

**ADB, GEF, UNEP**  
in collaboration with IGES and NIES

National Performance Assessment and Subregional Strategic  
Environment Framework in the Greater Mekong Subregion

ADB T.A. No. 6069-REG

**VIETNAM**  
**NATIONAL ENVIRONMENTAL PERFORMANCE**  
**ASSESSMENT (EPA) REPORT**

Prepared by  
**Ministry of Natural Resources and Environment, Vietnam**  
*and*  
**Project Secretariat UNEP Regional Resource Center**  
**For Asia and the Pacific**



**March 2006**

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## Acronyms and Abbreviations

DONREH	Department of Natural Resources, Environment and Housing
DCI	Department of Culture and Information
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EPA	Environmental Performance Assessment
FDI	Foreign Direct Investment
FMAP	Five Million ha Afforestation Project
FIPI	Forest Inventory and Planning Institute
GOV	Government of Vietnam
HCMC	Ho Chi Minh City
LEP	Law on Environmental Protection
MARD	Ministry of Agriculture and Rural Development
MCI	Ministry of Culture and Information
MONRE	Ministry of Natural Resources and Environment (formerly MOSTE)
MOSTE	Ministry of Science Technology and Environment (former)
MOST	Ministry of Science and Technology
MOET	Ministry of Education and Training
MOFI	Ministry of Fisheries
MOLISA	Ministry of Labor, Invalids and Social Affairs
MOI	Ministry of Industry
MOND	Ministry of National Defense
MPI	Ministry of Planning and Investment
NEA	National Environment Agency (former)
NMN	National Monitoring Network
NSEP	National Strategy for Environmental Protection
PPC	People Provincial Committee
PM	Particulate Matter
ODA	Official Development Assistant
SoE	State of Environment
UNFCCC	United Nations Framework Convention on Climate Change
VEPA	Vietnam Environment Protection Agency (after 2002)
VSTI	Vietnam Science and Technology Academy

# 1. EXECUTIVE SUMMARY

1. Since the launching of 'doi moi', the renovation policy, in 1986, Vietnam has registered rapid advances in industrialization and economic growth in general. GDP growth rates averaged 7.5% throughout the 1990s. These achievements, however, have not been without cost as the natural environment –forests, biodiversity and coastal zones-- came under additional pressure. Water and air quality and other parameters of urban environmental conditions have stagnated or deteriorated. Whilst the Government of Vietnam (GOV) has promulgated new legislation and embarked on programs and projects to mitigate the environmental impact of urban and industrial expansion the effectiveness of these measures has been insufficiently discussed and probed. This environmental performance assessment (EPA) report is a first step towards systematically documenting the country's performance under the most pressing environmental concerns. What is being assessed is the degree of success of all segments of the society, Government and non-government alike, in achieving performance targets contained in official strategic documents and plans.

2. Of the seven priority environmental concerns discussed in this report, Vietnam has achieved notable progress in some and substantially less in others. Air and water quality, and waste management in particular have fallen short of targets and performance suffered from hesitant enforcement (e.g. in the case of wastewater pollution). Rising economic prosperity has seen a rapid increase in vehicle ownership in urban areas resulting in severe pollution from mobile sources. Poor regulatory, monitoring and enforcement framework has reduced the effectiveness of pollution control and management. GOV has promulgated sensible environmental laws and policies but has not always backed them up by detailed yet simple and internally consistent regulatory provisions and efficient administration. Staff and financial resources available for effective implementation of environmental policies have consistently fallen short of what the intent of the policies would have required.

3. As to natural resource management, the forest cover has increased nationwide after years of decline. More work is required to assess the quality of this increased forest cover in order to relate it to variables such as biodiversity or soil conservation benefits. Coastal zone ecosystems have seen major changes linked to the rise of aquaculture and other developments leading to destruction of valuable coastal habitats like mangroves, sea grass and corals. There are indications of a gradual recovery of mangrove forest from the all-time lows recorded in 1995. Industrial and municipal issues continue to be dominated by the rising absolute volume of discharges and waste of all kinds, a situation where even improving percentages of waste recovery or disposal are not enough to reduce the absolute volumes discharged or left uncollected. As to global environmental concerns, Vietnam has performed creditably with respect to protected areas. The compliance with formal obligations under United Nations Framework Convention on Climate Change (UNFCCC) needs to be more firmly linked to efforts to increase domestic energy efficiency.

4. The EPA also identifies further research and data-collection needs to bridge the information gaps that have emerged in this study. Among other, a comprehensive water quality monitoring program under the aegis of the National Monitoring Network (NMN) should be undertaken for all the major rivers of Vietnam with data collected on a regular basis at strategic locations. Similar data strengthening needs have been identified under other environmental concerns.

5. Strengthening of the regulatory framework along with budgetary and technical support to MONRE and DONREHs is critical to allow these agencies to perform their environmental management functions. Improved inter-agency coordination with sectoral ministries such as MARD, MOC and MPI is required to ensure that development projects are implemented in an environmentally sustainable manner.

## 2. INTRODUCTION

6. Environmental performance assessment (EPA) is a systematic evaluation of the effectiveness of environmental management policies and protection measures in a defined administrative area (country, region, project, etc.) over a specific period. It builds on a pressure-state-response (P-S-R) model that links environmental 'pressure' factors to the state-of-the-environment variables under investigation and responses adopted to influence the outcomes. Supported by a purpose-built database, an EPA report draws a picture of principal environmental trends, assesses the degree of environmental managers' success in achieving the set environmental targets and makes recommendations for improvement. In this way, EPA assists the process of policy adjustment and becomes a tool of public accountability. Furthermore, in the Greater Mekong Subregion (GMS) sub-regional context, the preparation of EPA reports by each GMS member contributes to a shared understanding of environmental challenges and a greater comparability of underlying environmental trends.

7. The present Environmental Performance Assessment (EPA) report is the first of its kind to be written for Vietnam. It examines developments under selected environment concerns over a period of time and the degree of success the national authorities have had in influencing environmental outcomes. The report is one of the six prepared to a similar format by each of the countries of the Great Mekong Sub-region (GMS). The Asian Development Bank (ADB), the Global Environment Facility (GEF), the United Nations Environment Program (UNEP), the Institute for Global Environmental Studies (IGES) of Japan and National Institute for Environmental Studies (NIES) of Japan have provided financial and technical support for the National Performance Assessment and a Strategic Environmental Framework for the Greater Mekong Sub-region ("SEF II") Project under which the EPA reports were formulated.

8. The report was prepared with the contribution of following organizations and individuals:

Ministry of Natural Resources and Environment (MONRE) coordinators including:

- Dr. Truong Manh Tien
- Dr. Nguyen Van Tai
- Mr. Nguyen Hoang Duc

National consultants and support staff including:

- Dr. Nguyen Duc Minh - National consultant on environmental issues
- Mr. Nguyen Nhat Huy - National consultant on environmental database
- Mr. Nguyen Tuan Anh – Research Fellow – Research Center for Energy and Environment

9. EPA technical team reviewers included:

- Dr. Nguyen The Chinh, Faculty of Environmental Economics, Hanoi Economic University
- Dr. Nguyen Trung Thang, Ministry of Natural Resources and Environment
- Mr. Hoang Viet Cuong, Productivity Center, Ministry of Science and Technology
- Mr. Nguyen Huy Thang, Institute of Forestry Inventory and Planning, Ministry of Agriculture and Rural Development

- Dr. Nguyen Xuan Hai, Soil Department, Vietnam National University

10. The report was reviewed by the subregional expert group and international consultants and edited by Messrs. Mike Comeau, Mohit Kumar and Ivan Ruzicka.

11. The process of selecting environmental priority concerns to be studied under the national EPA process was carried out in national workshops, held in September 2004 and January 2005 respectively. These workshops invited decision-makers from various national agencies, local NGOs, and other stakeholders and members of the civil society with a stake in Vietnam's environmental protection.

12. The First National Workshop identified seven (from a list of thirteen potential) environmental concerns viz., forest resources, land degradation, threats to coastal zones, threats to biodiversity, inland water pollution, pollution from mobile sources, and inadequate solid waste management. Through a process of consultation at the first national workshop and discussions held during the initial stages of the project, these seven issues were considered as priority concerns that required immediate attention. Subsequently, climate change was also adopted as an environmental concern given its global significance and the importance of reporting on actual performance to Global Environment Facility (GEF), a key partner to the SEFII Project. The selection of the concerns tested the conditions for a meaningful assessment of performance such as availability of appropriate data, and presence of a clearly defined policy target or objective against which performance under the chosen concern can be assessed.

13. It was also agreed that other concerns that were not included at this stage of EPA, will be evaluated in future EPA reports. During the preparation of the EPA report, it was learnt that 'land degradation' was not supported by sufficient time series data to assess performance, and land degradation was excluded from the current stage of EPA reporting despite its intuitive importance.

14. This EPA report is organized in three parts:

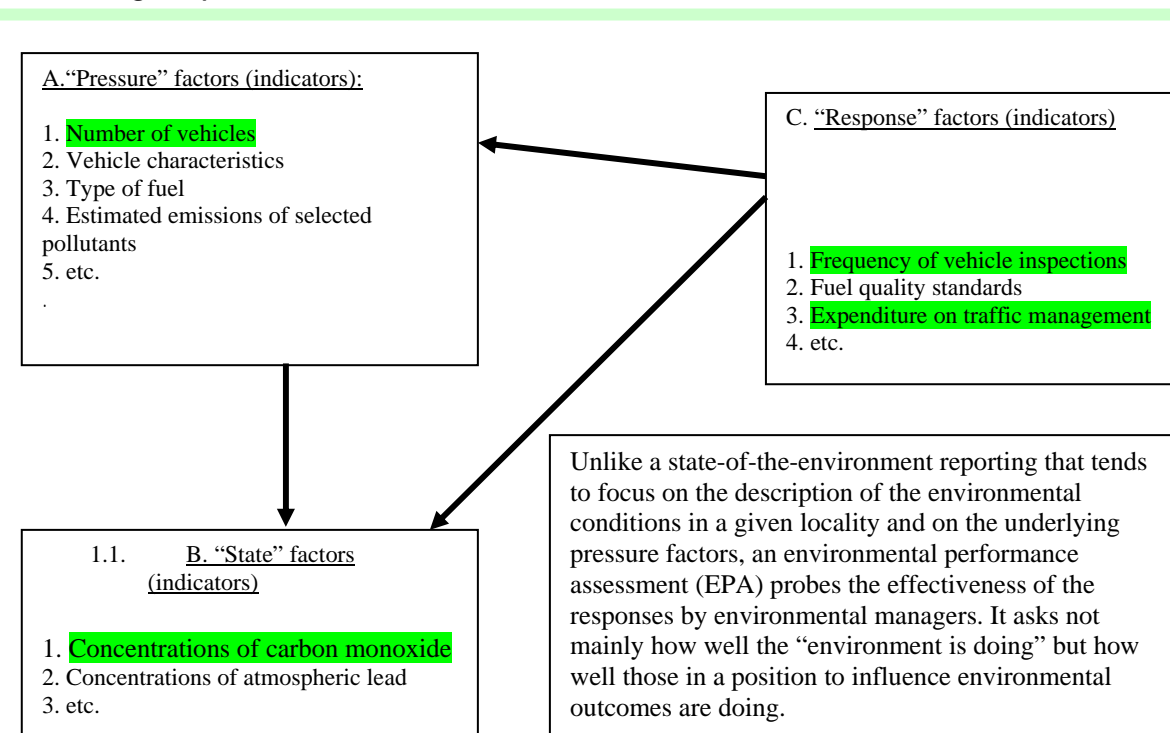
- Part I assesses performance under the priority concerns selected. "Performance" is understood as an assessment of the observed outcomes against the targets set under that particular concern. The assessment is based on a Pressure-State-Response (P-S-R) model that logically links the sources of environmental problems (the "pressure" factors) to the resulting "state" of the environmental concern, and the policy and institutional "responses" intended to influence the pressure factors, and through them, move the "state" towards the targets set. The most telling of the P, S, and R factors are chosen as environmental indicators. Their past trends and interplay are analyzed to say how effective the responses have been in improving the "state". A rating structure developed for the purpose is used to evaluate the performance.
- Part II discusses the cross-cutting development issues, i.e. those elements that affect overall environmental performance of the country without necessarily neatly falling under any one of the selected concerns
- Part III draws overall conclusions and recommendations for the national EPA report. It contains a summary of where the country stands in terms of its current performance under the chosen concerns and what additional efforts are recommended for the next stage in order to improve the process.
- The Annex provides the statistical information (organized in the form of "factsheets") that supports the analysis in Part I and III of the EPA report.

## The assessment method used: The P-S-R model

15. The P, S and R indicators' values are the raw material of the EPA. The statistical background of each indicator is summarized in the form of indicator "factsheets" and these are attached to the report to give the reader an opportunity to judge the underlying basis of the assessment. The assessment itself is a matter of rating (a) individual indicators and (b) the overall performance –an interplay of all indicators-- under the concern being studied. A rating structure has been developed for this purpose.

16. A double-word description is utilized to rate each indicator. The first word describes the magnitude of the indicator relative to some benchmark (such as an international standard, an average for several countries etc.). The second word describes the observed trend of the indicator value, as depicted by long or short-term historical data. The magnitude and the trend keywords are typically combined (e.g. "relatively poor and deteriorating"). In the case of baseline indicators with only one or few observations, the trend-keyword (and the "and" conjunction) are omitted. The descriptions applied to each class of indicators are contained in Table 1.1 and the rating applied to each concern is given in Table 1.2.

**Figure 1. Simplified representation of a P-S-R model (hypothetical example of air quality management with four indicators of performance, highlighted in green)**





**Table I.1: Rating used to assess selected indicators**

STATE INDICATORS			
<p>In order to qualify the magnitude of the state indicator using the recommended keywords below, the values of the state indicator are compared against known benchmark figures. The national policy target for the indicator is one such possible benchmark. In many cases, a GMS average values or an international standard would be more suitable if the indicator is to tell us something about the relative performance of each GMS country. If no such figures exist, the magnitude keyword is omitted. The “poorness” or “goodness” of the magnitude is dependent on the interpretation of the indicator value. In some cases a high state indicator value is “good” (e.g. % forest cover); at other times a low value is preferred (e.g. # threatened species).</p> <p>The trend of the State indicator is easy to rate as either deteriorating, stabilizing or improving, provided it is based on long-term historical data. In other cases or for benchmark indicators, the indicator value may not show any trend at all, in which case the trend keyword is left blank or specified as “Undetermined Trend”.</p>			
<b>Relatively Poor</b> and ....	<b>Average</b> and ...	<b>Relatively Good</b> and ....	<b>Unknown State</b> and ....
As evidenced by an indicator value which is far below (or far above) the same indicator value for other GMS countries or far below (or above) other benchmark figures such as international standards or national targets	As evidenced by an indicator value which is close to the same indicator value for other GMS countries or within the range of other acceptable benchmark figures such as international standards or national targets	As evidenced by an indicator value which is far above (or far below) the same indicator value for other GMS countries or far above (or below) other benchmark figures such as international standards or national targets	This rating is used if the value of the indicator cannot be compared against the value of the same indicator in other countries or regions and there are no other benchmark figures, such as international standards or national targets
<b>Deteriorating</b>	<b>Stabilizing</b>	<b>Improving</b>	<b>Undetermined Trend</b>
As evidenced by a steady long-term deteriorating trend and with no immediate signs of improvement.	As evidenced by a steady long-term deteriorating trend but with short-term signs of leveling or even improvement, or a long-term level trend.	As evidenced by a long-term deteriorating trend but with sure signs of improvement based on more than one observation in the positive trend.	This rating is used if the selected indicator is inconclusive in terms of long or short-term trends or if the indicator is based on a single observation over time.

PRESSURE INDICATORS			
<p>There will always be some magnitude of pressure and the trend over time can simply be rated as increasing or decreasing. Qualifying the magnitude of the indicator value may at times be difficult, especially if the pressure indicator is unique to one country and no comparative figures are available from other countries. It is also unlikely that international benchmark figures will exist for pressure indicator. Judgment is required to rate the magnitude of unique pressure indicators.</p> <p>The trend of pressure indicators should be easy to rate, provided that long-term historical data exists. If only one or few observations exist, the trend keyword can be left blank.</p>			
<b>High</b> and	<b>Medium</b> and	<b>Low</b> and	<b>Non-Comparable</b> and
As evidenced by the value of an indicator which is much higher than the value of the same indicator in other GMS countries or much higher than other benchmark figures, such as international standards or national targets	As evidenced by the value of an indicator with a value more or less equal to that of other GMS countries or other benchmark figures such as international standards or national targets.	As evidenced by the value of an indicator which is much lower than the value of the same indicator in other GMS countries or much lower than other benchmark figures, such as international standards or national targets.	This rating is used if, through lack of comparative numbers or other information, an order of magnitude cannot be assigned to the value of the indicator.
<b>Increasing</b>	<b>Steady</b>	<b>Decreasing</b>	<b>(blank)</b>
As evidenced by a long-term trend of increasing pressure, with very little sign of	As evidenced by a long-term steady or near-constant pressure that shows no sign of	As evidenced by a long-term trend of declining pressure, with perhaps fluctuating	The keyword is left blank if there is only one observation, or if there is no observed

relief or stabilization.	increase or decrease in the past or future.	short-term oscillations.	trend over time in the indicator value.
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<b>RESPONSE INDICATORS</b>			
Since responses tend to be very diverse, there may be few benchmarks to rate the magnitude of response indicators other than the national targets for the indicator selected. Once more, judgment is required to rate the magnitude of unique indicators to say how "big" or "small" the response was.			
<b>Low and</b>	<b>Average and</b>	<b>Significant and</b>	<b>Non-Comparable</b>
If the magnitude of the response is significantly below the national target or below the average in other GMS countries or other comparable regions.	If the magnitude of the response is in line with national targets or the average responses of other GMS countries or comparable regions.	If the magnitude of the response exceeds national targets of the average of other GMS countries or comparable regions.	This rating is used (or the keyword left blank) if there are no data or information to compare the magnitude of the response with, or there are no other benchmark figures.
<b>Sporadic</b>	<b>Intermittent</b>	<b>Consistent</b>	<b>(blank)</b>
If the response has been irregularly applied over time with no set program or budgets to continue the response in the future.	If the response has not been consistently applied but there are programs and budgets to continue the application of the response in future.	If the response has been consistently applied, calibrated to the pressure, with plans to continue until the pressure has been reduced to a desired level.	The keyword is left blank if there is only one observation, or if there is no observed trend over time in the indicator value.

The description used to rate overall performance under each concern is given in Table 1.2 below.

**Table 1.2: Rating used to evaluate performance under a selected environmental concern**

<b>ENVIRONMENTAL PERFORMANCE</b>			
For purposes of communicating the EPA results, rating of performance under each priority concern is required. In this EPA, a star-rating system is used where any performance counts but with different levels of merit. The star-rating is based on what the indicators are saying, backed up by hard evidence presented in facts sheets, not on what a consensus view or expectations may be.			
<b>1-Star *</b>	<b>2-Stars **</b>	<b>3-Stars ***</b>	<b>Un-Rated</b>
<p>If the pressure continues to increase, the state continues to deteriorate and the response(s) do not appear to have any effect on the pressure or the state.</p> <p>Additional criteria for 1-Star rating:</p> <ol style="list-style-type: none"> <li>1) Reasonable targets have not been set or have not been met.</li> <li>2) International conventions have not been ratified or adhered to.</li> <li>3) No ongoing monitoring or data collection.</li> <li>4) No clear institutional role and responsibilities for</li> </ol>	<p>If there are signs that the responses will or have had an effect on releasing the pressure, even though the state does not yet show signs of improvement.</p> <p>Additional criteria for 2-Star rating:</p> <ol style="list-style-type: none"> <li>1) Targets have been set and generally met.</li> <li>2) International conventions have been or will be ratified and most of the reporting requirements have been met</li> <li>3) Plans exist for ongoing monitoring and data collection.</li> <li>4) Institutional responsibilities assigned though limited</li> </ol>	<p>If there is clear evidence that the responses have reduced the pressure and/or there is a clear sign that the state is improving.</p> <p>Additional criteria for 3-star rating:</p> <ol style="list-style-type: none"> <li>1) Effective targets have been set and met.</li> <li>2) International conventions have been ratified and reporting requirements have been met.</li> <li>3) Ongoing monitoring and databases exist.</li> <li>4) Specific institutions with targeted roles and responsibilities assigned. Institutional measures in place for</li> </ol>	<p>If the trend in the state indicator cannot be explained by the pressures or the responses.</p> <p>The label "un-rated" is a sign that we have failed to identify appropriate indicators backed by facts sheets, and/or have failed to apply the PSR model, and/or have failed to apply the PSR model to performance assessment.</p>

<p>environmental management of environmental concerns have been assigned or where they have been, no tangible progress has been achieved suggesting an appropriate response and non-achievement of the target.</p>	<p>progress achieved due to weaknesses in institutional arrangements e.g. lack of coordination, duplication of roles, multiplicity of authorities etc.</p>	<p>the management of the concern e.g. EIA process, adequate budgetary and resources for environment monitoring, staff with appropriate technical skills and know-how, regular interaction with industry and NGOs on environmental management matters etc.</p>	
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17. Besides its potential usefulness for Vietnam, the EPA reporting as developed under the SEF II Project offers wider benefits. The methods used here can be applied at different levels of analysis, not just at the national level (as in the present case). The commonality of approach to indicator selection, data presentation and their analysis facilitates sub-regional environmental assessments, one of the objectives of GMS environmental program that seeks to respond to trans-boundary environmental challenges in the Mekong Basin. Additionally at the local level, an EPA can be utilized as a project monitoring and evaluation tool or even a tool of assessing performance of a development initiative at a local (e.g. municipal) level.

18. Finally, the EPA process typically offers assessments of performance under concerns that are simultaneously local and global (such as threat to biodiversity in this report) and it therefore becomes a form of reporting to the bodies set up to help protect the global commons (e.g. most notably GEF). Last but not the least the report can assist the design of future country assistance programs by principal donor agencies active in Vietnam.

19. The EPA team wishes to thank the Government of Vietnam and collaborating ministries and departments for making information available for undertaking this EPA exercise.

### 3. Management of Priority Concerns

#### 1. Inland Water Pollution

##### 1.1 Context

20. Vietnam's economy has grown rapidly in the last decade; the GDP has increased steadily by 5-7% per year and GDP per capita doubled from 200USD p.a. in 1990 to 400USD p.a. in 2000. This outcome is primarily a result of growing industrialization; with industrial output increasing at 12.9% p.a. on average during the period 1991-2002. The share of industry in GDP increased from 22.7% in 1990 to 38.6% in 2002. By 2005, some 110 industrial and processing zones had been established in 26 provinces.

21. However, Vietnam's industrial sector is in the initial stages of development, with production still dominated by small-scale units utilizing technologically simpler processes with more waste and adverse environmental impacts than larger, more modern, facilities. Industrial wastewater is a serious pollution issue in many cities. In addition, urban population increased from 20% in 1990 to 25% in 2002 and usually outstripped the development of environment infrastructure.

22. In Vietnam, wastewater pollution data are still seriously incomplete. Monitoring of surface water quality has been undertaken only in big cities like Hanoi, Hue, Danang and Ho Chi Minh City. BOD and NH<sub>4</sub> are the key parameters that are monitored. In time, other parameters such as COD, TSS and the heavy metals will need to be monitored. National environmental standards including the water quality standards were formulated only in 1992.

##### 1.2 State

#### Indicator: BOD5 Concentration in Selected Rivers – 1995 to 2002

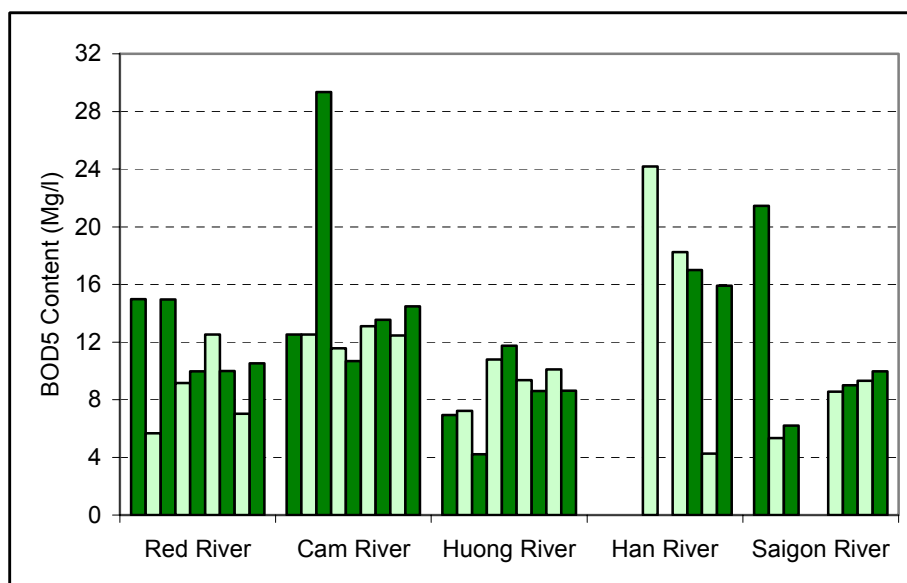
23. This indicator attempts to track the water quality in some of the major rivers of Vietnam; it is expressed as the amount of 5-day biological oxygen demand (BOD<sub>5</sub>)<sup>1</sup> concentration, in milligrams per liter, over time. BOD<sub>5</sub> was chosen because other parameters such as SS, TDS, pH, oil & grease that would help give a more rounded picture of surface water quality are incompletely monitored or not monitored at all for the time being.

24. The principal objective of Vietnam's environmental protection policy was stated in the National Strategy for Environmental Protection to 2010 -2020. It is : *“to halt pollution acceleration, remedy degraded areas and improve the environment quality and ensure sustainable development of the country; guaranteeing that all the people are entitled to live in the environment, landscapes and other environmental components with the good quality of air, land, and water measuring up to standards stipulated by the State”*. For inland water pollution it translates in the Government trying to meet the stipulated water quality standards.

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<sup>1</sup> BOD measures the amount of oxygen required or consumed for the microbiological decomposition (oxidation) of organic material in water.

**Figure 2.1.1: Trend of BOD<sub>5</sub> Concentrations in Some Major Rivers in Vietnam – 1995 to 2002**



25. According to the Vietnam Surface Water Quality Standard (TCVN 5942-1995), the maximum allowable concentration of BOD<sub>5</sub> (20°C) is 4 mg/l for surface water intended for domestic use (Category A); and 25 mg/l for surface water to be utilized for purposes other than domestic water supply (Category B).

26. BOD<sub>5</sub> concentrations are available for the rivers flowing through five cities, i.e. Hanoi, Haiphong, Hue, Danang and Ho Chi Minh City, for the period of 1995-2002. It can be seen (Figure 2.1.1) that annual average BOD<sub>5</sub> concentrations in all selected locations were below the limit of 25mg/l (except for Cam River in 1997); however all the rivers recorded BOD<sub>5</sub> levels that exceed the limit for domestic water supply of 4mg/l. Rivers in the North and Central regions (Red River, Cam and Huong rivers) seem to have lower BOD<sub>5</sub> concentrations than those in the South (Saigon River). The problem of water pollution is thus serious in all large cities of Vietnam. In all of them, domestic wastewater is not treated. Ponds, lakes and canals often give out bad smell in dry season (UNEP, SoE, 2001).

27. The main weakness of the indicator is that it is based only on five monitoring locations in the country, close to urban areas. As such, the indicator may not be representative of inland water pollution situation in the country. Also, the annual averages used in Figure 2.1.1 hide seasonal fluctuations; the water quality declines significantly during the dry season when the river flows and dilution of pollutants are reduced. The dry season picture is substantially less favorable than an assessment based on annual averages.

**Suggested rating:** Average and deteriorating

**Justification:** BOD<sub>5</sub> concentrations in major rivers exceed the standard for domestic use with no indication of an improving trend. The water quality declines further during the dry season. Water quality has not reached an alarming state yet but the growth in population and the slow pace of creating the wastewater treatment infrastructure suggests that the problem is here to stay.

### 1.3 Pressure

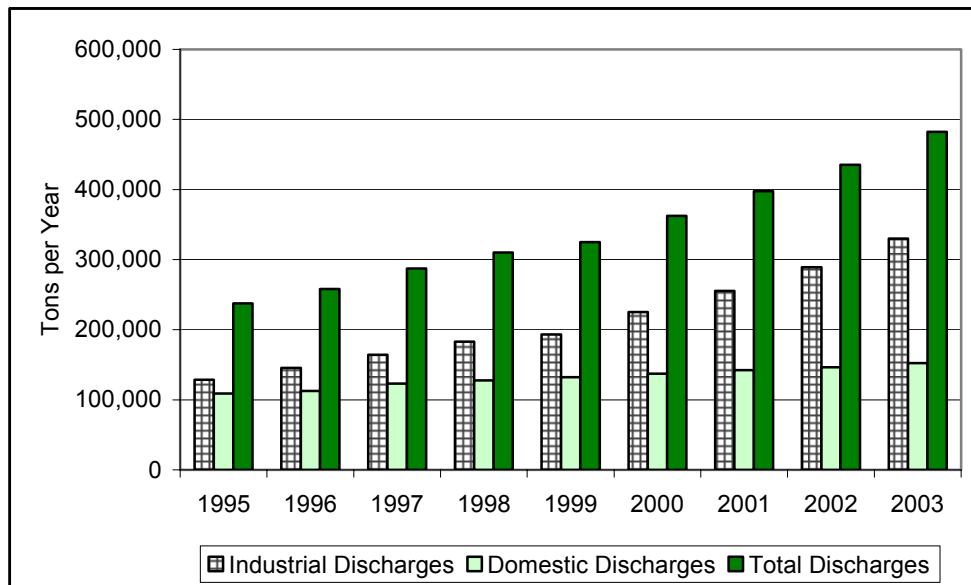
#### Indicator: BOD Discharges – 1995 to 2003

28. The indicator tracks the total wastewater discharges from domestic and industrial sources in terms of biological oxygen demand (BOD) expressed in tons per annum.

29. Domestic wastewater in big cities is discharged directly into the environment without any appropriate treatment. The drainage system in cities usually consists of open canals and people are exposed to wastewater. For industrial wastewater, only a few of the total 625,000 enterprises have operational wastewater treatment facilities. Of 82 industrial zones recorded in 2003, only 18 had central wastewater treatment facilities.

30. The BOD estimates used here are based on Ministry of Industry (MoI) data. Domestic BOD load is calculated using population figures and empirically established average BOD discharges per household in Vietnam whereas the industrial BOD load is calculated based on the output of each industrial sector, utilizing coefficients of pollution per unit of output of different industrial sectors. The methodology is presented in more detail in the factsheet.

**Figure 2.1.2: Estimated BOD discharge – Tons p.a. - 1995 to 2003**



31. Between 1995 and 2003, total BOD discharges doubled from 237,660 tons to 482,551 tons. Rapid urbanization and industrial growth are the principal causes. Industrial discharges have exceeded the municipal (household) ones throughout the period under review against the background of both population and GDP growth. The share of urban population in Vietnam has grown from 19.6% of the total in 1987 to 26.2% in 2004. In the same period, the share of industrial output in the country's GDP has grown from 28.4% to 40.1%.

32. The main limitation of this indicator is that its values are estimates on the basis of population data (plus fixed coefficients) for domestic loading; and industrial coefficients for industrial BOD. Actual data on BOD load are not available. The rate of population increase and industrial growth are only proxies for actual performance. Despite this weakness the results do give an indication of the trend.

**Suggested rating:** Non-comparable and increasing

**Justification:** As would be expected, estimated total BOD discharges have increased as a result of growing population and industrial development.

#### 1.4 Response:

##### Indicator: Industrial Wastewater Discharge Fees - 2003

33. This indicator is based on the amount of wastewater discharge fees collected by MONRE from industrial enterprises. The fee was formally introduced in 2003 as an incentive for the enterprises to undertake wastewater treatment and a tool of generating revenue for the construction of treatment facilities and for other pollution control measures. For the time being the indicator is incomplete and its construction reflects the weaknesses in the application of the discharge fee policy. First, information about the totals collected are available for a single year (2003). In 2003, the estimated fee collection was 42 billion VND (~2.6MUSD) of which 40% or 16.8 billion VND (~0.65 MUSD) was to be administered through the Vietnam Environment Protection Fund. The remainder of the amount was to be allocated to provinces/cities government units for development of environmental protection projects or facilities. However, it is not clear what the procedures for fee collection were and how fairly the system was applied. What is certain is that, overall, the fee could not have had any significant incentive effect. Based on the data in Table 2.1.2, the average amount of the discharge fee amounted to the equivalent of \$0.03 cents per cubic meter.

**Table 2.1.1: Industrial Wastewater Volumes and Treatment Cost - 2003**

Industry	Estimated Treatment Cost (VND)	Volume of Wastewater (m3/Year)
Pulp production	77,214,500,000	110,000,000
Textile	4,250,000,000	25,000,000
Leather production	73,500,000,000	70,000,000
Chemical industry	51,900,000,000	300,000,000
Alcohol, wine and soft-drink production	20,425,000,000	19,000,000
Sugar production	5,430,000,000	30,000,000
Aquatic product processing	70,380,000,000	92,000,000
Milk production	25,687,500,000	250,000,000
Total	328,787,000,000	896,000,000

**Source: Compiled from Reports of The Ministry of Industry, 2003**

34. MONRE's discharge levy policy is enshrined in Decree No. 67/2003/ND-CP. If experience so far is any guide, the Ministry has been unable to enforce the policy. The lack of any supporting information concerning the functioning of the levy reinforces the view that the application of the policy has been haphazard at best.

35. In addition it is questionable whether MONRE and DONREHs have the capacity to utilize the proceeds of the discharge levy efficiently. The policy needs a thorough review, and the substantial experience from abroad, especially the People's Republic of China, deserves to be studied and applied to local conditions.

**Suggested rating:** Low and sporadic

**Justification:** There is no consistency in the application of programs and policy from the government. Lack of financial and institutional resources constrain effective enforcement of regulation and collection of the fee.

36. The introduction of discharge fee is not the only Government initiative designed to address the water pollution issues. Other policy initiatives or statements include, among others:

- Decision 64/2003/QĐ-TTg, 2003 – addressing pollution from 4,295 most polluting establishments' viz., industries, hospitals, landfills, and chemical factories. The policy targets the most serious 439 pollution hotspots for remedial action during 2003-07, and the remaining by 2012. The Decision complements Decision No. 67 (see above). Under it, owners of polluting facilities can get preferential funding from Vietnam Environment Protection Fund to finance pollution control facilities.
- National Strategy for Environmental Protection with stated 2020 objectives as follows: (i) by 2020: 100% of urban centers, industrial parks and export-processing zones to be provided with centralized waste treatment systems; (ii) by 2010: 100% of newly constructed production units to adopt clean technologies or equipped with waste treatment facilities; 90% of domestic, industrial units' solid wastes to be collected, and 60% of collected hazardous wastes and 100% of collected medical wastes to be treated; and (iii) rehabilitate 50% of heavily degraded canals, lakes, ponds and river corridors traversing cities nationwide.
- Other specific targets are: by 2005 to ensure that 50% rural households are equipped with sanitary latrines; and 10% of "cottage villages" (communities usually specializing in a particular craft) are served by appropriate wastewater treatment. Importantly, all industrial estates zones are to have wastewater treatment systems. More than 1000 enterprises in Ho Chi Minh City are to be relocated out of the city. No information is available for now on the progress in achieving the above targets.

## 1.5 Conclusions

37. Whereas several programs and policies have been adopted by GOV, available information is insufficient to adequately assess their effectiveness. The first priority should be to help remedy this situation. The quality of inland waters is a subject too important not to be benefit from a wider and more searching review. The wastewater discharge fee policy is only one of several components that leave the public poorly informed about the way in which policies are being applied and about the implementation experience so far. As it is, the only safe conclusion that can be drawn is that urbanization and industrial growth continue to exacerbate the water pollution situation.

38. Not unreasonably, water quality monitoring efforts in Vietnam have focused on urban areas that experience the heaviest burden of water pollution and concentration of discharges. However it would be wrong to acquiesce in the virtual absence of any data on pollution of inland waterways caused by agricultural runoff in a country where the use of agrochemicals is significant. Given the distinct dry and wet season of Vietnam, attention to seasonal variations in the quality of surface water is also important.



39. Future work should widen both the area coverage of water monitoring and the range of parameters monitored to include also SS, TDS, oil & grease, pH, heavy metals etc., to provide a more balanced picture of the trends in water quality. Effective implementation of the discharge fee policy might be one way of financing the cost of improved monitoring.

40. A national database of all wastewater treatment facilities in the country including their capacity, and performance record does not exist. Its creation would be a major contribution to efforts to improve both the policy and practice.

41. Both MONRE and its provincial arms (DONREHs) are relatively new organizations that have limited institutional experience and financial resources to implement the pollution control policies in full. MONRE's Department of Environment; National Committee on Clean Water Supply & Sanitation; Agency of Water Resources Management and other agencies concerned with water pollution management in Vietnam would deserve to be better supported financially and technically. Reducing the serious underpricing of wastewater discharges could finance such support. MONRE should prepare a national water quality monitoring program that would generate the data necessary for improved wastewater management (including the database of WWT facilities mentioned earlier on).

42. Guidelines should be developed by MONRE and other relevant GOV agencies on the utilization of fees collected. These should include (i) criteria for and procedures for the collection of fees.; (ii) criteria for the allocation and distribution of collected funds; (iii) rules for monitoring of wastewater treatment facilities' performance and (iv) the approach to be used to maintain a centralized database on the status of these facilities.

**Suggested rating: 1 STAR**

**Justification:** Inland water pollution shows no signs of improvement. Data to date do not make it possible to say if GOV policies are having any impact in arresting the situation; institutional arrangements for managing water pollution are weak and greater effort is required to effectively implement pollution control programs.

**References:**

- *National Strategy for Environmental Protection to 2010 with vision to 2020*, pages 55-63 (objectives), 86-87 (measure on river basins), 118-119 (programs of the strategy on improvement of water environment).

## 2. Air Pollution from Mobile Source

### 2.1 Context:

43. The transformation of Vietnam into a more industrialized and urbanized nation has been accompanied by an increase in the number of factories, automobiles, motorcycles and other equipment that release atmospheric emissions. In particular, the number of motorcycles in Vietnam has been increasing rapidly. In 2000 alone, an increase of 14.2% was observed, and the numbers are expected to continue to grow. Associated with this rapid increase in vehicles has been poor air quality in urban areas. Exposure to airborne pollutants can cause respiratory problems and other health related problems.

44. The air pollution is serious in major cities in Vietnam, especially Ho Chi Minh City and Hanoi, with motor vehicles the main reason. Among the pollutants, the levels of particulate matter are especially high. The specification of fuels used in these vehicles is a contributing cause. The vehicle population continues to grow rapidly, and vehicle ownership has been outpacing the growth in available road space, leading to congestion (and yet more pollution as a result).

45. Although the concentration of many other atmospheric pollutants such as sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>) are generally below the national standard, increased vehicle ownership is expected to test these limits in the near future. In specific locations or certain times of the day, the concentrations of these pollutants exceed the standard. The interpretation of the results is made difficult by a degree of inconsistency and different measurement basis (e.g. monthly averages, maximum daily readings etc.) across the data sets. Here, too, one of the priorities in Vietnam is to upgrade and standardize air quality monitoring, data handling and reporting.

### 2.2 State:

**Indicator: Concentration of SO<sub>2</sub>, NO<sub>2</sub>, PM and CO in Hanoi and Ho Chi Minh Cities – 1997 to 2002**

46. This indicator is the concentration of regulated air borne pollutants (that include SO<sub>2</sub>, NO<sub>2</sub>, PM and CO) in Hanoi and Ho Chi Minh City, expressed in mg/m<sup>3</sup>. This is a commonly used indicator of ambient air quality.

47. Relevant data have been collected from the Centre for Environmental Engineering of Town and Industrial Areas. Additional information was sourced from the Report on Monitoring and Analyzing Environment, NEA, 2004.

**Table 2.2.1: Concentrations of SO<sub>2</sub>, NO<sub>2</sub>, PM and CO in Hanoi City – 1997 to 2000**

Parameter	Location							Standard TCVN 5937- 1995
	Nga Tu Vong (mg/m <sup>3</sup> )			Nga Tu So (mg/m <sup>3</sup> )				
	1997	1998	2000	1997	1998	1999	2000	
CO	5.822	5.478	4.333	5.32	5.713	5.44	4.933	5
SO <sub>2</sub>	0.792	0.839	0.723	0.752	0.742	0.801	0.723	0.3
NO <sub>2</sub>	0.239	0.221	0.073	0.145	0.205	0.21	0.063	0.1
PM	1.239	1.237	0.567	1.121	1.151	1.191	0.633	0.2

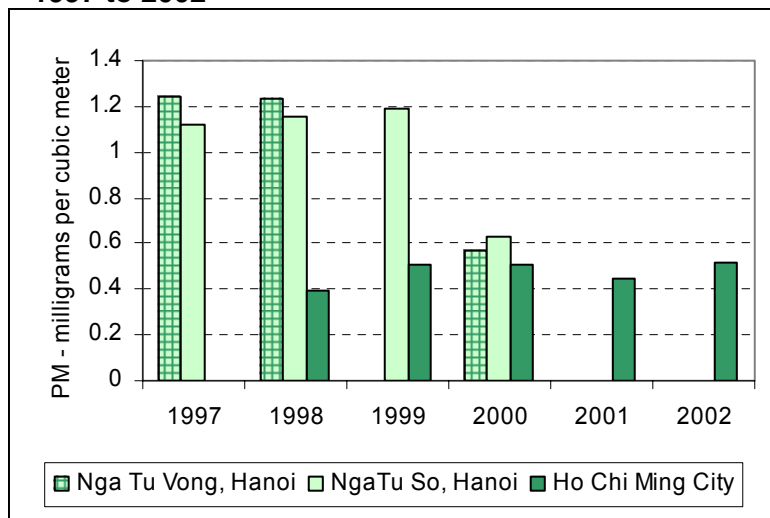
Source : Center for Environmental Engineering of Town and Industrial Areas

Table 2.2.2: Concentrations of SO<sub>2</sub>, NO<sub>2</sub>, PM and CO in Ho Chi Minh City – 1998 to 2002

Parameter	Average concentration (mg/m <sup>3</sup> )					Standard TCVN 5937-1995
	1998	1999	2000	2001	2002	
PM	0.39	0.51	0.51	0.45	0.52	0.2
SO <sub>2</sub>	0.093	0.149	0.146	0.155	0.160	0.3
NO <sub>2</sub>	0.061	0.077	0.088	0.120	0.130	0.1

Source : Center for Environmental Engineering of Town and Industrial Areas

Figure 2.2.1: Concentrations of Particulate Matter (PM) in Hanoi and Ho Chi Minh Cities – 1997 to 2002



48. In both Hanoi and Ho Chi Minh City, the concentration of PM has consistently and significantly exceeded the national standard. For the other pollutants, the concentrations have not systematically exceeded the standard although they may have done so in certain sub-locations or times of the day, or under certain climatic conditions. All parameters are showing a deteriorating trend in HCMC. Worsening air pollution in Hanoi and HCMC is overwhelmingly due to motor vehicles. It is estimated that each month, more than 1,000 vehicles are added to the city traffic of HCMC. Until 2001, vehicles used leaded petrol. More than 200,000 tons of gasoline and 190,000 tons of diesel were consumed each year around the beginning of the decade. Among others, 2,200 tons of SO<sub>2</sub> were emitted into the air-sheds annually. Any increases in the pressure indicator (number of vehicles in urban areas) is likely to further increase the pollutant levels in these cities, unless a concerted air quality management policy is put in place.

49. Compared with several other cities in the wider Asia region (e.g. New Delhi or several Chinese cities) which have also experienced rapid economic growth in recent decades, the air pollution problem in urban areas of Vietnam is less serious. This, however, can hardly be a consolation and reason for complacency.

**Suggested Rating:** Relatively poor and deteriorating

**Justification:** Most of the air pollutant parameters are showing an upward trend with PM already, exceeding the stipulated standards.

## 2.3 Pressure

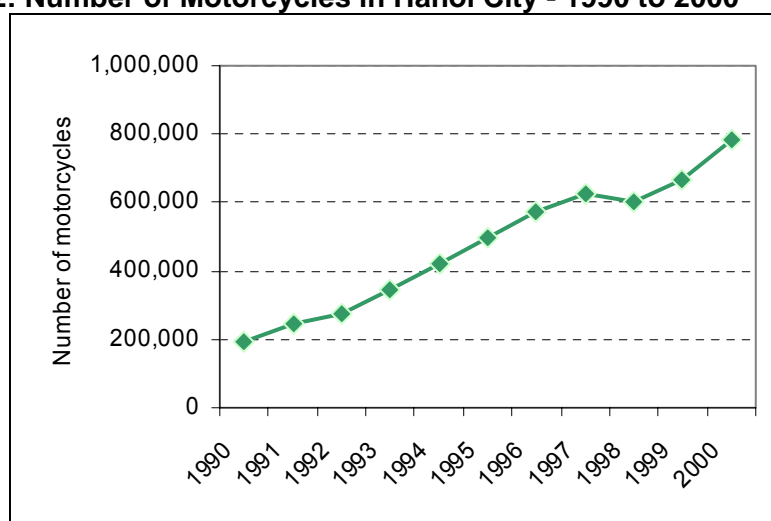
### Indicator: Number of Vehicles in Hanoi and Ho Chi Minh Cities – 1990 to 2001

50. Underlying the emission of atmospheric pollutants is a number of factors. The size of the vehicle fleet, in particular (in Vietnam) motorcycles, is clearly one of them. The number of vehicles in urban areas (Hanoi and Ho Chi Minh City) has the virtue of being statistically viable and was therefore chosen as the indicator of pressure exerted on urban air quality. The volume of automotive fuels sold in urban areas might be theoretically superior but has been plagued by absence of relevant data.

51. Together with the process of industrialization and urbanization, the number of motor vehicles has increased very rapidly, particularly in urban centers. Before 1980, the vast majority of urban population of Vietnam used bicycles; at present the vast majority use motorcycles. Vehicular emissions have become the principal source of air pollution in urban areas, particularly in large cities such as Hanoi, Ho Chi Minh City, Hai Phong and Da Nang.

52. The data of vehicle ownership in Hanoi and Ho Chi Minh City were obtained from the Ministry of Transport and the Vietnam State of the Environment Report (2003) and is presented below. Both automobile and motorcycle data are available for Ho Chi Minh City whereas only motorcycle numbers were available for Hanoi. However, as noted earlier, motorcycles are the dominant form of transport and the incompleteness of data for Hanoi does not fundamentally change the assessment.

**Figure 2.2.2: Number of Motorcycles in Hanoi City - 1990 to 2000**



53. During the ten-year period from 1991 to 2001, the number of vehicles in Hanoi increased by 384%; whilst in Ho Chi Minh City, the number of motorcycles increased by more than 200% during a shorter period 1997 to 2002.

**Table 2.3: Estimated Number of Motorbikes - Hanoi and Ho Chi Minh Cities – 1996/97, 2001 and 2002**

Year	1996-1997	2001	2002
Hanoi City	600,000	1,000,000	1,300,000
Ho Chi Minh City	1,200,000	2,000,000	2,500,000

Source: Vietnam-State of the Environment, 2003

54. The number of registered automobiles (except for military vehicles) in the whole of Vietnam increased at an annual rate of 9-10% between 1996 and 1998. During the same period the number of registered motorcycles increased at an annual rate of 15-18%. 75% of all automobiles use gasoline, 25% use diesel. Almost all motorcycles use gasoline. 70% of total gasoline used was Mogas 83 with (officially until 2001) a lead content of 0.40 g/l. A small number of vehicles (cars and motorbikes) use LPG.

55. Despite the rapid increase of the vehicle fleet and its young profile, the growing stock of vehicles means that the absolute number of older models with poorer emission characteristics is also increasing. In addition, the capacity for vehicle inspection is low. The fuel quality is not strictly regulated; many fuel types with high levels of pollutants, such as sulphur and benzene, are commonly used.

**Suggested Rating:** High and increasing

**Justification:** The number of vehicles including in particular the motorcycles continues to grow without any sign of slowing down; this trend will continue to exert pressure on air quality in urban areas of Vietnam.

## 2.4 Response

56. Several steps have been initiated by the government to deal with the problem of vehicular pollution. In the absence of ordered data over a meaningful period of time no indicator has been formulated and instead, simple listing is provided of the most important steps designed to mitigate the impact of growing vehicular emissions or to improve air quality in general.

- Unleaded fuel - Prime Minister's Instruction No24/2000/CT-TTg dated 23 November 2000. The Government finalized preparations for implementing the switch to unleaded gasoline, including the development of new gasoline standards and the finalization and dissemination of the results of vehicle testing; The switch to unleaded gasoline officially started on July 1, 2001 but no formal assessment has been made of the effectiveness in practice.
- Regulatory steps. Several donors have supported revision of vehicle emission and fuel quality standards, The work is ongoing.
- EIA requirement – GOV requires that EIA be undertaken for all projects to better assess and monitor the impact of development including encouraging use of clean technologies, including cleaner forms of combustion.
- Energy efficient devices – Vietnam's energy policy stresses the need to improve the efficiency of energy use, especially in thermal power generation. It envisages wider use of liquefied gas and light oil at the expense of coal and heavy oil with high sulphur content. Use of biogas in rural areas, and renewable energy (wind, solar energy, geothermal energy, tidal energy).is also to be promoted.
- Legal and policy instruments - The 'National and Local Clean Air Act' has been drafted by the NEA and Hanoi DONRE. Action Plan on Reducing Vehicle Emissions is under preparation
- Air quality monitoring – As in many other countries, monitoring of air quality is recognized to be weak in Vietnam. In a piecemeal fashion and with a combination of government and donor funding, the monitoring network has been expanded. The target for 2005 was (i) 10 automatic air-monitoring stations; (ii) 2 mobile air-

monitoring stations and (iii) 2 environmental analytic laboratories in urban and industrial areas.

- Use of public transport – At present, public transport is not developed in Vietnam but the conditions for its introduction may be gradually emerging. With donor support, schemes to introduce bus or street car services parts of Hanoi and HCMC are being formulated.

**Suggested Rating:** Non comparable

**Justification:** In the absence of an indicator, reflecting statistical and information gaps, the performance cannot be rated.

## 2.5 Conclusion

57. Urban air quality has stagnated in Hanoi and been deteriorating in Ho Chi Minh City, the two locations most affected by the problems of air pollution. The situation in other urban locations is not well documented to draw conclusions. These outcomes have coexisted with a rapid increase in vehicle (especially motorcycle) ownership. In general, announcements of new initiatives have outstripped efforts to assess their effectiveness.

58. Most air quality parameters' (PM, SO<sub>2</sub>, NO<sub>2</sub>) concentrations are showing an upward trend in Ho Chi Minh City including those of PM that exceed the national standards. The situation is less clear-cut in Hanoi. Available data on ambient quality hide localized, seasonal and temporal variability that translates into more frequent cases where ambient quality fails to meet the standards.

59. No government policy is in place to regulate the number of vehicles as one of possible approaches to influence air quality. Notable is the dearth of incentive-based approaches to managing air quality. The number of motorcycles is believed to have more than doubled in both Hanoi and HCMC during the period 1996 and 2002. However, the data on the structure of vehicle ownership and characteristics of the vehicle fleet are incomplete or inaccessible, hampering analysis. Updating vehicle registration records is one of the priorities. Initial steps are being taken to introduce public transport in Hanoi and Ho Chi Minh City. The effectiveness of the switch to unleaded fuel has not been formally evaluated

60. Sporadic and inadequate vehicle emission monitoring is a well known weakness, difficult to overcome quickly as Asian experience has amply demonstrated. Renewal of vehicle registration conditional on the vehicles complying with emission standards also remains a long term objective for now.

61. Other, more broad-based initiatives targeting air quality, such as EIAs, promotion of clean technology and energy efficiency are all laudable but their effectiveness needs to be researched and monitored.

**Suggested Rating: 1 STAR**

**Justification:** The state of air quality from mobile sources of pollution continues to deteriorate and pressure from growing number of vehicles continues to rise. Furthermore, no information exists on the effectiveness of the GOV policy and program responses to mitigate this growing problem.

**References:**

- Hoang Duong Tung. 2004. *Current situation of air pollution in Vietnam*, NEA, Hanoi
- US-AEP. 2002. *Before the clouds gather* –

### **3. Inadequate Solid Waste Management**

#### **3.1 Context**

62. Growth in industrial and commercial activity in Vietnam has resulted in greater volumes of waste generation. Vietnam produces over 15 million tons of waste each year, most of which is not safely disposed, posing a significant threat to public health and the environment. At the same time, waste collection and re-cycling are important sources of livelihood, especially in the informal sector. The proper handling of waste - including reuse and recycling, collection, treatment and disposal -- is crucial to reducing risk to public health and the environment, and to improving the quality of life.

63. Vietnam ended the year 2004 with the highest GDP growth rate (7.7%) since 1997. Along with economic growth, the amount of solid waste from households, industry and commercial establishments has increased rapidly. Over 15 million tons of solid wastes were discharged last year, 85% of which (equivalent to 12.8 million tons per year) came from households and non-industrial commercial establishments ("domestic waste"). Urban areas accounted for 24% of the total population in 2004, generating as much as 6 million tons of domestic solid waste, i.e. 45% of the country's total. Average waste per capita per day in urban areas was 2.3 times higher than that in rural areas (0.7 kg and 0.3 kg respectively). By 2010, municipal waste generation is projected to increase by over 60 percent, industrial waste by 50 percent and the volume of hazardous waste is expected to more than treble.

64. The total volume of waste from the industrial sector was 2.6 million tons (17% of the total) in 2004. About 160,000 tons of waste per year (around 1% of the total) was hazardous waste (hazardous hospital waste, flammable and toxic substances, pesticides etc.). Some 80% of industrial solid waste comes from flagship economic areas and industrial zones of which Ho Chi Minh City and neighboring provinces account for about a half; the Red river delta and the Central North region for about a third. In addition, nearly 1,500 handicraft villages, most of which situated in the northern rural areas, annually produce around 0.8 million tons of non-hazardous industrial waste.

65. The broad objectives of the Government relating to solid waste management are spelt out in Prime Minister's *Decision 199-TTg (1997) on the Solutions for Improving Waste Management in Urban Areas and Industrial Zones*. They are to (i) eliminate unauthorized disposal of solid waste; (ii) improve waste collection; and (iii) improve the sorting of waste by polluters for reuse, recycling and treatment.

66. Additional targets for solid waste management were set in:

- *Strategy for the Management of Solid Waste in Vietnamese Cities and Industrial Parks, 1999* – this strategy, the first in Vietnam, outlines actions to be taken by local governments until the year 2020 to implement a comprehensive approach to waste management. The focus of the strategy is infrastructure development in urban areas and industrial zones. Key features include: legal reform, increased awareness and training, increased privatization and cost recovery, and use of appropriate and modern technologies and their application in Vietnam. The lead agency is the Ministry of Construction and the collaborating agency is MONRE.



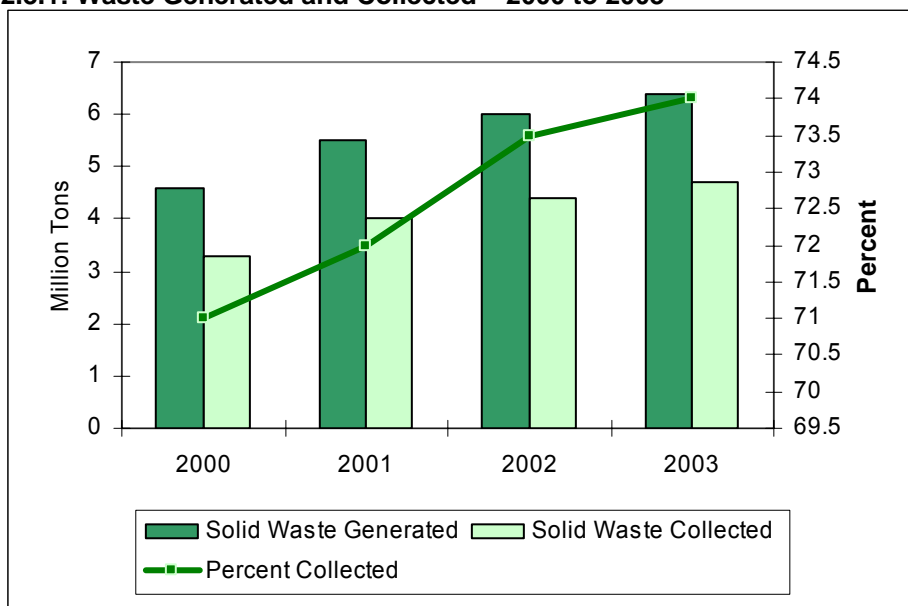
- *National Strategy for Environmental Protection, 2003* – this strategy addresses overall environmental protection in the country until 2020. The main focus of the strategy is environmental management and capacity building. Key features include promotion of economic approaches to environmental protection, legal and policy reform, promotion of public and civil society involvement, capacity building targeted at local and national agencies, policy research, and pollution control. The strategy's 2010 targets are 90 percent collection of municipal waste, and adequate disposal of over 60 percent of hazardous waste and 100 percent of medical waste.

### 3.2 State

#### Indicator: Solid Waste Collected as Percentage of Generated – 2000 to 2003

67. This indicator monitors the efficiency of domestic waste collection in municipal areas of Vietnam. Figure 2.3.1 shows the volume of waste collected and generated between 2000 and 2003. Disaggregated data for different parts of the country are given in the factsheet. At current rate of progress, the target of 90% collection of municipal waste by 2010 appears out of reach.

**Figure 2.3.1: Waste Generated and Collected – 2000 to 2003**



68. These figures do not show the important differences in the rate of collection in different locations of the country. In 2003, for instance, the rate fluctuated from 45% in Long An to a high of 95% in Hue city but remains low in rural and poor areas. Urban areas collect an average of 71% of the waste, a number that has increased steadily since 2000. However, while the waste collection in cities is improving in percentage terms the fast growth in the total volume of waste generated means that even with improved collection rates, the absolute quantities of waste uncollected continue to grow. In general, larger cities in Vietnam collect a larger percentage of their waste (76%) than smaller cities (70%), while in rural areas collection rates are typically less than 20%. The poor are largely not served by collection services; nine out of ten of the poorest urban households do not receive solid waste collection service. New initiatives are being promoted to fill the gaps in municipal waste collection service. For example, community based and private sector organizations are collecting waste in rural villages and in urban areas without municipal coverage.

69. Most of the municipal waste in Vietnam is not safely disposed. However, there have been significant improvements in the performance of the public urban environmental companies (URENCOs) that are responsible for municipal waste collection and disposal. Proper handling of hazardous waste, which is the responsibility of the industries and facilities that produce it, remains severely limited. Recycling and reuse is an active industry in Vietnam, driven by an informal network of waste pickers at landfills, informal waste collectors, and waste buyers (Vietnam Environment Monitor, 2004).

70. The dominant form of disposal of municipal waste remains open dumping; 49 sites have been identified by the authorities as hotspots with high environmental and human health risks. Of the 91 official disposal sites in Vietnam, only 17 are sanitary landfills. In many areas, self-disposal methods—such as burning or burying waste, or dumping in rivers, canals, and open fields—are common. Poorly operated landfills and open dump sites are a major source of inconvenience and health risk to surrounding communities, through contamination of ground and surface water by untreated leachate, emissions of airborne pollutants, and the spread of odors, flies, mosquitoes, rodents, dust, and noise, leading to a high incidence of skin, digestive, and respiratory diseases.

**Suggested Rating:** Relatively poor and deteriorating

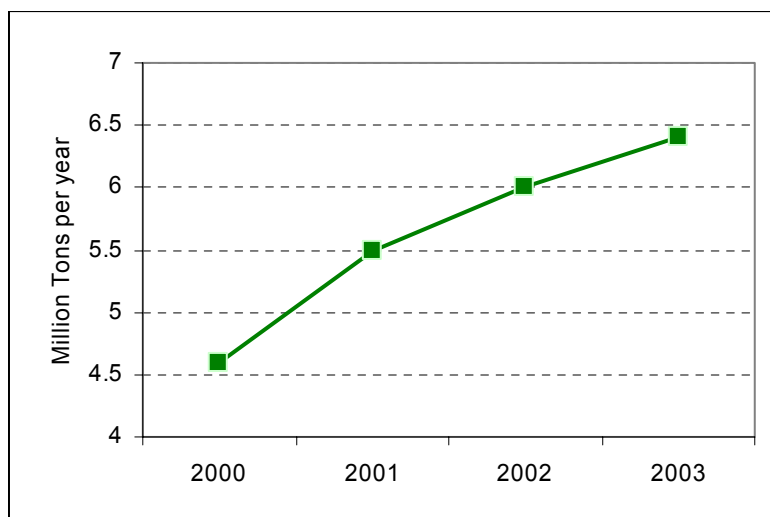
**Justification:** The rate of waste collection at the national level has increased from 71% in year 2000 to 74% in year 2003. However this marginal improvement is far from sufficient to meet the government target of 90% by the year 2010. The major challenge appears to be in the urban areas, and especially in Hanoi and Ho Chi Minh City, where it is estimated that approximately 1 million tons of solid waste is left un-collected every year.

### 3.3 Pressure

#### Indicator: Volume of Solid Waste Generated – 2000 to 2003

71. The principal indicator chosen to describe the pressures behind solid waste management is the total quantity (in tonnes) of solid waste generated in municipal areas of Vietnam. The data used and their statistical aspects are discussed in the respective factsheet in the Appendix. For lack of data, hazardous and toxic waste details are not discussed here.

#### Figure 2.3.2: Volume of Municipal Solid Waste Generated – 2000 to 2003



72. The volume of solid waste generated in Vietnam in recent years has grown rapidly outpacing the rate of population growth and showing little signs of slowing down. In the period from 2000 to 2003 the increase in waste generation was almost 40%.

73. Vietnam produces over 15 million tons of waste each year from various sources. More than 80 percent (12.8 million tons/yr) is from urban areas, including households, restaurants, markets, and businesses. Urban areas account for only 24 percent of the population of the country, yet produce over 6 million tons (50 percent) of the country's municipal waste (see Figure 2.3.3). This is due to the more affluent lifestyles, larger quantity of commercial activities, and more intense industrialization found in urban areas. These activities also increase the proportion of hazardous waste (such as batteries and household solvents) and non-degradable waste (such as plastic, metal, and glass) found in urban waste. In contrast, people in rural areas produce municipal waste at less than half of the rate of those in urban areas (0.3 kg/person/day vs. 0.7 kg/person/day), and most of the waste (99 percent of cultivation waste and 65 percent of domestic waste vs. 50 percent for urban domestic waste) is degradable organic waste.

74. There are good reasons to expect this trend to continue. The current average per capita waste generated in Vietnam is well below the levels in more affluent countries and, based on worldwide experience, likely to grow in line with improving living standards, and continuing urbanization. Present average real incomes in Vietnam are approximately double of those of ten years ago. The urbanization process (24 % of urban population now against 16% ten years ago) is expected to continue further adding to the total of solid waste generated. It is estimated that by 2010, the volume of domestic waste will go up by 60% over the current levels, industrial solid waste is expected to increase by 50% and hazardous waste discharges, mainly from industrial sources, are expected to triple.

**Suggested Rating:** High and increasing

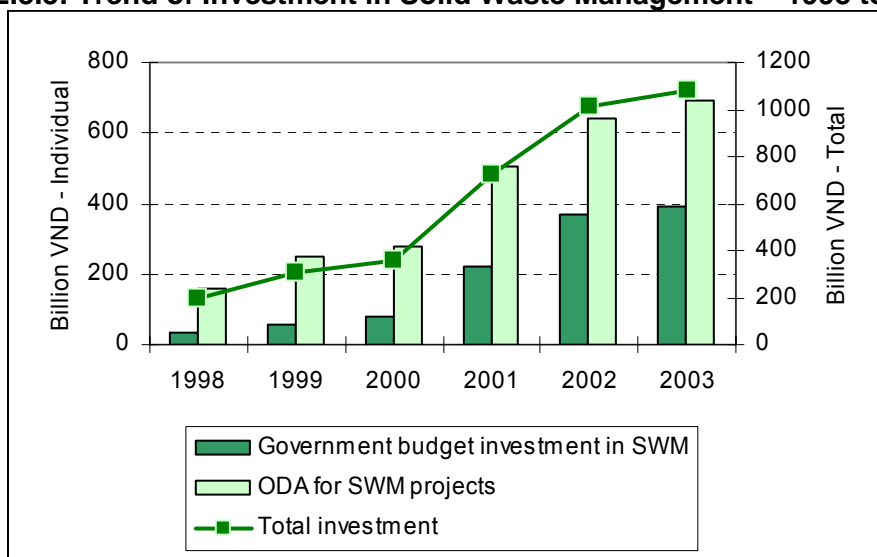
**Justification:** Volume of solid waste generated continues to increase as a result of urban expansion and industrial growth.

### 3.4 Response

#### Indicator: Investment in Solid Waste Management – 1998 to 2003

75. Financing of solid waste management is a key (though not the only) factor in effectively responding to the challenge posed by the growing volumes of waste. In Vietnam, the financing has been divided between the Government and international donors. The indicator chosen is the total level of expenditure by official sources on solid waste management (in constant VND p.a.).

**Figure 2.3.3: Trend of Investment in Solid Waste Management – 1998 to 2003**



76. As can be observed from Figure 2.3.3, total investment in waste management increased substantially in Vietnam from 195 billion dong in 1998 to 1,1 trillion dong in 2003. In 2003, 87% of the total expenditure was allocated for community waste management (largely synonymous with non-hazardous waste management) investment while the balance financed healthcare (12%) and industrial hazardous waste (1%) management.

77. Among notable trends was a rapid increase in investment in waste management infrastructure that, in 2003, was 100 times greater than the (admittedly derisory) amounts of 1998. During the same period, support from local budget doubled and that from ODA increased four-fold. Central agencies invested mainly in infrastructure while local bodies focused on operation and maintenance expenses. Investment in solid waste management during the early part of the current decade accounted for 1.2-2.4% of the total State development spending.

78. The trend of increased investment is expected to continue. Between now and 2020, planned landfill development, closure of unsafe open dumps, and further investment in incinerators for hazardous healthcare waste are expected to cost between VND 30 trillion and 40 trillion. However, the sustainability of these investments is uncertain since, under current conditions, expenditure on operation

and maintenance of solid waste collection and disposal systems is low (0.18% of GNP, or VND 160,000 per ton), and disposal fees furthermore cover only about 50% of the O&M expenditures. In 2003, central and local governments provided a subsidy of about VND 400 billion towards operating the system yet such amounts were believed to be still insufficient to ensure adequate performance.

79. In many cities, improved cost recovery can be achieved through more effective fee collection and service agreements with the city's departments. In other cities, it may be necessary to increase the fees, a measure that has met with resistance in many localities.

80. Other responses and programs of the Government included:

- *Introduction of new patterns of solid waste collection and disposal.* The principal among these is subcontracting of waste management to the private sector or cooperatives. Examples include village teams of waste collection and transport in Thai Binh; waste collection and transport cooperative in Thanh Cong, Hanoi; private enterprise involvement in Lang Son (Huy Hoang Ltd.) and Hanoi (Green Sun Co.), etc.
- *Decision 64 by Prime Minister* - rehabilitation or closure of selected landfills and creation of new safe dumpsites. The closure of the Ba Hoa landfill in Quy Nhon in compliance with Decision 64 is an example of this activity.

**Suggested Rating:** Average and intermittent

**Justification:** Whereas investment in solid waste management by the government and the donors has grown significantly in the last decade, the sustainability of the improved service is questionable.

### 3.5 Conclusions

81. Vietnam's solid waste management needs are substantial in relation to existing waste management infrastructure and the continued growth of urban areas and industrial development. Without undertaking further investments in effective handling, treatment, and disposal of waste, and ensuring adequate financing of the operation and maintenance of the system, the situation may quickly deteriorate.

82. Vietnam is only superficially on track for meeting its target for waste collection and management stipulated in the National Environment Protection Strategy. First, the progress has not been uniform. The performance in smaller towns, rural areas and urban peripheries is not satisfactory and is well below the national average of 71 per cent. Second, in a situation of rapidly increasing total amounts of waste, slow increases in the percentage of waste collected are not enough to reduce the totals left uncollected.

83. There are questions about the quality of waste disposal being employed in terms of safety and impacts on public health. For now, no reliable estimates are available on the quality of disposal. No official rating is available of the state of different landfills beyond the declaration that 10 per cent of them are unsafe. No registers or records exist that would make it possible to say which landfills continue to accept hazardous and toxic waste and which do not. In the absence of such evidence, it is difficult to ascertain how many landfills contain hazardous and toxic waste.

84. The database relating to solid waste disposal is insufficient to adequately inform the public about the progress made. No systematic data on recycling rates exist in Vietnam, surely a major weakness in the already weak data coverage of the problem. More work is therefore required to assess the state of existing landfills and develop a nationwide database on the state of disposal sites in Vietnam.

85. Whereas investment in solid waste management has grown; sustainable management of that investment remains a challenge. Greater attention should be paid to operation & maintenance of existing facilities and safe disposal of waste including hazardous and toxic waste.

**Suggested Rating: 1 STAR**

**Justification:** A 1 STAR rating is suggested as the marginal progress in collection rates achieved during the last decade has been insufficient to reduce the total amounts of waste left uncollected, because of poor quality of waste disposal sites, and because of insufficient knowledge about several important parameters of waste management. Despite much increased financing of solid waste management the sustainability of the waste management programs is in doubt under existing policies.

**References**

- World Bank (2004), Vietnam Environment Monitor.
- GOV (1999) National Strategy of Solid Waste Management, Hanoi
- GOV (2003) National Strategy of Environmental Protection for the Period 2004-2020, Hanoi.

## 4. Forest Resources

### 4.1 Context

86. Vietnam's climatic, topographical and geomorphologic features explain the diversity of the country's natural ecosystems including forest resources that are extensive, and abundant in species and vegetation types. Forest covered approximately 70% of the total land area at the turn of last century (Dai Nam Nhat Thong Chi) and about 42% in 1943 (Maurand), consisting mainly of little-disturbed natural forests. Though substantially diminished since then, Vietnam had over 9 million hectares of forests in 1980s (FIPI). The conditions of this resource has further changed since then and some of it is seriously degraded. Recent reforestation activities have contributed to a shift in the composition of the resource from native forest to forest monocultures. Apart from the task of protecting existing forests, the government has set a target of 39% and 44% forest cover by 2005 and 2010 respectively. A large part of the responsibility for achieving those targets has been placed on about one million households involved in government reforestation programs.

87. Several documents guide national policies on forestry. Key amongst these are:

- The National Action Plan on Environment and Sustainable Development 1991-2000, approved by Government in 1992
- Strategy for Environment Protection towards 2010 and 2020, approved by Government in 2003
- Strategy for Forest Development 2001-2010, approved by the Ministry of Agriculture and Rural Development in 2002
- Reforestation Program for Five Million Hectares 1998-2010, approved by the National Assembly and the Government in 1998.

88. Three forest land use categories are recognized in Vietnam.

- *Special Use Forests* form the basis of protected areas and include national parks, nature reserves, environmental forests and cultural and historic sites.
- *Protection Forests* are designated for protection purposes including the protection of watersheds, sand fixing, coastal protection and environmental protection for urban and industrial areas.
- The remainder of the forest area is regarded as *Production Forest*.

### 4.2 State

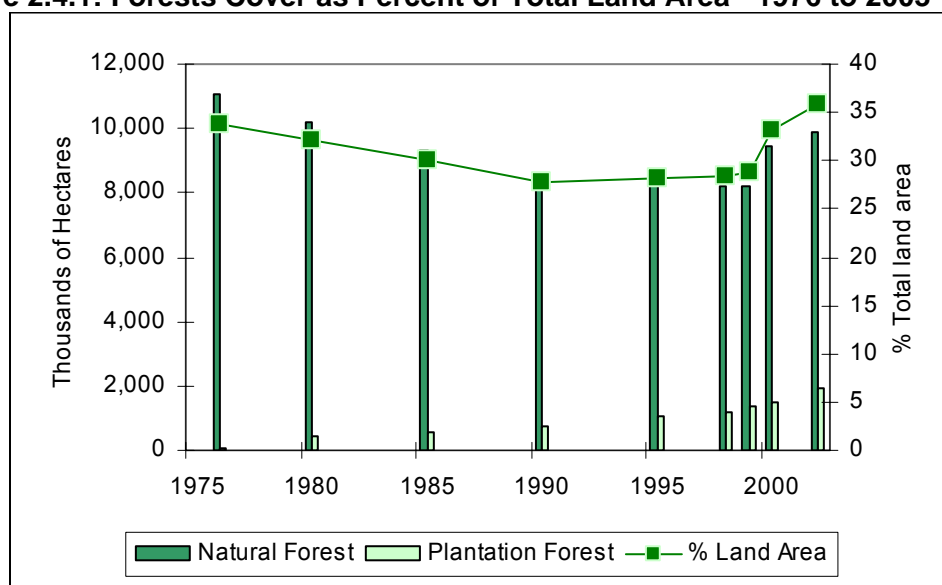
89. In line with globally accepted indicators of the state of forests and as utilized by the Food and Agriculture Organization of the United Nations (FAO) for global monitoring of tropical forests, forest cover, expressed as a percentage of the total forest area, was selected as the state indicator. By itself, forest cover provides only a partial picture of the state of the nation's forest resources but it is generally accepted

that a continuing decline of forest area signals unsustainable practices and environmental threats that extend well beyond the forests themselves.

**Indicator: Percent Forest Cover – 1943 to 2003**

90. As can be observed from Figure 2.4.1, forest cover in Vietnam steadily declined from an estimated 43% of total land area in 1942/43 to a low of 9,175,000 hectares or 27.8% of total land area in 1990. The decreasing trend was arrested in the 1990's but forest cover increased only slightly during that decade. Since 2000, there has been a noticeable upward trend. As of 2003, the percentage was 36.1% of the total land area representing a 8.3% increase over its level in 1990.

**Figure 2.4.1: Forests Cover as Percent of Total Land Area - 1976 to 2003**



91. The increase in overall percentage of forest was driven mainly by the expansion of plantation forest the area of which increased from 92,000 hectares in 1976 to 2,090,000 hectares in 2003. In 2003, plantation forests accounted for approximately 17.3% of the total forest area or approximately 6.3% of the total land area. The total standing volume of wood was estimated at about 750 million m<sup>3</sup>.

92. In terms of forest quality, P. Maurand's 1943 forest map shows that most of Vietnam forests in 1943 were natural forests of which about 50-60% were rich to medium stocked forests. In 1995, rich and medium stocked forests (defined in Vietnam as forest with standing volume greater than 80 cu m/ha) were only 23% of total land area and concentrated mainly on hilltop or steep slopes, mainly in Central Highland, East South and Central zones where rich forests (> 150 m<sup>3</sup>/ha) were 9% of the remaining total, and medium forests (80-150 m<sup>3</sup>/ha) 33%. Over a half of total forestland was covered by low quality and poor forests (less than 80 cum/ha), newly planted forests and mixed woody and bamboo forests.

93. The Strategy for Forest Development 2001-2010 approved by the Ministry of Agriculture and Rural Development (Decision 199/QĐ-BNN-PTLN) in January 2002 contains the objective to increase the country's forest cover up to 39% in 2005 and 44% in 2010. If the pace of the first years of the new century is maintained, these targets are well within reach. The data for 2005 are not yet available to confirm whether the target for that year was met or not.



94. The forest development strategy further seeks to establish 5.4 million hectares of protection forests in 2005 and 6 million hectares in 2010 comprising 1.6 million hectares of special use forests in 2005 and 2 million hectares in 2010; and 6.2 million hectares of production forests in 2005, and 8 million hectares in 2010. Here we merely note that the target for special-use forest has been reached and exceeded (2.5 million hectares in 2004). Other targets are not addressed here.

**Suggested Rating:** Average and improving

**Justification:** After a long period of decline, from 42% of total land area in 1943 to a low of 27.8% in 1990, the decline was subdued in the 1990's and the trend reversed at the turn of the new millennium. In 2003, 36.1% of total land area was under forest, close to the target of 39% target set for the year 2005.

### 4.3 Pressure

95. The pressures on forest resources in Vietnam have been many and no single indicator can capture them all. The post-war reconstruction, the dramatic rise in population which depends on wood for fuel, the demand for more agricultural land, shifting cultivation in the upland areas, forest fires, conversion of forests to tree crops and unsustainable forest management practices have all had an impact on the forest and its conditions.

96. An indicator based on per capita fuelwood production developed earlier on in the assessment process for all GMS countries concluded that the per capita fuelwood production of Vietnam had always been lower than that of other GMS countries and lagged the population growth: while the population of Vietnam grew 2.5 times between 1960 to 2002 (from 34 million to 80 million people), fuelwood production increased only 1.6 times and consumption per capita declined from 0.47 m<sup>3</sup> to 0.33m<sup>3</sup> per annum. Fuelwood consumption remains a source of pressure, especially with rising population, but this trend has been largely offset in Vietnam by improved availability of alternative energies and better forest protection.

97. Forest fires are perceived to be a major contributing factor and some 5 million hectares of forest are vulnerable to the risk of forest fires each year. Yet the total area destroyed by forest fires from 1995 to 2003 as recorded by the General Statistics Office only amounted to 57,300 hectares.

98. The net effect of converting forests to tree crops (rubber foremost among them) is partially captured by the state indicator which differentiates between plantation and natural forest. The data do not show the area of natural forest converted to plantations but they illustrate well the recent overall rise in the area of forest plantations.

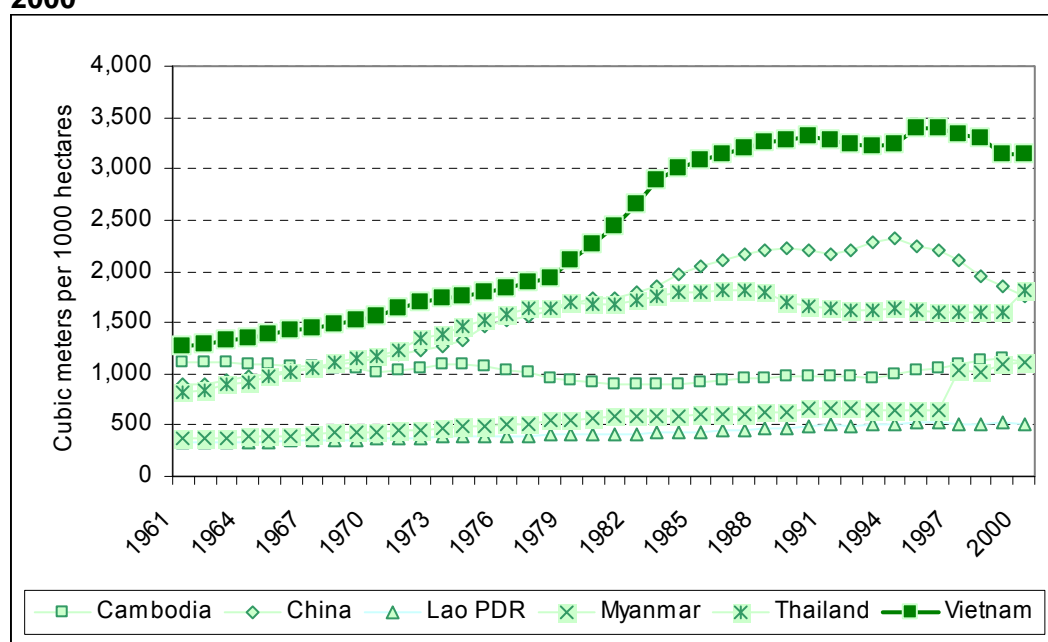
### **Indicator: Ratio of Roundwood Production over Total Forest Area – 1961 to 2000**

99. The magnitude and effect of unsustainable forest management practices, or the over-exploitation of the resource, is best captured in an indicator factsheet earlier developed for the Greater Mekong Sub-Region as a whole. It is based on FAO historical estimates of forest areas and wood removals but some of the figures have been replaced by in-country estimates. This indicator is expressed as the ratio of total annual roundwood production, in cubic meters, over the total forest area in thousands of hectares.

100. Roundwood production refers to all wood in the rough, whether destined for industrial or fuelwood uses. All wood felled or harvested from forests and trees outside the forest, with or without bark, round, split, roughly squared, or in other forms such as roots and stumps, is included. Wood that is harvested for charcoal production is also included. All wood production data refer to both coniferous and non-coniferous species.

101. Total forest area includes both natural forests and plantations. Total forest area is defined as land with tree crown cover of more than 10 percent of the ground and area of more than 0.5 hectares. Tree height at maturity should exceed 5 meters.

**Figure 2.4.2: Ratio of Roundwood Production over Total Forest Area – 1961 to 2000**



102. The range of this indicator within GMS countries is between zero and 3,500 M<sup>3</sup>/1000 hectares. Global averages for the last 34 years are between 500 and 765 M<sup>3</sup>/1000 hectares. OECD countries as a whole are slightly above this global average but have remained under 1000 M<sup>3</sup>/1000 hectares over the last 34 years.

103. As can be observed from Figure 2.4.2, Vietnam's rate of wood removal was slightly above that of other GMS countries in the early 1960's and rose at a rate comparable to that of other GMS countries in the 1970's. In 1980's however, as forest cover continued to decline, roundwood production continued to rise and the ratio of roundwood production over total forest area increased from 2,273 M<sup>3</sup>/1000 hectares in 1980 to 3,321 M<sup>3</sup>/1000 hectares in 1990. The rise in the indicator value in this decade is a significant departure from what happened in other GMS countries during the same period.

104. The observed peak value in 1994 of almost 3,400 M<sup>3</sup>/1000 hectares has no observed equivalent in any of the data analyzed and it surpasses the peak rates set by Indonesia (1,942 M<sup>3</sup>/1000 hectares in 1961) or Brazil (376 M<sup>3</sup>/ 1000 hectare) where forest over-exploitation is known to have occurred.

105. Since 1990, when overall forest cover started to rise and production figures remained constant, the ratio has begun to decline. Assuming the continuation of the

trends of the period 2000-2003, the ratio may have fallen below the 3,000 M<sup>3</sup>/1000 hectare mark. Even then, however, the ratio remains at almost twice the average of the six GMS countries.

**Suggested Rating:** High and steady

**Justification:** Although there are signs that the worst of the pressure on forest resources had been subdued at the turn of the century, the pressure exerted by roundwood production is significantly above the average of other GMS countries.

#### 4.4 Response

106. No one indicator of response is chosen; rather the principal programs and policies of the Government are briefly summarized. As with the pressures, the government responses to forest management have been many and diverse. One of the earliest was Program “327” implemented during the period 1992 to 1998. Program “661” also known as the 5-Million Hectares Afforestation Project (FMAP or 5MHRP) succeeded it in 1998.

107. Among other things, Program 327 resulted in the allocation of 1.6 million hectares of forest land to households for different activities that included protection of existing forest, rehabilitation of 1,368,600 hectares of degraded forest (including 638,500 hectares of new plantation and 748,100 hectares of natural regeneration forest), planting of 119,940 hectares of industrial crops and fruit trees, and resettlement of 92,420 households away from the most fragile areas.

108. The plus of the Program 327 was that households were targeted for investment and credit. There were minuses also. The matching of investments to forest types was poor. Also, in many provinces, the Program was considered as no more than a short-term poverty alleviation scheme. Loan disbursements were slow, and repayment rules were not clear or strictly followed.

109. Program 661 formulates two targets. One is forest cover; the other the means of achieving the desired forest cover, i.e. land allocation. The relationship between the two is far from straightforward.

110. The basis for 5-million hectares in the FMAP project is evident. At the time of its launching, some 8-million hectares, comprising of 73% of existing forest cover, had already been allocated to the three forest land use categories recognized by the forestry sector. Another 3-million hectares, comprising 27% of the existing forest cover, were not yet allocated and remained under the management of district/commune authorities. The total required forest land allocation (see Table 2.4.1 below) for the FMAP project is 16 million hectares; the 5-million hectare figure therefore represents the shortfall.

**Table 2.4.1: Major Indicators of the FMAP Project**

<b>Forest Area Indicators</b>	<b>2001 to 2005</b>	<b>2006 to 2010</b>
Protection Forest establishment	5.4 million ha	6.0 million ha
Special Use Forest establishment	1.6 million ha	2.0 million ha
Production Forest establishment	6.2 million ha	8.0 million ha
Sub-Total	13.2 million ha	16.0 million ha
<b>Other Indicators</b>		
National Forest Cover	39%	44%
Forest Management and Protection	12.0 million m <sup>3</sup>	24.5 million m <sup>3</sup>

(standing volume)		
Wood Production	12.0 million sterc	10.5 million sterc
Firewood production (value)	USD 700 million	USD 2,500 million
<b>Source: Forest Development Strategy – 2001 to 2010</b>		

111. The basis for the 2010 target of 44% forest cover appears to be the historical (1942) figure. What is not so clearly evident from the Forest Development Strategy is how a forest land allocation of 13.2 million hectares in 2005 or 16.0 million hectares in 2010 will result in a forest cover of 39% and 44% respectively. 39% of total land area (33,111,700 ha) is approximately 12.9 million hectares; 44% of total land area is 14.6 million hectares. The overall assumption, using simple arithmetic, is that approximately 98%% of the allocated forest lands will be forest covered in 2005 and approximately 91% forest covered in 2010.

112. A review paper coordinated by CIFOR suggests that in year 2002 forest cover in each of the projected forest land use categories was substantially less than this (see Table 2.4.2 below). Overall the existing forest cover was 74%. The area designated as production forest had the lowest percentage (56%); designated protection forest had a 95% forest cover.

**Table 2.4.2: 2002 Forest Cover of Forest Land Categories**

Forest Land Category	Total Area (hectares)	Actual Forest in 2002 (hectares)	% Forest Cover
Protection Forest	6,000,000	5,614,304	95%
Special Use Forest	2,000,000	1,727,379	86%
Production Forest	8,000,000	4,442,907	56%
Total	16,000,000	11,784,590	74%
<b>Source: Do Dinh Sam, Trieu Van Hung, Pham Ngoc Mau, De Jong Wil - How does Vietnam Rehabilitate its Forests?</b>			

113. The principal aim of the FMAP project is to afforest (by plantation or by natural regeneration) a 5-million hectare amount of newly allocated forest land; also to maintain the existing forest cover in what was previously allocated through programme 327. The main indicator of success will be a 39% forest cover by year 2005 and a 44% forest cover (1942 level) by year 2010. Since percent forest cover is already being tracked by the state indicator, no new indicator need be developed to track the overall success of the FMAP initiative.

114. The state indicator currently only tracks forest cover to year 2003. However the 2003 percentage forest cover of 36.1% is on track with the 39% year 2005 objective. Taking that into account, it can be said that the FMAP results are in line with stated targets.

115. Separate indicators could and probably should be developed to monitor all other aspects of progress of the FMAP project; however the development of such indicators is beyond the scope of this current assessment project. The implementation of the forest management strategy through the FMAP project involves many levels of government and much of the implementation is being conducted through hundreds of donor or NGO-sponsored sub-projects. The 5MHRP Partnership Secretariat can at best keep track of who is doing what and where, but not tally all the results.

116. Monitoring the progress of the FMAP project would require many indicators because the interventions of the FMAP project are very broad, the targets are many and some of the interventions and targets are inter-related. As Table 4-1 indicates, the strategy also contains targets for protection and management in terms of wood

volume. There are also timberwood and firewood production targets; achieving these targets while under-achieving others could have serious implications for the overall strategy.

117. In light of these data deficiencies, the current assessment can only rely on some preliminary progress figures published by the Forest Inventory and Planning Institute which reports on the progress of the FMAP project to year 2003. These results are summarized in Table 2.4.3 below.

**Table 2.4.3: Five Million Hectares of Afforestation Project Status 1999 – 2003**

Target	Result (hectares)	Planned to 2003 (hectares)	Planned to 2010 (ha)
Forest allocated for protection	2,432,960	1,740,250	
Protection & Special Use Forests	1,196,594	949,144	2,000,000
Newly planted	497,594	496,803	1,000,000
Natural regeneration	699,000	452,341	1,000,000
Production Forests	506,629		3,000,000
Forests supplying industrial materials	433,833		2,000,000
Industrial plants and fruit trees	72,796		1,000,000
<b>Total Afforestation</b>	<b>1,703,223</b>		<b>5,000,000</b>

**Source: FIPI- Forest Inventory and Planning Institute, 2004**

118. According to the above progress report, there had been considerable success already in 2003 in allocating more land for forest protection. The achievements were above target and will no doubt contribute to the achievement of year 2005 and 2010 targets.

119. With regard to the 5-million hectare afforestation objective, one third of this objective had been realized by the end of year 2003. New plantation targets in protection and special use forests were met and Mother Nature gave a helping hand through natural regeneration throughout protected forest areas.

120. The results were less positive in production forests where the forest cover percentage was inferior to start with (see Table 2.4.2). Only 17% of the 2010 overall objective was realized. The achievements were especially poor in the planting of industrial and fruit trees where only 7% of the 2010 target was realized.

**Suggested Rating:** Average and consistent

**Justification:** Targets in protected forest areas have been over-achieved while targets in production forests have been under-achieved. These imbalances will likely level out as the implementation of the FMAP project continues and more focus is placed on afforestation in production forests.

## 4.5 Conclusions

121. After a long period of forest decline, the Government of Vietnam took decisive action and elevated the importance of forest resource in national development. Clear policies and targets have been established. Many and varied efforts have been made to protect and increase the forest resource during the past 20 years.

122. The decline in forest cover was arrested during the 1990's and since the turn of the century the trend has been reversed as forest cover increased from a low of

27.% in 1990 to an observed 36.1% in year 2003. Forest condition however remains a concern as explained in more detail in the sub-section 5 dealing with biodiversity.

123. The 5-million hectare afforestation programme initiated in 1999 has aimed to improve forest condition; also restore the forest cover to 1942 levels. Progress to date has been significant with some shortfalls, however, in the replanting of industrial and fruit trees. The last mentioned may reflect the gap between a program (FMAP) that is largely of a command type (despite greater role given to households) and the emergence of a more market-oriented land use in which households choose the most profitable uses of land they are to manage.

124. Despite the achievements of the last two decades, the pressure on the existing forest remains high. The large and growing population is at the heart of it whether it is through demand for fuelwood or more farmland.

125. Rehabilitation projects of the past two decades have concentrated on protection forests and special use forests. Somewhat less attention was paid to the protection of Vietnam's unique tropical forests. International interest in conservation activities remains high and bodes well for future assistance possibilities.

126. The experience of the last two decades has generated a number of lessons. One of them is that forest rehabilitation is about much more than planting, tending and protecting trees. The most successful projects were those where adequate attention was paid to a range of supporting activities such as education, training, raising awareness among farmers and communities, improvements of local infrastructure, and the quality of the forest land allocation process.

**Suggested Rating: 3 STARS**

**Justification:** A 3-Star rating of performance is suggested based on clear evidence that responses adopted have improved the state variable as defined for this assessment and based only on percentage forest cover. This would be reduced to a 2-star rating if overall forest conditions continued to decline in spite of the increasing forest cover. The pressure on forest resources will remain; however it is noteworthy that GOV efforts are being applied consistently and the downward trend of falling forest cover seems to have been arrested.

Consistent with a 3-star rating criteria, clear and effective targets have been set and generally met. Ongoing monitoring of forest cover is in place, although improvements are needed in terms of monitoring forest condition. Ongoing programs are in place to improve forest cover and forest condition through to year 2010. The institutions responsible for this program implementation have been identified and roles and responsibilities have been clearly identified.

## **5. Threats to Biodiversity**

### **5.1 Context**

127. Vietnam is ranked as being among top 16 countries in the world in terms of biodiversity wealth. There are approximately 12,000 vascular floral species in Vietnam. Seven thousand vascular species, 800 moss species and 600 mushroom species have been scientifically described. Over 2,300 floral species are used for food, medicine, timber, oil and construction materials, etc. The endemism of the floral system is very high and includes at least 40% of all species. There is no endemic family but 3% of the genera are endemic. There are three focal regions in the Hoang Lien Mountain Range, Central Highlands and the Northern Animate Mountains.

128. There were 275 mammal species, 828 bird species, 180 reptile species, 80 amphibian species, 547 freshwater fish species, 2,033 marine fish species and about 12,000 insect species in the forests of Vietnam as of 1995. The number of endemic species is high with 78 species and sub-species of mammals, over 100 species and sub-species of birds, 7 primate species and 11 bird species endemic to Vietnam.

129. Vietnam has great expanses of wetlands of different forms such as estuaries along the coast, lagoons and bays, the Dong Thap Muoi inundated area, natural and man-made lakes, internal wetlands and thousands of ponds of various sizes from the north to the south. The biodiversity of the wetlands in Vietnam is very high. In each region, the biodiversity of the wetlands is very different, depending on their form and location. Estuaries have a variety of specialized species and migratory species and are significant sites for mangroves, salt marshes, sea grasses and algal beds. Estuaries are very important for fisheries and have great potential for ecotourism and recreational activities. Vietnam is one of the richest areas in the world in terms of marine biodiversity. Coastal and marine protected areas, from the sub-temperate ecosystem in the north to tropical ecosystems in the centre and the south, are of national and international importance.

130. However, due to a variety of reasons, Vietnam's biodiversity has been decreasing with some species depleted.

131. The main policy adopted by government is Vietnam National Action Plan on Biodiversity to 2010, adopted in 1995 with the aims of:

- Protecting sensitive habitats; avoiding losses of biodiversity on account of economic development.
- Building up 22 marine parks and 64 wetland protected areas by 2010.

132. The official work plan of the Forest Protection Department sets the target of increasing protected areas to 2.6 million ha -equivalent to 8% of the total land area- by 2010, and increasing the number of protected areas from 17 in 2002 to 30 in 2010.

## 5.2 State

133. As with most developing countries, Vietnam is far from having completed an inventory of its biological resources and there are many conflicting figures on the number of existing species in both fauna and flora in the literature. Therefore a state indicator which is sensitive to both nationally threatened and globally threatened species is not feasible at this time.

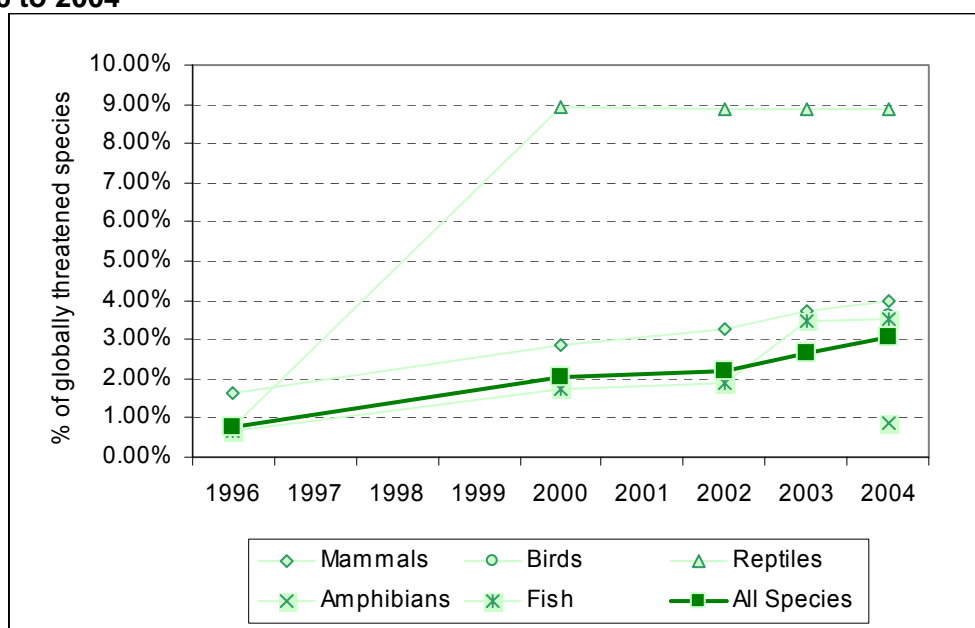
### Indicator: Threatened Species as Percent of Globally Threatened Species – 1996 to 2004

134. The selected state indicator is therefore based on globally threatened species, as defined and monitored by the International Union for the Conservation of Nature (IUCN) in the “Red List of Threatened Species”. This standardized data source attempts to track all endangered species, regardless of origin, with a mapping to individual countries based on the range of the individual species.

135. This indicator tracks the number of threatened species over time. It is expressed as the percentage of the number of threatened species at the national level over the number of threatened species at the global level. Expressed as a percentage of globally threatened species, the resultant value is indicative of a country’s share of globally threatened species.

136. Threatened species are those defined by the IUCN as vulnerable, endangered or critically endangered in the “Red List of Threatened Species”. Extinct or lower risk (conservation dependent, near threatened or least concern) do not form part of this indicator. Species under consideration include mammals, birds, reptiles, amphibians and fish; plant and insect species, for which the process of evaluation has only just begun, are excluded from the indicator figures. Sub-indicator values are also given for mammals, birds, reptiles, amphibians and fish species.

**Figure 2.5.1: Threatened Species as Percent of Globally Threatened Species – 1996 to 2004**



137. As can be observed from the final 2004 results in Figure 2.5.1, Vietnam is a tentative sanctuary to approximately 3% of the globally threatened wildlife species.



This standing includes approximately 4% of globally threatened mammals, 3.6% of globally threatened birds, 8.9% of globally threatened reptiles, 0.9% of globally threatened amphibians and 3.5% of globally threatened fish.

138. It is highlighted here that the rise in the share of globally threatened species from 0.75% in 1996 to 3.05% in 2004 is largely attributed to the progress of the evaluation work of IUCN and is not necessarily indicative of a trend of loss of biodiversity in Vietnam during the period 1996 to 2004. The 0.75% value in 1996 is based on the first version of the IUCN RedBook, when some relevant mammal, reptile and fish species had been evaluated but at which time amphibians and birds were not yet part of the equation. The bulk of the relevant reptiles were not evaluated until year 2000 and relevant amphibians and birds were not evaluated until year 2004. Therefore the indicator value and the trend before 2004 has very little meaning.

139. Subsequent to 2004 and now that the indicator value is inclusive of all threatened species tracked by this indicator, the future value of the indicator will be more indicative of the trend in the loss of biodiversity in Vietnam. It is not expected to vary dramatically from the 2004 figures. It may artificially rise if new globally threatened species also have sanctuary in Vietnam; it may artificially fall if new threatened species have sanctuary outside of Vietnam. Some of this artificial oscillation can already be observed in the reptile species since year 2000. While the indicator serves well to measure Vietnam's share of the global priority, only changes in the status of individual species (as detailed in the relevant factsheet) can be utilized to measure progress at the national level. Any future decrease in the level of endangerment of the listed species, or the removal of the species from the list, is indicative of progress in conserving biodiversity; any future increase in the level of endangerment will be a negative indication of progress.

140. With regards to the degree of vulnerability of these threatened species, as of 2004, 84 species were listed as vulnerable, 50 as endangered and 24 as critically endangered. It is also observed that not all of Vietnam's share of the globally threatened species are endemic to Vietnam and therefore Vietnam alone is not solely responsible for its 3% share of globally threatened species. However, 16 of the threatened species are endemic to Vietnam and for another 6 threatened species, Vietnam and one of its GMS neighbors share the responsibility.

141. While the overall intent of biodiversity conservation measures may be to reduce the number of threatened species specific to one country, target figures are seldom expressed in these terms. Targets in biodiversity conservation are normally expressed in terms of response, not as state variables. This is the case also in Vietnam where the principal policy document, i.e. the 1995 Vietnam National Action Plan on Biodiversity, sets the 2010 target as :

- Protecting the sensitive habitat; avoiding the loss of biodiversity on account of economic development; and
- Creating 22 marine parks and 64 wetland protected areas by 2010.

142. Other relevant policy is Forest Protection Department's plan to increase the protected areas to 2.6 million hectares, equivalent to 8% of the total land area, by 2010.

143. With the lack of specific targets upon which to evaluate the current state of biodiversity in Vietnam, the value of the indicator can only be compared with the value of the same indicator in other GMS countries to obtain a comparative value.

This comparative analysis has been completed in the related factsheet with the conclusion that Vietnam's 3.1% share of the globally threatened species, as tracked by this indicator, is the highest amongst all GMS countries, including Yunnan Province.

144. The state indicator analysis has also provided some insight as to what are the habitats of the threatened species in Vietnam and what are the major threats to those threatened species. Forests were identified as the dominant habitat for approximately 35% of the threatened mammals, birds and amphibians but loss of wetlands and grasslands were equally important to threatened bird species. Therefore pressure indicators which attempt to track the loss of habitat are an appropriate choice.

**Suggested rating:** Relatively poor with no observable trend

**Justification:** Vietnam's 3.1% of globally threatened species is the highest amongst all GMS countries (including Yunnan Province) and well above the average (2.1%) of all GMS countries combined. Based on a comparison of this indicator with the indicator value of other GMS countries, it is concluded that the current state of biodiversity in Vietnam is relatively poor. Vietnam is exceptionally rich in biodiversity but has not done a very good job protecting it. As previously highlighted, the rise of the indicator value from 0.75% in 1996 to 3.1% in 2004 is not indicative of the loss of biodiversity during such period. Therefore no observable past trend can be deduced from this indicator.

### 5.3 Pressure

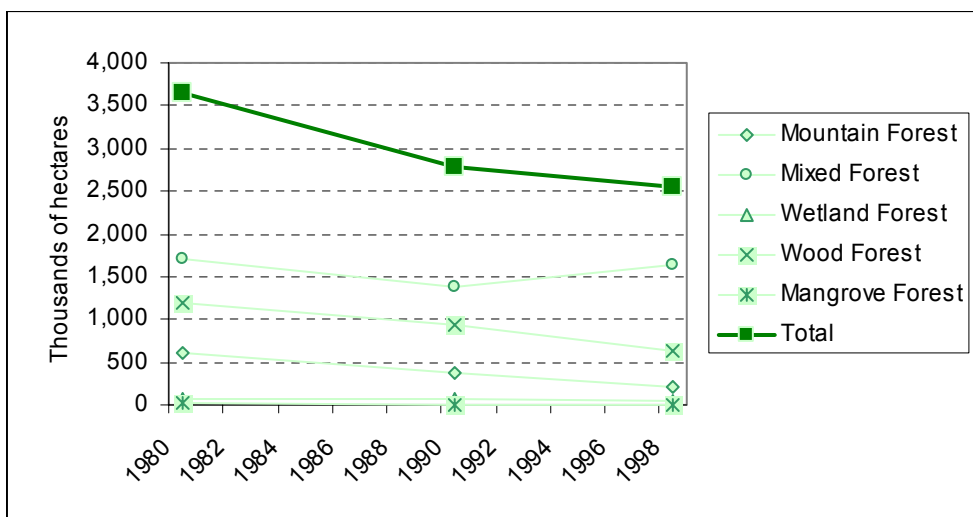
145. Loss of forest cover has already been addressed under the forest resources concern and there is no need to repeat such indicator here. Instead, the loss of natural forests, which has been monitored by the Forestry Inventory and Planning Institute since 1980, has been selected as the pressure indicator.

#### Indicator: Loss of Natural Forest Habitat – 1980 to 1998

146. This indicator attempts to track the loss of natural forests over time; it is expressed as the net amount, in thousands of hectares, of remaining natural forest over time. Natural forest area is defined by the Vietnam Forestry Inventory and Planning Institute as un-disturbed forest in one of the following categories: (i) mountain forest (ii) mixed forest (iii) wetland forest (iv) wood forest or (v) mangrove forest.

147. As can be observed from Figure 2.5.2, the natural forest area has declined from approximately 3.6 million hectares in 1980 to approximately 2.5 million hectares in 1998. This represents a loss of approximately 1.1 million hectares over the 18-year period.

#### Figure 2.5.2: Loss of Natural Forest – 1980 to 1998



148. The rate of decline accelerated during the period 1980 to 1990 and it appears to have been subdued somewhat during the period 1990 to 1998. However this is largely due to an increase in the mixed forest type that supports less biodiversity. Mountain forests, which provide the best biodiversity, have continued to decline throughout the 1980 to 1998 period. Mangrove forests, which serve a multitude of purposes other than protecting biodiversity, are also on the decline.

**Suggested rating:** High and Steady

**Justification:** Based on the area of natural forest which remains and rate of decline over the 18-year period of observation, it is concluded that the pressure on loss of biodiversity originating from the loss of forest habitat is still relatively high. There are signs that the pressure has been subdued during the last decade but there is yet no sign of a reversal in the loss for this very important biodiversity conservation habitat.

## 5.4 Response

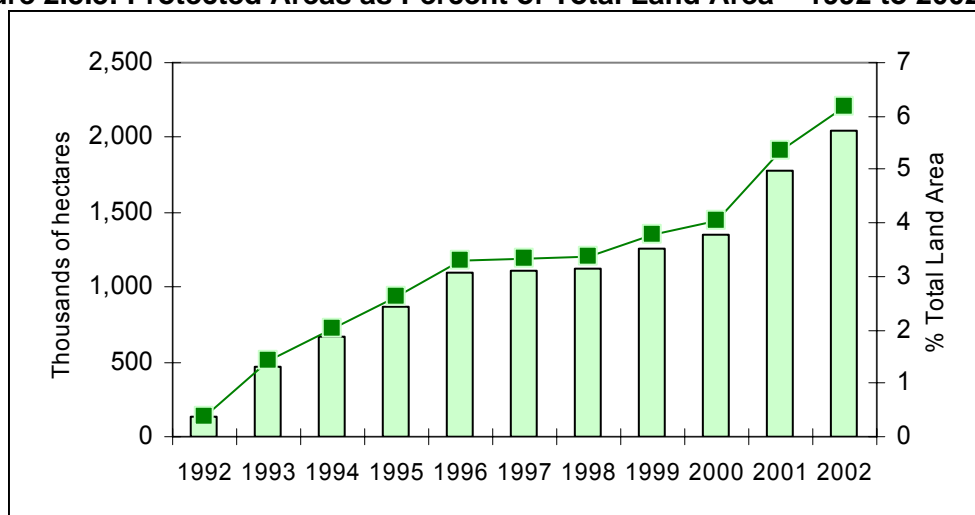
149. The typical government response to protecting endangered species is to enact laws which protect those threatened species, or to establish a system of protected areas which protect the habitat in which those species exist. For consistency with other GMS countries an indicator which tracks the development of protected areas was selected as the response indicator.

### Indicator: Protected Area as Percent of Total land Area – 1992 to 2002

150. This indicator attempts to track the extent of protected areas over time; it is expressed as the percentage of protected area over total land area. Protected areas under the Vietnamese system of protected areas include: national parks, nature conservation areas, and cultural, historical and environmental sites. Vietnam is also host to one Ramsar Wetland Site (Xuan Thuy), four World Heritage Sites and one Man and the Biosphere Reserve.

151. As can be observed from Figure 2.5.3, the system of national protected areas in Vietnam has increased from 128,675 hectares or 0.39% of the total land area when it was initiated in 1992 to 2,049,992 hectares or 6.18% of the total land area by year 2002. This is no doubt a significant achievement of the government of Vietnam during the 10-year period of record.

**Figure 2.5.3: Protected Areas as Percent of Total Land Area – 1992 to 2002**



152. There appears to be two different and conflicting target figures for the extension of the system of protected areas in Vietnam. The Forest Protection Department has established a target to increase the system to 109 protected areas covering 2.6 million hectares or 8% of the total land area by year 2010. The National Environment Protection Strategy calls for its increase to 10% of total land area by 2010. This 10% target is consistent with the IUCN recommendation which suggests that 10% of the country's land area should be set aside for the conservation of biodiversity. A 10% target figure is therefore assumed for the assessment of performance.

**Suggested rating:** Low but consistent

**Justification:** The achievement to date of 6.2% of total land area is relatively low when compared to the achievements to date of other GMS countries; it is also relatively low when compared to the 10% IUCN recommendation as the target figure set out in the National Environment Protection Strategy. The progress since 1992 is nevertheless substantial and if the trend is sustained the 10% target figure will be achieved by 2010.

## 5.5 Conclusions

153. The loss of habitats has anthropogenic and natural causes. The Vietnamese Government with support of the international community has been trying to limit the anthropogenic causes. The intensity of these efforts increased since the formulation of the National Action Plan on Biodiversity.

154. More than 100 special-use forests with conservation functions, covering an area of 2 million hectares, have been established nationwide by now. However the total area under protection in Vietnam is 6.2 % of the land total, which is the lowest in the GMS region and below the officially adopted target.

155. There has been a steady development of policy and legal provisions for the management of the country's biodiversity. Vietnam has joined all the relevant international conventions related to this thematic area (UNBDC, Ramsar, CITES, and others).

156. Among the tasks requiring more attention are the following:

- Further expand the protected area system.
- Strengthening the management, data collection and monitoring of main habitats;
- Improving the monitoring of trade in protected fauna and flora and its effective suppression.

**Suggested rating: 2 STARS**

**Justification:** A 2-star rating of environmental performance is suggested, mainly based on the recent achievements in expanding the system of protected areas. While the added protected areas will not have an immediate impact on lowering the pressures and improving the state, there is hope that this will occur in the future. Long-term targets for biodiversity conservation have been set and the short-term target can be said to having been met. Also consistent with a 2-star rating, international conventions have been ratified and most reporting requirements have been met. Ongoing monitoring and databases exist for tracking forest habitat and protected areas.

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Nguyen Chu Hoi et.al., 2001. Setting up the basic scientific for planning marine park systems in Vietnam.

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## 6. Threats to Coastal Zones

### 6.1 Context

157. Vietnam has a long coastline of 3,260 kilometers. This provides it with abundant marine resources and biodiversity, and a valuable location for commercial and industrial activities and people's livelihoods. Fisheries, aquaculture, port development, navigation, oil and gas exploration and coastal tourism are the major commercial activities that simultaneously create economic opportunities and threaten the coastal zone systems through marine pollution, uncontrolled waste disposal, and loss of mangroves, to mention only the most important.

158. The richness of coastal waters is considerable. They contain more than 2,000 fish species. Of these, approximately 130 species are economically important. Additionally, there are more than 1,600 species of crustaceans and 2,500 species of mollusks with an annual allowable catch of 50,000-60,000 and 60,000-70,000 tons respectively. The rare and endangered species listed in the IUCN Red Book (2002) of Vietnam include: 5 mammals, 6 waterfowls living in wetlands, 5 marine turtle species, 1 crocodile, 53 marine fish, 15 corals, 5 echinoderms, 1 horseshoe crab, 2 marine crabs, 6 shrimp, 6 species of Palinuridae family, and 26 mollusk species. The very diverse ecosystems that nurture these habitat include wetlands (with mangroves particularly important), coral reefs and sea grasses.

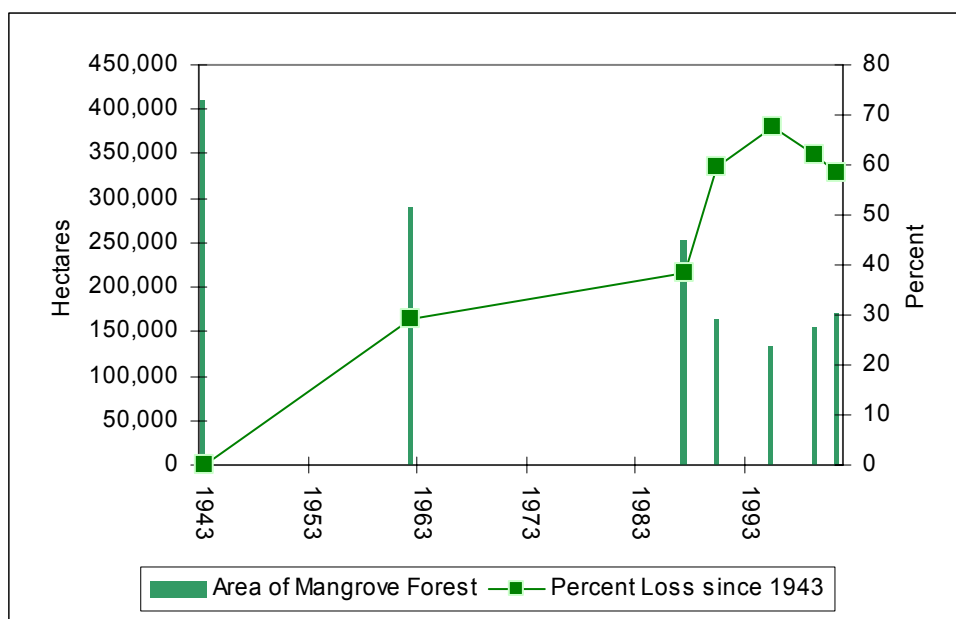
159. Mangrove forests provide a variety of benefits to the national economy. Extensive mangroves occur on Mekong Delta in the south and Red River Delta in the north. The southern estuaries of the Mekong and Dong Nai rivers are the most favorable for mangrove growth. The lower temperatures and poorer soils in the north have limited the height of trees. Although mangroves occur along the central coast, the narrow tidal flats in this region combined with poor sedimentation from rivers, and exposure to typhoons and floods offer less favourable conditions for growth in some of the regions that are most disaster prone. The mangroves' direct benefits include wood as well as roof thatching material, medicinal plants and honey. Since 80-90% of all marine fisheries production in Vietnam (660,000 tons p.a.) comes from coastal waters less than 30 meters deep, mangrove forests play an indirect but vital role as breeding, feeding, and nursery grounds for commercially important aquatic organisms. Through their filtering function, mangroves lessen the impact of toxic substances on surface and ground water as well as soils. Furthermore, mangrove forests serve as buffer zones against typhoons, floods and salinity intrusion, help protect sea dikes and limit coastal abrasion (which reaches 10-25 meters per year on roughly 20% of Vietnam's vast coastline).

### 6.2 State

#### Indicator: Area of Mangrove Forest – 1943 to 2001

160. Area of mangrove forest was selected as indicator of the state of coastal zone in Vietnam. Depletion of mangroves poses a serious threat to the long term sustainability of Vietnam's coastal ecosystem with impacts on biodiversity and abundance of marine resources as explained above. From Figure 2.6.1 it can be observed that by 1995, the area of mangroves had declined to a third of its size in 1943.

**Figure 2.6.1: Decline in Area of Mangrove Forest – 1943 to 2001**



161. The surge in shrimp aquaculture emerges as one of the leading causes of mangrove forest loss. The growth has been the greatest in the Mekong (Cuu Long) Delta, Quang Ninh and Hai Phong provinces. Other causes of mangrove losses include conversion to agricultural and construction lands, war destruction, and fuel wood collection.

162. Mangrove formations now cover over 170,000 hectares. Various government and international assistance projects have project specific targets for mangrove plantation and rehabilitation.

**Suggested Rating:** Relatively poor and stabilizing  
**Justification:** Over the last five decades, Vietnam has lost about 60 percent of its mangrove forests; there are signs, however, that mangrove rehabilitation efforts are beginning to stabilize the situation and even reverse this trend.

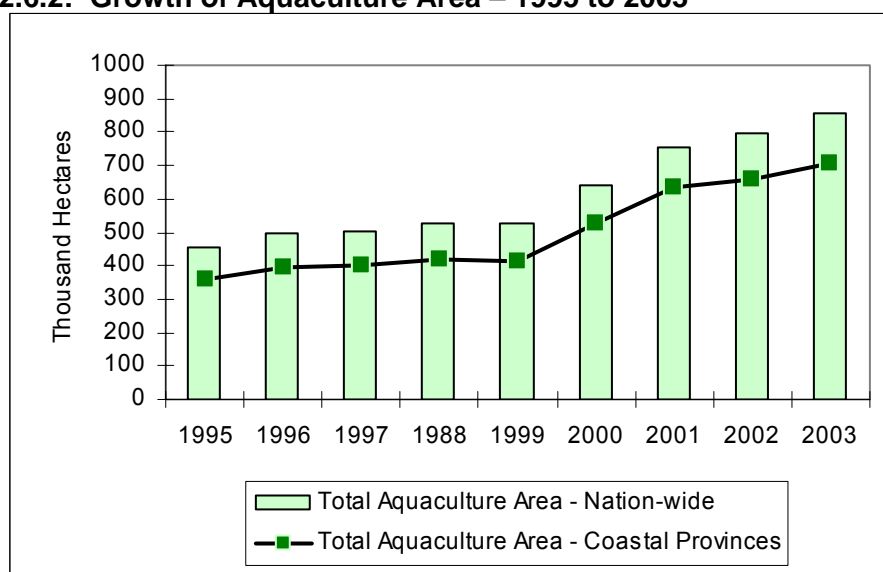
### 6.3 Pressure

163. Growth of coastal aquaculture is widely accepted to be the main cause of mangrove loss and it was therefore chosen as indicator of pressure. Shrimp aquaculture clears mangrove forests to construct large, brackish water ponds that, under disciplined management, can offer the prospect of considerable financial gain for the operators. The environmental impacts of coastal aquaculture are several and serious, going well beyond the mangrove loss.

**Indicator: Growth of Aquaculture Area – 1995 to 2003**

164. Since 1995, Vietnam's aquaculture sector has expanded steadily. The annual growth rate of the aquaculture production was 12.3% over the period 1996 to 2000. In 2000, total production of the country was 2.22 million tonnes, an increase of one million compared to that of 1995 (Vietnam Environment Monitor 2002). In coastal provinces, aquaculture area increased from 356,000 hectares in 1995 to 704,000 hectares in 2003.

**Figure 2.6.2: Growth of Aquaculture Area – 1995 to 2003**



165. The origins of coastal aquaculture lie with the “Doi Moi” or economic renovation policy launched in late 1980s that authorized a transformation of over 500,000 hectares of coastal mangroves into prawn farms. The sector soon became an export winner. Its environmental impact has been less favorable. Experience in the region (well documented in Thailand) has highlighted the ambiguous and unsustainable contribution of aquaculture to economic development and there is concern that Vietnam may follow in Thailand’s path to discover the high economic cost of contamination and ultimate pond abandonment. For now, however, aquaculture is a major export industry in Vietnam and there are no signs of deliberate restraint or tighter regulation. Efforts to rehabilitate mangroves are considered by the authorities to be a sufficient safeguard.

**Suggested Rating:** High and increasing

**Justification:** Aquaculture industry continues to grow in Vietnam with adverse environmental impacts including mangroves loss and marine pollution. In the absence of any specific legal instrument to regulate the growth of this industry the trend is not expected to change in the foreseeable future.

166. Other forms of pressure on coastal zones in Vietnam include impacts from increasing oil exploration activity that has potential for oil spills and related accidents. About 30% of the total cargo shipping through the ports carry petroleum products. Off-shore exploitation activities are increasing every year. From 1996 to 2002, the crude oil production increased from 8.8 to 17 million tons per year. About 772,000 tons of oil is leaking into the sea from crude oil exploitation per year. Between 1995 and 2002, at least 35 major oil spill incidents occurred in the sea. It was estimated that 92,000 tons of oil flowed into the coastal and marine environment during these incidents (Vietnam Environment Monitor, Water, 2003)

Year	Number of Cases	Oil Amount (tons)
1995	2	202
1996	7	68,300
1997	4	2,450
1998	6	12,900
1999	10	7,600



2000	2	45
2001	3	Approx. 900
June 2002	1	24
<b>Source: NEA, SOE 2002</b>		

167. Sufficient data were not available to construct an indicator for pressure from oil spills or accidents. However, future EPAs should explore other pressures on coastal zone including those posed by the oil & gas exploration activity.

#### 6.4 Response

168. Several programs and policy measures have been adopted by GOV towards improved management of the coastal zones. However, in the absence of sufficient time series data on any particular response measure; a suitable indicator could not be selected. The following gives the reader an overview of GOV initiatives in the CZM (coastal zone management) sector.

169. *Legal Provisions* - Since the Law of Environmental Protection was adopted in 1993, GOV at both central and provincial level has undertaken several measures in the marine and coastal zone management sector. The 'State Committee of Marine Areas and Islands' was established as an inter-ministerial committee chaired by the Prime Minister. Members include MONRE, Ministry of Fishery, Industry, Agriculture, and major coastal provinces. This committee coordinates the functioning of various government units tasked with addressing coastal zone issues. In addition, laws and regulations specific to coastal and marine issues have been promulgated: these include (i) maritime law, (ii) marine production law, and (iii) oil and gas law. In addition, the Ordinance on Fisheries Resource Protection contains specific regulations on fish catch, methods, seasons, etc. to be enforced by the Department of Fisheries Resources Protection, which was established in 1993 under the Ministry of Fisheries (MoF).

170. *Institutional Initiatives/Marine Protected Areas* - The Ministry of Forestry has the mandate and responsibility for nature reserves, national parks and other protected areas on land including mangrove areas. However, there is as yet no government department clearly authorized to manage Marine Protected Areas (MPAs) although the Ministry of Fisheries and the MONRE have both shown concern about the issue. Management of existing island reserves tends to be more focused on the terrestrial area since these are run by the Forestry Department and by MARD. The lack of a clearly identified responsible authority has been repeatedly identified as the major obstacle to marine conservation, and specifically to MPA viability (Biodiversity Action Plan Planning Committee, 1994 draft; Roop et al. 1994).

171. The legal framework is taking shape slowly and several important legal instruments are still not in place, hampering implementation (of, for instance, the National Oil Spill Management Plan). Enforcement remains weak.

172. Under-funding is a major constraint to effective coastal zone management, be it management of MPAs or undertaking simple marine surveys for improved knowledge of the state of coastal zones. In the case of MPAs, all protected areas are understaffed. Currently, no more than 685 permanent staff are charged with protecting and managing some 226,400 ha of coastal and marine environment in Vietnam's 20 existing coastal and marine protected areas.

**Suggested Rating:** Non-comparable and undetermined trend

**Justification:** Whereas a variety of laws, policies and programs have been adopted or prepared; their effectiveness cannot be assessed in the absence of data and institutional vacuum.

## 6.5 Conclusions

173. The rapid economic development of Vietnam has brought both opportunities and threats to its coastal zones. The trade-offs are complex. The undoubted success of aquaculture as an export earner and source of incomes, for instance, needs to be set against the cost of mangrove loss and aquaculture's uncertain future. The growing prosperity of harbours, to give another example, co-exists with increasing contamination of coastal waters.

174. There are signs of progress in some areas. While it is the case that Vietnam has lost approximately three quarters of its mangroves during the past half century there is evidence to suggest that the area of mangroves has stabilized and indeed, may have begun to increase. The GOV's goal of restoring the mangrove cover to 80% of the cover in 1990 may have already been achieved (even if this achievement is partly devalued by the choice of the target, since the 1990s was the period of mangroves' historical minimum (see Figure 2.6.1).

175. Institutional and budgetary constraints undermine effective implementation of the mitigation programs in the coastal zone. Lack of coordination between GOV agencies, NGOs and other organizations engaged in the activities related to coastal zone slows down the management and mitigation efforts.

### **Suggested Rating: 1 STAR**

**Justification:** The ecosystems of coastal zones in Vietnam are under serious threat from commercial development. Although Vietnam has adopted several policies intended to protect the coastal zones and signed international conventions like the Ramsar and Marplot convention only a limited progress is evident in the coastal areas.

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The Report on Environmental State of Aqua Production Branch, 2002

Vietnam: The Environment and Living, SIDA, National Political Publishers, 2004.

## **7. Climate Change**

### **7.1 Context**

176. Vietnam has been a participant in the international debate about climate change, its causes and possible consequences. In a country with a long coastline the prime concern has been a possible impact of global warming and sea level rise on the national shoreline zone as well as a possible effect on the seasonal patterns of rainfall. The principal consideration under this concern, however, is the extent to which Vietnam has acted upon its undertakings under UNFCCC.

177. Vietnam signed the United Nations Framework Convention on Climate Change (UNFCCC) on 11/6/1992 and ratified it on 16/11/1994. The country also signed the Kyoto Protocol on global warming on 3/12/1998 and ratified it on 25/9/2002.

### **7.2 State**

178. The status of climate change is determined by factors that are overwhelmingly outside the control of Vietnam or GMS authorities. In principle, a single report on climate changes is prepared for the whole world by Intergovernmental Panel on Climate Change (IPCC.) For that reason, this EPA report does not attempt to formulate a separate state indicator at national level.

### **7.3 Pressure**

#### **Indicator: National Greenhouse Gas Emissions – 1993 to 2002**

179. Under the IPCC standard, the quantity of greenhouse gas (GHG) emissions is taken as the indicator of pressure, i.e. the country's contribution to global climate change. The three main greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). As customary under UNFCCC reporting, the emissions are expressed in Gigagrams (Gg) of CO<sub>2</sub> equivalent.

180. By now, Vietnam has undertaken three greenhouse gas inventories according to IPCC guidelines. The first was conducted as part of the Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS) project and included a baseline inventory for 1993 as well as GHG estimates for 2000, 2010 and 2020.

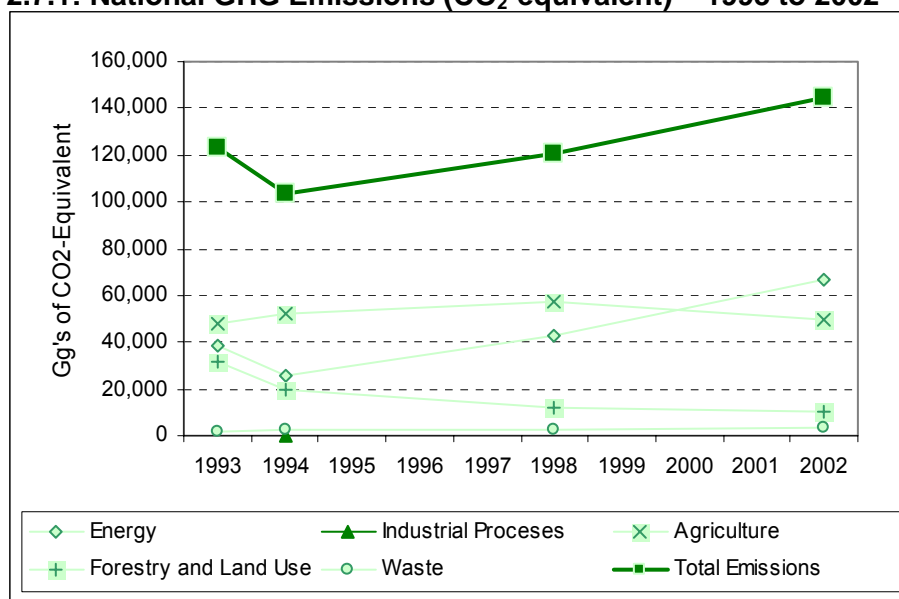
181. Based on that research and experience, a second inventory was conducted to form the basis of the First National Communication to the UNFCCC which included inventory figures for 1994 (the IPCC baseline year) as well as revised estimates for year 2000, 2010 and 2020.

182. A third inventory was conducted by the National Climate Change Office with year 1998 and year 2002 inventory figures. This will form the basis for a Second National Communication to the UNFCCC which is currently in 4th draft. The indicator is based on a consolidation of these three inventory results, as reported in the draft 2nd communication document.

183. These reports give data on emissions of the three key greenhouse gases with global warming potential, i.e. carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O). Annual emissions of GHGs in metric tons were inventoried in five main

sectors, i.e. energy, industrial processes, agriculture, land use change and forestry, and wastes. These were then converted into CO<sub>2</sub> equivalents by using these gases' global warming potentials.

**Figure 2.7.1: National GHG Emissions (CO<sub>2</sub>-equivalent) – 1993 to 2002**



184. As can be observed from Figure 2.7.1, total GHG emissions in CO<sub>2</sub>-equivalent were estimated at approximately 120,000 Gg's in 1993 and are estimated to have risen to 145,000 Gg's in year 2002.

185. Until year 1998, the agricultural sector was the dominant source of GHG emissions, accounting for approximately 50% of all emissions in 1994. While emissions from this sector are estimated to have risen slightly in 1998, emissions from the energy sector have surpassed those of the agricultural sector by the turn of the century. In 2002, emissions from the energy sector accounted for approximately 46% of all national emissions.

186. Emissions from waste were minimal in all inventory years. Emissions from industrial processes have been relatively small but are likely to increase in the future. Emissions from forestry and land use change (FLUC) were significant in 1993 but are estimated to become less significant as forest cover increases and becomes more of a sink of GHGs. As with most other GMS countries, emissions from the energy sector are expected to dominate in the future.

**Suggested rating:** Low and Increasing

**Justification:** The emissions are small when compared to heavily industrialized nations. Nevertheless overall emissions are on the rise.

## 7.4 Response

187. The actions already taken by the Government include:

- Establishment of the National Climate Change Task force and National Technical team.
- Completion of the GHG inventories in 1993, 1994, 1998 and 2002.

- Formulation of the GHG reduction scenarios.
- Implementation of initial projects on Climate Change, including a project on strengthening the capacity to implement CDM in Vietnam.
- Establishment of the national focal point on CDM.

## 7.5 Conclusions

188. Vietnam signed the United Nations Framework Convention on Climate Change (UNFCCC) on 11/6/1992 and ratified it on 16/11/1994. The country also signed the Kyoto Protocol on global warming on 3/12/1998 and ratified it on 25/9/2002. The nation-wide GHG emission inventory was carried out in 1993, 1994, 1998 and 2002. As would be expected in a developing economy the GHG emissions are showing an upward trend. As a singatory of UNFCCC and by virtue of meeting its obligations under that convention, Vietnam is committed to monitoring its performance.

189. The national focal point to implement UNFCCC, Kyoto Protocol and CDM-related matters has been appointed. The most important next step is to formulate and approve the National Action Program to Implement the UNFCCC and Kyoto Protocol.

**Suggested rating: 2 STARS**

**Justification:** Vietnam has met its obligations with respect to the Climate change Convention.

**Reference:**

- Report on UNFCCC (4th draft), prepared by MONRE, July 2005

## 4. Environment and Economic Development

190. The purpose of Part 3 is not to comprehensively review the existing institutional and legislative basis of environmental management in Vietnam. Several summaries exist (including the Institutional Analysis prepared as part of the SEF II Project) and the reader is referred to them for details. Rather, the purpose is to identify those elements of the existing institutional framework that affect the performance of the national environmental management process.

### 4.1. *Integration of Environmental Concerns in Economic Decisions*

191. In 1980s<sup>2</sup> the Government of Vietnam embarked on "doi moi", a program to guide a transition from rigid central planning to a mixed market economy. Vietnam has since opened up its economy and substantially liberalized trade. The country has achieved strong economic growth but the same growth has created new challenges, not least in the area of environmental management. In order to take full advantage of the potential created by economic modernization while minimizing its the negative environmental side-effects it is necessary to adopt suitable environmental safeguard policies. The ongoing reform process, together with the fact that Vietnam has a unique opportunity to learn from the experiences of its neighbors, creates a good opportunity for the development and introduction of effective environmental management that integrate environmental considerations into the economic development mainstream.

#### 4.1.1 Policy and Institutional Integration

192. On December 27, 1994, Vietnam's National Assembly approved the Law on Environmental Protection (LEP) that created a legal basis for a more systematic approach to pollution control, natural resources management and protection of ecological diversity. The LEP has 7 chapters and 55 articles. The Law contains general provisions and sets out the overall approach to preventing and remedying environmental pollution and degradation. It describes the responsibilities and duties of MOSTE (now MONRE) at central level and of the People's Committees at provincial level (with DONREH). The LEP calls for international collaboration and makes provisions for implementation and for dealing with violation of the law. Other environmental legal initiatives include government decrees, ordinances, inter-ministerial circulars, guidelines and by-laws.

193. MONRE has 3 departments that have environmental management responsibilities:

- the Environment Department tasked with policy formulation, strategy and legal regulations for environmental protection,
- the Environmental Protection Department that oversees the implementation of policy, strategies and legal aspects of environmental protection, and
- the Department for Environmental Impact Assessment and Evaluation in charge of environmental assessment of investment projects.

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<sup>2</sup> In 1986 the VIth National Party Congress officially adopted the renovation policy ("Doi Moi"), however, it was only in 1989 that implementation of the policy started in earnest with such measures as inflation control and trade liberalization.

194. In the provinces, the local counterpart of MONRE, the DONREHs are tasked with advising the provincial-level people's committees about environmental management and protection. Other staff are assigned environmental duties at districts and commune levels. In addition, various development sector line ministries and agencies have staff in their organization that are responsible for looking after environmental management tasks associated with projects under their organizations.

195. In 1993, the National Environment Agency (NEA) was established under MOSTE (now MONRE). By 1999 the NEA had 9 divisions with 79 staff. Environment Management Divisions usually with 2 to 5 employees were also established in every province/city under the Provincial Departments of Science, Technology & Environment. Several districts and provincial towns also have a cadre for environmental management. The functional units for environment management normally attached to the Department of Natural Resource & Environment have been established in some line ministries and economic sectors.

196. Whilst MONRE plays a key role in the development and enforcement of environmental policies and regulations; line ministries' role is also important. For instance, implementation of forest policy and related measures is in the purview of Ministry of Agriculture and Rural Development (MARD); management of urban solid sewage is under responsibility of Ministry of Construction (MOC); management of ecological diversity and agriculture is with MARD; management of coastal and marine ecological diversity, aquaculture are responsibility of Ministry of Fisheries; and air pollution management is responsibility of Ministry of Construction, etc.

197. This cross-sectoral nature of environmental management requires pro-active collaboration between policy makers at the central and state committee's level and the line agency staff who are responsible for implementing policy decisions. Furthermore collaboration needs to exist at horizontal levels as well between various organizations that may have overlapping functions. As would be expected the multiplicity of authorities and overlapping tasks have not been fully ironed out and they complicate the environmental management.

198. Other sectoral laws that have a bearing on the concerns discussed in this EPA include Forest Protection and Development Law (1991), and Land Law (1993). In addition, the National Strategy for Environmental Protection, 2001-2010 (NSEP) has been developed that focuses on prevention and minimization of negative impacts on environment, environmental recovery in seriously polluted areas, improvement of environmental quality, nature conservation and biodiversity protection. As part of the strategy, other programs have been developed to expand the legal and policy foundation of environmental management, apply economic instruments; and develop a network of environmental monitoring and analysis.

199. Integration of environmental concerns into economic decision-making is still not a part of the development paradigm in Vietnam. Active cooperation between various development line agencies and MONRE remains an exception rather than the norm. Ministry of Planning & Investment (MPI) is the key agency that approves investment proposals in Vietnam. It solicits opinions from various line agencies when submitting its recommendation to the Prime Minister's office, including MONRE. This process does not always work smoothly and suffers from lack of coordinated approach and not always does each agency get a say. For larger projects of national importance a national appraisal committee has been formed that includes MONRE.

200. In terms of monitoring the environmental impacts of development, whereas EIA is a requirement for development projects, the process is not imposed very strictly. Project feasibility reports (FS) do not always include an appropriate EIA rather only a chapter devoted to environmental issues, hence eliminating a complete review of the environmental impacts of the proposed development. Decree 175-CP on EIA, requires that the EIA permit be issued only upon approval of the EIA report at the construction stage however, in practice the EIA approval does not come in time to monitor the construction stage of the project.

201. The following Table presents an outline of the national framework for environmental management in Vietnam:

<b>Agencies in the National Framework for Environmental Management</b>	
Policy makers	Communist Party of Vietnam Prime Minister National Assembly Provincial People's Councils
Law makers	National Assembly Prime Minister Provincial People's Councils
Planners	State Planning Committee Ministries and National Committees (planning depts.) Provincial People's Committees (planning depts.)
Advisors	Office of the Government State Planning Committee Ministries, universities and institutions Non-government organizations Steering committees, cross-sectoral working groups
Executive organizations	Ministries MONRE National Environment Agency (NEA) Provincial People's Committees Provincial Services of Natural Resources and Environment National committees
Implementing organizations	Environment Department of the National Committees and Ministries (e.g. DONRE) NEA, NGOs, institutes, mass organizations universities, research institutions
<b>Source: UNDP, 1995</b>	

#### 4.1.2 Inter-Agency Cooperation

202. Coordination between MONRE and other line ministries is unstructured and inadequate. There is no procedure or established mechanism for organizing regular meetings between MONRE and other agencies to deliberate upon environmental issues. A first small step has been made by MONRE with the preparation and distribution of the SOE report to various other line agencies. In addition the Government has established inter-sectoral committees and inter regional committees to manage and give direction for cross sectoral issues on environment and natural resources management. These are:

- National committee on water resources
- National committee on agent orange/dioxin
- Steering committee on Cau river basin, Nhue- Day river basin, Dong Nai river basin



- National appraisal committee on investment
- Others groups including (i) appraisal committee on EIA; (ii) inter sectoral task force on strategy & government decree formulation. All key policy measures relating to environment management are deliberated between ministries before approval of Government or National Assembly.

203. The absence of clear mandates and poor coordination often stifle action. For instance, nine agencies have jurisdiction over water quality monitoring in Hanoi viz., Ministries of Health, Heavy Industries, Construction, Water Resources, Science Technology and Environment; as well as the Hydrometeorological Service and the Hanoi Service for Science Technology and Environment. Each agency has a written mandate for water quality monitoring in the form of a governmental decree (UNDP, 1995).

#### **4.1.3 Non Governmental Sector**

204. Until recently the economic and political situation in Vietnam provided few opportunities for non-government organizations to be involved in environmental management. This situation is now changing. Not only are new organizations being formed outside of the state sector, it is also the case that many government organizations are being given greater autonomy.

205. With the progress towards market economy the non-State production sector, especially the economic production sector viz. agriculture, industry and services are fast becoming active partners in environmental management in Vietnam. Another important sector is the academic and research sector. Many organizations in this sector have recently developed own sources of funding to supplement traditional government subsidies, in the process increasing their autonomy. Univeristy of Can Tho for instance is one of the major institutions that is engaged in coastal zone management programs with assistance from international and bilateral programs. Many institutions that originally provided inputs only to government projects can now be considered as research and consulting organizations.

206. In addition, there are other professional organizations that are influential actors on the environmental stage. These include: the Lawyers Association, the Association of Geographers, the Mining Association, the Forestry Association, and the Association on Conservation of Nature and the Environment. All of these associations are members of the Vietnam Union of Scientific and Technical Associations (VUSTA).

#### **4.1.4 Process of Integrating Environment & Development**

207. EIA is the main tool of incorporating environmental concerns into investment planning. However, the EIA process in Vietnam is still in its incipient stages and suffers from legislative and implementation bottlenecks. The provisions for the timing of EIA do not fit well with project development planning itself. According to Decree 52, EIA need not be undertaken until the project's feasibility and design stage; by that time, however, most of the project's technical parameters are often fixed lessening the scope for EIA-inspired modifications.

208. In addition to this, implementation of the EIA process especially at the review stage suffers from inadequate staffing and expertise; lack of monitoring and evaluation; poor coordination between MONRE and sector line agencies and units in the provinces; poor coverage of baseline information; insufficient integration of responsible ministries and agencies as well as superficial public participation.

Strategic environmental assessment of development programs and policies is not common unless there is international funding for the initiative.

#### **4.1.5 EPA Manager Institution**

209. Based on the experience of the preparation of the present document, the first EPA in Vietnam, Department of Environment within MONRE is considered the logical candidate for conducting future EPAs. The Department has an established structure and necessary mandate within which the additional task of EPA can be accommodated. It is responsible for environmental reporting in MONRE. It works with environment specialists nation-wide and has the inter-organizational links both at central and provincial level through its other activities to forge a collaborative alliance for the conduct of EPA activities.

#### **4.1.6 International Donor Assistance**

210. Vietnam is the largest recipient of international donor assistance in the GMS including multilateral and bilateral assistance. Environmental policy setting and institutional strengthening have received considerable attention from the donors, in particular CIDA, SIDA and DANIDA.

211. The challenge remains in aligning donor pledges with national development priorities. This is closely related to effective donor aid management with support from GOV. Aid coordination and management is first and foremost the responsibility of the Government. The Government's leadership in and commitment to the development process and its specific interventions ("national ownership") are essential to ensuring the effectiveness and sustainability of development efforts. In practical terms, the Government is best positioned to translate its overall development strategies and priorities into policies, frameworks, sectoral programs and plans, which will enable the ODA community to coherently channel their assistance. Donors in turn have a responsibility to encourage, advise and support the Government at its various levels, in the formulation of effective strategies, frameworks and plans. This type of Government-led interaction should help to minimize the adverse consequences of piece-meal and fragmented assistance or duplication, and pave the way for a more effective investment of ODA flows. This requires various initiatives and work is underway against most of these:

- Enhanced the capacity of GOV to absorb large amounts of ODA effectively through a program of strengthening of its ability to plan, coordinate and manage ODA at the central, provincial and sub-provincial levels, actively involving other sectors such as NGOs, academia and private sector in project implementation.
- Development of an effective framework for ODA in Vietnam that streamlines the institutional responsibilities for project processing and approvals, counterpart arrangements etc.
- Development of national plans and strategies by GOV that makes it easier for the donor community to align their assistance portfolio with the national environment and development needs. The National Environmental Action Plan was prepared in this manner, i.e. based on a structured review involving GOV and the donors active in the environment sector.

#### **4.1.7 Environmental Expenditure and Financing**

212. Data compiled by MPI (see Table 3.1.1) indicate that government environmental expenditure in Vietnam in the second half of the 1990s fluctuated between 0.5% and 0.7% of the total government expenditure, or between 0.1% and 0.2% of the country's GDP. The interpretation of these figures is not easy given that

many categories of government expenditure (e.g. those on components of urban infrastructure, water management, etc.) have major environmental impacts without being classified as “environmental”. Official data tend to equate environmental expenditure with funds available to the official environmental regulator (in Vietnam, MONRE) and thus tend to underestimate the amount of resources devoted to environmental improvement.

There are other methodological reasons that lower the value of simple official figures of environmental expenditure. The official data typically ignore the expenditure made by enterprises for pollution control and they ignore expenditure made by households. To say that, based on official figures, environmental expenditure in Vietnam is too low relative to other macroeconomic totals would be therefore too facile and might be considered self-serving. An adequate analysis of environmental financing in Vietnam is yet to be made.

**Table 3.1.1: Investment for environmental protection from national budget 1996-2000 (bil VND)**

No.	Item	1996	1997	1998	1999	2000
1	GDP	258,609	295,700	34,5000	400,000	456,000
2	Total public expenditure	70,270	77,380	80,770	85,500	98,320
3	Total public operating expenditure	43,066	48,953	48,200	47,400	54,000
4	Total public development investment from state budget	14,679	15,964	17,630	24,000	28,320
5	Total environmental expenditure from state budget	481	546	571	570	720
6	Operating expenditure for environment	390	425	450	420	550
7	Environmental expenditure from state development investment	91	121	121	150	170
8	Ratio of total environmental expenditure /GDP (%)	0.19	0.18	0.17	0.10	0.11
9	Ratio of total environmental expenditure / total public expenditure (%)	0.68	0.71	0.7	0.61	0.51
10	Ratio of operating expenditure for environment / total public operating expenditure (%)	0.91	0.87	0.93	0.81	1.00
11	Ratio of environmental expenditure from state development investment/Total public development investment from state budget (%)	0.62	0.76	0.69	0.61	0.60

**Source: Research report on implementation of 5 years social economical plan, MPI**

213. What can be said with more certainty is that economic growth as reflected in GDP outpaced official environmental expenditure during the period under review. This pattern seems common to the “tiger” economies of Asia during the last two decades. Whether such outcome in Vietnam is a classical illustration of the “grow-first-clean-up-later” approach or an interpretation distorted by the methodological weaknesses of official environmental expenditure data cannot be established without careful analysis.

214. Such an analysis would need to take adequate account of the existence and function of environmental funds several of which have been established in Vietnam, namely:

- The National Environmental Fund;
- Local environmental funds in Hanoi, Ho Chi Minh City, Danang and Baria Vungtau province; and
- Coal Sector Environmental Fund

## **4.2. Implementation Issues**

### **4.2.1 Administrative Reforms**

215. MONRE leads the efforts to coordinate environmental management in Vietnam. Its various departments work with other line agencies and provincial organizations in implementing the national programs and policies.

216. There is a clear need to simplify procedures and introduce administrative reforms. For instance, plans are underway to clarify procedures pertaining to wastewater fee collection; licensing and operational procedures of treatment facilities; developing detailed guidelines for environmental impact assessment; guidelines for environmental auditing, inspection and enforcement; a national regulation on waste management; better management regulation for sustainable use of natural resources, and the improvement of the national system of protected areas (terrestrial and marine).

### **4.2.2 Economic Instruments**

217. 'Command-and-control' (C&C) has been the dominant approach to many things in Vietnam, including the protection of the environment. The use of incentive-based approaches to environmental management is in its infancy. That said, interesting initiatives in the incentive mold have appeared supported by the provisions of the Law on Environment Protection that requires that calls on entities using the environment to "contribute financially to environmental protection". In order to achieve this task, three criteria have been proposed to the GoV for choosing economic instruments, namely, selection of priority polluting industries, compatibility with regulatory instruments, and institutional capacity and administrative feasibility.

218. During the last decade, the Government has been providing grants for a number of education and awareness raising programs. Several environment-oriented taxation measures have recently been considered for application (e.g. reduction of tax on import and/or installation of clean technology, use of differentiated resource extraction taxes on forest products and minerals, removal of subsidies on chemical fertilisers and pesticides, etc.).

219. Several funds have been created that act largely as environmental funds, such as funds for reforestation, and funds for coal mining and oil spill contingency. NEA is moving towards the establishment of a National Environmental (Reserve) Fund and is also preparing sectoral and provincial environmental funds.

220. NEA and most of provincial Departments (DONREHs) have been imposing penalties for violations against environmental law and regulations that share the characteristics of C&C and incentive-based instruments. The problem of defining property rights as an incentive for long-term and sustainable use of the environment and natural resources needs more attention and further development.

## **4.3. Environment and Civil Society**

221. Vietnam lays significant importance on the role of community in environmental protection. The Communist Party of Vietnam Central Committee's directive No 36/ CT-TW dated 25 June 1998 states: "The environmental protection is

the cause of all the party, the whole army, and the whole people". The Decision No 256/2003/ QĐ –TTg dated 3 December 2003 of the Prime Minister approving the national strategy on environmental protection up to year 2010 and vision to 2020 has also pointed out: "The environmental protection is the task of the entire society, branches, all levels, organizations, communities and the whole people". For instance organisations such as the Forestry Inventory and Planning Institute (FIPI), the Hanoi Economic University, Vietnam National University and research departments of various national environmental agencies have been instrumental in the preparation of this EPA document. These agencies have nominated experts to the national EPA technical working group

#### **4.3.1 Community Organizations**

222. Community based organizations have been increasingly gaining credibility in Vietnam. These include social – vocational organization, 40 of which have been established in scientific and technological fields. The socio-political organizations namely Vietnam Peasant's Association, Vietnam Women's Union, have grassroots organizational linkages that are very effective in mobilizing public opinion for an environmental initiative.

223. Village convention has been voluntarily regulated and executed by local people with purpose of forest protection, rational forest's resources exploitation, bio-diversification preservation for living generation and future ones. The environmental regulations on village conventions have importantly contributed to environmental protection in localities, intensifying people's awareness of environmental protection in the village communities. For instance, by regulations set out by a group in Hop Thanh village, Xa Luong commune, Tuong Duong district, Nghe An province under buffer zone of Pu Mat national Park, are: "not to hunt gibbon, muntjac if they had been trapped, they would have been released". Beside the village conventions, communities have still taken measures for environmental protection such as building network of environmental protection's community to help forester's activities.

#### **4.3.2 Education and Awareness.**

224. Raising public awareness and improving the quality of environmental education and training have long been among stated priorities of the GOV. The implementation of this objective has not been particularly efficient, however. Genuine public participation and the involvement of NGOs have been limited.

225. Environmental education is being introduced into the school curricula. GOV's program "*Bringing the contents on environmental protection in national education system*" (Decision No 1363/QĐ-TTg (2001)) and Ministry of Education and Training's "*Policy and plan of action for environmental education in secondary schools in the 2001-2010 period*" (Decision No 6621/QĐ-BGDĐT-KHCN (2002)) contain extensive provisions to this effect. After an introductory phase during the period 2001-2005, the program is to be expanded nationwide. Progress has been slower than anticipated.

226. The mass media have started to play an active role in providing the public with useful environmental information but the task of wider dissemination and free exchange of information is still to be addressed. It is important to utilize the internet technology for wider dissemination of environmental information.

## 5. Conclusions and Recommendations

227. Since the adoption of the "renovation policy" in 1980s, Vietnam has been shifting from a rigid centrally planned economy to a more mixed form of economic management. This transition has unleashed the entrepreneurial energy of the nation. Over the past 10 years, GDP growth has averaged at 7.5% p.a. However, the rapid economic advance has not been without risks and costs, the conditions of the country's environment foremost among them. The significance of these threats cannot be underestimated in a country that continues to be predominantly rural with a resulting imperative to preserve the natural resource base.

228. Most of those in a position of official responsibility in Vietnam are well aware of the need to strike a balance between economic growth and maintenance of environmental quality, and a large number of steps have been taken in an attempt to strike that balance. This EPA report is a first attempt to give a broad assessment of how successful the country has been. More than anything else, an attempt is being made to shift the nature of environmental reporting away from simple description of environmental trends towards trying to identify the main factors that lie behind the observed environmental outcomes.

229. The preceding sections of this report have discussed national performance under major environmental policy concerns in Vietnam and in particular the effectiveness of GOV programs in mitigating the environmental threats associated with rapid economic development. Among other things, the discussion identified substantial areas of uncertainty about both the outcomes and the reasons for them.

230. The section below summarizes the key findings and makes recommendations for improvement to the EPA process as well as suggesting technical, institutional and other steps that might improve environmental management in Vietnam.

### **5.1. Inland Water Pollution**

231. There is increasing evidence of pollution of Vietnam's inland water bodies. Although the quality of upstream river waters is generally good, downstream sections of major rivers are seriously polluted especially during the dry season. Urban population and industrial growth have outrun additions to the wastewater treatment capacity and total volume of untreated domestic and industrial wastewater has been increasing.

#### **A. EPA Process and Data Gaps**

- 1) Data gaps need to be addressed as a matter of priority. A wider water quality sample is required; more locations close to other urban and industrial areas in the country need to be monitored for BOD<sub>5</sub> and ammonia Nitrogen - NH<sub>4</sub>; to be able to present a more representative picture of the state of national water quality.
- 2) Before the next EPA is conducted, monitoring data on parameters such as COD, DO, SS, TDS, heavy metals, NH<sub>4</sub>, oil & grease should be collected for same locations for which BOD<sub>5</sub> and NH<sub>4</sub> are being monitored.

- 3) Information should be updated on 'industrial wastewater fee' for the response indicator. Last set of data was for 2003. This dataset should be updated on an annual basis and an attempt should be made to cover all industrial sectors. MONRE should stipulate clear guidelines for the use of the wastewater collection fee and should publish an update of activities undertaken with environment fund resources.
- 4) Also, in future EPAs, data on waterborne diseases should be collected so that a relationship can be established between water quality and public health impacts especially in the country's pollution hot spots. 'Incidence of water borne diseases' should be considered as another state indicator.

## **B. Other Recommendations**

- 5) Monitoring of water quality data should be better institutionalized in Vietnam. A comprehensive water quality monitoring program under the aegis of the National Monitoring Network (NMN) should be undertaken for all the major rivers of Vietnam; with monitoring data collected on a regular basis at strategic locations in the major river basins. The Plan for 'National Network of Monitoring Stations to Year 2010' should be implemented soon; the plan calls for an expansion of the existing network of regional inland and coastal monitoring stations; laboratory facilities and local provincial level monitoring stations.
- 6) Enforcement - The political will and organizational capacity for enforcing the existing laws remains weak, and this is evident in the major rivers that traverse urban and industrial areas with high pollution levels. Reversing the declining trend in water quality remains a key challenge to public health. The economic instruments and performance disclosure approach must be explored, while at the same time effecting changes to the existing command-and-control approach. Legal instruments stipulating fines and penalties for environmental violation should be investigated. For instance the provisions of Decree 67/2003/ND-CP on wastewater fee charge should be enforced more rigidly and more polluting enterprises should be asked to pay the fee.
- 7) EIA – all major development projects should pass through a rigorous EIA process such that the anticipated impacts to water quality during construction and operation of the facility can be known well in advance and appropriate mitigation measures undertaken. The challenge is to increase the capacity of implementing agencies to undertake EIA studies and to sufficiently implement environmental management plans so that EIA can be a tool for integrating environment into project planning and decisionmaking.
- 8) Legal tools - Important secondary legislation necessary to implement many of the water laws' objectives needs to be developed. Also, In Vietnam the water sector has no overall integrated strategy and action plan at the national or regional basin level. However, strategies and action plans exist for a number of the subsectors. The Law on Water Resources, approved in 1998, represents a major step toward integrated water resources management. But only partial progress has been made in implementing the reforms embodied in it. Little information exists on the status of the measures proposed under these regulation. Detailed guidelines need to be developed to monitor the effectiveness of the regulation and related measures and suitable amendments recommended to the proposed measures or regulation if they are found to be ineffective. In the absence of regular monitoring and enforcement of such regulatory tools; the effectiveness of such measures cannot be assessed. If the targets cannot be met in time, then some

consideration of modifying approaches/measures in order to make it more feasible would be necessary.

## **5.2. Air Pollution from Mobile Source**

232. The major cities in Vietnam, especially Ho Chi Minh City and Hanoi, experience serious air pollution, with motor vehicles being the principal cause. The levels of particulate matter are especially high. Pollution controls on vehicles and the specifications on fuels are among the principal weaknesses, the phasing out of leaded gasoline after 2001, an important plus. Because the vehicle population and congestion in cities continue to grow it is expected that the pollution problem will get worse despite improving emission characteristics of newer vehicles.

233. Lack of appropriate technical and financial support constrains the implementation of a regular monitoring regime. In the absence of a sound database on pollutant concentrations appropriate program of abatement cannot be developed.

### **A. EPA Process and Data Gaps**

- 1) Pollutant concentration dataset for CO, NO<sub>2</sub>, SO<sub>2</sub> and PM should be updated for Hanoi and Ho Chi Minh City; current dataset as available for this EPA is only until 2002. Similarly the dataset for number of vehicles in Hanoi and Ho Chi Minh City needs to be updated.
- 2) For future EPAs data should be collected on 'per capita volume of automotive fuel used'; and a pressure indicator developed from that dataset.
- 3) Suitable response indicator needs to be developed for next stage of EPA. Candidate response indicator includes 'per cent of registered cars undergoing pollution inspection'.
- 4) The next stage of EPA should also attempt to correlate increase in vehicular traffic (pressure) to 'incidents of respiratory disorder among urban population' (state). In this relation further studies should be conducted to understand the characteristic of the airshed in relation to stationary and mobile sources, and the emission inventory for Hanoi and HCMC.
- 5) More studies on the effect of air pollution (the levels of particles, organic compounds (PAH) and other pollutants) on health are needed to ascertain the economic cost of air pollution.

### **B. Other Recommendations**

- 5) Fuel – Major reduction of lead levels has been achieved in many cities which adopted a gradual phase-out of leaded vehicles. In Bangkok, Thailand, after unleaded petrol was introduced in July 1991, the 1996 study of newborn babies showed that the lead level in the blood is one third of that before the introduction of unleaded petrol (Bangkok Post, 1996). In Vietnam, the effectiveness of the July 2001 Prime Ministerial Decree on use of unleaded petrol should be studied and further recommendations made for improvement of the implementation process. Also, consideration should be given to the encouragement of the use and the gradual introduction of low sulfur diesel fuel. This will reduce the SO<sub>2</sub> emissions from buses and utility vehicles that may be a small but growing segment of the vehicle stock in Vietnam.



- 6) Enforcement – Set up standards for emission control of vehicles for registration and enforce the emission compliance of on-road vehicles. The introduction of catalytic converter for motor vehicle should also be considered<sup>3</sup>. Vehicles should be checked for emission compliance to be eligible for registration. The check should be done before the vehicle is registered or registration renewed.
- 7) Monitoring - Establish permanent air quality monitoring stations to assess the effectiveness of GOV initiatives. The design of the network and the type of pollutants to be measured are important element of the monitoring design. Permanent continuous monitoring stations also make it possible to establish the long term trend of air quality. Gradually extend the network of permanent air quality monitoring stations to include other large cities (in addition to Hanoi and Ho Chi Minh City) like Danang, Can Tho etc.
- 8) Develop and provide daily information/forecast of air pollution level (or index) in large cities taking into account meteorological forecasts. Such a service is strongly positive for public health besides raising awareness of air pollution issues among the populace.
- 9) Transport planning to reduce the traffic congestion. A number of initiatives such as road widening, private build-operate-transfer (BOT) schemes should be encouraged. High levels of nitrogen oxides and carbon monoxide at many traffic sites are due mainly to traffic congestion.
- 10) Use of Public Transport - At the moment, the provision of public transport, mainly by bus, is low. There is an increasing number of shared cars and small private buses. The demand for convenient transport in the city is increasing with increasing numbers of tourists. A scheme to expand the bus services in many parts of the city, especially along main traffic routes might ameliorate the traffic and air quality.
- 11) Airshed Study - Conduct studies to understand the characteristic of the airshed in relation to stationary and mobile sources, and the emission inventory for the urban areas of Vietnam. The airshed studies involve the detailed understanding of the transport mechanism of the air due to meteorology and the emission inventory of both stationary and mobile sources. An airshed model then can be constructed to be used as a tool of selecting optimal control strategies.
- 12) Air Quality Management Plan - Formulate an effective air quality management plan based on the airshed studies and the economic implications of various control strategies.

### **5.3. Inadequate Solid Waste Management**

234. Assessment in this EPA tells us that performance in solid waste management has been mixed. Whereas urban areas have seen improved collection rates; rural areas lag behind. In conditions of rapidly increasing total amounts of waste, improvements in collection rates were not sufficient to reduce the total volume of waste left uncollected. Furthermore, collection does not necessarily translate into safe disposal. Vietnam produces 15 million tons of waste every year most of which is not safely disposed, posing a significant threat to public health and environment. This is particularly true of hazardous and toxic wastes.

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<sup>3</sup> One example of this measure is that of the Thai MOSTE and the Pollution Control Department (PCD) who together set up emission standards for cars in 1992 and for motorcycles in 1993. In 1995, all buses, 3-wheeled cars (tuk-tuk) and boats were tested for emission compliance before registration.

235. Given Vietnam's fast economic growth, the waste from households, industries, commercial enterprises, and hospitals is expected to increase rapidly over the next decade. Managing this waste is a major challenge—both because of its substantial cost and its large potential benefits to public health and the quality of life. It is also important for the lives of many Vietnamese who rely on informal waste collection and recycling activities for their livelihood.

236. Vietnam's solid waste management needs are substantial in relation to existing handling and disposal infrastructure and the continued growth of urban areas and industrial development. It is essential to sustain the recent trend of increased investment in waste management while paying more attention to the sustainability of its financing.

#### **A. EPA Process and Data Gaps**

- 1) Data on waste collection should be updated regularly (current EPA only presents information to 2003). Also, a sample of data from rural areas should be obtained to provide a more balanced picture of waste management in the country.
- 2) More information should be collected on disposal methods employed, the condition of landfills and open dump sites, leachate control, in particular at the 'hot-spot' locations that have been identified by GOV to have pose health risks. Data should also be collected on informal waste collection modes such as waste pickers at landfills, informal waste collectors, and waste buyers.
- 3) For 'response' indicator, further studies should be conducted to analyse the expenditure pattern of investment in solid waste management, both for GOV and ODA funds.
- 4) Better understanding is needed of the structure of waste disposal charges and the evolving policy on waste disposal charges payable by households in Vietnam.

#### **B. Other Recommendations**

- 4) Safe Disposal – In addition to effective collection systems; GOV should focus on safe disposal and treatment of collected waste. All open and controlled dump sites should progressively be phased out and replaced with sanitary and/or engineered landfills. A 'national hazardous waste management strategy and plan' should be developed.
- 5) Institutional Framework - URENCOs suffer from staffing and capital constraints; and do not have staff trained to deal with hazardous waste. Increased budgetary allocation should be made for URENCO and staff trained in hazardous waste management technologies.
- 6) Financing Priorities – A very large investment is required to meet the estimated expenditure target of VND 40 trillion by 2020 and much of this needs to be contributed by the users of waste collection services. Various forms of cost recovery need to be explored; including flat rates, fees combined with other service fees (water, electricity), and fees linked to ability-to-pay. Private sector participation and should be promoted and supported by policies and other economic incentives. Also, appropriate budget allocation needs to be made to operation and maintenance of solid waste management facilities.

- 7) Monitoring and Enforcement – improved monitoring of landfills and composting facilities needs to be undertaken; to ensure their technical and environmental performance.
- 8) Recycling and Reuse – Simple to use and inexpensive ways of waste recycling and reduction should be explored. Any recycling or reuse programs should be easy to implement schemes without requiring energy intensive equipment or processes so that no additional pollution and climate change impacts result.

#### **5.4. Forest Resources**

237. The Government of Vietnam is keenly aware of the importance of forest resources. Clear policies and targets have been set. Several programs have been undertaken to protect and increase the forest resource during the past 20 years. Fuelwood extraction is regulated better than in the past, reducing the pressure on forests. However, some threats to the forests such as forest fires, localized overlogging, and shifting cultivation remain. Success in stabilizing and increasing the forest cover may have come at the cost of reduced forest quality.

##### **A. EPA Process and Data Gaps**

- 1) Forest cover assessments should be made separately for each of the three principal forest land use categories and not only for all categories combined.
- 2) Future forest cover assessments should attempt to assess the quality of the remaining forest; not only the quantity.
- 3) Monitoring of forest conditions within protected areas would be useful for the assessment of responses to threats to biodiversity.
- 4) The total wood extraction should be closely monitored, replacing FAO estimates in the current factsheet with in-country figures.
- 5) Regular and consistent reporting of the FMAP or 5MHRP project progress needs to be put in place.

##### **B. Other Recommendations**

- 6) National programs like the 5-Million Hectare Afforestation Program should be used as vehicles for greater community participation in forestry planning.

#### **5.5. Threats to Biodiversity**

238. The IUCN Redlist of Threatened Species has provided the basis for a baseline state indicator and in the future can form the basis for the ongoing state of biodiversity monitoring in Vietnam. However the Redlist by itself does not record the history of threatened species in Vietnam and a system needs to be put in place for the annual update of the indicator and the recording of the history of threatened species in Vietnam. And depending on how well the indicator serves in the future, further research may be required to develop alternative state indicators. In light of recent efforts to protect marine areas, a separate or combined indicator should be developed to monitor progress in marine protected areas.

239. The threats to biodiversity are numerous and diverse and no single pressure indicator can capture the compound effect. Loss of habitat is the dominant cause but

loss of forest habitat is not the only one. Hunting and gathering is also an important factor and a separate indicator should be developed to capture this pressure.

240. On the response side, the total under the national system of protected areas will likely remain the principal indicator but the indicator needs to take into account the level of species-specific protection that these protected areas offer. The IUCN category is a starting point but this should be complemented by ongoing monitoring of the activities that take place within these protected areas, the change in vegetation cover, and the threatened status of the species that these protected areas aim to protect. Some of this work has already been initiated by BirdLife International through the online publication of the Vietnam "Sourcebook". Much like the IUCN Redlist, the ongoing support for the Sourcebook will be critical to ongoing monitoring of biodiversity in Vietnam.

241. Wetland areas and marine habitats demand additional efforts to ensure adequate levels of protection. Additional wetland and marine areas should be included in the national protected area system with specified management and exploitation regimes.

#### **A. EPA Process and Data Gaps**

- 1) Using the 2004 indicator factsheet as baseline, establish an ongoing system which will monitor the change in individual species status on the IUCN Redlist and add or delete individual species from subsequent issues of the Redlist.
- 2) Develop a complementary state indicator and monitoring system for marine protected areas.
- 3) Develop long-term trends and monitoring of critical habitat loss.
- 4) Develop a response indicator and monitoring system based on species protected by law.
- 5) Institutionalize the ongoing publication and updating of the Vietnam Sourcebook on Protected Areas.
- 6) Monitor and conduct research on other globally-accepted indicators of biodiversity conservation.

#### **B. Other Recommendations**

- 7) Strictly enforce controls on trade in protected fauna and flora species;
- 8) Periodically assess the experience of biodiversity management and conservation and disseminate the lessons and insights of scientists, managers, conservationists and local people.

### **5.6. Threats to Coastal Zones**

242. Vietnam's coastline has been under pressure from population growth and commercial activities that have included aquaculture, oil & gas exploration, tourism, fishing, transport and sea port development and others. Over the last 50 years, Vietnam has lost about three quarters of its mangrove forest. The surge in shrimp farming emerges as the leading causes of mangrove forest loss that has been the greatest in the Mekong Delta, and Quang Ninh and Hai Phong provinces. Other

causes of mangrove loss have included conversion to agriculture and housing, war destruction, and fuelwood production.

243. In Vietnam, most sectoral economic activities in marine and coastal zones have paid insufficient attention to the social and environmental aspects of development. The co-operation among project management units, scientific organizations and non-government organizations on environmental management of coastal zone issues is weak. Coastal communities themselves need to be engaged more pro-actively in coastal resource management.

#### **A. EPA Process and Data Gaps**

- 1) To support future EPAs, it is recommended that MONRE undertake studies to document the progress achieved in implementing the various policies and programs intended to safeguard the coastal zone eco-systems. An annual survey of all coastal provinces should be undertaken to assess the (i) changes in the area of mangroves, province by province; (ii) changes to the number of shrimp farms and/or aquaculture ponds; (iii) the use of pesticides in shrimp farming; (iv) the volume of aquaculture waste discharged into coastal waters and areas; (v) the development of marine ecotourism in and close to sensitive habitats.
- 2) Additional state and pressure indicators should be considered such as impact from oil spills, oil content of coastal waters, or number of oil spill incidents.

#### **B. Other Recommendations**

- 3) Develop and implement comprehensive management plans for declared MPAs. Incorporate buffer zones for MPA management, especially for inhabited and heavily used sites. Utilize integrated coastal management (ICM) principles into MPA zoning, e.g. including a landscape approach from the watershed to the offshore.
- 4) Institutional framework – Clear delineation of authority is required for the management of marine protected areas. Staffing and financing constraints for management of marine protected areas should be better understood and addressed urgently.
- 5) Oil spill contingency plan should be rolled out.
- 6) Ways of recycling some of the aquaculture profits into mangrove regeneration and protection should be explored.
- 7) Given that most oil spills accidents are related to commercial activities, private sector participation should be explored in oil reduction and spill prevention/management plans.

### **5.7. Climate Change**

244. Vietnam signed the United Nations Framework Convention on Climate Change (UNFCCC) on 11/6/1992 and ratified it on 16/11/1994. The country also signed the Kyoto Protocol on global warming on 3/12/1998 and ratified it on 25/9/2002. The nation-wide GHG emission inventory was carried out in 1993, 1994, 1998. The national focal point to implement UNFCCC, KT and CDM was set up.

#### **A. EPA Process and Data Gaps**

- 1) Estimate/collect data on CO<sub>2</sub> emissions from sources not documented in this EPA e.g. waste combustion, vehicles and some industrial processes.
- 2) Reassess the GHG emission data (CO<sub>2</sub> equivalent) data in light of the current (2005 or later) economic conditions.

**B. Other Recommendations**

- 3) Formulate and approve the national action program to implement the UNFCCC and Kyoto Protocol recommendations.
- 4) Strengthen the coordination among line ministries/agencies to bring into play their capacity for UNFCCC implementation.
- 5) Pay attention to renewable energy development, clean development mechanism and other cross-sectoral initiatives that have the potential of delivering multiple benefits besides GHG emission reduction, such as assessment of climate change impacts of biodiversity conservation policies etc.
- 6) Continue to support climate change awareness raising programme and technology transfer.