and Recreation

The Government has, in its Law on Foreign Investment promulgated in 1988, designated five sectors of the national economy as having high priority with respect to foreign capital. Among them is the foreign exchange-earning service sector including tourism.

The State Committee for Co-operation and Investment (SCCI) was established in 1989, which is responsible for the management and administration of Direct Foreign Investments (DFI) in Vietnam. The functions of the SCCI are to provide guidance to foreign investors concerning laws and regulations, to examine and evaluate proposals,

to determine investment priorities, to monitor and supervise the operations of enterprises with foreign capital involvement, and to analyse the economic consequences of DFI. During the first half of 1990, the SCCI received a number of foreign investment proposals for hotels, which, together with transportation, constitute the beginnings of a tourism infrastructure.

Tourism in Vietnam presently has a low profile and is mainly confined to conducted tours for foreigners as well as visits by home-coming Vietnamese living abroad. Domestic tourism for nationals is virtually non-existent mainly because of tight financial situation. Despite recent efforts by the Vietnam National Tourism Corporation (of the Ministry of Culture, Information, Tourism and Sports), the support services of the tourism sector still needs to be improved considerably. UNDP is presently developing a master plan for tourism development.

Tourist attractions in Vietnam are numerous, the most popular being Ha Long bay, Hue, and Nha Trang, where tourist development plans have been made. Other potential tourist areas are quite various and hold high potential for development in the future.

The tourist sector strategy should incorporate environmental standards, especially anti-pollution and sewerage/waste treatment guidelines, as well as land-use zoning and regulations regarding building constructions such as minimum distances from the water line; the latter is particularly essential in coastal areas where tourism can have a serious impact on commercially important and environmentally vulnerable coastal resources such as mangroves and sand dunes, as well as aquatic resources such as coral reefs and associated marine life. In order to ensure protection of all important resources, appropriate tourism management plans should be drafted for each targeted area which should particularly set maximum limits to tourism growth considering the carrying capacity of the coastal environment in question. They should also incorporate effective environmental awareness raising strategies. For example, in coastal area tourism, an environmental awareness raising strategy is essential in order to control the artifact and souvenir industry which is traditionally associated.

Finally, for a country like Vietnam, with its richness in endemic species of fauna and flora, and as a supporting mechanism for the maintenance of National Parks and Protected Areas, "ecological tourism" could be developed and become a key strategy for the tourism sector, as is being done in Madagascar. The strategy entails the following:

- a. Identification and evaluation of potential tourist sites associated with existing and/or new National Parks and Protected Areas, as well as the associated necessary investments (transport, communication and accommodations);
- b. Integration of provisions for ecological tourism in the legislation covering the protected areas;

- a. It is essential that land-use zoning be given high priority, especially for sectors such as light and heavy industry, tourism, residential areas and nature conservation. It is essential to restrict polluting industries to a pre-determined site. Thus, development needs to be controlled and regulated

Considering the above, the following strategy is recommended:

Integrated planning of land use to achieve optimization rather than maximization of their utility, and zoning of land use to develop focal areas based on the type of intended use could basically solve many of the problem areas of current development approaches. Land-use planning should integrate the following components: (i) land capability and use; (ii) environmental value, vulnerability, and carrying capacity; (iii) land and resource development goals; (iv) distribution policies regarding the uses of land; (v) the traditional skills, interests and development aspirations of the local residents; and [vi] population migration policies to prevent migration of labour from other areas to the focal areas of development attracted by the new employment opportunities. By integrating these components, land zoning for specific types of development should be established, such as for residential areas, agriculture, tourism, industries, nature reserves, etc.; and the "carrying capacity" of a specific area for a specific use should then be determined, i.e. the optimal number of families that can be settled without threatening the environmental and economic sustainability of the area.

2.5.10. Land Use Planning and Zoning

- c. Combining foreign investments of hotel groups with local entrepreneurs; a foreign hotel operator could let franchises with local entrepreneurs in order to develop more modest and original accommodations associated with parks or reserves;
- d. Environmental impact assessment of all proposals for ecological tourism ; and sharing of management costs of parks and/or reserves with the potential investors;
- e. Enhancement of awareness and appreciation of the country's cultural wealth together with the ecological heritage;
- f. Progressive development of national tourism;
- g. Increase, through training, of the negotiation capabilities of the Vietnamese with international groups; and
- h. Development of training capabilities for the hotel industry and tourism in general.

through the establishment of a national land zoning plan for the specific types of targeted development;

- b. An integration mechanism for regional and local planning needs to be developed on an urgent basis. As referred to in section 2.1.3., there is a vacuum between central and district level planning; land-use policies pertaining to resource rehabilitation lack the mechanism to transmit them to the district level, which is the major tax recipient, and thus controls all land development. It is thus essential to develop appropriate mechanisms and an institutional framework to integrate the central with the local level planning. This will, however, take some time to establish, and it is recommended that the development of a National Land Zoning Plan be accelerated through the following steps:

- c. Central planning should establish the most vulnerable and commercially important environmental resource areas for each ecological and socio-economic zone;

- d. A multi-sectoral central planning team, assisted by an environmental planner, should then work out a land zoning plan with the chosen provinces and districts for the pre-selected areas;

- e. The most important land zones such as those for light and heavy industry, and areas for environmental protection should be enacted through legislation;

- f. The experience from (b) above in selected pilot areas should be utilized to develop and institutionalize a mechanism for district-level; and

- g. Initiate land zoning plans for areas of a second order of vulnerability.

As regards specific initiatives, Export Processing Zones (EPZ) are now being established in Ho Chi Minh City, and another one is planned in Danang, to attract export-oriented direct foreign investment. These EPZs will offer cheap land, guarantees against nationalisation, zero taxes and duties on imports and exports, and cheap labour supplies, but no environmental aspects have so far been considered in the establishment of these EPZs.

2.6. Environmental Impact Assessment Process

Environmental Impact Assessment (EIA) is a study process used to predict the consequences of a development project or program for the natural and social environment, and to prevent, mitigate and monitor any environmental deterioration that may result. EIA has most often been applied in relation to proposals for large scale

development projects such as dams, bridges, industrial complexes, harbours, etc. However, it is increasingly being used in relation to broader programs, for instance, those of a particular government ministry, as a means to ensure that such programs are well integrated and do not lead to negative environmental impacts. Some efforts are also being made to develop EIA procedures that are applicable to policy proposals. These attempts to broaden the scope of EIA will make it an even more effective agent for sustainable development.

EIA is, first and foremost, a planning tool, designed to ensure that development projects or programs have minimum adverse impact on natural and social environments. The EIA process that is developed or adopted by Vietnam must therefore be practical in its ability to provide useful information to planners and decision makers at just the right time in the project or program cycle. A key requirement in this respect is that certain elements of the EIA be initiated at the earliest phases of a project or program, i.e. even before pre-feasibility studies are conducted. This will allow the EIA to have a useful effect on matters such as feasibility studies, cost-benefit analysis, site selection, project design and engineering, mitigation measures, and monitoring requirements.

The following are some of key questions which EIA should address in relation to a major project:

- to what extent will the project affect the local natural environment and any critical ecosystems in the vicinity?
- can the local environment cope with the additional pollution or waste that will be produced?
- will the proposed location of the project create conflict with nearby land uses, or preclude later developments in the area?
- how will it affect local communities, farms, fisheries, or industries?
- can the project operate safely without risk of dangerous accidents or health effects?
- how much water, energy and other resources will it consume, and are these in sufficient supply?
- is there sufficient infrastructure, such as roads and sewers, to support it?
- what human resources will the project require or replace, and what social effects might this have on the community?
- what damage may be caused to national assets such as forests, recreation areas, or cultural and historic sites?

Disaster preparedness in Vietnam operates through a chain of command and is basically the coordination and pooling of the physical means and technical resources of various concerned ministries and specialized agencies against the major natural hazards, particularly typhoons. Administratively, coordination is achieved through the National

Natural disasters cannot be prevented and it is only possible to protect the people and property from their effects. Disasters compete with other development activities for financial support and thus indirectly affect other development projects. The socio-economic impacts are particularly sensitive, simply because it is the smaller, poorer and more vulnerable settlements which are most affected as the deprived could not afford better, safer and more permanent homes.

In Vietnam, disasters and other natural phenomena that affect the people and their property occur frequently. In spite of the relief assistance provided by the various governmental, non-governmental and international agencies, the level of suffering is still very high.

2.7. Environmental Disaster Management

However, given that the development of a workable framework for EIA in Vietnam will take some time, the country should immediately institute a requirement that all proposed foreign assistance projects be subject to an environmental screening, and if warranted, to an EIA. (Many funding agencies, however, already maintain this requirement themselves). EIA would be conducted (or sponsored) by the donor organization, but should be required to involve local trainees, in order to help develop local capability in EIA.

Substantial literature is available to provide guidance on the establishment of laws, institutions, and mechanisms for EIA. Some work has already been done in Vietnam in this area, including a draft legislation and a detailed proposal for training courses in EIA.

The cost of EIA is often a major concern of officials and developers. However, these costs generally represent a very small percentage of the overall costs of any major development project, nearly always less than one percent. This is a small price to pay to prevent costly, unforeseen problems, to generate positive and sustainable development, to help avoid environmental disasters, and to obtain public acceptance and approval.

In terms of resources needed to perform EIA, among the most important are qualified, multi-disciplinary staff; appropriate institutional frameworks; useable information on baseline conditions in the area involved and on the relevant features of the project or program; and, finally, legislated powers for review, monitoring, and enforcement to ensure that appropriate mitigatory measures are implemented.

- Committee on Natural Disaster Reduction. Each ministry and agency has the responsibility, within its particular area of expertise, competence and mandate, to prepare for disaster control and management (typhoons and floods in particular). Consequently, each ministry has a special disaster preparedness unit that cooperates with the National Committee. Forecasting and early warnings of floods and typhoons are provided by the Hydrometeorological Services through its National Forecasting Centres. The regulations regarding the distribution and dissemination of these forecasts and warnings have been laid out in the National Regulations promulgated in 1960 and revised in 1980. Centres for disaster preparedness operate down to the district level, who draft initial proposals for disaster control and forward them to the central ministries concerned. The high priority given to disaster management by the government is evident from the fact that the chairman of the People's Committee also chairs the Natural Disaster Committee at the provincial level and is fully empowered to organize immediate relief and assistance. In general, the setup reflects sound principles of organization. The main problem lies with resource gaps and technical shortcomings which require improvement.
- The Government is concerned about the recurring nature of these disasters particularly considering the relative poverty of the affected areas, and plans to improve the effectiveness of the existing disaster prevention measures and further strengthen the disaster management strategies through more accurate and advance forecasting, at all levels more effective regulation of water levels in reservoirs, better communications to issue advance warnings and enhance preparedness, more extensive protection through shelter belts, through extension of disaster resistant construction techniques, etc. The Government is also fully aware of the need for large-scale external assistance in this field to tackle the problem.
- Considering the seriousness and urgency of the problem, strategies and policies need to be strengthened on a priority basis to improve upon the preparedness for disaster control and management in the country:
- a. More detailed statistical analysis of all available data on disasters for a better understanding of their frequency, randomness etc,
 - b. Evaluation of the current forecasting and warning systems to improve upon their efficacy;
 - c. Extension of the existing hydrometeorological system of observation stations and upgrading the forecasting capacity of the provincial hydrometeorological observatories;
 - d. Improvements in the accuracy of forecasts and warnings regarding severity etc. Mainly through the acquisition of more sophisticated and weather-proof technology;

- e. Improvements in the communications system for efficient and more effective transmission of forecasts and warnings, as well as achievement of their widest dissemination and publicity;
- f. Strengthening of linkages with global telecommunication systems for the facilitation of data inputs from global weather monitoring programmes;
- g. Improve infrastructure leading to disaster prevention such as construction of coastal and inland dykes, shelter belts, etc.;
- h. Train local construction technicians and builders in disaster resistant building techniques and materials and launch awareness/training campaigns in concerned provinces;
- i. Better cooperation and coordination between the various departments and agencies dealing with the meteorological, hydrological and oceanographic sectors for more studies on the phenomena, mainly to improve upon the predictions;
- j. Improvements in capabilities for short and long term predictions of disasters with special emphasis on their social effects on subsistence employment in rural areas and economic impacts on such crucial sectors as agriculture;
- k. Establishment of a contingency relief fund for emergencies arising from disasters especially for the rehabilitation of the rural subsistence employed to restart their vocation, such as reconstruction of houses, reestablishment of farms, acquisition of fishing boats and equipment etc.;
- l. Establishment of a separate disaster relief agency to deal with all such emergencies and that will have full legal authority to independently take all necessary action to provide disaster relief and coordinate all activities for this purpose;
- m. Intensification of mobile emergency medical facilities and their incorporation as a part of the disaster relief agency;
- n. Technical assistance for the rehabilitation of the affected professions, ecosystems and/or resources as the case may be, such as fisheries and farming;
- o. Strengthening of the administrative set-up for quick and efficient channelling of disaster relief assistance to the affected areas and the needy people;

- i) establish an oil spill alert mechanism to issue warnings and promptly report oil spills;
- ii) limit and minimize the oil spill;
- iii) clean up the coastal waters after the oil spill;
- iv) minimize damage to commercially exploited coastal living resources;

Two oil spill accidents occurred in the coastal waters of Vietnam in 1990, the sinking of a small oil tanker in Vung Tao Bay, and a spill from an offshore oil drilling rig along the southern coast. These were small in scale and damage was not very widespread. Moreover, a major oil tanker route from the Middle East to the East Asian countries plows through the waters of South China Seas off the coast of Vietnam. There is thus a constant threat of a major oil spill disaster in the coastal waters of the country; it is thus essential to develop an oil spill contingency plan in advance of an emergency situation. The contingency plan should include activities and measures to:

There are large offshore oil reserves and the prospects are good for their commercial development. At present, the only producing field is Bach Ho, 200 km off the southeastern coast. Crude oil production now amounts to 1.5 million tons per year (mty), compared to current imports of 2.6 mty of oil products. A number of exploration contracts were signed with foreign oil companies which will ensure a continuation of exploratory activities on a significant scale in the coastal waters of Vietnam. At present these companies are mainly undertaking seismic and geological work, but initial results are reported to be encouraging and drilling of exploratory wells is presently in progress. The overall output target for the years 1991-1995 is to produce between 20-23 million tons of crude oil and to reach an annual production rate of 7 million tons by 1995. With these increasing offshore activities, the potential for an offshore oil spill catastrophe in Vietnamese coastal waters could increase substantially in the near future.

2.7.1. Oil Spill Contingency Planning

- p. Assessment of the manpower and training requirements to provide for a permanent follow-up capability in the area of disaster preparedness, control and vulnerability reduction and design of a staged programme for the development of this national capability;
- q. Promotion of community awareness to achieve people's participation in disaster preparedness and education of the same communities in disaster warning and relief;
- r. Wide dissemination through the mass media of audio-visual programmes on disaster preparedness;

Flood control has been traditionally attempted through construction works such as dams, levees, channels and seawalls. Such structural solutions alone usually have a negative long-range impact on the environment if remedial measures are not undertaken, such as controlling urbanization, preventing overgrazing that could increase surface runoff and in general minimise or avoid conflicts in utilization. Any sustainable development of the fragile environment of the flood plain must find a balance that minimises negative impacts and maximises the general benefits.

Flood plains are often a valuable environmental resource and quite often the only means to support life. But total flood control is neither possible nor economically feasible. Thus, flood plain management goes far beyond basic protection against floods and over encompasses all aspects of planning and action that are needed to determine, implement and update comprehensive integrated plans for the wise and suitable use of the floodplains (and flood-prone areas) and their related water resources. All policies and plans for managing flood plains must have two broad concepts: an immediate disaster prevention approach to prevent loss of life and hardships, and destruction of productive environments which are already fragile from incessant human use (disaster control); and a long-range plan to optimise the economic exploitation of flood plains with due regard to environmental impacts and socio-economic concerns, including the selection of development alternatives that could minimise environmental impacts, but at the same time beneficial for the welfare of the inhabitants.

Heavy rains cause severe flooding in many river basins and floods are an almost annual event in varying degrees particularly in the Mekong and Red river deltas during the monsoon season, causing untold hardships to human settlements and loss of livestock, crops and farmlands. Systems of river dykes of about 3,000 km in the three most important river basins in the north, namely the Red, Ca and Ma rivers where the risk of floods is most severe have been built over many centuries. Nearly 20% of the annual budget of the Ministry of Water Resources is allotted to maintain the 5,000 km of river and sea dykes.

2.7.2. Flood Control

The Action Plan should also have a strong and effective institutional component to ensure that the Contingency Plan will be activated immediately upon receipt of an oil spill report and the necessary legislative measures to achieve the same should be incorporated in the proposed national environmental law which is presently being drafted.

- v) conserve specialized marine ecosystems such as coral reefs and mangrove forests; and
- vi) protect commercially and environmentally important beach areas from fouling.

Until recently, the poor state of old and obsolete equipment was a probable source of fundamental data errors and inaccurate forecasts. This probably diminished the confidence of the local people in the official forecasts and warnings, which resulted in damage and destruction that could otherwise have been prevented. (Reportedly, in the case of the above typhoons, fishermen in exposed coastal areas resisted the attempts by the authorities to evacuate them which resulted in the high death toll). Now a UNDP funded project, executed by WMO, has equipped the three main stations with very sophisticated equipment which helped the services to forecast very accurately during the last two years. Unfortunately the local people have not yet gained confidence in accurate forecasting. The telecommunications facilities in the provinces were badly damaged and subsequently cut off at the onset of the above typhoons so that the necessary crucial information could not be transmitted widely enough; this resulted in greater losses that could otherwise have been avoided.

UNDP in collaboration with UNCHS has undertaken several activities in recent years to create awareness of the technologies for constructing simple and low-cost typhoon resistant housing through seminars, awareness kits and pilot demonstrations. The Institute for Housing Design is responsible for the housing sector, but is not yet being fully utilized for this purpose. No specific government agency or organization is mandated to collect information and prepare designs, guidelines and standards to build typhoon-resistant houses.

Vietnam's climate is greatly influenced by the monsoon season between the months of May and October when frequent typhoons bring heavy rains with intensities of up to 800 mm per day and 1,700 mm per week. Typhoons visit the coasts of Vietnam at an average frequency of 4.6 per year and contribute to 10 - 30% of the total annual rainfall. Vietnam was affected by 482 typhoons and tropical depressions during the period 1885 - 1988, often causing heavy loss of human life and livestock, heavy damage to houses, crops and coastal structures, as well as widespread floods. In the coastal areas, strong winds exacerbate the height of tides and cause occasional tidal waves of over 10 m. Seventy (70) to 80% of the typhoons pass through the central region (mainly, provinces of Quang Binh, Quang Tri, Thua Thien-Hue, Bac Bo Plains and Thanh Hoa). For example, two strong typhoons (named Andy and Cecil) struck the coastal areas of this region in succession in October 1985, seriously affecting over 2 million people (killing 875), damaging 400,000 houses and sinking 3,300 fishing boats, in addition to destroying over 375,000 ha of crops and farms.

2.7.3. Typhoon Damage Control

Long-range flood control measures need to be planned through the construction of multi-purpose dams (usually a series of dams on a river system), development of watershed management programmes (See Section 3.2 for details) of levees, overflow basins and floodways, and a network of multipurpose channels.

There is also a general lack of community preparedness to alleviate the damage from typhoons. For example, there are hardly any attempts by villagers to plant bamboo clusters or casuarina trees as wind barriers around buildings. There is clearly a need for more active participation of the people in disaster preparedness and promotion of awareness of the same.

Considering the annual recurring nature of typhoons and the havoc it causes in the rural areas, strategies and policies need to be strengthened to convey the political will and determination to tackle the problems caused by typhoon damage and to activate the resources to achieve the same. All strategies and policies suggested under section 2.7. will also apply to typhoon damage control and the following should be considered in addition to these:

- a. Upgrading of the meteorological data collection and processing systems and introduction of modern and accurate typhoon forecasting techniques to provide accurate and timely warning of typhoons;
- b. Strengthening of research projects for a better understanding of the wind and weather patterns, oceanographic phenomena, sealevel and tidal fluctuations, frequency and pattern of tidal waves etc.;
- c. Strengthening of linkages with the regional weather watch systems to obtain information on the development of weather patterns and low pressure areas outside the Vietnamese area of responsibility; Establishment of modern typhoon-proof telecommunications system for faster transmission of forecasts and warnings;
- e. Improvement in the general preparedness for the management of typhoon damage control;
- f. Assessment of the vulnerability of the existing, mostly traditional, housing to typhoon damage;
- g. Preparation of designs, guidelines, standards and manuals for the construction of more typhoon-resistant and typhoon-proof houses;
- h. Construction of typhoon-proof and typhoon-resistant rural housing and small community buildings and assessment of the feasibility of replication of these techniques at the local level;
- i. Development at the provincial and local level of the capability to establish and implement an overall integrated vulnerability reduction programme;

2.8. Monitoring Frameworks and Strategies

- j. Establishment of wind barrier forests to act as wind breakers during strong winds; and
- k. Public education programmes to promote awareness about better disaster preparedness through improved typhoon-resistant housing etc.

A critical component of any framework or system of environmental management and planning is monitoring. Monitoring serves several purposes, which can be summarized as follows:

- Monitoring is necessary to keep track of environmental conditions in a given region or ecosystem to determine if attention is required to resolve a problem, and if so, when, where, and how (e.g. what types of mitigation measures). For example, the monitoring of a particular wildlife species may reveal that the species is being threatened by habitat destruction, pollution, etc. and that actions must be taken to relieve such stress.
- In relation to specific activities, such as agriculture or industry, monitoring is necessary to ensure that legal standards are being met, for example, on maximum allowable pollution loads.

- In relation to a given development project, monitoring is needed to determine if the project is generating environmental disturbances and impacts, and if so, whether and how these should be mitigated. If an environmental impact assessment has been conducted prior to a project, it should have identified specific environmental "indicators", that should be monitored during and following project implementation.

Vietnam must improve its capability to conduct monitoring when and where it is necessary. In some cases this will require only that one or several staff members of a particular resource-related department be trained in monitoring techniques as they apply to the type of monitoring required. In other cases, a more formal institutional structure may be necessary, for example, for following up an EIA of a large project, or to conduct regular monitoring of industrial plants in a given region.

In any case, a requirement should be instituted that monitoring capabilities be developed where, and in the form necessary, on the basis of guidelines developed by the State Committee for Environment and Sustainable Development (See Section 2.1.1). In addition, some types of monitoring will require that access to equipment and/or laboratory facilities be provided.

Some of these measurements must be made in the field, others can be done from remote sensing data. The data collected must be accurately recorded, reported, stored and held available for recovery or analysis. A bureau of statistics or environmental data centre is needed. While planning, it is advisable to make detailed time-tables of activity and expected achievements so that realised achievement can be gauged and evaluated, more easily against such targets and projections (e.g. trees planted, hectares reforested, seedling survival, tons harvested, laws in effect, etc.). The identification of success indicators is a useful component of plans and operation designs.

- incidence of meaningful events-storms, floods, droughts
- land reflectivity (Albedo)
- noise pollution levels in residential areas
- air quality sampling
- sedimentation rates
- water flow and quality
- productivity per unit area and per unit effort
- product condition and quality
- area of different production systems
- soil depth, humus content, nitrogen content
- pest densities
- species composition, diversity, biomass and production

The following types of measurements are useful:

In order to measure the effects of particular actions, policies or courses of management or biological systems, it is necessary to identify trends, monitor these over time and see if changes in trends can be correlated to the actions concerned. This means making repeated measurements or taking samples in comparable fashion over regular units of time. The use of control areas where the particular actions or policies are not applied help to give stronger confirmation to observed correlations.

The success of the implementation of the National Conservation Strategy can be evaluated in a number of ways. It is important that a process of review is established with sufficient feedback to the NCS so as to enable revisions of the strategy or changes in the direction of the strategy wherever necessary.

- Coordination of sectoral and regional sub-strategies to translate more easily the recommendations of the NCS into action at the ground level.
- Follow-up action on the various recommendations for implementing the NCS, particularly further development of areas in the NCS requiring more detailed planning and study.
- Publications and communications strategy to launch and publicise the NCS and the principles of the NCS. A prime objective of this is to gain greater public participation.
- Monitoring the progress and success of the NCS.
- Periodic reviews and revisions of the NCS.

The maintenance of the NCS involves several measures:

It is recommended that a permanent NCS secretariat be established to supervise the maintenance and running of the NCS.

Maintaining the NCS

It is recommended that for the first two years of implementing the NCS, an annual review meeting should be held for re-evaluation. After that, such meetings need be held only every second year and eventually may be required less frequently.

These numerous indicators of success or failure in the implementation of the NCS must be taken note of at regular periodic NCS reviews or symposia so that decisions can be made to incorporate changes or new elements into the NCS. The emphasis should be on pinpointing the bottlenecks and pressure points that are causing delays or failures and identifying priorities for action. In allocating priorities, a balance must be sought between the urgency of the problem or the desirability of the objectives with the practical aspects of ease of funding, availability of necessary expertise and the likelihood of success.

Monitoring of public awareness and education programmes can be carried out by simple statistics of how many people have been contacted, given courses, examinations passed, etc. But the question, "Is the message getting through?" and "Are we putting over the message in the right way?" - can often be best answered by conducting public opinion surveys or soliciting direct feedback through questionnaires.

The NCS is intended to catch the attention of the whole country and alert people about the serious and real dangers of environmental degradation, the consequences of which have not been clearly realised. Unless appropriate actions, as outlined in the NCS, are taken immediately, Vietnam is heading for an internal population and environmental crisis far more dangerous than the external threats to the country for which it is much more alert and better prepared.

To attract government and public attention, the NCS should be launched in a well planned and concerted manner with maximum publicity. The launch should be an event. This could involve public announcements by senior national leaders, a children's procession or display of environmental paintings, television, radio and newspaper coverage, special audiovisual presentations on television and so on.

In addition, a number of follow-up activities must keep people constantly aware. Regular features on environment in the newspaper, Nhan Dan, etc., extracts from the NCS should be included in language courses at schools. NCS study camps should be established by the National Youth Organisation and the Ho Chi Minh Generation Movement. The idea is to jolt people's ideas and understanding of environmental affairs in the country and start a new conservation ethos among the people of Vietnam.

CHAPTER III

ACTION PROGRAMS

3.1. Urban Development and Population Control

To achieve sustainability of urban development, environmental management needs to be incorporated at the early stages of planning; this improves urban economic efficiency, promotes equity in the distribution of development costs and benefits, and avoids unnecessary foreclosure of future development options. The neglect of environmental considerations in urban planning and management thus constrains prospects for social and economic development.

Institutionalization of environmental planning and management mechanisms at the local level can also lead to the alleviation of the consequences of impoverishment, for the urban underprivileged suffer disproportionately from urban environmental decay and the health hazards that arise from it, as in the case of water pollution and inadequate waste management.

Environmental management and planning for such areas as Hanoi, Ho Chi Minh City, and Haiphong can thus make a significant contribution to the improvement of the quality of life, and ensure the continued appeal of the cities as a place to live, to earn a living and to benefit from opportunities.

3.1.1. Urban Development

The main components of urban planning where environmental considerations are of key importance are land zoning, housing & construction, transportation, energy and water supply, health and waste management.

Land Zoning

In spite of the decrease in the growth rate of urban population from 2% in 1981 to 1.6% in 1988, the population density in central Hanoi continues to increase and has attained extreme densities of up to 35,000 people per sq km in the older parts of the city; this has deteriorated the quality of life and brought about severe environmental stress. Zoning of land by forecasted use for housing, industries, business and recreational green areas is therefore urgently needed to enhance the environment of urban life in general, and so that the city resident, while living in reasonable comfort in the urban environment, will also have easy daily access to all urban amenities and

a means to make a living under reasonable conditions. However, a sustainable urban development needs to consider the carrying capacity of its environment; thus action will have to be taken to avoid high population concentrations in focal areas of cities. This could perhaps be attempted through horizontal expansion of cities and by accelerated rural development programmes to improve the quality of life in rural areas through rural employment generation and the provision of more rural amenities in order to encourage migration from the cities. This approach will at the same time discourage mass migration in the reverse direction.

Housing and Construction

Dwellings in relatively good condition account for less than 40 per cent of the total housing, and the remainder are in need of extensive repair or renovation. According to recent estimates, construction costs vary between \$US 100 per sq meter if prefabricated technology is used and \$US 45 for traditional-type housing. Efforts are now being made to further reduce the cost of the traditional construction methods. There are over 1 million sq m of slum housing along the banks of canals and waterways. The phenomenon of squatter settlements has been observed in almost every city, and even in smaller cities such as Hue and Nha Trang. These communities of people in search of work appear wherever a vacant site is available; in central parts of the city as well as in the suburbs, and along the banks of its canals and waterways.

Overcrowding constitutes another serious problem. It was estimated in 1987 that the average floor space per urban inhabitant was less than 4.3 sq m for the whole country, which is the lowest among the socialist countries. In Hanoi, about one third of the population live in an area less than 2 sq m per inhabitant. The problem is further exacerbated by the destitute without a roof, who migrate to the cities in search of jobs and a better means of living.

Finally sanitary conditions are critical, as drinking water and toilet facilities in cities are in a deteriorating condition. In Hanoi, 33 per cent of the housing units still depend on double-vault latrines, and 30 persons on an average share a toilet, with a maximum of more than 100 persons per toilet in the worker's districts. In Ho Chi Minh City, 16,000 dwellings along the canals and waterways (inhabited by 98,000 people) have no sanitation facilities.

The national housing problem cannot be solved in isolation, independent from an urban strategy. Housing development should be accompanied by effective policies and programmes to deal with city and metropolitan development, to reduce population growth and influence internal migration trends, and to develop secondary satellite growth centres. Action is thus needed to improve the housing situation through renovation, upgrading and modernisation of the existing housing, as well as the construction of modern housing facilities with better water supply, modern sanitation, garbage disposal facilities and proper ventilation.

Transportation System

As this section has been covered under 2.5.7, it should only be re emphasized here that the main environmental issues relating to urban transportation concern establishment of vehicle emission standards and their enforcement, as well as proper vehicle maintenance, limits on private vehicles, limits on traffic densities, smooth traffic flow, traffic zoning and taxation for the use of private vehicles and roads.

Energy

The energy generation and supply system even in major urban centres is unreliable; an expansion and upgrading of the present systems will have to ensure that emphasis is placed on energy conservation through more efficient use of electricity and electrical systems (See Section 2.5.6 for more details).

Water Supply

In 1985 and 1987, it was estimated that about 70 per cent of the urban population is presently supplied with potable drinking water. Based on the 1989 census, the urban population is approximately 13 million people, with Hanoi and Ho Chi Minh City leading with populations of about 4 million and 3 million people respectively. As the existing system now supplies only about 7 million people, the percentage of urban population with access to safe drinking water is only around 50 per cent. Of these, 20 per cent have direct access to running water through taps in the house, and 80 per cent share public taps. On an average, a public tap is shared by 900 people. Those who have no access to piped water use water from shallow wells (which is in most cases unprotected and polluted), rainwater collection tanks and streams.

In Hanoi, the natural groundwater system includes several aquifers. The aquifers have been polluted by infiltration from dirty city water and from organic materials, nutrients and possibly chemicals from fields. According to a recent study, the main problem lies in water quality and soil conditions rather than the actual supply of water.

Sewerage and Waste Management

Both Hanoi and Ho Chi Minh City have underground sewers in the older parts of the city, but most residents are served by ditches, street gutters, and other forms of open drainage. Clogged or inadequate drains often overflow, widely spreading human wastes and garbage during storms. Lakes in city parks and other areas frequently receive sewage during this period.

The problem of waste disposal during storms has been exacerbated for towns along the Red River where the river bed rises annually because of siltation, and is now higher than some surrounding lands in some areas; the drainage pumps are often inadequate as a consequence. In these towns, flood waters mix freely with waste water during floods.

Environmental Health

Hanoi drains its wastes into numerous ponds of varying sizes located around the city. These ponds provide a good environment for reducing the biochemical oxygen demand of the wastes. Fish are also cultured in many of these ponds. However, the ponds could be better managed through the culture of water hyacinth or other aquatic plants, which would increase the aesthetic value of the ponds and could then be used to produce biogas, or composted and used in agriculture or as livestock feed. However, growth of water hyacinths should be carefully controlled and managed.

In urban areas, the threat to human health lies principally in effects of industrial pollution, vehicle emissions, overcrowded living conditions, poor sanitation infrastructures such as drinking water, toilet facilities, sewage disposal and waste management as a whole; all these variables contribute to severe human health risks. A 1980 survey showed a strong correlation between the number of respiratory diseases and living conditions. Over the past decade, the ten leading causes of mortality and morbidity are communicable diseases, and most of them are preventable, such as lung and intestinal illnesses. This suggests that the control of communicable diseases should be the top priority in the health programme, and that this should be integrated into all sectors involved in a sustainable urban development plan.

The following recommendations aim at general urban development as regards environmental management is concerned in the country, with special reference to such cities as Hanoi and Ho Chi Minh City:

- a. Prepare environmentally sound urban development master plans for each city integrating all related components such as land zoning, housing and construction, transport, energy supply, water supply, as well as sewage and waste management; furthermore, the carrying capacity of the urban environment has to be assessed and a strategy developed to avoid high population concentrations and overcrowding;
- b. Develop an urban land zoning plan for residential areas, business, industry, recreational or green areas, etc., with special emphasis on the assessment of environmental impacts of such zoning;
- c. Develop an urban housing strategy incorporating health standards for public and private latrines as well as investigate the possibility of reducing the cost of housing, which will necessitate the participation of all sectors of the economy;
- d. Develop an urban transportation plan, with emphasis on mass transportation rather than private transportation, smooth flow of traffic to avoid traffic congestion (e.g., one-way streets), energy efficient vehicles etc.;

- e. Develop an energy plan with major emphasis on energy efficiency which will necessitate an analysis of all potential means for the efficient use of energy;
- f. Prepare a sanitation plan which should incorporate health standards for public and private latrines, aim at improving short and long term sewerage and sanitation planning, define major bottlenecks of the existing system and indicate priority projects;
- g. Develop a flood protection plan to provide basis for cost-effective implementation of flood protection and stormwater drainage in Hanoi;
- h. Test and demonstrate the feasibility and technical performance of various types of wastewater treatment processes and applications as well as various institutional and financial arrangements;
- i. Develop a waste management plan for Hanoi, to improve the collection, transportation and disposal of all sludges, including settled solids from the watercourses, sewage sludge, nightsoil, etc.;
- j. Rehabilitate the ponds and canals of Hanoi to improve the hydraulic capacity of the canal and pond system to allow for their full benefit for drainage and wastewater discharges;
- k. Develop a plan for lake restoration in Hanoi area. The lakes and ponds are important elements of visual landscape. They serve as focal points for recreation and act as a receiving body for flood protection. At present, they are mostly overloaded and filled with sediments;
- l. Develop an integrated aquaculture plan for Hanoi to maintain the utilization of the biotreatment capacity of the waterbodies and to prevent a collapse of the aquatic ecosystems. This would also help to maximize the recirculation of resources and organic matter;
- m. Study the hydrogeological conditions of each urban area and the inflows and outflows of groundwater to that area; and develop a system to monitor groundwater pollution from surface sources; improve well field and design; improve the groundwater management and the management of deep-wells;
- n. Assess environmental impacts of water supply and industrial growth in Ho Chi Minh City and develop a master plan to optimize the rational use of available water resources;

- o. For all smaller cities, introduce environmental planning at the onset of development especially for drinking water supply and waste management; and
- p. Develop an integrated environmental health plan for urban population with the participation of all sectors involved in urban development.

3.1.2. Population Stabilization

It is difficult to talk about the environment without talking about people, as population is the common denominator to all aspects of the environment. Moreover, environment and population are issues which cut across all sectors and at any level of development, population growth increases the environmental stress. Environmental resources provide the basis for development just as environmental factors constitute part of the improvement in the quality of life that development is meant to bring out. Similarly, the size of the population, the rate of its growth and the pattern of its distribution influence the state of the environment, just as they condition the pace and composition of development. There is an emerging consensus on the nature, scope and need for sustainable balance between people, natural resources, development and environment. Population policies are central to the success of attempts to avert the environmental crisis, and are an essential contribution to policies of balanced resource use. They are needed not only to slow rapid rates of population growth, but also to balance the distribution between rural and urban areas. Recognition of the potential mutual support between population and environmental policies should facilitate earlier and smoother achievement of the demographic transition to population equilibrium as well as of the chosen development goals.

The population of Vietnam paradoxically constitutes the country's most valuable renewable resource as well as the greatest threat to its environment. The total population was estimated to be around 65 million in 1990. This amounts to a mean density of nearly 200 persons per sq km, one of the highest densities for any agricultural country in the world.

This population pressure places an impossible strain on the environmental capacity of the country.

If the present annual growth rate of 2.4% continues, the country's population will double in size within 30 years. In other words, by the year 2000, the population will already be above 80 million. The Government is fully aware of the need to control the population growth and is actively pursuing a birth control programme. The Government policy is outlined in a decree issued in October 1988, which urges couples generally to have no more than two children, to space them three to five years apart, with the minimum age to achieve parenthood set at 22 for women and 24 for men. The National Committee for Population and Family Planning coordinates and manages the

national population programme. This programme aims to provide maternal, child health and family planning services, supported by information, education and communication activities to raise the level of awareness about family planning in particular. The programme is showing good results in urban areas but difficulties arise in the midland and mountain areas where peasants still have large families. There is thus a particular need to promote awareness among the general public on the interrelationships between population and environment in the context of self-sustaining socio-economic development.

Lack of access to essential amenities and services, together with the persistence of widespread impoverishment, have led large numbers of people to overexploit scarce natural resources and facilities that are in the public domain. This has tended to undermine the environmental foundations of economic development. Even where untapped natural resources exist, large amounts of public capital that would need to be invested in order to establish the infrastructure and facilities to use them are often not available. It is thus clear that no environmental or socio-economic scheme will be effective in the long run unless population levels come down. And because of the difficulty of this problem, much more priority focus should be put on it by the Government, with associated massive rural awareness promotion campaigns using well-trained, well-motivated as well as well-paid extension workers; moreover, some compensation mechanism should be established for one and two children families in rural areas. Finally, a cross-sectoral policy review should be undertaken to both ensure that sectoral policies support population policies and to infuse population-related incentives into other sectoral policies. In essence, the Government should immediately develop a comprehensive strategy incorporating all facets of the socio-economic fabric into a cohesive motivator for reducing the population size. As regards foreign assistance to Vietnam in this field, emphasis should be laid on inter-agency cooperation and joint programming ventures, as the multi-disciplinary links between population and environment are complex, which almost always transcend sectoral concerns of governments and donor agencies.

Considering the urgency of the problem, the ongoing activities need to be accelerated with additional action both on the short and long term to tackle the same. On the short term,

- a. Studies on the interactions between population, conservation and development should be undertaken; the results should be utilized as a basis for an integrated approach to the development of long-term sustainable development policies, which should aim at the stabilization of the population at a level that will permit sustainable management of resources and a satisfactorily high quality of life for all people;
- b. Population policies should be formulated and implemented which take into consideration the natural resources base, environmental conditions, and socio-economic and human resource development

- prospects; Environmentally sound urban policies and sustainable rural development policies should be promoted and pursued keeping in view the special environmental problems of the urban and rural poor;
- c. Public work programmes which will generate employment and which will enhance the availability and productivity of natural resources need to be designed and implemented in rural areas experiencing acute environmental stress and population pressure; initiatives to restore the environment should receive high priority, such as reclamation of croplands and grasslands; plantation of wood-lots and forests; building canals, dykes, wells, reservoirs and water catchments; and terracing, bunding, levelling land. The potential for food for work programme should be fully utilized in this regard;
- d. Efforts aimed at awareness promotion and the popularization of family planning should be reinforced at the community level, with information on the nature and prospect of environmental degradation, its relation to population pressures, its likely impact on people's lives, and how local action can improve the situation. Such an extension of population programmes will help place them more firmly in a perspective of sustained, environmentally sound development;
- e. Priority attention should be given to establishing programmes of basic education for women, especially in areas that are undergoing acute environmental stress. Women must develop a full awareness of the choices available to them regarding family size and life-style in their own environment. Improvement in the social status of women can play a pivotal role in accelerating the progress of societies towards their desired population, environment and development goals;
- f. The institutional structures through which population, conservation and development policies are formulated and implemented should be clearly identified. Coordinating mechanisms should be introduced, where appropriate, to ensure that an integrated approach is taken in each of these policy areas; and
- g. Programmes to integrate women into socio-economic development processes should be further strengthened. Educational and training opportunities for women should be broadened to promote full awareness of choices open to women with particular regard to their role in society;

h. Efforts should be intensified to increase awareness of the interactions between population, natural resources and development prospects. These activities should necessarily include information on the availability of family planning services and maternal and child health care services.

On the medium and long term,

a. Specific development plans should be prepared and implemented for environmentally critical areas (which should be identified in advance) which are experiencing, or are likely to experience, acute population pressures on environmental resources, in both rural and urban contexts. Priority attention should be given to the elements of population distribution, capital investment to restore natural resources and develop infrastructure, and community-level involvement to improve health, sanitation and other environmental conditions;

b. Monitoring, and forecasting of changes in the status of key natural resources, e.g., cropland, grassland, woodland, forests, groundwater and freshwater should be undertaken in the critical areas; Economic and social appraisals of the anticipated changes in key natural resources must be fed back into national development plans, especially with regard to the allocation of investment capital among sectors and geographical areas;

c. Physical planning with a view to bring about a balanced and broadly based distribution of the benefits of development should be given priority attention. Incentive systems for the appropriate location of industries, resettlement from fragile and vulnerable ecosystems, and environmental management of desired modifications to relatively undisturbed ecosystems should also be given careful attention;

d. The existing national pricing and taxation policies need to be reexamined carefully with particular reference to their bearing on sustained agricultural development, in the light of the impacts that past policies have had on the patterns of population distribution, use of natural resources and environmental stress. Rural employment-generating potential of the agricultural sector should receive particular consideration in this matter;

e. Research and development, industrial licensing, product pricing, import taxation, economic cooperation, and economic incentive systems for producers and consumers need to be so designed, coordinated and monitored that high levels of efficiency in the use

of scarce natural resources can be attained. They should actively encourage consumption and production patterns that would promote recycling, multiple uses, minimum recourse to non-renewable resources, and high efficiency in energy use; and

f. Efforts need to be intensified to effect sustained improvements in both drinking water supply and sanitation facilities, especially in the most underdeveloped areas.

At the international level,

a. International population assistance should be increased to levels consistent with the goals of attaining the desired slowdown in population growth rates and eventual stabilization of population;

b. The development assistance agencies need to take into consideration the implications of their programmes for natural resource regeneration, environmental improvement and population distribution, prior to selecting the project area. Especially in areas experiencing environmental stress and population pressure, such programmes should provide for built-in mutual support between the elements of population, natural resources, environment and development;

c. International agencies which provide support to population activities need to give priority attention to those geographical areas which are likely to suffer acute environmental stress during the next 20 - 30 years. In addition, they should promote awareness of the linkages between population and environmental factors and the need to design and execute population programmes which would respond effectively to such linkages; and

d. International support to programmes aimed at arresting environmental degradation need to be intensified, with special emphasis on areas which are experiencing, or are likely to experience, acute population pressures. The success of environment programmes in these areas would help ensure the success of the corresponding population programmes.

3.1.2. Quality of Life

Environmental factors constitute part of the improvement in the quality of life and rapid growth of population in developing countries is often accompanied by a steady decline in average levels of living accompanied by a steady decline in the quality of life,

- a. Preservation of adequate water sources for human needs and protection of these sources from pollution by toxin, diseases or parasites;

The other needs relate to the use of natural resources. Nature has bountifully provided Vietnam with scenic beauty, living space, room for healthy outdoor recreation, clean air and water. It is man's uncontrolled destructive activities which lead to waste and pollute these resources on which the quality of life so much depends. These needs must be kept in mind when planning the country's development and the use of its natural resources. The following actions are regarded as essential:

Some of these needs relate to the social environment for living and this, in turn, depends upon the socio-political developments of the country. The current course of village-organized socialism in Vietnam is based on the traditional living patterns of the region and Marxist principles adapted to ensure greater fairness in the organization of work and the distribution of the fruits or labour. These policies have been developed over thirty years and have been found to provide a healthy and suitable social basis for human life in this country.

The maintenance of major life-support systems, preservation of genetic resources and sustained utilization of renewable resources all contribute directly to the material basis for human welfare. But the quality of human life is measured in terms of more than just material benefits. For human life to be satisfying, there must be a reasonable balance between different material needs. Major shortages in one area cannot be compensated for by surpluses in another area. A starving man needs food: he cannot get comfort from extra wood or money. Cooking requires fuel - it can not be done with extra rice. All these basic material needs - food, water, shelter, clothes, fuel, employment and enough money to buy the minimal comforts of modern life - must be available. In addition to these, are a number of qualities less easy to quantify or evaluate but equally important to the satisfaction of basic human needs - clean air, space for living, positive social environment, good health, privacy when needed, satisfying spiritual, political or philosophical beliefs, facilities to enjoy recreation, attractive clean living environment, clean water, personal liberties, sense of belonging and opportunities for achievement.

as measured by such indicators as per capita availability of food and nutrition, drinking water and sanitation. On the other hand, they did not bring about noticeable improvements in the levels of living of the majority of people even in cases where rates of economic growth appeared to be satisfactory. A major goal of policy makers is to achieve a better quality of life and rising standards of living, with sustainable use of the natural resource base. Recognition of the potential mutual support between population and environmental policies should facilitate earlier and smoother achievement of the demographic transition to population equilibrium as well as the chosen development goals.

b. The prime objective of research and development should be to improve the efficiency of utilization of natural resources. This includes increasing

a. Population growth must be reduced to zero as soon as possible;

The National Conservation Strategy advocates the following measures to maintain the optimal quality of life:

where R = resource base,
 e = efficiency of utilization,
 r = level of renewability and
 P = human population.

Quality of life $= R \times e \times r/P$

It has been pointed out earlier, that the capacity of the land to produce food is limited. The best that can be hoped for is the maintenance of a sustained capacity to produce a maximum yield of food. If the standard of living is to be maintained when food production is constant, then population must also be stabilized. The following simple formula approximates the situations:

All human societies, even highly industrialized countries, are ultimately dependent on their support of their agricultural base. Vietnam cannot rely in the future on import of food for its people. Food will be in short supply in all the other countries of Asia and most of the countries of the world. Even gold cannot buy the food from the hand of a starving man. Vietnam must aim at maintaining agricultural self-sufficiency.

Attainment of a Balanced State

- f. Reforestation to secure adequate water sources.
- e. Strong support for the programme to develop a system of national parks and recreation areas and all encouragement to promote healthy domestic recreation habits; and
- d. Continuation and intensification of a population control programme until the population is stabilized to a socially acceptable density;
- c. Establishment and enforcement of population controls and standard for discharge or industrial and motor vehicle emission, for effluent and waste disposal, for sewage treatment and disposal, etc.;
- b. Provision of social medical services including immunization programme, health clinics and hospitals in reach of the whole population;

production and reducing wastage; increasing the efficiency of the manufacturing industries and marketing; increasing the use of alternative energy sources (solar, wind, tidal, geothermal, nuclear, etc.), improving the quality of crops and domestic herds and applying improved techniques of agriculture, forestry, agro-forestry, fishery and animal husbandry; improving methods of disposal of wastes and pollutants and better management of health and hygiene;

c. The rate of use of renewable resources must be determined by the relationship between efficiency of use and level of renewability for the resource in question. The principle of maximum sustained yield should be followed; and

d. Vietnam must maintain strong natural security so as to safeguard the need for territorial stability implicit in the concept of a steady state and the balance between population and the renewable productive capacity of the land. The people of Vietnam must always be willing to make whatever sacrifices are needed to guarantee their continued independence;

The rate of use of non-renewable resources offers the widest scope for manipulation of the quality of life in Vietnam. Rapid use of these resources can provide immediate improvement in living standards but may reduce the potential of living standards for future generations. These resources should not be squandered selfishly or wastefully on non-constructive, consumptive pleasures or to fuel further population growth. It is proposed that the benefit reaped from the exploitation of these resources be utilised in three ways. First, to pay for the immediate physical investments that are needed to raise the sustainable productivity of renewable resources, such as irrigation systems, land terracing, reforestation and further research. Second, to provide the investment needed to simulate industrial growth. Third, to cushion the population during the transition from the current standard of living to that eventual position when the population has been stabilized.

If the overall living standards are to be maintained at current levels or improved, the total increase in efficiency of use of renewable resources must be greater than the total increase in population by the stabilization date plus the current proportion contributed to living standards by the exploitation of non-renewable resources. It is likely that increase in efficiency will be stepwise (as technology improves) rather than gradual. In addition, the exhaustion dates of different non-renewable resources will tend to cause sudden falls in living standards. Controlled use of the wealth from non-renewable resources can soften the curve of living standards through this transition period, avoiding sharp changes which might threaten the social order.

Watershed management aims at integrating the management of water and land resources for their sustainable development and utilization by human settlements. To achieve this goal, it is very important that the size of the population depending upon any given area for its livelihood does not exceed the carrying capacity of its environment. The next priority for watershed management is to protect the catchment area and to conserve the hydrological system through forestation of hillslopes and control of soil erosion. Erosion and siltation can have devastating consequences on the entire watershed: it can cause flash floods, affect the quality of surface water and its utility, shorten the life of reservoirs, clog irrigation and navigation canals as well as hydroelectric dams, smother coral beds and fish spawning grounds, and in such other ways affect development projects and the well-being of the society. In addition to this, the endless misery and economic losses caused by floods need special consideration. Thus, measures to control soil erosion need to be incorporated in all considerations of water resources and watershed management, energy generation, agriculture, water transport and fisheries development.

Vietnam's watersheds are degraded because of a high degree of deforestation, erosion of hillslopes and exhaustion of soils by unsustainable agricultural practices such as shifting cultivation. The environmental repercussions of shifting cultivation in particular are disproportionate as compared to the relatively small area where it is practiced and the relatively small number of people involved in it. Per capita availability of land in Vietnam is one of the lowest in southeast Asia and this naturally results in exacerbating the demand for land and its resources for housing, food and fuel. The environmental effects of the decades of warfare, especially chemical warfare, and frequent natural disasters such as typhoons and floods, have further lowered the carrying capacity of the land.

3.2.1 Current Developments Regarding Land and Water Resources Management

According to the forest land use classification system, about 1.1 million ha is designated as special forest reserves (parks, wildlife reserves and tourism areas), 5.7 million ha as protected forests (natural forests managed for protection and timber production), and 12.1 million ha as productive forest (land forested for productive use). The 1.1 million ha of special reserves are divided into 87 areas, comprising of seven parks with a total area of 135,000 ha, 49 nature reserves of 666,000 ha and 31 areas called historical and cultural sites.

Although the Ministry of Forestry has jurisdiction over approximately 19 million ha (57 per cent of the total land area), the actual area controlled by it is not clearly demarcated. In reality, the Ministry of Agriculture, which has jurisdiction over approximately 10 million ha of land, takes primary responsibility for lands with a gradient of less than 30 per cent and the Ministry of Forestry takes primary responsibility for lands with greater slopes. But this

It will thus be essential to establish acceptable standards for the import, transportation, storage and application of pesticides, and to carry out an environmental impact assessment of increase in the use of agrochemicals. Import of

As regards the policies for export of surplus agricultural production, the major criterion in resource utilization is the relative profitability from the exports for generating foreign exchange. As this involves increases in productivity, it will also need increases in the application of agrochemicals which could have serious downstream effects.

Agricultural land should be broadly zoned based on criteria of ecological conservation and economic efficiency, in order to incorporate this new food strategy into integrated watershed management.

During the official policy of "food self-sufficiency at all costs", land resources were devoted to rice cultivation regardless of their suitability or returns. During this period, even tree crops of high economic value were replaced by low value food crops in some areas. More recently, the Government has realized that this policy worked against efforts to maximize the potential economic benefits from the country's ecological zones and to promote specialization in terms of productivity. A more comprehensive food strategy has since been developed, taking into account, the interrelationships between agriculture and industry, between food crops and industrial crops, between cultivation and animal husbandry, and between ecological conservation and agricultural productivity.

Agriculture occupies 21 per cent of the total land area covering about 6.9 million ha (1989). Thus, on a per capita basis, Vietnam has an extremely small area of arable land, namely 1,073 sq m, the distribution of which is uneven between the different regions. In the Red River Delta with the highest population concentration, only 591 sq m of arable land is available per capita, or 2,397 sq m per capita for those engaged in farming.

Precise zoning of classified forest land, especially of hydrological reserves, is essential for effective watershed management, along with effective legislation, training, awareness raising and enforcement.

Furthermore, according to the current law, permission for the use of forest lands is to be obtained from the district-level People's Committees for use of areas up to 10 ha, from the Ministry of Forestry for areas between 10 and 20 ha, and from the Council of Ministers for areas greater than 20 ha. In practice, these controls do not work so effectively. Once permission is obtained to use smaller areas, people intrude upon larger areas, and forest lands are sometimes intruded upon even without obtaining any permission.

distinction is rarely clear in practice, especially in large parcels of land with varying slopes or largely agricultural terraced slopes with interspersed forest stands. This lack of clear jurisdictional demarcation most probably adds to the problem of deforestation.

highly toxic and persistent chemicals should be banned. Farmers should also be trained in the safe application of harmful agro-chemicals.

Water resources are of crucial importance for the development of agriculture in Vietnam. The most highly productive parts of the agricultural system depend upon irrigation, drainage, flood control and control over water-logging and salinization.

Management of water resources within the broader framework of the watershed as a whole should incorporate environmental impact assessment of any planned land use on the water resources system, and integrate ecological considerations into choices for the use of available water, considering the existing water supply. For example, the long-term planning of hydropower development must be integrated with irrigation and fisheries development. The implications of the level of water usage in one province on the potential supply of water in neighbouring provinces may also become crucial in some cases. In the coastal areas, situations also arise where one will have to decide between investments for protecting the quality of water against salinity intrusion for paddy cultivation and adopting a strategy of shifting to brackish water aquaculture production to adapt to the changing salinity realms. For example, aquaculture is becoming more economically attractive in the lower reaches of the Mekong Delta, and agriculture and water management strategies are being modified to adapt to the new situation. Similarly conflicts also exist between the use of waterways for navigation and irrigation, or between protection of fish spawning areas and construction of water control works.

With the introduction of liberal economic policies, decisions on the utilisation of water resources are being increasingly made at the commune and provincial level rather than at the national level; farmers now have a choice to decide upon the use of land and water in a way which they consider most beneficial. With increasing decentralisation and lack of effective coordination of the local decisions, water use conflicts will arise and affect the carrying capacity of the environment if effective and environmentally sound policies are not established within an integrated watershed management framework. Thus,

Water management policies should be established within an integrated watershed management framework;

Development of water pollution standards and controls on industrial effluents, integrated of pest management (IPM) in the agricultural sector, and proper systems of sewage treatment, solid waste management and recycling. The strategy should also develop and adopt water quality standards in relation to particular uses including drinking, recreation and industrial uses etc.; and

The development of new water supplies focusing on sources that are unlikely to become polluted in the future.

Deforestation and resulting soil erosion in the Northern Mountainous Zone has reached an annual loss of soil per ha of up to 240-300 tons. The major cause of hilltop deforestation is the practice of shifting cultivation. Eight million of the 64 million Vietnamese belong to 54 ethnic minorities; of these 8 million, 3 million are mountain dwellers, that have traditionally practiced slash and burn cultivation for centuries. On an average, a family destroys one hectare of forest per year; stays 3 to 10 years in one area, then moves elsewhere, only to return to the same lot of land 7 to 15 years later. When the area of forest available to the cultivator is reduced, shifting cultivators inevitably put even greater pressure on the available land by reducing the fallow periods and, therefore, the possibility for natural recovery of the forest soils. Thirty years ago, 482,000 families practiced slash and burn cultivation; of these, 100,000 have been resettled, and another 100,000 are in the process of being resettled. The Department of Forestry has developed and is implementing a Human Resettlement Programme, which is intersectoral in nature;

Reforestation/Afforestation of Mountain tops and steep hills

Population stabilization policy should be reinforced by other sectoral policies, especially for rural areas.

Effective population stabilization programs must be implemented, especially in the midlands; and

Furthermore, land tenure policy may be adding motivation for large rural families as two children count for one work unit for land tenure allocation. Thus,

As mentioned above, the priority for a sustainable watershed development in Vietnam is to stabilize rural population levels in accordance with the carrying capacity of the land that is to sustain them. The most fertile northern soils (260,000 ha of alluvial soils in the midlands and 600,000 ha in the Red River Delta) are subject to excessive population pressure and are reaching or have overshoot the limits of carrying capacity. In some areas land exhaustion has resulted from years of intensive cultivation without adequate nutrient replenishment.

Population stabilization

3.2.2 Watershed Management Priorities

The level of utilization of groundwater resources is still low due to high investment requirements. Management of groundwater resources is therefore not yet an urgent issue. However,

Planning and coordination of groundwater resources will prevent long-term adverse effects.

once a project is approved by the Council of Ministers, funds are directly transferred to the particular district that is chosen as the relocation site. Once agreement is reached with a group of shifting cultivators to relocate with assistance under the government programme, the following steps are taken: (i) establishment of rice field terraces; (ii) development of irrigation systems; (iii) planting of other crops such as cinnamon, rattan, bamboo, flowers, medicinal herbs, coffee and tea; (iv) construction of roads for market access, of schools and hospitals, (v) training and education. It is estimated that the newly established settlements become self-sufficient regarding food within three years. Only as low as 2 per cent of these resettlement projects are difficult land accessibility, low level of literacy of mountain people, lack of sufficient funds, as \$25 million US would be necessary to resettle 17,000 families in 7 Provinces.

It is recommended that

Priority should be placed on creating alternative agriculture and non-agricultural opportunities for groups that presently are inflicting severe damage in forests and/or watershed areas, and especially to shifting cultivators in resettlement schemes; exchange of information should occur regularly with neighbouring countries on new approaches to tackle the problem; research efforts should seek to improve sustainable hillside cultivation methods and crops;

Priority should also be put towards massive reforestation and afforestation of the Mountains and steep slopes in the Northern Mountain Zone, the Northern Coastal Region, and the Central Coastal Region in order to protect the whole watershed from flash floods, massive erosion, siltation and runoffs; and

Planting efforts should aim to develop mixed forests of indigenous species most suitable to local conditions and climate, rather than monocultures and the use of exotic species. Where catchment protection is the primary objective, natural reforestation is more efficient than plantations.

Intensification of Agriculture and Fuelwood Plantations

In Northern Midlands and the Northern and Central Coastal Region of the country, fuelwood shortage is the single most important factor contributing to environmental degradation; clearing of forest land for food production is also a contributing factor.

The priority there should thus be to reduce pressure on natural forests by establishing fuelwood plantations near population centres for the sole purpose of providing fuelwood.

Simultaneous to the increase in availability of firewood, the strategy should be to decrease the demand for it by introducing and popularizing more efficient cooking stoves.

Natural forests areas should also be protected; surrounding buffer zones could be given to communities to manage in return for the protection of central area. Stronger programs are needed for forest area protection, both to conserve existing forests and reforested areas, and to allow for natural regeneration of degraded areas; where catchment protection is the primary objective, passive use of natural reforestation is more efficient than plantations.

But the protection of these areas will remain impossible to enforce until survival needs of the people are satisfied. So as a second priority, agricultural production on presently cultivated land should be intensified, thereby lessening the need to clear new land and taking the pressure off forest lands. Once the harvest of prime land increases, efforts should concentrate on putting marginal idle land, often on hillsides, back into production, which will reduce soil erosion; the latter will necessitate technical assistance and support, because of problematic soils and other limiting factors. Agronomic systems for hillside areas should be promoted such as agro-forestry, contour planting, tree cropping and terracing, etc. While the hilly and midland areas are suitable for industrial crops and the lowlands are intensively exploited for rice cultivation, the potential of the uplands has not yet been surveyed.

Finally, in the lower lands, 30 km from the coast, agricultural infrastructure will have to be reinforced (see section 2.7.2 and 2.7.3) and upgraded to adequate standards to ensure protection of agricultural land, and to minimize the devastation of typhoons and tropical storms.

To achieve the above, it is recommended that

Support of agricultural efficiency through the removal of market disincentives and the implementation of other sectoral reforms such as maximizing benefits from multi-cropping, improving farmer incentives, and minimizing post-harvest losses.

Development and promotion of sustainable cultivation and agronomic systems for hillside areas. Activities should consider agro-forestry, contour planting, tree cropping and terracing, and be adapted to specific site conditions, farmer preferences for crops, and feasible soil and water conservation technologies;

Agricultural practices should emphasize intensified cultivation to increase productivity, crop rotation, control of agricultural chemicals, popularization of organic farming and irrigation practices to avoid waterlogging, and soil salinization;

Research and extension work related to agro-forestry systems should receive top priority, with a view to future replication in areas where shifting cultivators from the

uplands are being resettled. In addition, men and women should be involved in planning and implementing these activities and their individual needs should be incorporated at all stages of project development;

An intensified program of reforestation and afforestation should include the establishment of forest buffer zones and economic forest plantations to provide both fuelwood and timber. Planting efforts should aim to develop mixed forests of indigenous species most suitable to local conditions and climate, rather than monocultures and the use of exotic species;

The involvement of local people must be incorporated into these activities as rural employment and rural income generation projects; and the needs of the people for forest products must be thoroughly assessed;

To reduce pressure on forest exploitation for rural firewood supply, community level fuelwood plantations should be established, and more fuel efficient ovens must be popularized;

Stronger programs for forest area protection, both to conserve existing forest and reforested areas, and to allow for natural regeneration of degraded areas. Where catchment protection is the primary objective, passive use of natural reforestation is more efficient than plantations. Protected areas thus should include forests set aside as hydrological reserves, national parks and nature reserves, cultural sites and recreation areas;

Measures to control forest fires and disease and stricter enforcement of forest regulations. The success of such programs will likely be greater if land tenure systems are established to ensure that local communities have a direct interest in protecting and managing forests on a sustainable basis;

The promotion of agro-forestry focussing on adapting the traditional systems of agro-forestry already existing in Vietnam;

A review of all forest policies and laws should be undertaken to ascertain if current rules and regulations are being enforced, if realized government revenues approach economic values, and to ensure that protection and conservation measures are adequately secured within these policies. Issues to be reviewed include allowable cuts, harvesting cycles, stumpage fees, etc.;

The banning of large-scale commercial logging in the remaining areas of natural forest. A ban is needed both for watershed conservation and for habitat protection. Commercial logging should be focused on plantation forests that have been established for such use;

Both the Coastal Northern and Central Regions incorporate some of the most degraded land, such as rocky land, sand dunes, steep or bare hills that erode very quickly; in some areas, not only has the vegetation been destroyed but rocks are now picked from the gulleys and sold to build houses: the area is an ecological disaster. Intensive rehabilitation schemes will have to be developed to build terraces out of stone and plant something resistant to hold the land.

3.2.4. Restoration of degraded lands

The Mekong Delta covers an area of 49,520 sq km of which 39,000 sq km is in Vietnam. It is the largest rice producing area of the country and currently accounts for around 45 percent of total paddy production. The area presently under rice, estimated at 2 million ha, could be expanded to 2.4 million ha. Each year some 1 to 1.2 million ha are waterlogged for a period of 2 to 4 months. Some 40 per cent of the Delta within Vietnam comprises acid sulphate soils of various degrees. The 703,500 ha of saline soil could be highly fertile if seawater intrusion could be prevented. At the same time, the intrusion of saline water controls the acidification on the surface of the acid sulphate soils and provides a good shrimp habitat. Thus control of saline intrusion should be undertaken on a flexible basis. Some interesting pilot projects have been designed to demonstrate the most suitable and ecologically sound development of land-uses (agro-fishery-forestry) in salino-acid sulphate soils in the Delta.

Research on the management of salino-acid sulfate soils should continue and the use of small pilot demonstration areas is encouraged; research should also concentrate on finding a solution to the scarcity of drinking water during 3 to 4 months of the year.

3.2.3. Management of Problem Soils of the Mekong Delta

Education, training and workforce development in a wide range of forest management and conservation topics.

Development of programs to assist in the promotion, marketing and distribution of forest products. Emphasis should be placed on products grown by local people in agro-forestry systems or products that can be harvested from the forest on a sustained yield basis without disturbing the natural vegetation; and

Development of an accurate inventory of Vietnam's forest resource base and development of forest land use allocation programs based on this information;

Anti-desertification measures will have to be taken such as dune fixation; successes in other parts of the world should be built on and a programme developed. Strategies will have to be developed to rehabilitate the most degraded lands in the Northern and especially the Central Coastal Regions.

In summary, it is recommended that,

a. To achieve sustainable watershed development, Vietnam must emphasize the integration of land use planning and zoning for the most appropriate agricultural crops, with zoning of forest cover, protected areas, and human settlements, always taking into account population levels and land capacity;

b. Protection of existing forested watersheds and the rehabilitation of denuded watersheds is crucial. This will require a program of reforestation and afforestation, a system of protected areas, enforcement of forestry regulations, fire and disease protection measures, and reforestation;

c. Integrated watershed management should emphasize multi-purpose utilization of water resources, soil erosion control through appropriate soil stabilization measures, forestry rehabilitation by large scale reforestation, land use and human settlement planning, waste management, focusing on recycling, and flood control measures; and

d. Intensification of cultivation in areas that are in fact suited to sustainable agricultural use. Special attention must be paid to improving and promoting techniques and systems, such as agro-forestry, aimed at sustainable hillside cultivation.

3.3. Pollution Control and Waste Management

3.3.1. Appropriate Technologies for Waste Reduction, Reuse, and Recycling

One of the best ways to control pollution is to minimize wastage in the first place (i.e. waste reduction). This requires an emphasis on efficiency in the way fuels or other materials are used by a particular industry, enterprise, farm, or household. At present, for example, most industrial plants in Vietnam are characterized by high systemic inefficiency, due to old and poorly maintained equipment, and thus by high leakage and pollution loads. This problem should be addressed by industrial policy.

Another optimal strategy is to minimize the amount of material that can be classified as waste after it has been used to carry out a particular task. It must be borne in mind that what is considered as "waste" from one perspective, may actually be viewed from another

as a resource that can be utilized effectively. Vietnam is quite familiar with this principle. Sewage, for example, is used on a widespread basis, as fertilizer, both in agriculture and in fish cultivation. It is even reported that there is stiff competition in some areas for sewage by fish cooperatives, gardeners, and rice cultivators.

Such patterns of "waste exchange" or re-use should be further promoted and developed in other sectors as well. Efforts to create industrial waste exchanges should be made, between industries of different types. One plant's by-product may be a valuable production input to another plant, but an information centre with data on who is producing what "waste", and where, is necessary to enable such an exchange. Not only does this reduce pollution, it reduces the amount of raw material to be obtained by the industry, and thus makes good economic sense.

Recycling should also be promoted wherever it is economically feasible. Recycling involves the re-processing of a given material to enable it to be re-used. Examples here include glass, plastic, or metal recycling. However, it is preferable to minimize the use of products that need to be re-processed before they can be re-utilized, if another less expensive (and often less energy intensive) alternative is available. For example, re-useable beverage bottles should be promoted over aluminum cans or plastic bottles, as the latter need to be re-processed in order to be used again.

3.3.2. Control and Treatment of Air, Water, and Soil Pollution

The use of waste reduction, re-use, and recycling will not serve to eliminate all waste or deal with pollution-causing agents of all types. Other control and treatment methods are therefore also required.

a. Domestic

Domestic or household pollutants consist primarily of sewage and solid wastes. Whatever remains of these materials after any portion is separated for re-use and recycling should be properly treated and/or disposed of. This will require some form of treatment system in the case of sewage, and in the case of solid wastes, incineration and/or disposal in a suitably designed and located sanitary landfill. Incineration often is attractive as a form of electricity generation, but proper air pollution controls from incinerator smokestacks must be ensured to avoid health risks.

b. Transport-related

The subject of rational and sustainable transportation systems is addressed in section 2.5.7. As noted, the best way to avoid air pollution and numerous other problems related to the

In the event that present barriers to foreign investment in SRV are lowered, the country may permit the establishment of such industries as a means to develop the economy and and dispose of them.

Pollution and health effects from toxic chemicals and other hazardous substances has emerged as one of the most critical problems of the industrial age. Far too many countries have permitted, and even promoted, the development of industries which use and produce such substances but without sufficient regard for the systems required to properly manage

3.3.3 Control of Toxic Chemicals & Hazardous Substances

The use of chemical pesticides also is fairly low relative to most other countries but is likely on the increase, and some negative effects of pesticide pollution already have been observed, e.g., on freshwater fisheries. Integrated pest management, a system which makes maximum use of intercropping, crop rotation, natural pesticides, and other traditional pest control methods, should be promoted to the greatest extent possible. Regulations on storage, transportation, handling and use of pesticides should also be developed, including restrictions on the types of pesticides that can be used in the country.

Agriculture pollution stems mainly from the use of agrochemicals in the form of chemical fertilizers and chemical pesticides. At present, there continues to be substantial use of organic fertilizers, a practice which should be maintained, as it is more conducive to the maintenance of long-term soil fertility, and to the prevention of water pollution in the form of eutrophication.

d. Agricultural

Standards on industrial pollution should be established, and subsequently enforced, in relation to smokstack emissions and fluid effluent discharges. Regulations on the use, handling, and disposal of toxic and hazardous substances also should be developed and tightly enforced (See Section 3.3.3). Other relevant points are raised in Section 2.5.8 on industry and sustainable development.

c. Industrial

It also would be beneficial to require that only clean fuels be utilized by vehicles (e.g. lead free, gasohol, etc.) and that vehicles be required to maintain efficient, clean-running engines that meet exhaust emission standards that should be established and enforced. transportation sector is to promote public transportation and the continued reliance on bicycles and motorbikes, and to discourage the use of private vehicles.

One of the most important issues in the area of coastal zone management is the need to prioritize the development directions so as to avoid conflicts and to prevent overlapping of development interests of the various resource sectors such as tourism development, land use planning etc., and to compromise on their exploitation levels to achieve sustainability. By integrating the development thrusts and conservation needs in the coastal zone, the Integrated Coastal Zone Management Plan will optimize the exploitation of the various coastal resources to ensure their sustainability. Sustainable land use planning and zoning could be an important tool for the planner for this purpose. As already discussed under Section 2.5.10, considering the environmental characteristics of each area from the point of view of development potential, coastal zones can be delineated for specific development thrusts such as tourism development, aquaculture, ports & harbours, coastal industries,

3.4 Integrated Coastal Zone Management & Planning

- establish a national registry of potentially toxic chemicals and hazardous substances and strengthen relationships with UNEP/IRPTC for information and technology transfer on environmentally safe management of these substances (See Section 4.2.1a for details).
- develop regulations pertaining to the storage, transportation, handling use of toxic chemicals and hazardous substances.
- form a special group, perhaps within the SCESD, to address problems relating to hazardous substances and to develop a program for their management and disposal.
- seek to develop or adopt alternative methods, or to use alternative, non-hazardous, materials in industries that presently employ or generate hazardous substances.

However, there are existing industries which involve toxic chemicals and hazardous substances and it remains possible that additional ones will be established. With regard to these, the following measures are suggested:

Furthermore, as noted in Section 2.5.8, analyses have led to the conclusion that the country is better off pursuing an industrial strategy based on light industry.

provide employment. It must be borne in mind, however, that even with a very complex and expensive framework in place for managing these technologies and their by-products, they represent a dangerous proposition which is not fail-safe, and which does not manifest a program of sustainable development for Vietnam.

Sedimentation and pollution from land-based sources are brought about by environmental mismanagement on land and can mainly be controlled and prevented at the source through such activities as reforestation, improved agricultural practices, especially proper application of agrochemicals, and proper waste treatment. The damage caused by human activities in

With the anticipated growth of tourism in the near future, collection of reef organisms for the processing of souvenirs could soon become another important environmentally damaging factor.

- i) increased runoff from rivers due to deforestation;
- ii) increased sedimentation caused by freshwater outflow;
- iii) marine pollution from land-based sources, especially from human settlements and agricultural practices;
- iv) Environmentally damaging fishing techniques such as dynamiting; and
- v) Excessive removal of reef organisms and harvesting of commercial species for food and manufacture of artificats.

Although no estimate has so far been attempted of the extent of coral reefs in Vietnamese waters, considering that fringe reefs on an average extend only 100-200 m from the coastline and around the offshore islands, the country's coral resources are not extensive. There are no coral atolls and the fringe reefs are most abundant along the central coastline and around the southern coast. About 70 genera and 200 species of corals have so far been identified some of which are already becoming rare and are threatened. Action is needed to tackle the following problems that affect the coral reefs of the country:

3.4.1. Coral Reefs

Development of such plans will particularly take into consideration the daily needs of the offshore oil and mineral exploration/exploitation, marine parks and protected areas etc. local population, employment generation, and local traditional professional skills. The management plans will also lay special emphasis on measures necessary to prevent the proliferation of such commercial activities in the zones that are detrimental to the sustenance of the natural resources (such as the collection, processing and sales of souvenirs etc.) and mass migration of labour from other regions attracted by the increased opportunities for employment generated by such development, that could increase the stress on coastal resources. For this purpose, the Plan will also include measures necessary to monitor the pace of development.

Several well-known methods for mangrove forest management have been tried in many countries such as strip felling, logging rotation to allow for natural regeneration etc. Action

Protection of mangrove areas should always be planned, keeping in mind their importance as buffer zones against storm surges and typhoon damage, coastal erosion and flood control, as well as their prime role as the breeding, feeding and nursery grounds for commercially important coastal organisms. The importance of the ecosystem in economic terms, although not easy to estimate, should not therefore be neglected.

- i) clearing for construction of aquaculture ponds and housing;
- ii) cutting for logs for commercial uses and fuelwood supply;
- iii) after-effects of chemical warfare, especially napalm bombing and application of defoliants;
- iv) harvesting of Nipa fruits and hunting;
- v) felling for extraction of aromatic oils and honey; and
- vi) changes in the ecology of the mudflats from sedimentation, oil pollution and land-based pollution, especially garbage.

The mangrove forests of Vietnam grow luxuriantly around the southern coast and because of the attention received from scientists from time to time, some baseline data is available that can be of help in planning their sustainable development. Mangrove forests suffer, among other things, from:

3.4.2. Mangrove Forests and Seagrass Ecosystems

the field could be tackled through improved legislation and their enforcement by local authorities. This should include banning of environmentally undesirable fishing practises, limits on minimum sizes of species that could be commercially exploited, prohibition on collection, sale and export of endangered species in any form, establishment of marine parks and protected areas, as well as promotion of environmental awareness among those involved in subsistence livelihood. At the same time, research needs to be undertaken to arrive at a realistic estimate of their overall significance for both environmental and economic sustainability. Because of difficulties in quantifying the importance of coral reefs as the feeding, breeding and nursery grounds of commercially important marine organisms and therefore for the sustenance of coastal fisheries, their significance in economic terms is often underestimated by planners.

is needed to rehabilitate the exploited and degenerated areas through the intensive application of such techniques, together with the establishment of large-scale mangrove plantations.

The mangrove area and the marginal land should be properly zoned, and the type and nature of development in this area be properly planned and regulated. For example, aquaculture ponds should be allowed to be constructed only in the marginal areas, and never in the forest proper. It is also very important that whenever a plan for alternative utilization is drafted, a cost-benefit analysis should first be undertaken to determine the primary suitability of the area for the alternative use in mind as compared to the natural benefits accrued from it.

First and foremost, action is needed to remove/ease the pressure of exploitation on the mangrove areas by the following activities:

- i) allow only limited selective logging by strict regulations;
- ii) establish alternative fuelwood resources such as fuelwood plantations;
- iii) establish special *Melaleuca* plantations for the production of aromatic oils (Because of the income generated, this could actually be considered as a development project under the small-scale industry sector);
- iv) popularise alternative bee-keeping techniques (This could be better propagated as a small-scale cottage industry);
- v) encourage alternative livelihood training along subsistence patterns;
- vi) establish protected areas;
- vii) promote awareness among people depending on mangroves for livelihood; and
- viii) conduct research to observe the long-range effects of chemical warfare and the recovery of affected areas.

Sea-grass beds usually occur in close association with coral reefs and mangrove swamps, and although not a specifically significant habitat/ecosystem as such, their significance should be evaluated from the point of view of their importance for marine turtles and as the nursery ground for other commercial species. Although almost nothing is known about the extent of sea-grass beds in Vietnamese waters, increasing sedimentation from land sources is badly affecting their distribution. Several species of marine turtles occur and breed in coastal waters associated with the sea-grass beds. Both the adults and eggs are

extensively exploited and their populations are presently reported to be on the decrease. Action is needed in the following areas to conserve the commercially exploited populations of marine turtles:

- i) establishment of limits on minimum size that could be caught commercially;
- ii) protection of breeding female turtles, nesting grounds and eggs through enforcement of banned seasons, quotas and license system for eggs removed from nests etc.;
- iii) protection of traditional nesting beaches from other development;
- iv) establishment of hatcheries;
- v) ban on sale and export of turtle shells and other artifact souvenirs; and
- vi) promotion of environmental awareness.

3.4.3. Estuarine and Marine ecosystems

Estuaries along the coastline of Vietnam are formed by the mixing of sea water and freshwater discharged from the river systems, especially the strong Red River and Mekong river systems. Along estuaries and coastlines are located many large populated cities, sea ports and industries (Hai Phong, Vinh, Da Nang, Quy Nhon, Nha Trang, Ho Chi Minh City etc.).

These coastal regions play a very important role in various economic fields, in the exploitation of biological resources and minerals, in transportation and in the expansion of new land for cultivation.

Estuaries and shallow sea waters are the spawning and breeding ground of many species of marine organisms of commercial importance. In these regions are distributed rich coral reefs and mangrove forests where a wide range of fishes, shrimps, oysters, birds, and terrestrial animals is concentrated.

Estuaries in Vietnam suffer changes by both natural and human activities. The main factors which have an impact on the estuaries are the following:

- Fishing is chiefly concentrated in the estuaries and the shallow coastal waters

- the main spawning and breeding grounds of many commercial species and home of the young larvae.
- Methods of fishing are by hand but fishing tools used are over-destructive, namely, the use of fishnets of small mesh and the use of explosives. Because of these effects, catch per fishing unit does not increase, but is, in fact, decreasing. Fishing intensity is now rapidly increasing in comparison with what it was some years ago, but the total catch only increases slightly. Owing to over-fishing over several decades, many economic species of marine organisms have decreased or now are threatened. These include *Clupanodon thrissa* in the Tonkin Bay, *Dorosoma nasus* in Central Vietnam's sea. *Mytilus smaragdinus* in the lagoons of Central Vietnam, *Haliotis diversicolor* in Bach Long Vi island and *Panillurus* sp. in the coral reefs. The fish *Megalops cyprinoides* was abundant in the Nam Bo estuaries about 30 years ago but now seems to be absent.
- According to available statistics the surface of mangrove forests in estuaries is about 300,000 ha, including 140,000 ha of *Melaleuca* forest. This area is now greatly reduced by napalm bombing and herbicide spraying by the US military during the war against Vietnam, and by the destruction of mangrove forests for other economic uses, such as expanding brackish fishpond, cutting of firewood and building materials and the burning *Melaleuca* forests for hunting purposes.
- Exploitation of coral reefs for making quick lime is very wasteful use of these productive living resources, especially extensive alternative sources of quick lime are available in the karst limestone hills of Vietnam.
- Loss of coastline tree cover increases the incidence of storm damage by tidal waves and typhoons in populated coastal areas and leads to sand blowing on to agricultural lands.
- Estuaries and shallow waters suffer pollution by waste water from the populous cities and industrial plants, by exploration of oil and gas on the continental shelf and by loading and unloading of goods, especially petroleum products in the sea ports. In addition, increased siltation from deforested upland areas is changing the nature of estuaries and coastal areas and killing aquatic life and coral reefs. In many estuarine regions people are also expanding the cultivation of new land by building dykes seaward. Many hydro-electric stations, reservoirs, dams, etc. are built on the upper streams and water courses. These activities affect the life of organisms and biological productivity of estuarine ecosystems by changing the flow of freshwater

Coastal erosion is a serious problem in some areas during times of strong freshwater outflow (especially from the Mekong and Red rivers) and floods, as well as during monsoon stormy weather, tropical storms and typhoons, causing hardships to coastal populations and destruction of property and aquaculture ponds. To protect against such problems, an integrated coastal protection plan needs to be developed which should include the following actions:

3.4.4. Coastal erosion control and coastal protection measures

- Vital spawning areas should be protected from fishing
- Other fishing controls, such as limits on mesh size, banning of explosives and poisons, etc. should be established.
- Fishermen should be encouraged to fish further out at sea. This requires larger boats and, therefore, the formation of larger fishing cooperatives.
- Mangrove reforestation project must be continued.
- The mining of live coral for making lime and building materials should be banned.
- Pollution measures to control the discharge of organic and industrial wastes must be enforced.
- Planning permission must be necessary before seashore developments can be approved. Guidelines should be drawn up as to what types of development are to be excluded or limited.

The following actions are urgently required:

Estuaries are important areas and are subject to profound changes from both natural and artificial factors, yet they have not been fully studied. Investigation of Institute of Marine Researches concentrates only in the areas from 30-50 isobaths out to the open ocean. To fill this gap in knowledge, a project "Rational Utilization and Protection of Natural Resources of Estuarine Ecosystems in Vietnam" was begun in 1985.

dowstream. The balance of freshwater with salt water which determines the distribution of species in the coastal zones in thus affected.

The flora and fauna of Vietnam is very rich and diverse, and is characterized by a high degree of endemism. Some 7000 plant species have been identified, but it is estimated that another 5000 occur. Many of the floral species are confined to small geographic ranges and occur at low individual densities, features which render them particularly vulnerable to deforestation. Several of the most valuable timber species are becoming scarce or already are endangered with extinction.

3.5. Maintenance of Genetic Diversity

- i) avoid cross impacts from conflicting development activities through rationalization of resource utilization, so that benefits from one area does not conflict with or affect other activities in neighbouring areas or create a potentially disastrous situation;
- ii) avoid, as far as possible, artificial, technically demanding and costly structural coastline protection measures, such as revetments, groins, bulkheads, dykes, levees etc.;
- iii) conserve coastline in a natural condition and avoid loss of beach area by regulating any construction near waterline that could increase stress on beach geomorphology;
- iv) plan coastal zone protection in broader geomorphological and ecological context as an integrated natural unit taking into consideration such human activities as coral extraction, sand quarrying, mangrove utilization etc.
- v) regulate sand mining and beach rock quarrying;
- vi) protect coral reefs as wave breakers (See Section 3.4.1. for details);
- vii) adopt natural beach nourishment methods such as aquatic vegetation to prevent sediment starvation;
- viii) develop dunal ridges to trap and retain wind-swept sand and stabilize them with self-propagating and self-maintaining dune grass and shrubs;
- ix) encourage natural establishment of sand dunes and their stabilization protection and planting of beach vegetation; and
- x) encourage mangrove establishment, wherever feasible, as buffer zone against coastal erosion and typhoon damage (See Section 3.4.2 for more details).

The fauna include 773 bird species, 273 mammals, 180 reptiles, 80 amphibious species, many hundreds of fishes, and many thousands of invertebrate species. Included among these are numerous species which are valuable and rare, and which are of great interest to conservation. Some have been or could be domesticated, while others could be bred for food production, biomedical research, or for their skins. About 2300 of the plant species in Vietnam are used by humans for food, medicines, wood, animal fodder and other purposes.

Therefore, in addition to the value of preserving biodiversity genetic diversity as a means to protect against global environmental change, direct economic benefits also are to be derived from doing so. Essentially, the improvement and sustainability of agricultural, forestry, and fishery production, as well as scientific progress, depend upon a full range of genetic variation.

Unfortunately, the decline of species in Vietnam is occurring very rapidly, primarily as a result of deforestation, overhunting, and in the case of some marine species, overfishing. In order to reverse or slow this trend the needs identified in the sections on forestry (2.5.2.), fisheries (2.5.3.), and watershed management (3.2) are of particular importance.

The following are also recommended as per the National Conservation Strategy :

- Establish additional national parks, protected areas, and wildlife reserves, and ensure their effective management and/or protection (See Section 3.7).
- Develop practical, implementable programs to protect particular species that are endangered, as identified through monitoring. A list of these species has already been compiled, which includes 54 mammals and 60 bird species, but enforcement is still lacking. In some cases, protection will require international cooperation, as in the case of the kouprey and the various species of sea turtles.
- Develop hunting regulations, including total hunting bans in areas where this is desired.
- Implement measures to control trade in endangered species, e.g. CITES membership, border patrols, etc.
- Initiate further programs aimed at *ex situ* conservation, e.g. seed banks, botanical gardens, zoos, captive breeding, etc.

A National Wetlands Conservation Programme for Vietnam should be developed along with a series of demonstration projects dealing with the sustainable utilization and rehabilitation of critical wetland ecosystems. IUCN has developed a draft proposal for the development of a National Wetland Conservation Programme for Vietnam.

Wetlands play an important role in the Vietnamese economy. The sustainable use of the wetlands in the Red River and Mekong delta systems is critically important to the long-term economic and social welfare of the Vietnamese people. The two deltas form the foci for concentrations of population and generate a high percentage of the food and raw materials produced, both for domestic and export markets. However, the maximisation of food production in the wetlands of these deltas has been achieved almost entirely through conversion of the natural ecosystems into agricultural land and aquaculture ponds. Vast areas of wetland have been reclaimed for rice cultivation and associated human settlements, or extensively modified for aquaculture (fish, shrimp and edible aquatic plants). Although many thousands of hectares of deltaic wetlands have been successfully converted to agriculture, many of these conversions have not created conditions which are sustainable under the levels of investment and management which are economically and technically feasible at this stage in Vietnam's development.

The non-sustainable conversion of wetlands and alterations to the soils and hydrology of wetland systems make it difficult to rehabilitate natural wetland ecosystems, the renewable resources they normally generate which people can exploit on a sustainable basis, or the valuable environmental services wetlands provide. In some cases, these man-made changes may provide irreversible and the formerly very productive become unusable wastelands.

It is unlikely that the Government of Vietnam will be able to make rapid progress in the formulation and implementation of new measures to promote the sustainable utilization of its wetland resources without technical external and financial assistance to supplement its resources. Selective international development assistance is required to provide technical and financial support for clear demonstrations of what can be achieved through improved environmental planning and management and the coordination of development initiatives.

A number of practical steps can be taken to strengthen the institutions which will influence conservation of wetlands and their resources. These include the encouragement of the development of strong and effective policies which promote the wise use of wetland ecosystems. Strengthening the manpower resources available to conduct applied research and to assist in the planning and management of national and local wetland conservation initiatives is also critical. It is also important to strengthen the information base on wetlands and their value to Vietnamese economy and society. The information available to politicians, planners and managers on how to plan and implement wetland conservation

A list of endangered species in the country has already been drawn up. Official protection is proposed for 54 species of mammals and 60 species of birds. It is planned to produce

Protected Species

Since the establishment of nature reserves is rather a new idea in Vietnam, a country where there is little experience in this field, it is felt that international assistance in the initial stages of planning and training for the management of a few model reserves is needed.

The experience of other countries has shown that protected areas fall in their objectives unless the needs of local people are given serious attention at the design and planning stage and unless various direct or indirect benefits are made available to the local people through the establishment of such reserves. This involves considerable skill in socio-economic evaluation and the development of sensitive extension services for the reserves.

A system of natural parks and nature reserves should be established and managed by the Ministry of Forestry. A start has already been made by declaring 87 areas as reserves. These reserves have been selected to cover the full range of distinctive ecotypes of the country. However, most of them are not large enough to contain viable populations of each species. In complex tropical ecosystems which have high species diversity but generally low individual densities this means areas of very large size (e.g. 100,000 ha). Smaller areas can be expected to lose many local species. However, where large areas are not available, the small size of some reserves can be countered by designing buffering layers of surrounding land use which are partially protective (e.g. non-hunting areas) and can act as migration corridors to maintain exchanges between neighboring "islands" of surviving natural habitat. The preliminary system protects a total of 1.1 million ha, or 3% of the country.

3.7. National Parks, Protected Areas, and Wildlife Reserves

The most effective group within the Government of Vietnam to develop and implement a national wetlands conservation programme is the State Committee for Sciences and the Centre for Resources and Environmental Studies (CRES). The State Committee already performs a coordinating function, acting through its Department of Natural Resources and Environment; CRES could provide the required technical assistance. Projects could be developed directly with the provincial and district Peoples' Committees with full support from the relevant central government agencies.

Initiatives must also be improved. Greater cooperation among Vietnamese institutions for higher learning should also be encouraged.

a Vietnam Red Data Book to give information on a wider range of species categorized as endangered, threatened, vulnerable or of indeterminate status. The current promulgations by Ministry of Forestry on protected species should be revised in the light of these recommendations.

These activities must be continued and the status of wild species should be constantly monitored so that revisions to the protected species lists can be made and other priority actions to save species that have become endangered. This continuous monitoring should give an indication of the environmental health in the country. A loss of constituent is a clear sign that something is wrong. Unfortunately, there is at present almost no enforcement of the regulations regarding protected species. The legislation needs tightening up and the local judiciary and police alerted to its existence and importance.

Hunting Regulations

Properly control hunting could provide valuable protein to the people, a source of recreation for them, and also prove to be a profitable tourism and trophy industry. Instead there is no control and game species are being hunted out of existence.

The police should try to register and check all firearms in the country and confiscate all unofficial weapons. Regulation to control hunting should be brought into effect if any game is to survive the present decade in Vietnam. Such regulations should insist on hunting only under permit, with prescribed hunting areas, hunting seasons and size limits. Hunting permits should limit the holder to a maximum number of kills and all kills should be registered with the local controlling agency.

Under proper management, population densities could be built up to levels where quite a high sustainable kill would be possible. At present, however, game have been reduced to such low levels that few large animals remain to be shot and hunters are turning to squirrels, civets and other small animals as alternatives to the preferred deers, pigs, goats and monkeys. Most areas require a total ban on hunting for a few years to allow stocks to recover. Even reintroduction of species are needed in many areas.

Control of Trade

One way to reduce over-utilization of genetic resources and to enforce protection laws is to apply much stricter control of trade. There is no control, for instance, on the export of tiger skins, although this is a protected species. An immediate step should be for Vietnam to become a member of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES). As such, Vietnam would be obliged by international commitment to introduce regulations to control the trade in a number of species listed on three different appendices of the convention, each requiring different

types of documentation to permit export. This would be particularly relevant to control the heavy trade in ivory passing through Ho Chi Minh city.

It is also recommended that a 5 year moratorium is passed on all wildlife export so that stocks can recover, a full assessment of the situation can be made and realistic regulations can be established to control trade.

Ex Situ Convention

In addition to efforts to save valuable species in situ in the wild, there should be efforts to build up self-maintaining captive breeding stocks in zoos and botanical gardens; develop seed banks and other forms of ex situ conservation. Attempts should be made to rescue and artificially propagate some of the rare relict tree species of Vietnam as well as some animal species. A good example is the rare bovid, the kouprey Bos sauveli, which is reduced to less than 10 individuals in Vietnam (out of a world population of perhaps no more than 100). This species is known to have domestication potential and could be hybridised with domestic cattle. Such potential, and may be even species survival, can only be realized if a captive breeding herd is established. A breeding centre to receive such animals is already prepared at Buon Me Thuot.

CHAPTER IV

PROGRAMME SUPPORT ACTIVITIES

4.1. Education, Training, Extension, and Awareness Promotion

4.1.1. Development of Formal Environmental Education

Various aspects of the basic environmental sciences are already incorporated in the traditional educational curricula in the schools and colleges. But to keep in step with the increasing awareness of the worsening environmental concerns and of the importance of a healthy environment to support the quality of life, it is very essential to pick out and incorporate them in an integrated environmental curricula that would specifically focus attention on the basic concepts of sustainable development. This will also necessitate the establishment of specialised degree courses in the field of environmental sciences and the training of teachers in this field.

a. Curricula, syllabi and textbooks

Proposals already exist on the development of environmental curricula and its incorporation into the existing educational framework; even the areas suitable for each grade level have been identified. As part of an overall programme to promote and improve environmental education in the country, these curricula should be revised and elaborated into detailed syllabi, followed by the development of textbooks. Such programmes are now in full swing in many countries under the motto that the environment will be safer in the hands of a future generation that is more aware of its importance.

b. Postgraduate courses

Vietnam is in need of environmental managers with a broad-based view of the environment and of its relationship to resource use and other human activities, as a determinant of sustainable development and the maintenance of genetic diversity. This need can be met most effectively at the university level, through the establishment of postgraduate courses and programs in environmental sciences *per se*, but also classes in other critical aspects of environmental management such as economics, political sciences, public administration and even anthropology, as they relate to environmental concerns.

Extensive research and measurement of various environmental parameters need to be undertaken for evaluating the current environmental situation in order to derive realistic purpose.

Developmental responsibilities are currently divided between several ministries along traditional sectors, whereby the environmental interests get dissipated and the cross-sectoral and multi-sectoral interests obliterated. In other words, integrated planning of the concept of environment needs to be developed from fundamental upwards. The concept of an integrated cross-sectoral environmental planning and its importance for achieving sustainable development has to be cultivated among the planners and a series of seminars and training courses should be organized for this purpose.

There is a need to develop and/or improve upon the existing national expertise in virtually every field of environmental management. However, considering the major issues that need to be tackled on an urgent basis, specialised training should be provided on a priority basis in some areas as indicated below in order to boost the national management capabilities:

a. Specialised training

Development and cultivation of national expertise in the field of environmental management depends to a great extent on on-the-job training of officials through (a) specialised training in areas pertaining to the most urgent environmental issues that face the country; (b) overseas training and experience through fellowships, attendance at international conferences, etc. to soak up technical know-how from foreign countries; and (c) exchange of experts to achieve technology transfer and inter-change of experiences with other countries.

4.1.2. Technical Training

The ultimate success of the development and incorporation of environmental curricula and syllabi in the educational system, including the establishment of degree courses, will depend upon the efficient training of sufficient number of teachers. This aspect should therefore be considered as an integral aspect of the above two activities.

c. Training of teachers

In addition, students in other degree programs, e.g. engineering and economics, should be required to take some classes in environmental management. This will help to ensure that environmental factors are integrated into planning, and even project conceptualization, at the most fundamental level.

environmental quality standards and to monitor and to keep track of any environmental changes from development. For both national and international compatibility and comparison of all such data collected, it is also very essential to standardize the methodologies applied. Technicians involved in such measurements should be provided with specialised training in organizing laboratories, laboratory procedures, methodologies and, over and above everything else, their standardization and quality control.

There is a growing awareness among the environmentalists and even among some planners in the country of the need to conduct an early environmental impact assessment of development projects in order to avoid or mitigate any possible adverse effects. Environmental assessment of at least two multi-purpose dams have so far been attempted that could be termed as Environmental Impact Statements. However, national expertise needs to be developed in this field from foundations upwards to cover the development projects in various fields.

Considering that industrial development in the country is expected to take off in the near future, development of national expertise in this field must receive high priority if the country's environment is to be adequately protected from pollution and if environmental impact assessment of development projects is to be made compulsory by legislation. It should especially be borne in mind that if national experts are not available in time even for foreign-funded projects, use of foreign consultants will involve additional expenditure in foreign currency. Outlines of proposals for such EIA courses in the country have already been prepared for consideration.

b. Overseas training and fellowships

Specialised training and on-job training for further development of national expertise could be boosted through overseas training and overseas fellowships, and additional opportunities for participation in international conferences, seminars, workshops and meetings for discussions and exchange of experiences.

c. International exchange of expertise

Opportunities for two-way technology transfer, particularly in the field of appropriate and traditional technology transfer, could be further enhanced through bilateral arrangements with other countries/agencies/organizations in the region for exchange of experts in various fields of environmental management and areas of sustainable development, with special emphasis on those areas that need to be further developed in the country.

4.1.3. Promotion of Environmental Awareness

Environmental education should be continued beyond the classroom through the promotion of environmental awareness by various means among the professionals, general administrative staff especially at the provincial, district and commune level and the general public. Considering their potential for generating wide publicity and dissemination, the volunteer groups (non-governmental organizations) and urban media should be involved to play a very special role in all activities for the promotion of environmental awareness.

a. Development of environmental awareness tools, kits & packages

Preparatory to such environmental awareness campaigns, a set of awareness tools, kits and packages should be prepared as (non-formal) educational material, in the form of posters, placards, slogans, paintings, calendars, pamphlets, brochures, newsletters, booklets etc. aimed at the various target groups, particularly taking into consideration the assimilative capacity and understanding level of each target group in mind. All these materials should include basic concepts of environment and its over-encompassing dimensions, its importance to life and crucial role in sustainable development. Special emphasis should be given to the major environmental concerns and issues, how they are brought about, how they affect the day-to-day life of the common man and how each citizen can bring about their prevention and alleviation through participation in the decision-making process. Availability of such material is presently very limited in the country. Activities of many of the non-governmental organizations and volunteer groups involved in environmental campaigns are presently badly hampered precisely for lack of such materials, as they are not environmentalists *per se*. Thus, production of such development tools will greatly assist the activities of these groups.

b. Training of provincial & district-level officials & non-governmental organizations (NGOs)

For the successful promotion of environmental awareness at the national level, it is very essential to recruit the assistance and co-operation of government officials at the provincial, district and commune level, as well as the volunteer groups such as the various non-governmental organizations. The objectives and contents of the awareness promotion materials need therefore to be explained to these officials and volunteer groups through orientation courses and methodological seminars, with details on the propagation techniques on how they could be disseminated most efficiently and effectively among the various target groups and otherwise utilized to make people change their traditional attitudes, habits and ways of life, and to make them participate in the rehabilitation of the damaged environment.

c. Mass media campaigns

Considering the popularity of the mass media and its potential for achieving wide dissemination and influencing attitudes, the assistance of the press, radio and television should be sought and utilized for promoting environmental awareness among the masses, through preparation and dissemination of press releases, news articles etc., and the production of popular interest radio and television programmes that explain the environmental phenomena and the various issues in an easy-to-understand non-technical style. For this purpose, a series of orientation seminars should also be conducted from time to time for awakening and alerting the awareness of the media personnel themselves.

4.1.4. Extension Service Network and Training

Environmental exhaustion from overexploitation is of special concern to the subsistence farmers and fishermen in the rural areas as it affects their livelihood through loss of productivity even when they are not exactly aware what is causing it. At the same time, some methods of farming and destructive fishing methods could also have an effect on further deterioration of the environment. Sustainable rural development will thus necessarily involve action for the establishment of an extension service network of special interest and volunteer agencies and organizations, such as the non-governmental organizations for the propagation of environmentally sound subsistence livelihood practices and a nation-wide training program for this purpose.

a. Establishment of extension service network

The above approach will primarily involve the establishment of a network of extension services for propagating improved agricultural cropping such as intensive cultivation and more efficient, but environmentally non-destructive fishing practices, which, while maintaining and even improving the harvests, will minimise the damage to the environment and ensure the sustainability of the livelihood practices.

b. Networking via specialised volunteer organizations

As an integrated segment of the rural society, women and youth play a very important role in any programme on rural development. Several Women's Groups and Youth Organizations in the country are actively involved in extension work on rural subsistence livelihood practices. A network of these groups and organizations should be set up especially for involving them in extension work for making the prevailing subsistence livelihood practices sustainable and to propagate the basic concepts of sustainable development in the rural areas.

c. Nation-wide training program for extension workers

The rural extension workers mostly do not have any background training in the basic concepts of environment except from experience and are mostly in need of trainer-training on the importance of environment in integrated rural development. There is thus a clear-cut need for a nation-wide training program for the extension workers on the concepts, definitions and importance of sustainable development practices with special emphasis on the methodology of its application to integrated rural development for sustaining the livelihood practices and the socio-economics.

Integrated rural development

It is very clear that environmental dimensions need to be incorporated in rural development practices in order to achieve sustainable development. Technologies are available for increasing rural productivity without damaging the environment if only precautionary measures are taken. The biggest developmental gap exists in that they have not yet been introduced and propagated in the rural areas. By networking extension workers involved in rural development and their training in environmental aspects as discussed above, it should be possible to achieve integration of sustainable development concepts in rural development practices.

4.2. International Co-operation

By strengthening international co-operation, developing linkages and more actively involving in international activities, Vietnam stands to gain considerably from:

- i) information exchange in the field of environment, especially on international activities and projects;
- ii) assistance in the improvement of efficiency in data collection, processing, analysis, collation, storage, dissemination and general management;
- iii) establishment of reference stations for collecting comparative data on the quality of the environment with other countries;
- iv) availability of data on the environment and natural resources in other countries, sub-regions and regions;
- v) reference base for comparative evaluation of environmental quality in the country as compared to other sub-regions and regions;

INFOTERRA is an international information management system established by UNEP designated to facilitate the flow of environmental information, within and between countries through a system based on and operating through government-designated

Reliable information is a basic cornerstone and important tool in the planning of environmental management and sustainable development and its importance could never be overemphasized. Strengthening of linkages with international information networks will only help promote national capabilities in information collection and management; provide a window for access to information on regional and international situation; and supply information, through technology transfer, of use in the standardisation of methodologies for maintenance and management of environmental quality. INFOTERRA, GRID and IRPTC, all managed by UNEP are three useful examples in this matter.

a. Regional and international linkages

4.2.1. Information Exchange

Vietnam has already established linkages with several international activities and global programs such as INFOTERRA, IOC, Mekong Project and the Ramsar Convention on Wetlands of International Importance, to name a few. In fact, Vietnam is the first signatory to the Ramsar Convention in the southeast Asian region. However, further action is needed to establish and/or strengthen linkages with other ongoing international programs and activities as indicated below:

- vi) technology transfer, especially on recent methodologies for controlling and preventing pollution from various sources;
- vii) development of sub-regional and regional environmental programmes;
- viii) assistance in the management of trans-national pollution and environmental problems;
- ix) assistance in the management of shared and common resources;
- x) exchange of experts and experiences through international contacts;
- xi) opportunities for attending international meetings, seminars, workshops and conferences for exchange of experiences; and
- xii) over and above everything else, participation in the mainstream through membership of the international community.

national focal points. The fundamental aspects of INFOTERRA has been defined as provision of information to decision-makers, facilitation of exchange of environmental information through access to environmental databases, promotion of awareness of the role and importance of information in environmental decision-making, and stimulation of the development of national environmental information systems. The national focal points are the key elements in the INFOTERRA network and their participation may be considered as the least costly and most effective way of gaining access to modern science and technology to solve environmental problems.

The International Register of Potentially Toxic Chemicals (IRPTC) was established as a global network of information exchange to collect information on hazardous chemicals and disseminate it to anyone who needed the data, as part of UNEP's Earthwatch Programme created to look out for environmental changes, try to establish their causes and communicate the results. It embodies a concept for managing and exchanging information in a consistent and harmonized manner based on scientifically sound principles, leading to information-sharing partnerships. It is also a scientific tool for recording and sharing data used to assess the hazards posed by chemicals to human health and environment, and has encouraged a more open relationship between industry and regulatory authorities.

IRPTC

- i) operates a global network for exchange of information on production, distribution, release, disposal and adverse effects of chemicals;
- ii) develops data profiles on chemical substances and operates a databank on all aspects that are deemed important to conducting a hazard assessment including information on regulatory controls on substances;
- iii) gives help to developing countries to establish their own National Registers of Potentially Toxic Chemicals (NRPTC);
- iv) offers training in areas related to control of hazards posed by chemicals, and use of chemical data;
- v) identifies important gaps in the knowledge of the effects of chemicals and the needs for research to fill these gaps;
- vi) provides information about national, regional and global policies and recommendations on controlling and regulating potentially toxic chemicals; and

vii) promotes awareness of the damages and potential hazards from such chemicals and toxic wastes.

Vietnam does not have any large-scale chemical industries and the production of hazardous wastes from such sources may therefore be considered negligible at present, and the use of potentially toxic chemicals is presently limited to the application of pesticides in the agricultural sector. However, with the development of industries in the near future, it is inevitable that the country will soon be faced with the problem of tackling with more or less hazardous wastes and other substances, even if a deliberate policy of discouraging chemical industries is implemented. Vietnam should therefore take timely action to prepare for such eventually through the development of a National Register of Potentially Toxic Chemicals (NRPTC) of its own based following the international style, with the technical inputs and assistance from IRPTC. IRPTC has standard data management and exchange procedures for this purpose and provides training for the development of competent personnel for the management of NRPTC in the member countries.

b. Collaboration with international monitoring networks

Through the development of linkages with international monitoring networks, establishment of monitoring stations in the country under the program, and collection of information on the various environmental parameters, Vietnam could keep itself informed on the global environmental situation and ongoing changes, and evaluate the quality of its environment as compared to the global situation. The Global Environmental Monitoring Systems (GEMS) is a good example. GEMS operates to make comprehensive assessment of major environmental issues and provides the scientific data needed for the rational management of natural resources and the assessment of environmental health; and provide early warning of environmental changes and impending disasters. GEMS network monitors changes in atmospheric composition and the climatic system, freshwater and coastal pollution, air pollution, deforestation, food contamination, ozone layer depletion and the build-up of the greenhouse gases, acid rain and many issues related to biological diversity. The system could also be developed as a national ecological monitoring network (including determination of baselines, and monitoring the variations of climate, soils, plants, animals and the impacts of man) to obtain a total picture of the environment that would be of help in convincing bilateral donors of the seriousness of the country's environmental situation.

Conservation of renewable natural resources should not be conducted by countries in isolation. Conservation is a global imperative. The distribution of natural resources crosses international frontiers so that responsibilities for their management are shared. Even when an endemic resource is entirely confined to one nation, that country holds a global as well as a national responsibility for its protection.

In some cases, one country may be responsible for the protection of a wild species from which it gains little benefit but upon which another may be heavily dependent. Thus, Brazil contains the wild stocks and close relatives of the rubber tree *Heava* sp. but has virtually little rubber industry itself. Even so, conservation of these wild species is vital to the economy of Malaysia and to a lesser extent, Vietnam. For these reasons, several international agencies have been established with worldwide operations to help conserve natural resources and assist in environmental planning. They must also seek ways to get those countries that the use and depend on the natural resources of the developing countries to contribute to the cost of conserving those species in the wild. In the case of Vietnam, there are eight areas in which international implications must be kept in mind. These are:

Management and Utilization of Migrant Species

Vietnam is the winter home of many northern bird species including species of potential food or trade value, such as ducks, waders, rails, storks, cranes and ibises. Management of such populations should be coordinated with the countries in which such species breed, for instance, to determine species status or for research through banding, etc. The International Convention on Migratory Species is a useful forum for coordinating such cooperation.

Management of Shared Transfrontier Resources

International cooperation is needed for effective management of shared transfrontier resources, such as mutually vital protected forests or individual species. For instance, the whole world population of Kouprey *Bos sauveli* is distributed along the borderlands between Thailand, Kampuchea, Laos and Vietnam. Only an international effort can manage such a species including the establishment of transfrontier reserves and cooperation in catching poachers who dodge back and forth across national boundaries.

Management of resources of International Concern

In cases where Vietnam is fulfilling an international responsibility by protecting resources of worldwide concern, such as qualitatively or quantitatively unique species

As a developing country with an extremely low per capita income, Vietnam should be entitled to considerable international aid and development assistance. However, this is not the case and donors remain scarce. In an optimum situation, primary sources of aid to be channelled into the environmental sectors could include: several UN agencies, such as UNDP in association with FAO, WFP, UNEP, DTCP, UNESCO, WHO, UNCHS, ESCAP, UNICEF etc; direct assistance from other friendly countries (Sweden, Australia, Finland etc.); loans from international development banks (World Bank, Asian Development Bank); assistance from international non-governmental organizations (WWE, IUCN, Earthscan, IFED, International Red Cross, OXFAM, CARE, CIDSE, etc.); exchange and technical cooperation with other developing countries (India,

Access to Foreign Aid and Technical Assistance

Vietnam could benefit through greater participation in international cooperative efforts, such as the UN Decade of Drinking Water and IUCN's Programmes to save "Marine Resources", "Tropical Rainforests", "Endangered Plants", "International Wetlands" and "UNEP's Regional Seas Programme".

Participation in International Cooperative Efforts

Considerable benefits can be achieved by entering into international agreements to control trade in natural resources. For instance, one of the most effective means to stop illegal trade is through participation in CITES. Vietnam should also establish bilateral agreements with its immediate neighbours and possibly with ASEAN who are developing their own trade agreement. In addition, a common marketing policy is vital if countries selling the same products to a monopoly buyer are not to be played off against each other in a price undercutting game.

Control and Organization of International Trade

Most of Vietnam's rivers extend well beyond its national frontiers. Extensive deforestation of these upstream catchments has direct adverse consequences on Vietnam's agricultural programme. Vietnam must get the cooperation of other countries to agree on common land-use policy and water management (e.g. pollution control, diversion or flow checks) and should assist such countries to achieve more rational use of these vital catchments. The Mixed Commission for the Mekong Project of which Vietnam is a member, is a good example of this type of cooperation.

Management of Transfrontier Watersheds

or features or combinations of both, it can considerably benefit through the use of international programmes, such as the "World Heritage Convention" of UNEP and the Man and Biosphere (MAB) programme of UNESCO.

Thailand, Indonesia...). Some countries which may not wish to enter into direct bilateral assistance arrangements with Vietnam may be willing to channel funds through international organizations or even non-governmental organizations. The Conservation for Development Centre (CDC) of IUCN is an agency which regularly fulfils this intermediary role. Assistance can take many forms - cash, equipment, training, technical assistance, information as grants or loans.

Preservation of Cultural Heritage

International assistance and concern should be mobilised to help in the preservation of Vietnam's rich cultural heritage, both living (art, dance, folklore, language, tradition) and non-living (archaeology, historical monuments). The various programmes of UNESCO are particularly relevant in this context.

1991 - 1995	1996 - 2000	First Second	First Second

1991 - 1995	1996 - 2000	First Second	First Second

ACTION PROGRAMMES			
2.7	Environmental Disaster Management		
2.7.1	Oil Spill Contingency Planning	X	X
2.7.2	Flood Control	X	
2.7.3	Typhoon Damage Control	X	X
2.8	Monitoring Framework & Strategies	X	X
1991 - 1995 1996 - 2000			
First Second First Second			

3.1	Urban Development and Population Control		
3.1.1	Urban Development		
3.1.2	Population Stabilization	X	X
3.1.3	Quality of Life	X	X
3.2	Integrated Watershed Management		
3.2.1	Present Land and Water Management	X	X
3.2.2	Management of the River Catchment Areas	X	X
3.2.3	Management of Specific kinds of soil in the Mekong Delta	X	X
3.3	Pollution Control and Waste Management		
3.3.1	Appropriate Technologies for a Waste Reduction, Reuse & Recycling	X	X
3.3.2	Control & Treatment of Air, Water & Soil Pollution	X	X
3.3.3	Control of Toxic Chemicals and Hazardous Substances	X	X
3.4	Integrated Coastal Zone Management and Planning		
3.4.1	Coral Reefs	X	
3.4.2	Mangrove Forest & Seagrass Ecosystems	X	
3.4.3	Estuarine Ecosystems	X	

3.4.4	Coastal Erosion Control and Coastal Protection Measures		X	X
3.5	Maintenance of Genetic Diversity	X		X
3.6	Protection of Wetlands		X	X
3.7	National Parks, Protected Areas and Wildlife Reserves	X		X

PROGRAMME SUPPORT ACTIVITIES

4.1	Education, Training, Extension and Awareness Promotion			
4.1.1	Development of Formal Environmental Education	X		X
4.1.2	Technical Training	X		X
4.1.3	Promotion of Environmental Awareness	X		X
4.1.4	Extension Service Network & Training		X	X
4.2	International Cooperation			
4.2.1	Information Exchange	X		X
4.2.2	International Implications	X		X

ANNEX I

LIST OF ENVIRONMENTAL RESEARCH & BASELINE DATA COLLECTION PRIORITIES

1. Baseline data collection on little-known ecosystems
 - freshwater ecosystems
 - estuarine ecosystems
 - coastal & marine ecosystems
 - wetland & swamp ecosystems
 - terrestrial ecosystems
2. Establishment of appropriate guidelines for an ecological framework for sustainable development of:
 - agricultural production
 - forestry, including agroforestry
 - fisheries, including agrofisheries
3. Motivation tools for achieving population control
4. Environmental valuation tools
5. Relationships between socio-ecological systems & communities
6. Environmental consequences of war
7. Sustainable aquaculture technologies
8. Rehabilitation techniques for degraded lands

9. Socio-economic approaches for stabilization of shifting cultivation
10. Rational utilization of problem soils
11. Measures against deterioration & for enhancement of cultivated soils
12. Soil erosion control & conservation technologies
13. Optimal utilization & appropriate application techniques of agrochemicals
14. Reforestation & afforestation technologies
15. Measures against desertification
16. Energy conservation technologies
17. Environment-friendly alternative energy sources
18. Waste reuse, recycling, alternative utilization & alternative technologies for waste reduction
19. Coral reef conservation measures
20. Mangrove ecosystem conservation measures
21. Environmental effects of non-renewable resource utilization
22. Effects of global climatic changes & sea-level rise
23. Coastal erosion prevention & control measures
24. Information collection, storage, retrieval & exchange system
25. Flood prevention measures

26. Environmental disaster prevention measures
27. Conservation of nature
28. Protection of endangered & threatened species
29. Inventory & prioritization of areas for protection

ANNEX II

PILOT AREAS FOR TESTING FEASIBILITY OF ACTION PLAN BEFORE ITS APPLICATION ON A NATIONAL SCALE

1. Hanoi city
2. Ho Chi Minh city
3. Haiphong town
4. Hue town
5. Viet Tri industrial area
6. Bien Hoa industrial area
7. Red river delta area
8. Mekong river delta area
9. Tay Nguyen (High plateau) area
10. North-west area
11. Ha Long Bay
12. Thuan Hai area

ANNEX III

SUGGESTED AREAS FOR REGIONAL COOPERATION IN ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

Major opportunities for regional cooperation in the area of environmental management for sustainable development could be identified in the following priority areas :

1. Environmental Impact Assessment of development projects, with particular emphasis on safeguards to minimise environmental deterioration, control of potentially toxic chemicals and hazardous waste management.
2. Effects of global climatic change and anticipated sea-level rise (the Greenhouse Effect) and disaster preparedness to combat the same.
3. Rehabilitation of forest ecosystems, with special attention to stabilization of shifting cultivation, development of community forests, establishment of fuelwood plantations etc.
4. Environmental management of agricultural pesticides, including occupational safety aspects and popularization of non-toxic chemicals.
5. Tourism development planning and monitoring of development impacts to minimise environmental deterioration through proliferation of such tourist services as souvenir sales.
6. Integrated coastal zone management to optimize natural resource utilization for sustainability.
7. Integrated management of watersheds, catchment areas and floodplains for sustainable development through forest management, soil and water conservation, disaster prevention etc.
8. Integrated rural development acceleration, with particular emphasis on application of environment-friendly technologies in livelihood practices, such as biogas technology as an alternative energy source and to reduce environmental pollution by rural organic wastes.

9. Propagation of energy-efficient and resource-conserving technologies such as fuel-efficient stoves to save fuelwood.

10. Appropriate traditional technologies to protect the environment through reuse, recycling, waste exchange, alternative utilization etc. to minimise or eliminate pollution, such as pollution-free technologies.

Attention should particularly be focused on the development, rational utilization and conservation to minimise the developmental effects and to ensure the sustainability of the common resources and the shared resources in the geographical region. This could be achieved by minimizing the duplication of efforts to find solutions to common problems and by maximizing the transfer of technology and development of expertise mainly through training, demonstration of successful techniques and innovative approaches. Regional cooperation could best be developed by initiating and/or strengthening and coordinating activities in the following areas:

- A. Regional cooperative planning of integrated Action Plans;
- B. Development and cultivation of regional expertise, particularly in the field of environmental management;
- C. Training courses, particularly in methodologies and their standardization;
- D. Development of joint environmental pilot and research projects;
- E. Transfer of environmentally-sound technologies;
- F. Extension work;
- G. Environmental awareness promotion campaigns;
- H. Exchange of national experiences; and
- I. Exchange and collation of environmental information.

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