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

CAMBODIA
NATIONAL ENVIRONMENTAL PERFORMANCE ASSESSMENT (EPA) REPORT

Prepared by
Ministry of Environment, Cambodia
and
Project Secretariat UNEP Regional Resource Center
For Asia and the Pacific

March 2006

Executive Summary

1. Sustainable management of the country's natural resources and healthy environments for its population are important strategic priorities for Cambodia, as they are for the other countries of the Greater Mekong Subregion. The challenges to Cambodian authorities and other national stakeholders in pursuing these priorities are many not least because of Cambodia's immature market economy and young regulatory frameworks. This report, a national environmental performance assessment of EPA, is an attempt to present an overall picture of the progress made in reaching the goals of sustainable development and environmental health. The reports addresses six key environmental concerns, viz., forest degradation, biodiversity loss, sub-optimal utilization of water resources, depletion of fish resources, agricultural land degradation and climate change (as a global environmental issue).

2. Cambodia remains a predominantly agricultural country. Agriculture and forestry contribute nearly 40% of the country's gross domestic product (GDP). The country's forest cover (under Cambodian definition) declined from 73% in 1965 to approximately 60 per cent in 1997. A gradual reversal is observed from 1997 onward. The RGC cancelled a large number of forest concessions that brought the area under concession management down from 6.5 million ha in 1998 to 3.8 million hectares in 2003 and reduced the pressure on the forest. Nonetheless, illegal logging has not been eliminated both in and outside the cancelled concessions, and shifting cultivation and agricultural expansion remain significant pressure factors. As a principal line of defense, the Government further increased the area of protected forest to a comparatively high 23.5 per cent of total land area by 2002.

3. Cambodia's natural habitats have been partly degraded in the course of last three decades, resulting in additional pressure of the country's rich biodiversity. Despite this, biodiversity appears to be in better condition in Cambodia than in the other GMS countries. Since 1993, the government has been building up a system of protected areas. By now a relatively high total of 32 per cent of Cambodia's territory has some form of protection status. It remains to be seen how effective the protection has been in the face of continued and widespread pressures.

4. Fish accounts for three quarters of the animal protein intake of Cambodia's 13 million people and inland fisheries are essential for local livelihoods. Fish production has grown in recent years due mainly to greater production by small-scale and rice-field fisheries. The production by Tonle Sap appears not to have changed significantly in volume terms but there is evidence of changes in the composition of the catch towards smaller size fish, raising concerns about sustainability. Destructive fishing practices are widely used throughout Cambodia. The responses have featured support for community-based fisheries and reduction of commercial fishing lots in favor of community-based management. The change of policy direction is too recent to say whether it has resulted in a more sustainable management of the fish resource.

5. As the country grows economically and in population size, the demand for safe drinking water increases also. Access to safe water has improved in both urban and rural areas of Cambodia during the past decade but from an extremely low base. Cambodia has by far the lowest overall percentage of access to safe drinking water among the GMS countries. The growth of rural population has increased also the demand for irrigation water. RGC's policy for the rural sector rests significantly on

further expansion of irrigation and reduced dependence on rain-fed farming. The policy target of increasing the percentage of irrigated lands in the cropland total from about 16 per cent in mid-1990s to 20 per cent in 2003 may have been achieved. There has been a significant decline in the per capita endowment of agricultural land from about 0.65 ha in 1961 to about 0.37 ha in 2003 due to a rapid growth of rural population and constraints placed on area expansion. Efficiency of land use has come to be an important policy consideration. Additional and special measures such as clearing land of unexploded ordinance have added to the stock of agricultural land (beside reducing risk to life).

6. Cambodia has the necessary suite of laws and regulations for environmental management, and MoE holds the responsibility for their implementation. However, improved institutional coordination with other development ministries and better technical and financial resource availability is required to strengthen the institutional framework of environmental management in Cambodia.

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Acronyms and Cambodian terms

ADB	Asian Development Bank
APHEDA	Australian People for Health Education and Development Abroad
CBD	Convention on Biological Diversity
CBNRM	Community Based Natural Resource Management
CCC	Cooperation Committee for Cambodia
CCEAP	Climate Change Enabling Activity Project
CDRI	Cambodia Development Resource Institute
CFDO	Community Fisheries Development Office
CIAP	Cambodia-IRRI-Australia Project
CMDG	Cambodia Millennium Development Goal
DANIDA	Danish International Development Agency
DFW	Department of Forestry and Wildlife
DoF	Department of Fisheries
EIA	Environment Impact Assessment
EPA	Environmental Performance Assessment
FA	Forestry Administration
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GMS	Great Mekong Sub-region
GPCC 98	General Population Census of Cambodia in 1998
Habitat	United Nations Conference on Human Settlements
ICLARM	International Center for Living Aquatic Resource Management
IGES	Institute for Global Environmental Strategies
IPCC	Inter-Government Panel on Climate Change
JMP	Joint Management Program
LAC	Law on Administration of Commune Councils
LUCF	land use change and forestry
MAFF	Ministry of Agriculture, Forestry and Fisheries
MIME	Ministry of Industry, Mines and Energy
MLMUPC	Ministry of Land Management, Urban Planning and Construction
MoE	Ministry of Environment
MoP	Ministry of Planning
MOWRAM	Ministry of Water Resources and Meteorology
MRC	Mekong River Commission
NAPCBD	National Action Plan on Conservation of Biological Diversity
NGO	Non-Governmental Organization
NIES	National Institute for Environmental Studies
NRM	Natural Resource Management
PIP	Public Investment Program
POP	Persistent Organic Pollutants
Prakas	regulation
PRASAC	Program for Agriculture Sector Assistance and Credit
RGC	Royal Government of Cambodia
SEDP	Socio-Economic Development Plan
SEDRP	Socio-Economic Development Requirements and Proposals
SEF	Strategic Environmental Framework
Seila	foundation
UNDP	United Nations Development Program
UNEP	United Nations Environment Program

UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
WB	World Bank
WRI	World Resources Institute

I. INTRODUCTION

1. The present Environmental Performance Assessment (EPA) Report is the first of its kind to be written for Cambodia. It examines the 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 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 the National Institute for Environmental Strategies (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.

2. The report is a first step by Cambodia in the direction of better understanding of its progress towards achieving the goals of national sustainable development. The preparation of the national environmental performance assessment report is intended to support (i) informed decision making through better understanding of environmental conditions, trends, and impacts; (ii) effective national environmental program management and improved public accountability for the results, and (iii) reporting of principal environmental trends and assessment of performance under environmental issues of national and global importance. The report and its findings will also facilitate the analysis of development assistance in the environment domain and enhance local capacity for carrying out performance assessments.

3. The Ministry of Environment (MoE) was the lead agency in preparing this report in consultation with other environment-concerned institutions. The preparation of Cambodia's EPA report was a team effort under the guidance of:

- H.E. Dr. Mok Mareth, Senior Minister and Minister of Environment, National Focal Point
- Mr. Chuon Chanrithy, Director, Department of Natural Resources Assessment and Environmental Data Management, Ministry of Environment, National Coordinator.

The initial draft of the EPA report was prepared by national technical consultants:

- Mr. Touch Vina, National Consultant on Database Development
- Mr. Mak Sithirith, National Consultant on Environmental Issues

The EPA technical review team included representatives from:

- Forestry Administration, Ministry of Agriculture, Forestry and Fisheries
- Department of Fisheries, Ministry of Agriculture, Forestry and Fisheries
- Ministry of Water Resources and Meteorology
- Ministry of Industry, Mines and Energy
- Ministry of Land Management, Urban Planning and Construction

4. The environmental priority concerns to be studied under the national EPA process were selected at national workshops, held in Sihanouk ville and Siem Reap in September 2004 and January 2005 respectively. These workshops brought together decision-makers from various national agencies, local and international

development organizations, NGOs, and other stakeholders and members of civil society, all with a stake in Cambodia's sustainable development.

5. The First National Workshop identified five (from a list of thirteen potential) environmental concerns viz., loss of forest resources, threats to biodiversity, management of fishery resources, and the state of water resources and land. These five were considered priority concerns requiring immediate attention. They also provided conditions for a meaningful assessment of performance such as data availability, and existence of clearly defined policy targets against which performance under the chosen concern could be assessed. Climate change was added to the five concerns to strengthen the assessment's global dimension. The Workshops concluded that other concerns that were not included at this stage of EPA could be evaluated in future EPA reports.

6. This EPA report is divided into four parts:

- Part I is an introduction and overview of the objectives of the report including brief information on the EPA team and other institutions involved in the process.
- Part II assesses performance under each of the priority concerns selected. "Performance" is understood to be an assessment of observed outcomes against the targets set under each concern. This 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. (ses Figure I.1 below) 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'. The method used is described more fully below.
- Part III 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 IV draws overall conclusions and recommendations. It is a summary of where the country stands under the chosen concerns and what additional efforts are recommended to improve performance and assessment of performance.
- The Annex provides the statistical information (organized in the form of "factsheets") that supports the analysis of Parts II to IV of the report.

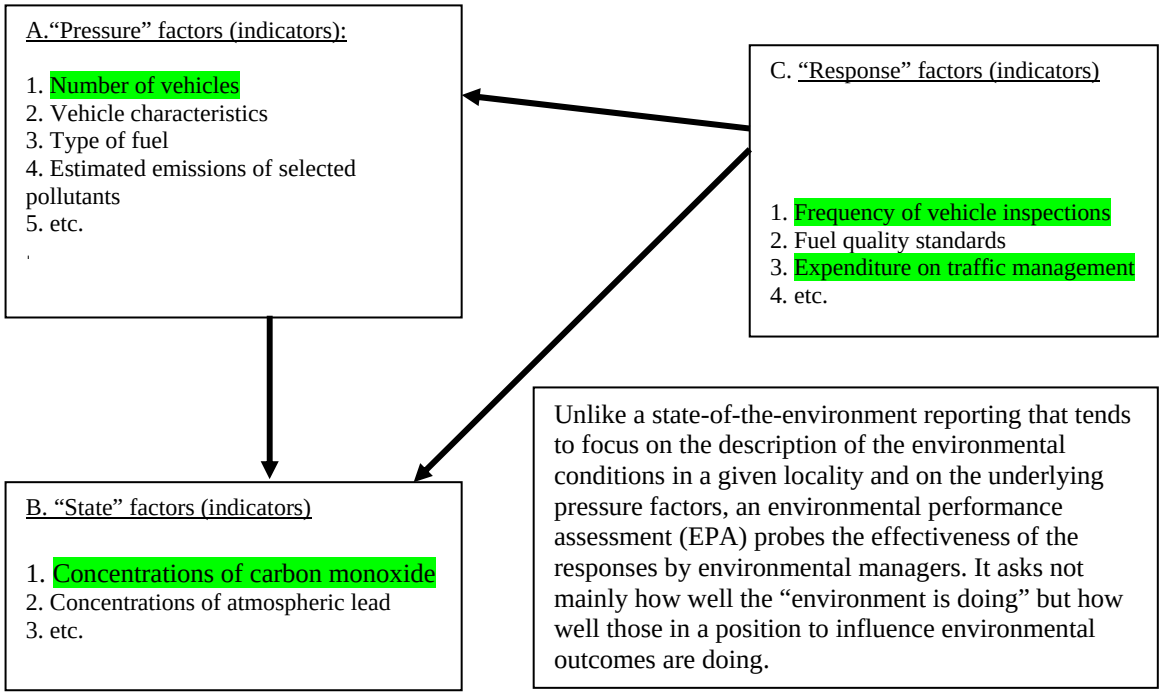
The report was reviewed by the subregional expert group and international consultants and edited by Messrs. Mike Comeau, Mohit Kumar and Ivan Ruzicka.

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

7. The approach to assessing performance under any selected environmental concern is anchored in a Pressure-State-Response (P-S-R) model that logically links the sources of environmental problems (the "pressure" factors) with the resulting "state" of the variables of concern, and the policy and institutional "responses" intended to influence the pressure factors, and through them, the state (see figure below). The desired values of the state variables typically (but not always) feature in state authorities' plans and strategies. The assessment of performance is a matter of

judging how successful the responses adopted have been in reaching the target values of state (and/or pressure) variables.

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



8. The P, S and R indicators' values are the raw material of the EPA. The statistical background of each indicator is summarized in 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.

9. 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) is omitted. The descriptions applied to each class of indicators are contained in the tables below:

Rating Criteria Utilized to Assess State Indicators

STATE INDICATORS			
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). 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".			
Relatively Poor and ….	**Average** and ...	**Relatively Good** and ….	**Unknown State** 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
Deteriorating	**Stabilizing**	**Improving**	**Undetermined Trend**
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.

Rating Criteria Utilized to Assess Pressure Indicators

PRESSURE INDICATORS			
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. 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.			
High and	**Medium** and	**Low** and	**Non-Comparable** 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.
Increasing	**Steady**	**Decreasing**	**(blank)**
As evidenced by a long-term trend of increasing pressure,	As evidenced by a long-term steady or near-constant pressure	As evidenced by a long-term trend of declining pressure, with	The keyword is left blank if there is only one observation, or if

with very little sign of relief or stabilization.	that shows no sign of increase or decrease in the past or future.	perhaps fluctuating short-term oscillations.	there is no observed trend over time in the indicator value.

Rating Criteria Utilized to Assess Response Indicators

RESPONSE INDICATORS			
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.			
Low and	**Average** and	**Significant** and	**Non-Comparable**
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.
Sporadic	**Intermittent**	**Consistent**	**(blank)**
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.

Rating Criteria Utilized to Evaluate Performance under Selected Priority Concerns

ENVIRONMENTAL PERFORMANCE			
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.			
1-Star *	**2-Stars ****	**3-Stars *****	**Un-Rated**
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. Additional criteria for 1-Star rating: 1) Reasonable targets have not been set or have not been met. 2) International conventions have not been ratified or adhered to. 3) No ongoing monitoring or data collection. 4) No clear institutional role and responsibilities for environmental management of	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. Additional criteria for 2-Star rating: 1) Targets have been set and generally met. 2) International conventions have been or will be ratified and most of the reporting requirements have been met 3) Plans exist for ongoing monitoring and data collection. 4) Institutional responsibilities assigned though limited progress achieved due to weaknesses in	If there is clear evidence that the responses have reduced the pressure and/or there is a clear sign that the state is improving. Additional criteria for 3-star rating: 1) Effective targets have been set and met. 2) International conventions have been ratified and reporting requirements have been met. 3) Ongoing monitoring and databases exist. 4) Specific institutions with targeted roles and responsibilities assigned. Institutional measures in place for the management of the concern e.g. EIA	If the trend in the state indicator cannot be explained by the pressures or the responses. 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.

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.	institutional arrangements e.g. lack of coordination, duplication of roles, multiplicity of authorities etc.	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.	

10. Besides its potential usefulness for Cambodia, the EPA reporting as developed under the SFE II Project offers wider benefits. The method used here can be applied at different levels of analysis, not only the national one (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 transboundary 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 for assessing performance of a development initiative at a local (e.g. municipal) level.

11. 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 Cambodia.

12. The EPA team wishes to thank the Royal Government of Cambodia (RGC) and collaborating ministries and departments for making information available for undertaking this EPA.

II. MANAGEMENT OF PRIORITY CONCERNS IN CAMBODIA

1. Forest Resources

1.1 The Context

13. Cambodia is predominantly a low-lying country that occupies the central plains of the lower Mekong basin and is bordered on three sides by dense forested mountainous ranges. Forest in Cambodia tends to be located on the country's periphery while paddy cultivation is the norm to the lowland areas (see Figure 1.1).

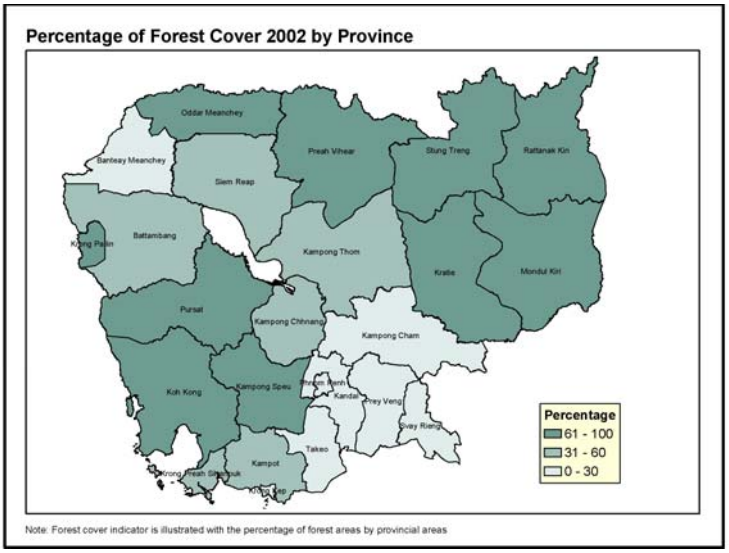


Figure 1.1 Forest Cover Map of Cambodia

14. Forest is one of the most important economic and environmental resources of the country and an important source of government revenue and employment for the local people. Cambodia's forests provide a variety of timber and non-timber products such as wildlife, fuel wood and medicinal plants. About a third of Cambodia's forests (all of it in the evergreen category) are considered commercially attractive (DFW, 2003). Article 3 of the Regulations on Forest Resources Exploitation prescribes selective cutting and sets the extraction rate at 30 per cent of the total volume available for harvest in evergreen and mixed evergreen forests (all merchantable trees that satisfy prescribed diameter limits). The average forest growth in Cambodia has been estimated to be about 0.3 m^3/ha/yr. Applied to a cutting cycle (35 years), this has been used to fix an annual average harvest limit at 10 m^3/ha (DFW, 2003).

Table 1.1: Cambodia Forest Cover, 2002

Forest Type	Area (1000ha)	Percentage
Evergreen Forest	3,720.5	20.5
Semi-evergreen forest	1,455.2	8.0
Deciduous forest	4,833.9	26.6
Other forest	1,094.7	6.0
Total forest land	***11,104.3***	***61.1***
Non-forest land	7,056.4	38.8
Total	**18,160.7**	**100.0**

15. Cambodia's location in the tropical monsoon zone accounts for marked biological richness of the forests (see Table 1.1 for a partial illustration). Complex interrelationships exist between the country's forest cover and unique hydrological systems of the Mekong River and Tonle Sap Lake.

16. The institutional history of forestry in Cambodia during the last fifteen years includes a period of rapid expansion of the role of private forest concessions in the early 1990s followed by a retrenchment when the difficulty of controlling the concession holders' and other parties' logging activities became apparent. The

current phase in forestry development in Cambodia cautiously makes room for community based management and decentralization and in part follows the trends observed in countries that have lost most of the once abundant forest.

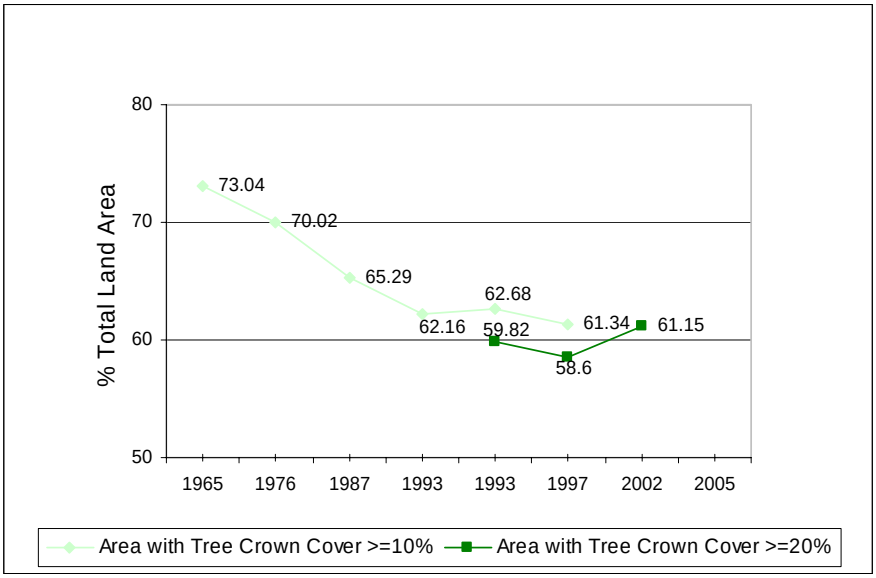
1.2 The State

Indicator: Forest Cover as Percent of Total Land Area – 1965 to 2002

17. Forest cover, expressed as a percentage of total land area was selected as the most suitable indicator to describe the state of the country's forest resources. The indicator is common world-wide and –with qualifications-- similar to the selection by all other five GMS countries. Other indicators (e.g. those relating to the quality of the standing stock) would naturally add to the understanding of underlying conditions provided reliable values could be generated for them, which is not the case for Cambodia at present. Although suitable, the indicator is not ideal in a GMS context where countries tend to use their own definition of forest cover (e.g. using different percentages of forest canopy).

18. The forest cover as defined in Cambodia (see the relevant factsheet) steadily declined from 73% in 1965 to 59.8% (or 62.7% under a slightly different definition of forest) in 1993, averaging a loss of approximately 0.4% annually during this 28-year period.

Figure 1.2: Percentage Forest Area over Total Land Area, 1965-2002



19. The downward trend continued with only a moderate slowing down (to 0.3 per cent p.a.) until 1997. However, a reversal is observed from 1997 onward. The forest area increased by 1.3% p.a. from 1997 to 2002 to a total of 61.1% of the total land area.

20. In 2003, RGC set a target of 60 per cent forest cover for the period 2005 to 2015 (CMDG, 2003). If the recent trend can be maintained, Cambodia should not have any problem maintaining the target.

Rating: Relatively Good and Stabilizing
Justification: Forest cover in Cambodia has been declining over the long-term but there are signs of a reversal, based on observations between 1997 and 2002.

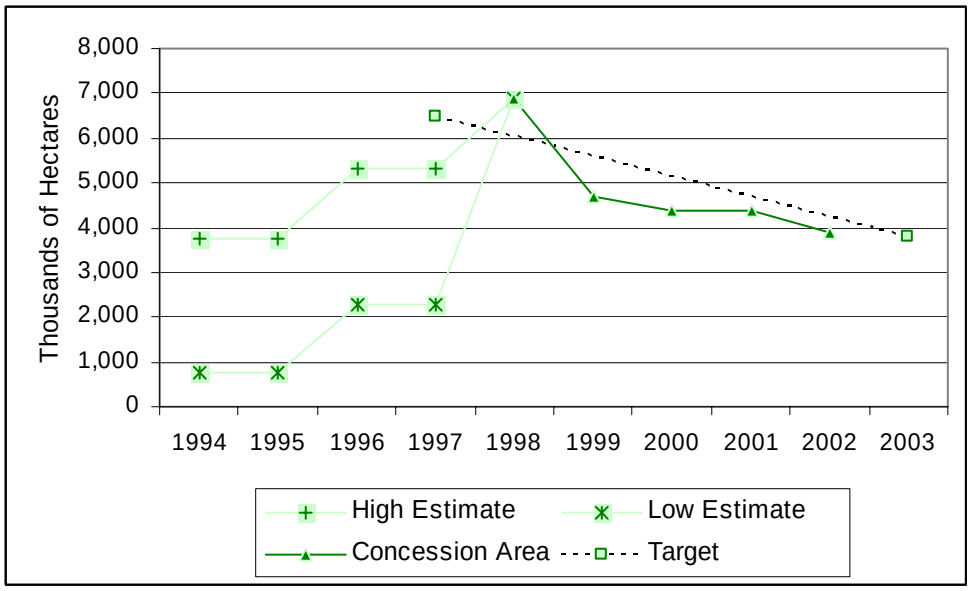
Cambodia has the highest forest cover of all GMS countries in excess of 60 per cent of the total land area. The condition of the existing forest cover however remains a concern.

1.2 The Pressure

Indicator : Forest Concession Areas – 1994 to 2002

21. The total area under forest concessions was perceived to be an important factor in contributing to the pressure on the forest cover, together with illegal logging. Typically the two are closely related, and whereas getting reliable information on illegal logging is not always easy data on concession areas are available. In late mid-1990s, RCG set a target of reducing number of forest concessions from 30, operating on 6.5 million ha in 1997 to 12, operating on 3.8 million ha, by 2003. The 12 authorized concessions were required to develop forest concession management plans before resuming operations.

Figure 1.3: Trends in Forest Concession Area – 1994 to 2002



22. As can be observed from Figure 1.3, the area under forest concessions rose steadily from 1994 and peaked in 1998 when it approached 7 million hectares. This was more than half of the total forest area at the time. The Government's policy of sharply reducing the area under concessions, as mentioned earlier, reflected alarm at an apparent inability to control concessionaire activities. The 2003 target of 3.8 million hectares was reached one year earlier, in 2002, when the total under concession management was approximately 30% of the total forest area (See Table 1.2).

23. It is important to note that during the period 1996-2002, forest cover decreased both inside active *and* cancelled concession areas suggesting that cancellation of forest concession areas by itself may be insufficient to put a stop to forest loss.

Table 1.2 – Percent Forest Cover Change in Concession Areas – 1996 to 2002

	1996/97 (hectares)	2002 (hectares)	% of total forest cover

			% 1996/97	% 1996/97
Concession areas	3,335,232	3,346,453	30.49	30.13
Canceled concession	2,095,311	2,072,157	19.15	18.66
Source: **Trends in Land Cover Changes Detection between 1996/97-2002**				

Rating**: **Non-comparable and Decreasing
Justification: The RGC has succeeded in reducing the pressure on forest resources through cancellation of a large number of forest concessions that brought the area under concession management down from 6.5 million ha in 1998 to 3.8 million hectares in 2003. Operating forest concessions are closely monitored based on detailed forest management plans. The rating assigned is not comparable with that for the rest of the GMS countries, since each country uses different indicators to capture the pressure on standing forest.

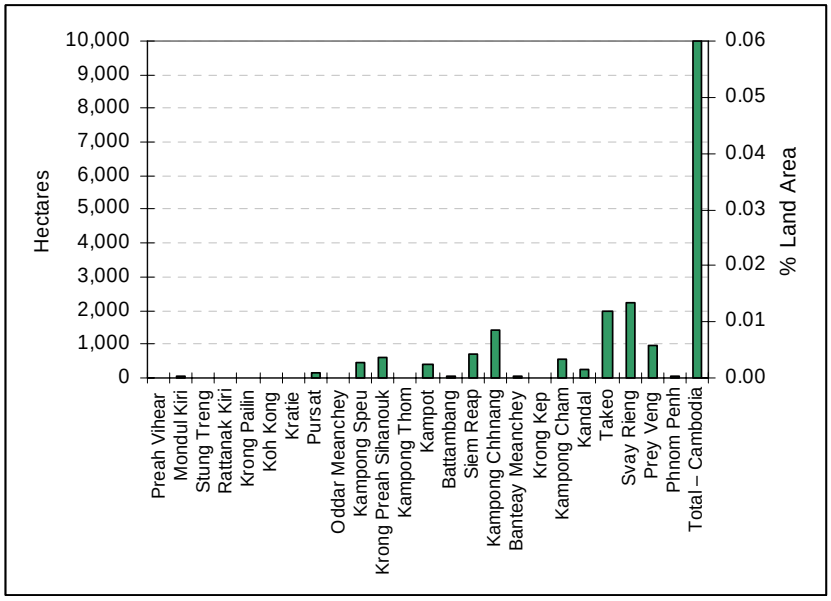
1.4 The Response

1st Indicator: Re-forested Areas – 1985 to 2002

24. The percentage of re-forested areas in the total land area was considered first. It is easily understood, intuitively sound, and good information was available to make an assessment.

25. Between 1985 and 2002, the government's re-plantation program focused on the severely degraded forest areas in Svay Rieng, and Takeo provinces (see Figure 1.4)

Figure 1.4: Percentage Re-Forested Area by Total Land Area – 1985 to 2002



26. The total areas involved, however, have turned out to be very small. Only about 10,000 hectares (or 0.05% of the total land area) had been re-forested up to 2002 in a country with a total forest area of some 11 million hectares. Clearly such a level of effort had little impact on the overall forest cover and indeed it is likely that the main purpose of these measures was not that but to set a good example and

initiate reforestation in vulnerable watersheds in the most seriously affected provinces.

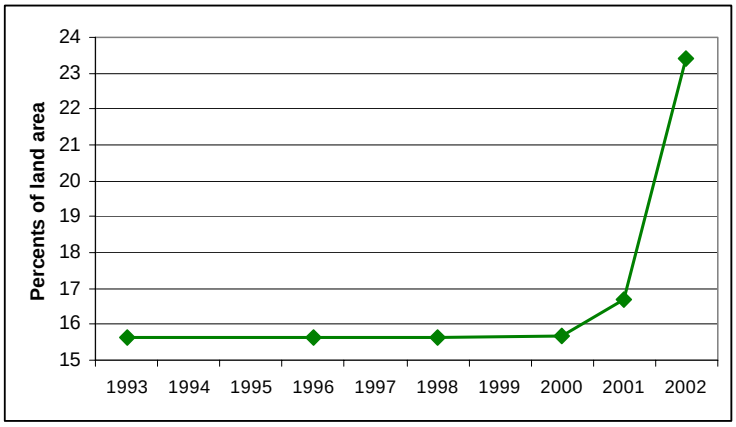
Rating**: **Low and sporadic
Justification: RGC has implemented various re-forestation programs sensibly paying attention to small environmentally important areas of the most deforested provinces. The overall impact of re-forestation programs on the country's forest cover, however, has been negligible.

2nd Indicator: protected Forest as Percent of Total Land Area – 1993 to 2002

27. The area of forest placed under a system of protected areas was chosen as the second response indicator. This is a globally accepted indicator and one utilized by several GMS countries under the SEF II Project. The indicator is expressed as a percentage of protected forest in total land area. There is no direct target for this indicator but an indirect policy target exists for protected areas, namely to maintain 23 existing protected areas and 6 more recently created forest protected areas (CDMG, 2003), and increase the number of rangers from 600 to 1,200 between 2001 and 2015 (CMDG, 2003).

28. As can be observed in Figure 1.5, the 23 protected areas established by a 1993 royal decree comprised a total of 2.8 million hectares of forest amounting to approximately 15% of the total land area. The 23 protected areas comprised: (i) 1.8 million hectares of forest under wildlife sanctuaries; (ii) 0.7 million hectares of forest under national parks; (iii) 0.3 million hectares of forest under multiple-use protected areas and (iv) 0.06 million hectares of forest under protected landscapes. In 2001, the Tonle Sap Multiple Use Area became a Biosphere Reserve and its transition zone increased the forest area under protection by 0.2 million hectares.

Figure 1.5: Protected Forest as Percent of Total Land Area – 1993 to 2002



29. The system of protected forests was formalized in 1996 under the jurisdiction of the Ministry of Agriculture, Forestry and Fisheries. Figures 1.5 shows no new areas added to the protected realm between 1993 and 2000. Concerted efforts by the government resulted in an area expansion of the Tonle Sap Multiple Use Are in 2001. In 2002, further 1.2 million hectares were added bringing the total of forests under protection to approximately 4.2 million in a total of 11.1 million hectares of existing forests, amounting to 38% of total forest and 23.5 of the total land area of Cambodia. .

Rating**: **Non-comparable and sporadic
Justification: Protected forests can significantly contribute to biodiversity and forest cover conservation, and protection of watersheds' environmental functions. During the period 1993 to 2002, forest area under protection increased to 4.2 million hectares or from 15 to 23.5 per cent of the total land area. This increase resulted from two discrete actions by the Government rather than reflecting a steady and sustained trend in government-led protection efforts.

1.5 Conclusions

30. Compared to its GMS neighbors, Cambodia's forest cover exceeds 50 per cent of the country's total land area. This is a high percentage for a country with a topography less demanding than that of Cambodia's two mountainous neighbors, viz., Laos and Vietnam. The trend of further loss of forest cover seems to have been arrested. It is less clear how the overall quality of the standing forest compares with the situation in the past. The forest cover has been stabilized at a comfortable overall level but the quality of the standing forest could still be declining. Information pertaining to quality of forest cover in Cambodia would deserve to be organized in the next stage of performance evaluation in order to establish the impact of government efforts on that variable.

31. The success in stabilizing forest cover seems to mirror quite closely the Government's responses, most notably the limits placed on forests' commercial exploitation and, to a lesser degree, support for community forestry. However, illegal logging still continues. For Cambodia's forestry to become truly sustainable the quality of forest concessions' management plans and the compliance with the plans need to be closely monitored and the problem of illegal logging –largely unconnected with concession operations by now--must be kept at the forefront of attention.

32. A significant proportion of protected forests now are former concession areas. Improved management and protection of cancelled concession areas could be among the most efficient ways of increasing forest cover. Illegal logging appears to have targeted mainly these areas.

33. Measures need to be undertaken to improve the institutional capacity of the forest departments to better monitor compliance with the rules of sustainable forestry. Capacity to follow up on policies is still inadequate. Limited financial resources further constrain government's implementation capacity.

Rating: *2 – STARS*
Justification: A 2-star rating is suggested based on evidence that the responses (especially forest protection under the system of protected forests) have or will have an impact on improving the state (forest cover). Demanding targets (60% by 2005 and through to 2015) have been set and there are signs that these targets will be reached. International agreements (e.g. ITTO) have been signed and international benchmarks (e.g. MDG) accepted. Monitoring programs and databases are in place in the MAFF to allow regular monitoring of forest cover and forest conditions.

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2. Threat to Biodiversity

2. 1 The Context

34. Cambodia's geography and hydrology contribute to the country's rich biological diversity. Four main ecosystems are distinguished besides artificial/ terrestrial one (IUCN term used to describe farmed areas): forest, shrubland, grassland and wetlands. The areas with significant biological diversity are the southwest, especially the Cardamom and Elephant mountains, the eastern section of Dangrek Range, northern and northeastern parts of Cambodia-Laos and Cambodia-Vietnam border, central plains of Cambodia and the Tonle Sap Lake and its wetlands which cover 30% of the total land area (MoE, 2003).

35. Cambodia is home to an estimated 2,300 plant species, some of which are of inestimable value to local communities as medicinal plants. In addition, Cambodia is home to 130 mammal species (UNDP-GEF, 2001)[1]. There are over 500 bird species mainly living in the wetland areas. Mekong River and its tributaries are home to about 500 species of freshwater fish in Cambodia (Rainboth, 1996). Approximately 70 terrestrial species are recorded in Cambodia (MoE, FAO and UNDP, 2001).

36. The Tonle Sap Lake and the wetland areas in the northeast of the country are unique and natural havens for many wetland species. Since the 1960s, studies of Tonle Sap's biodiversity have recorded 225 bird species, more than 200 fish species, and 40 reptile species. Moreover, Tonle Sap area is the last stronghold in Southeast Asia of several of the globally threatened bird species. Threatened freshwater dolphin is found in the upper Mekong River (ADB, 2002).

2.2 The State

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

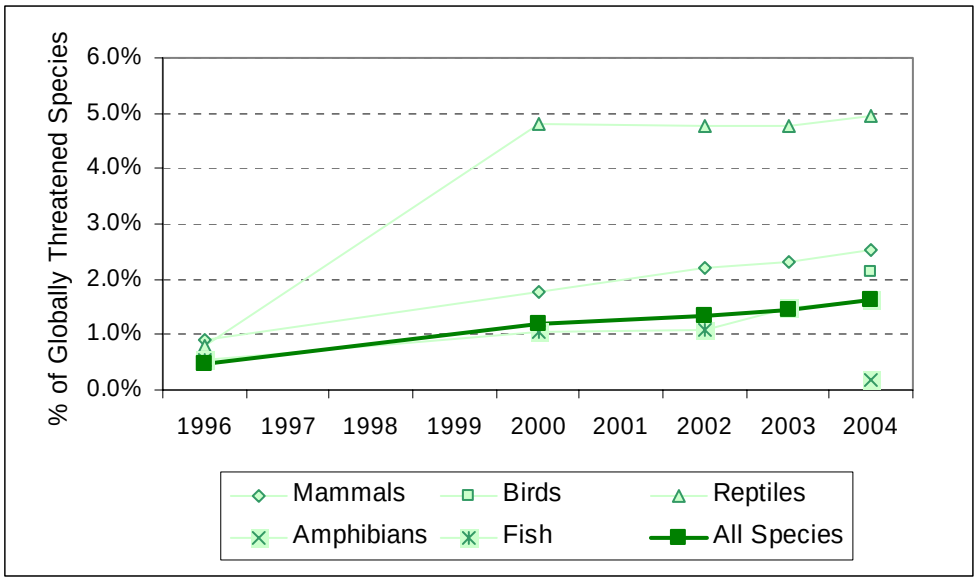
37. Percentage of globally threatened species was selected as the state indicator. The indicator tracks over a period of time the number of globally threatened species present in Cambodia. It is expressed as a percentage of threatened species at the national level in the number of threatened species at the global level. Expressing the indicator as a ratio has the merit of placing the national protection efforts in a global context. Threatened species are those defined as vulnerable, endangered or critically endangered (IUCN Red List, 2004).

38. No specific targets for this indicator value have been set by the Government. For this indicator, of relevance is the Convention on Biological Diversity, which Cambodia ratified on 09/02/95.

39. Figure 2.1 presents the values of the indicator in 2004. What happened between 1996 and 2004 is less relevant; it is 2004 which forms the baseline for the future development of this indicator.

Figure 2.1: Threatened Species as Percent of Global Threatened Species – 1996 to 2004

[1] UNDP-GEF, 2001, The Tonle Sap Conservation Project; Draft Inception Report.



40. It can be observed that Cambodia is a sanctuary to approximately 1.6% of the globally threatened species. This figure consists of approximately 2.5% of globally threatened mammals, 2% of globally threatened birds, 5% globally threatened reptiles, 1.6% of globally threatened fish and less than 1% of globally threatened amphibians.

41. By habitat, the species at risk are presented in Table 2.1. As can be observed, forests are the dominant habitat for approximately 33% of the threatened species in Cambodia including threatened mammals, birds and amphibians but loss of wetlands is also an important factor. Interestingly, terrestrial habitats, which include arable land and pasture land (i.e. areas by definition disturbed), are also important habitat for some of Cambodia's threatened bird species.

Table 2.1 – Threatened Species by Major Habitat Type – 2004

Habitat	Mammals	Birds	Reptiles	Amphibians	Fish	Total	Citations %
Forest	21	20	0	3	0	44	**33.59%**
Wetlands	2	15	0	3	5	25	**19.08%**
Artificial/Terrestrial	0	14	0	0	0	14	**10.69%**
Grasslands	4	9	0	0	0	13	**9.92%**
Shrubland	6	6	0	0	0	12	**9.16%**
Sea	1	5	1	0	1	8	**6.11%**
Coastlines	1	1	1	0	4	7	**5.34%**
Savanna	4	2	0	0	0	6	**4.58%**
Artificial/Aquatic	1	1	0	0	0	2	**1.53%**
Rocky Areas	0	0	0	0	0	0	**0.00%**
Caves and Sub-Terrananean Habitats	0	0	0	0	0	0	**0.00%**
Desert	0	0	0	0	0	0	**0.00%**
Introduced Vegetation	0	0	0	0	0	0	**0.00%**
Other	0	0	0	0	0	0	**0.00%**
Unknown	0	0	0	0	0	0	**0.00%**
Total Citations	40	73	2	6	10	131	**100.0%**
Source: IUCN Red List - 2004							

42. Cambodia's 1.6% of globally threatened species is relatively low compared to the average of 2.13% for all six GMS countries as a whole. Its low-lying topography (for the most part) contrasting with the mountainous topography of its neighbors Vietnam and Laos contributes to that being the case. Nevertheless it appears that the current state of biodiversity in Cambodia is relatively good, with no observable past

trends and an expectation that the global share of Cambodia's threatened species will remain constant in the very near future. However, loss or changes to habitat and intensity of harvesting should be closely monitored.

***Rating**: Relatively good with undetermined trend.*
Justification: The state of biodiversity is relatively stable in Cambodia and in better condition than in the other GMS countries; focus needs to be on preserving the key habitats and also monitoring the ten species endemic to Cambodia, Vietnam & Thailand.

2.3 The Pressure

Indicator: Loss of Critical Habitat between 1993 and 1997

43. Loss of critical habitats is taken as the most suitable indicator of pressure on the country's biodiversity. It tracks the loss of critical habitats over time and expresses it as a percentage of the country's total land area.

44. Habitat loss has a direct impact on the fate of the species that depend on it for survival. The IUCN Red List (2004) cites loss of key habitats as the major threat to the survival of non-plant threatened species in Cambodia. Critical habitats for the purpose of this indicator are Forests, Wetlands, Artificial/Terrestrial, Grasslands, and Shrublands. No national targets for the area of these habitats, however, exist. Cambodia is signatory to several international conventions and agreements of direct relevance to biodiversity management, use and protection (see the factsheet for details).

45. Loss of critical wildlife habitats has several well know causes, predominantly of anthropogenic kind. In spite of the tragic decline during the Kmer Rouge period, the population of Cambodia has doubled from 1960 to 2000. The increase was accompanied by the expansion of human activities into wildlife habitat. Logging, clearance for agricultural expansion, growth of settlements and urban areas all contributed to the loss of natural ecosystems and the inherent biological diversity.

46. Deforestation and conversion of forest lands to agriculture played an important role. As established earlier, Cambodia's forest cover declined from 73% in 1965 to approximately 59% in 1996. Logging spread into protected areas. For instance, a biodiversity survey (2000) of Cardamom Mountains, considered the richest biodiversity area in the country, confirmed that logging was taking place inside the protected areas (MoE, UNDP/GEF and FAO, 2001).

47. Agricultural land increased from 3 million ha in 1960 to 3.8 million and 4.3 million in 1992-93 and 1996-97 respectively. It is estimated that about 2.1 million hectares of forest lands were converted to agriculture and other uses between 1960 and 1992-93. Around the Tonle Sap Lake, clearance of flooded forest for agriculture and settlements has been significant. Areas under inundated forest and mangrove declined by nearly 10 per cent in the space of 5 years from 0.43 million ha in 1992 to 0.40 million ha in 1997 (IREF, 1958; Croker, 1960; Tichit, 1981; MAFF & MRC, 1991).

48. The changes in the areas of the four critical habitats relevant to this indicator are illustrated in Table 2.2. The rate of designated habitat loss is measured as the loss of forestland, shrubland, grassland and wetlands between 1993 and 1997 as a

percentage of the total country's land area. The forest habitat decreased by 1.22% between 1992/93 and 1996/97, followed by shrubland (0.80% loss).

Table 2.2 Loss of Critical Habitats as % of Total Land Area - 1993 to 1997

Ecosystem type	1992/93		1996/97		Loss of Habitat
	Area (ha)	% of Total Land Area	Area (ha)	% of Total Land Area	%
Forest	10,891,918	60.00	1,0671,936	58.79	**-1.21**
Wetland	537,242	2.96	552,478	3.04	**0.08**
Artificial/Terrestrial	4,022,304	22.16	4,358,435	24.01	**1.85**
Grassland	476,804	2.63	488,643	2.69	**0.07**
Shrubland	2,204,223	12.14	2,059,449	11.34	**-0.80**
Total Land Area	**18,152,985**				
Source: Forestry Administration, Ministry of Agriculture, Forestry and Fisheries					

49. However, the artificial/terrestrial habitat increased by 1.85% during the same period, wetlands by 0.08% and grasslands by 0.07%. The increase in artificial/terrestrial class agrees with the common perception about the direction of land use changes in most GMS countries in which farming and urban expansion (components of "artificial/terrestrial" class) gain at the expense of other land categories.

50. It is important to add that habitat loss may not be neatly correlated with the loss of underlying biodiversity. The relationship between the two is complex and lagged. If periods of evaluation are too short to establish trends, it is possible to observe increases in habitats coexisting with high threat and vice versa.

***Rating**: Non-comparable with undetermined trend*
Justification: Although pressure exists on biodiversity, there is not enough information to establish a long term trend. The pattern of habitat loss in Cambodia defies easy generalizations. The pressure on biodiversity furthermore depends on the intensity of hunting and gathering in each habitat and trade in wildlife for which systematic data are not available.

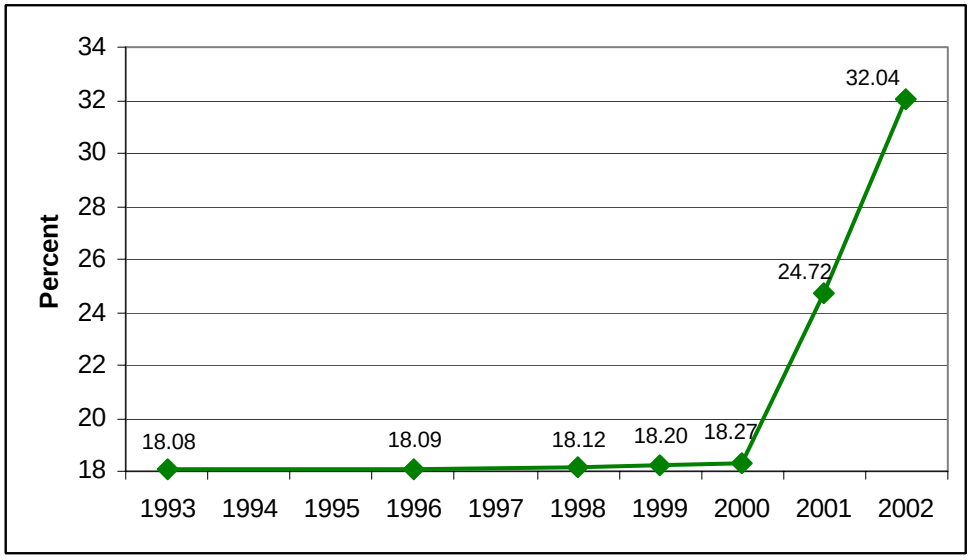
2.4 The Response

Indicator: Protected Areas as Percent of Total Land Area - 1993 to 2002

51. Total protected areas as percent of total land area is taken as the indicator of response to the threats on biodiversity. The numerator is the area of habitats given a protected status. It is assumed that the higher the percentage of the indicator, the better the performance of the country in protection and conservation. RGC has established an indirect target for this indicator i.e. to maintain the 23 protected areas at the 1993 level of 3.3 million hectares through 2015 and 6 post-2001 forest protected areas at the present level of 1.35 million hectares through 2015 (CMDG, 2003).

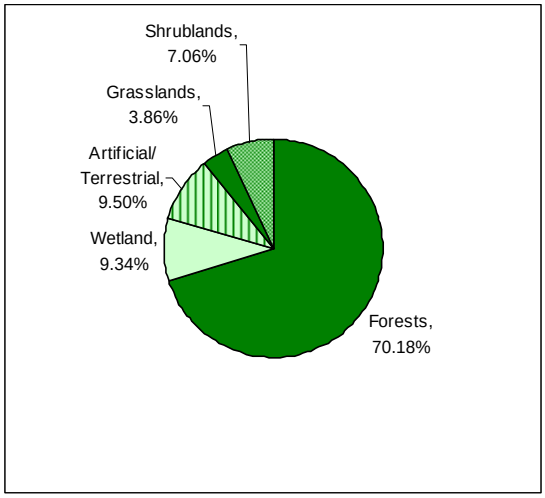
52. Figure 2.2 depicts the trend of protected area development in Cambodia between 1993 and 2002 since the proclamation of 1993 Royal Decree on Protected Area that designated 3,273,200 hectares or 18.08% of the total land area as protected area. This consisted of 23 protected areas divided into National Parks (742,000 hectares), Wildlife Sanctuaries (2,030,000 hectares) and Multiple Use Area (403,950 hectares) (MoE, 1993).

Figure 2.2: Protected Areas as Percent of Total Land Area – 1993 to 2002



53. The protected areas increased slightly from 18.08% 1993 to 18.27% in 2000 due to the inclusion of 3 additional sites designated as Protected Forests and another 3 Ramsar Sites, between 1996 and year 2000. However, it increased sharply from 18.27% in 2000 to 24.72% in 2001 as a result of RGC's designation of the Tonle Sap Multiple Use Area as biosphere reserve and extending its area to 1,167,000 hectares. By 2002, large forest areas formerly under forest concessions and other areas totaling 1,332,218 hectares were added to the system of protected areas bringing the total to 32% of the total land area (see Figure 2.2), the highest among all GMS countries.

Figure 2.3: 1997 Habitat Composition of Existing Protected Areas



54. Figure 2.3 attempt to further describe the system of protected areas in terms of the habitat which they attempt to protect. As can be observed from this figure, the protected areas as a whole are composed of 70.18% forest, 9.34% wetlands, 9.5% artificial/terrestrial and the remaining 10.98% of grasslands, shrublands and other land covers. While loss of forest habitat was identified as the single most important threat to endangered species in Cambodia (see Table 2.1), loss of wetland habitat was cited as being the second dominant threat, followed by loss of artificial/terrestrial habitats, including arable land and pasture land.

Table 2.3: Protected Areas in GMS Countries

Country	Percent of Total Land Area	Future Target
Cambodia	32.0% as of 2002	Maintain existing and extend protected forest area.
Lao PDR	14.3 % as of 2002	Maintain existing which is above IUCN recommendation of 10%.
Myanmar	7.2% of as 2004	IUCN recommendation of 10%.
Thailand	18.2% as of 2004	Include another 18% as Class 1 Watersheds.
Vietnam	6.2% as of 2004	IUCN recommendation of 10%
Yunnan	8.8% as of 2004	Maintain existing which is above 8% target.
Source: Findings of the SEF-II Project		

***Rating**: Significant and consistent*
Justification: Over the years, RGC has stepped up its efforts to improve the state of biodiversity. Since 1993, the government has been building up a system of protected areas. By now a total of 32 per cent of Cambodia's territory has some form of protection status. However it remains to be seen how effective the protection is in the face of continued and widespread pressure on biological and other natural and cultural resources in Cambodia.

2.5 Conclusions

55. The RGC has taken concrete measures to protect key ecosystems and habitats. With recent inclusion of cancelled forest concessions into the system of protected areas, forest areas enjoying some sort of legal protection amounted to 37%

of the forests' total. All habitats taken together under legal protection now account for 32% of the total country's land area.

56. Among all threatened species listed in Cambodia, 45% of wildlife inhabits the forest. That habitat declined by 1.22% between 1992/3 and 1996/7. 25% of threatened species are found in wetlands. Their area decreased by 0.04% over the same period. Besides a decrease in area, there are indirect indications of the reduced quality of these habitats that are under pressure by hunters.

57. The cancellation of the majority of forest concessions and their inclusion into the protected realm speaks of RGC's commitment to biodiversity conservation. Cambodia's performance compares favorably with that of other GMS countries, especially in terms of the area set aside for protection.

Suggested Rating: 2-STARS
Justification: Although there is no observable trend in the loss or gain of threatened species, Cambodia's share of globally threatened species (1.6%) is relatively small when compared to that of other GMS countries. Also, none of these threatened species are endemic to Cambodia, and this cannot be said of other GMS countries. While it cannot yet be shown that the pressure (loss of habitat) is decreasing and that the state shows signs of improvement, there are signs of improvement in other related indicators. Forest habitat for example, which used to suffer the most, has shown signs of improvement, at least in terms of area. Consistent with the guidelines associated with this rating, international conventions (CBD, CITES, etc.) have been ratified and the reporting requirements of these conventions have been adhered to. Institutional responsibilities have been assigned and the Biodiversity Unit within MAFF which is responsible for continuous monitoring and database development of threatened species.

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3. Fish Resources

3.1 The Context

58. Inland fisheries are an important component of rural economic growth and key to local livelihoods in Cambodia. Fish is a staple diet for local people accounting for three quarters of the animal protein intake of Cambodia's 13 million people. Along with rice it forms the basis of food security. The Tonle Sap Lake and Mekong River are home to many inland fish species, and the richness of fisheries is intimately inked to the floodplain areas around the Lake, its flooded forest and the water flow regime of the Mekong. More than 200 fish species reside in the Tonle Sap Lake. Some of them migrate upward and downward of Mekong River. Together with fish in Tonle Sap Lake, the Mekong River Basin in Cambodia is home to about 500 out of 1,200 Mekong fish species (ADB 2002).

59. Given the above, protecting the exceptionally rich inland fisheries is vital. If fish availability were to deteriorate the nutritional and health status especially among the poor would be seriously affected.

3.2 The State

Indicator: Inland Fish Consumption – 1981 to 2003

60. The indicator is based on data of live weight fish catch. Output data are recorded by the Department of Fisheries (MAFF). These and other sources used to construct the values of the indicator are described in the relevant factsheets. An indicator that closely (but not perfectly, given the existence of fish exports) tracks fish output has the disadvantage of possibly not revealing the threat of over-fishing. Abundance today may mask scarcity tomorrow. Here this disadvantage was in part offset by the existence of a long time series of data and supplementary information about the changes in the quality of the catch.

61. The official objective of government policy (DoF, Fisheries Policy Briefing, 2004) is to ensure that by 2010 all living aquatic resources are harvested within their sustainable limits. No specific figures have been given for these sustainable limits but the policy provides an overall policy direction for fisheries management.

62. Fish consumption per capita was estimated by different groups of researchers in various locations across Cambodia and throughout the 1990s, the estimates ranged from 13-16 kg to 21-40 kg in the south of Cambodia to 70-80kg in the Tonle Sap Region (see Table 3.1). The national average consumption per capita has been estimated at about 30 kg and is projected to stay at that level through to 2010.

Table 3.1 –Estimate of Per Capita Fish Consumption in Cambodia

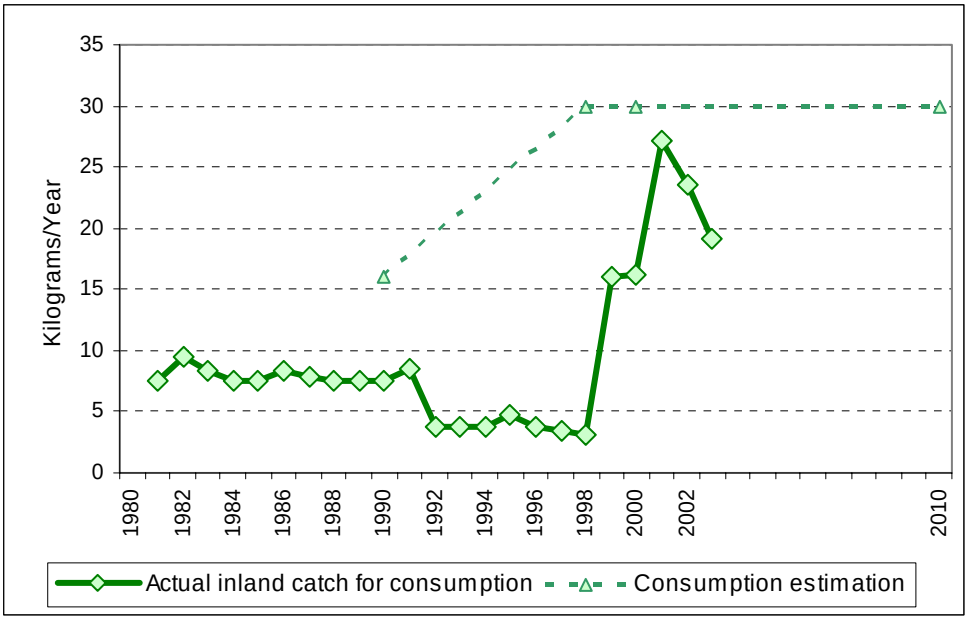
Fish consumption per capita (kg/year)	Sources*
20 - 25	(Lagler, 1976)
13.3 - 16	(MS, 1992) with increased population (annual growth rate: 2.5-3%), (World Bank, 1992).
25	(Tana, 1993) in the South-Eastern Cambodia
13.5	(Csavas, 1994)
40	(CIAP unpublished) in the South
38	(APHEDA, 1997) in the Southwest
71	FAO Participatory Natural Resource Management in the Tonle

	Sap Region in the floating villages
32	in the up-land areas of Siem Reap province (Hy, 1995)
86.8	MRC/DoF/DANIDA Freshwater Capture Fisheries Management Project (1995) in fishing dependent communes
71	(Ahmed et al., 1998)
21.5 - 33.8 - 39.5	Gregory et al. (1997) in Svay Rieng.
24.2 - 32.2	(MRC/DoF, 1998/1999)
30	National average of fish consumption per annum (MRC/DoF, 1998)

* Detailed references are given at the end of this section

63. Estimates of per capita fish consumption based on total inland fish catch excluding exports, marine catch, aquaculture production, and imported fish is shown in Figure 3.1. Per capita consumption during the period 1980 to 1991 stabilized at around 6kg per year, but dropped below that level between 1992 and 1998. It increased again from 1999 to 16kg and peaked in 2001 at 27kg per year. However, 2003 saw a decrease to about 19 kg. A figure of 20 kg per year is considered a reasonable estimate of average per capita fish consumption during the period 1999-2003.

Figure 3.1: Annual Fish Consumption per Capita in Cambodia



64. The data of per capita fish consumption between 1980 and 1998 do not include the output of small scale and rice field fisheries. Since 1999, upon the advice of MRC, the figures do include these categories and substantially increase the totals.

65. Fish consumption in Cambodia has steadily increased over the years especially in the last five years. Combined with the avian flu, increased living standards among urban dwellers and increased health and nutrition awareness, fish is becoming more popular than any other food item. Domestic price of fish is on the increase and remains high relative to incomes.

Rating**: **Relatively Good and Improving
Justification: Fish consumption in Cambodia has grown in recent years due to further shifts in consumer preferences towards fish and greater production by

small-scale and rice-field fisheries. The production by Tonle Sap appears not to have changed significantly in volume terms. Fish consumption per capita in Cambodia is higher than in other GMS countries.

3.3 The Pressure

66. No single pressure indicator has been chosen as several factors contribute to affecting fish catch in Cambodia. These are all discussed in the accompanying paragraphs.

67. Pressure on fisheries in Cambodia comes from various directions the principal one being the use of more sophisticated fishing gear and equipment. Figure 3.1 shows the catch to have been fairly stable between 1990s and 1998s. The annual commercial fish catch data before 1998 recorded by the DoF was estimated at around 55,000 to 75,000 tons annually. Fish catch from the Tonle Sap was between 36,000 to 45,000 tons per year (van Zalinge 2002), constituting about 60% of the total inland fish catch of Cambodia (Ahmed et al, 1998). After, 1999, figures lose comparability. The annual fish catch increased to between 290,000 and 430,000 tones due to the inclusion of fish catch from small scale and rice field fisheries (van Zalinge et al, 2000).

68. Although there may have been an increase in stable commercial fish catch, the share of large and medium size i.e. higher–value, fish has declined because of intensive fishing and inadequate regulation of fishing techniques and gear. This resulted in a higher proportion of small fish used for fishmeal and fermented fish paste production in the total catch. (MRC 2003)

Table 3.2 MRC - Freshwater Fish Capture (ton)
(Cambodia Fishery Project, 1999)

Large-scale	
Fishing lots	30,000 - 60,000
Bagnet lots	15,000 - 20,000
Middle-scale	85,000 - 100,000
Small-scale	115,000 - 140,000
Rice Fields	50,000 - 100,000
Total	**295,000 - 420,000**

Source: *Van Zalinge, et al.*

69. In addition to meeting the demands of domestic fish consumption, there is also flourishing fish export business. About 25% of the total fish catch is exported (about 100,000 tons), half of that through illegal channels. Approximately 75% of exports are delivered to Thailand[2], as fresh. The bulk of the balance goes to Vietnam (MOC, 2002).

70. Destructive fishing practices are widely used throughout Cambodia, ranging from the use of prohibited fishing gear, use of electricity to stun the fish, explosives and poisonous substances, and encroachments of fishing grounds. Small to medium scale fishermen resort to illegal fishing practices in order to meet their basic subsistence needs whereas large-scale fishing enterprises often overfish driven by the profit motive.

71. Over-harvesting of smaller fish and/or less-valuable fish for animal feed also contributes to the problem. The collection of fingerlings (newly hatched fish) for aquaculture[3], pumping around the Tonle Sap Lake and elsewhere within fishing areas are all illegal forms of fishing. Pumping disrupts the ecological balance by removing virtually all aquatic life from the pond including juvenile fish. It has also caused problems for communities who lose their access to water that is essential for

[2] About 50,000 tons of inland fish have been exported every year to Thailand (FACT and EJF, 2000).
[3] Scrogging, Lucrative Trade in Baby Fish a Deadly Business, Phnom Penh Post, 4-17 September 1998.

irrigation. Electrocuting fish is the preferred option for illegal fishers as it is the cheap method of mass capture of fish.

***Rating**: High and Increasing*
Justification: The pressure on fisheries is high due to increased human activities, whether over- or illegal fishing for consumption and commercial purposes or destructive fishing practices. The composition of inland fish catch has been changing towards smaller fish suggesting threats to sustainability exist. The trend will continue unless enforcement of existing legal provisions improves.

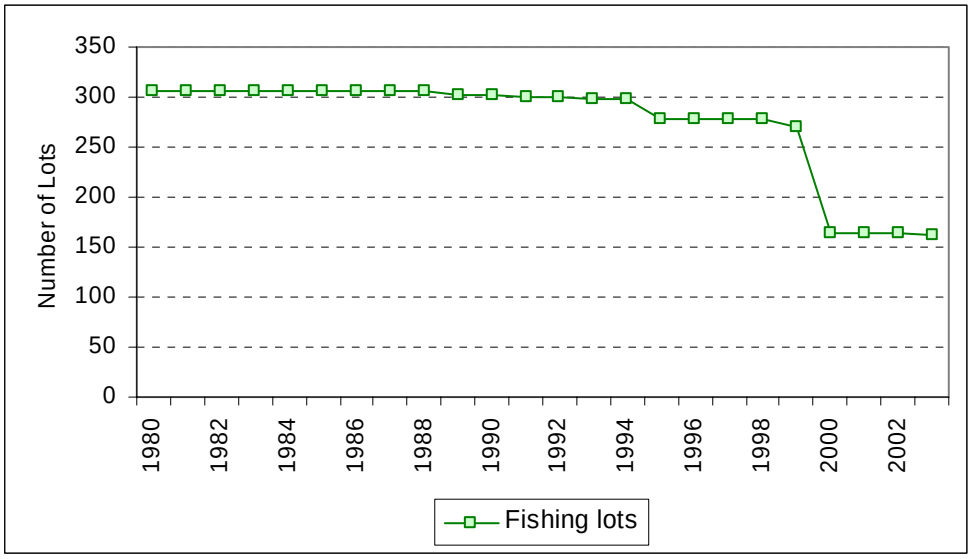
3.4 The Response

Indicator: Number of Community Fisheries 1996-2005

72. This indicator tracks the development of community fisheries; it is expressed in absolute numbers of fishing lots in the country, both inland and marine areas. The indicator has a basis in the recent development trend in fisheries management in many countries (Cambodia included) that encourages decentralized management of fisheries as an alternative to the centralized approach predominating until recently. The change of direction is motivated mainly be equity and poverty-reduction concerns as well as a presumed positive effect on sustainability. RGC has formulated two targets that feature in Cambodia's Millennium Development Goals (CMDGs) for sustainable fisheries management. The targets are:

- ☞ To increase the number of community-based fisheries from 264 in 2000 to 589 in 2015.
- ☞ To increase the proportion of fishing lots released to local communities from 56% of the total in 1998 to 60% in 2015.

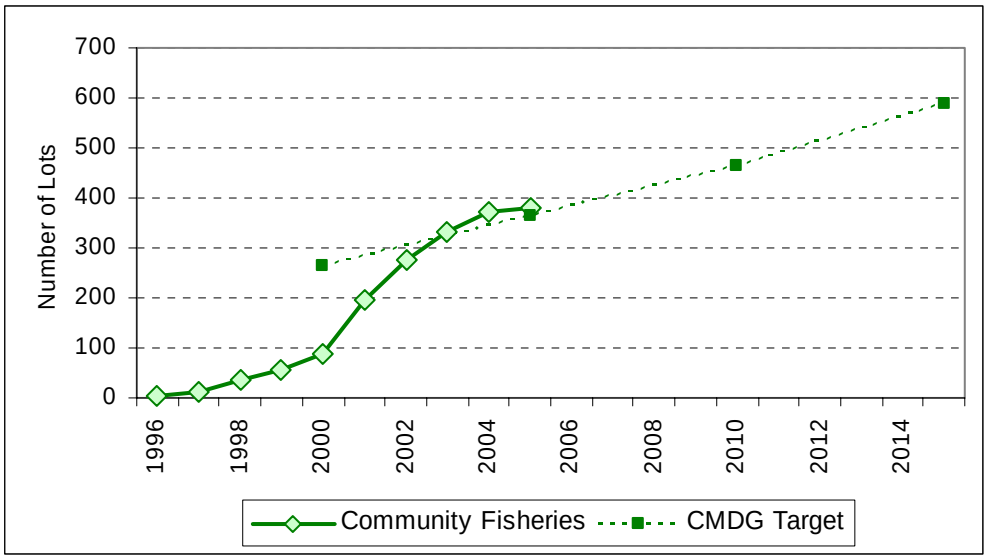
Figure 3.2: Numbers of Commercial Fishing Lots (1980-2003)



73. The number of commercial fishing lots in Cambodia has been reduced since 1994 (see Figure 3.2). In 2000, RGC reformed the fisheries sector in an attempt to regulate fishery activities. Commercial fishing lots were reduced from 307 in 1988 to 162 in 2003.

74. Fishing areas released from the commercial sector were re-allocated to community fisheries. The number of community fisheries has grown rapidly since the beginning of the program in 1996 (see Figure 3.3) to reach a total of 382 communities with fishing lots in 2005, exceeding thee CMDG's target of 333 communities for 2003.

Figure 3.3: Community Fisheries in Cambodia 1996-2005



75. Furthermore, RGC in collaboration with ADB has launched a program of environmental management of Tonle Sap Lake 2003-2008. Under the Program, 500 community fisheries are to be established around the Lake. (ADB, 2003).

Rating: ***Significant and Intermittent***
Justification: The iincreasing number of community fisheries (382 of them by now) has improved communities' access to fisheries while curbing the pressure of commercial fishing. Cambodia has placed tighter controls on commercial access to its fishery resource and is on track to meet the CMDG goals for sustainable fisheries. The change of policy direction is too recent to say whether it has resulted in a more sustainable management of the fish resource.

3.5 Conclusions

76. Current levels of inland fish catch are not significantly different from those of ten years ago. However, as a result of local intensive use combined with other pressures from the economic development of the Mekong basin, fish resource is under increasing pressure. Behind a relatively stable total volume of fish catch is a significantly changed composition of fish catch (more small fish being caught than larger fish) that suggests that sustainability of the catch is in doubt. This has been accompanied by changes in fish biodiversity.

77. There is a trend towards higher fish consumption amongst the local population and a greater awareness of the role of fish in nutrition and health. Fish has become more expensive in real terms.

78. RGC has taken steps towards regulating the fisheries sector in its drive to meet the target set by CMDG i.e. to release a total of 56% of commercial fishing lots for

development by community fisheries by 1998, and 60% by 2015. At present, about 382 community fisheries have already been established. If the RGC maintains this effort, the target of 589 community fisheries for 2015 looks well within its reach.

Rating: 2-STARS
Justification: Per capita fish consumption in Cambodia is relatively high and increasing. It has grown in recent years due to further shifts in local consumption patters towards fish, and greater attention to small-scale and rice-field fish production. However there is a high pressure on the resource evidenced by an unfavorable trend in the quality of the inland catch, and destructive fishing practices that continue undiminished. Both of these invite doubts about the two star rating. The two stars are chosen in the end only because of the strong equity content of the policy re-orientation towards community fishing. Here too, however, caution is justified as the effect of this change on sustainability of the resource in Cambodian conditions is yet to be demonstrated. RGC has signed international treaties and conventions related to fisheries resources such as Ramsar, CITES, CBD and Mekong Agreement as part of its commitments to the protection of the fisheries resources. Institutional responsibilities have been assigned and the Department of Fisheries is responsible for ongoing monitoring and management of fisheries resources though clearly unable to curb illegal practices.

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4. Water Resources

4.1.1 The Context

79. Cambodia has abundant water resources due to its geographical and physical setting with wide central plains surrounded by highland areas at the periphery. The main rivers are the Mekong, Tonle Sap and Bassac Rivers. Of Cambodia's 181,035 km^2, 86% (156,000 km^2) is drained by the Mekong-Tonle Sap system. On average, the annual inflow from the Mekong's upstream is estimated at 410 billion cum. (MOWRAM, 2001). Although the surface water may be abundant in simple volume terms, the effective use of this resource for irrigation, household- and other purposes is costly as generations of irrigation, drainage and other projects have amply demonstrated.

80. With increased economic activity in Cambodia, utilization of water resources becomes an aspect of natural resource and environment management. The main concerns are depletion of the resource, its inefficient use, and deterioration of water quality.

4.1 Drinking Water

4.1.2 The State

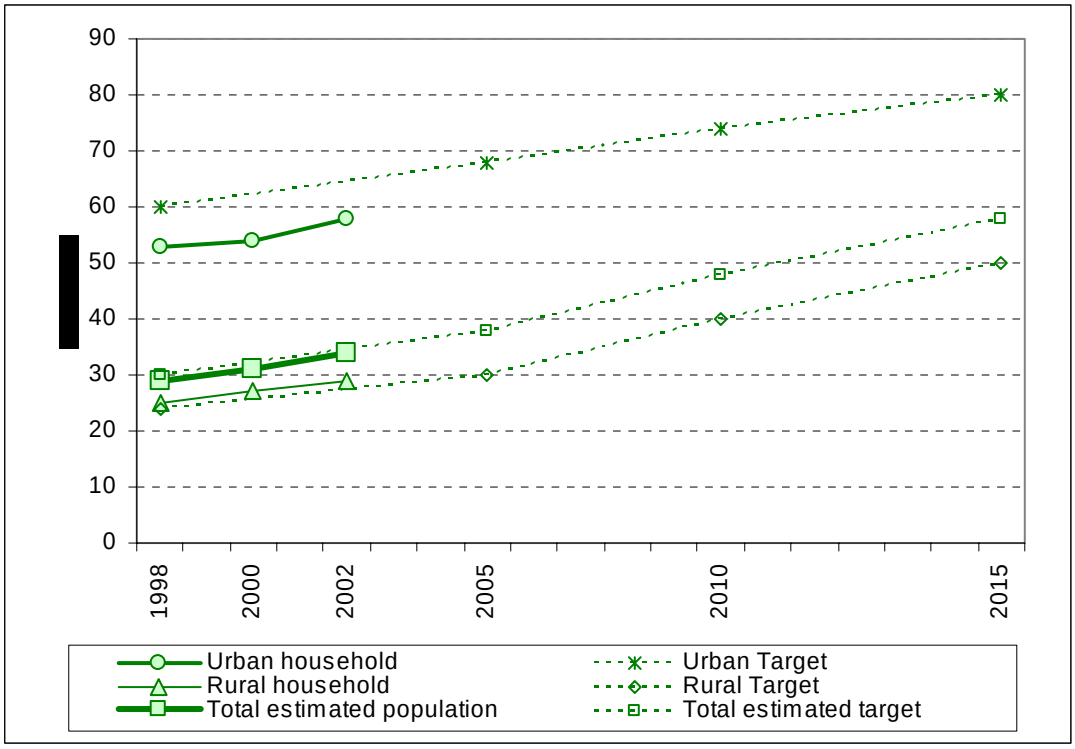
Indicator: Percent Population with Access to Safe Potable Water - 1998 to 2002

81. The indicator tracks the proportion of the population with access to safe drinking water at home or within reasonable distance. It is expressed as the percentage of the population with access to an "improved water source" following the definition adopted by the Joint Monitoring Program (JMP) for Water and Sanitation of the World Health Organization (WHO) and of the United Nations Children Fund (UNICEF). An "improved" source is one that is likely to provide "safe" water, such as a household connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection, etc. "Not improved" source is one that is unlikely to provide "safe" water, such as a unprotected well, unprotected spring, vendor provided water, bottled water, tanker truck water.

82. Likewise water supply service is defined as the availability of water, at least 20 liters per person per day from an improved source within one kilometer of the user's dwelling. Estimates of the percentage of households with access to improved/safe drinking water in urban and rural areas are currently available for 1998, 2000 and 2002.

83. The national target, as set in the 2003 Cambodia Millennium Development Goals and expressed separately for urban and rural population is to increase the proportion of rural population with access to safe water source from 24% in 1998 to 40% in 2010 and 50% in 2015, and urban population from an assumed 60% in 1998 to 80% in 2015. Expressed as nation-wide average, the target is to improve access to safe drinking water from 30% in 1998 to 38% and 48% in 2005 and 2010 respectively and to 58% in 2015.

Figure 4.1: Percent of Households Access to Safe Drinking Water (Urban and Rural) 1998 to 2002



84. An earlier RGC's mid-1990s target was to improve urban access from 60% in 1998 to 68% in 2005. However, in 1998, only 53% of urban population had access, increasing to 58% in 2002. It is unlikely that the 2005 target will be met. In rural areas, the progress –form a very low base-- was somewhat better with 25% of rural population with access to safe drinking water in 1998, increasing to 27% in 2002. Between 1998 and 2002, access grew at an annual rate that fluctuated between 1 and 1.5%. Only if the higher rate is maintained will the 2005 target be achieved. To achieve the 2015 target under conditions of rapid population increase, the rate of improvement will have to be reach about 2% per annum.

85. The proportion of population with access to safe drinking water in Cambodia is low when compared with other countries in the GMS. Indeed, Cambodia has the lowest percentage of population access to safe drinking water (see below).

Country	Access to Safe Potable Water % Population, 2002
Cambodia	34%
China	77%
Lao PDR	43%
Myanmar	80%
Thailand	85%
Vietnam	73%
Source: WHO/UNICEF-JMP	

Rating**: **Relatively Poor and Improving
Justification: Access to safe drinking for both urban and rural population in Cambodia has improved during the last decade to 58 and 27 per cent of the population, respectively, in 2002 with greater rate of improvement in rural than in urban areas, but improved from an extremely low baseline. Cambodia continues to lag behind other GMS countries.

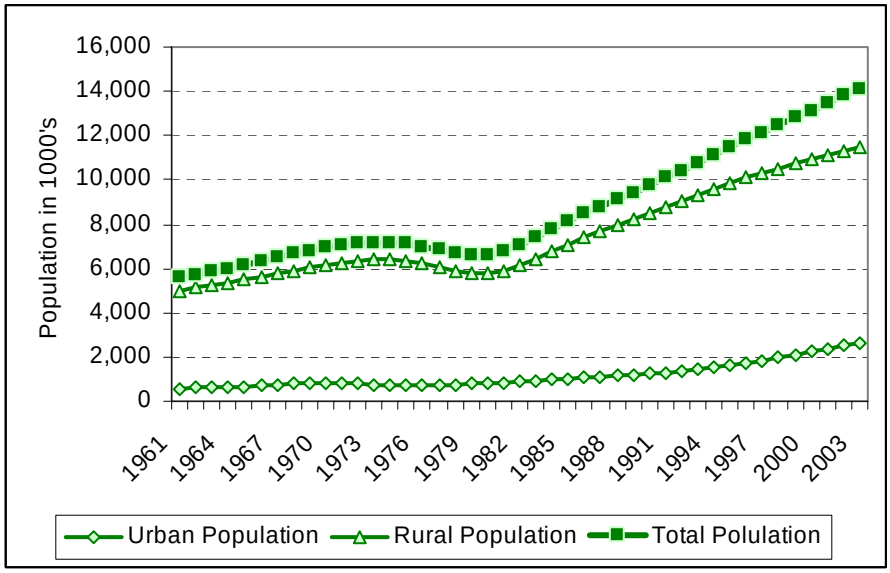
4.1.3 The Pressure

Indicator: Urban and Rural Population 1961-2003

86. Population growth in urban and rural areas is the main factor affecting access to drinking water supply. In the assessment here the population data going back to 1962 were used.

87. The first population census for Cambodia in 1962 put the total population at 5.7 million and the second[4] in 1998, at 11.4 million (The General Population Census, 1998). Cambodian population thus doubled in the space of less than 40 years despite the decrease experienced between 1975 and 1979 during the Khmer Rouge period. The current (2005) population of Cambodia is estimated at 14.0 million. The population remains predominantly (84%) rural.

Figure 4.2: Urban and Rural Population



88. Cambodia recorded a high population growth rate (2.49% p.a.) during the 1990s compared to other developing countries in the region. Among ASEAN countries only Lao PDR had a similar population growth rate (2.90% per annum).

89. The population declined of about 6% during the Khmer Rouge years was followed by the 1979 famine. Since 1980, in spite of civil war and political instability, population growth exceeded the pre-war levels. The growth rate in the early 1980s is believed to have been the highest ever recorded for the country (MoP 2002).

90. The rapid population growth has naturally led to increased demand for water both in rural and urban areas. Population growth at this stage in Cambodia's socio-economic development is considered a healthy trend by RGC and it is likely to continue. The Government sees its role as managing the country's water resources and principal infrastructure in a way that steadily improves access of people to water.

Rating: Low but Increasing

[4] The General Population Census of Cambodia (GPCC), 1998, by NIS-MoP/UNFPA

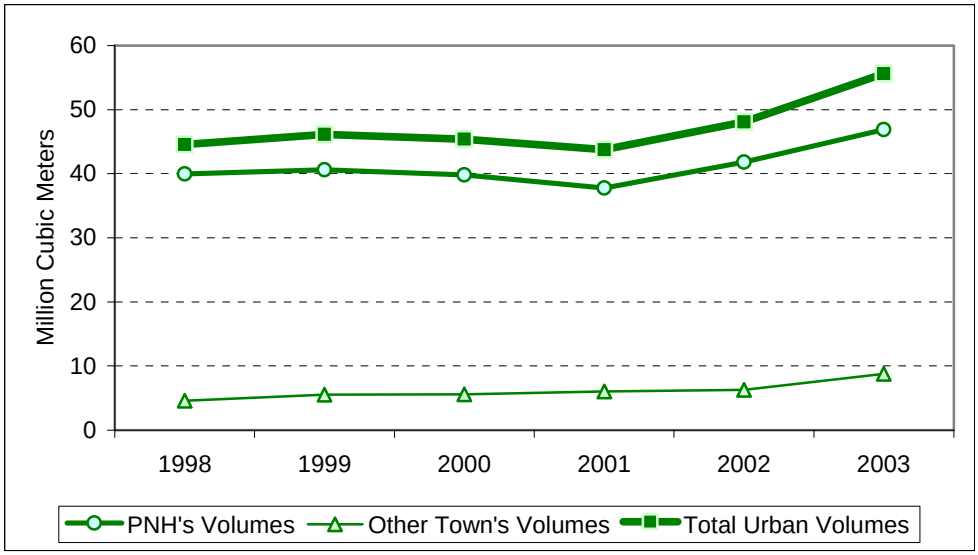
Justification: Cambodia's population has been increasing in both rural and urban areas resulting in increased demand for safe drinking water. The average annual growth rate of 2.5% is relatively high compared with GMS countries.

4.1.4 The Response

Indicator: Urban and Rural Drinking Water Provision - 1998 to 2003

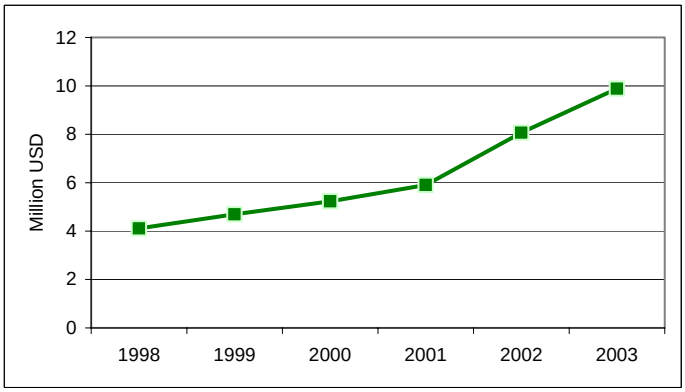
91. Expansion in drinking water provision to urban and rural areas in Cambodia is the composite of efforts made by the government as well as rural households acting on their own. Information exists for urban and rural areas of Cambodia as well as for the city of Phnom Penh. In the case of urban townships and Phnom Penh, "provision" is measured by the volume supplied (in cu m) while for rural areas it is measured by the number of safe water outlets.

Figure 4.3: Urban Drinking Water Provision (1998 to 2003)



92. The volume of drinking water supplied to Phnom Penh increased from about 40 million cubic meters in 1998, to about 46 million cubic meters in 2003. In other urban areas taken together, the volume increased from 4.6 million cum. in 1998 to 8.8 million cum. in 2003.

Figure 4.4: Expenditure on Drinking Water Supply in Phnom Penh – 1998 to 2003



93. For the country as a whole, total volume of urban drinking water supplied thus increased from 44 million cubic meters in 1998 to 55 million cubic meters in 2003 (see Figure 4.3). The expenditure on drinking water supply in Phnom Penh steadily increased from about US$ 4 million in 1998 to about US$ 10 million in 2003 (see Figure 4.4).

94. In rural areas, many people take advantage of rainwater collected in large water jars during the wet season and use other means of water access during the remainder of the year – for many households, especially women and children, this may entail a long walk to fetch water.

95. Information on the volume of safe water available in rural areas is incomplete besides presenting several conceptual difficulties. The response is therefore more easily measured through estimating the number of drinking water facilities (wells, drilled wells, water basins, ponds and giant jars) available in the rural areas. Figure 4.5 plots their number between 1998 and 2003.

96. Groundwater reserves currently estimated at 17.6 billion cum are an important potential source of water supply for rural Cambodia. They have been exploited only in part, mainly by shallow tube wells used for community water supply and irrigation (MOWRAM, 2001). Dug and drilled wells increased from 3,000 in 1998 to approximately. 15,000 in 2003. This five-fold increase, supported by internationally funded rural water supply and sanitation projects, demonstrates the government's commitment to improving rural water supply. Nevertheless it presents an incomplete picture of the rural drinking water infrastructure and a more comprehensive accounting for the entire expenditure on improved rural water supply is needed.

97. The United Nations Water Conference recommended that Governments reaffirm their commitment made at Habitat II to adopt programs with realistic standards for quality and quantity to provide water for urban and rural areas.

Rating: Low and Consistent
Justification: RGC has consistently invested in improving access to safe water to both rural and urban areas. Water supply projects have increased the volume of water and in rural areas, and diversified the type of access. However, the level of investment was clearly inadequate given the extremely low percentages of rural access in Cambodia. Comparisons with other GMS countries are difficult but possible to make given the well developed WHO and UNICEF methodology and these comparisons are unfavorable to Cambodia.

4.1.5 Conclusions

98. Whereas progress has been made in improving access to safe water in various parts of the country the overall access to safe water remains low in Cambodia, and extremely low in rural areas. Considerable differences continue to exist between Phnom Penh and the rest of the country. Further efforts are needed to reduce this gap and bring Cambodia up to the world and GMS average. By itself, the rapidly growing population of Cambodia is not a major obstacle to improved water availability.

99. More systematic information needs to be collated of expenditure and details of improved water supply in rural areas of Cambodia. Only once the extent of the problem is fully understood will appropriate investments be allocated both from the national budget as well as internationally funded projects to improve the situation.

Rating: 1-STAR
Justification: Access to safe water has improved in both urban and rural areas of Cambodia has improved but improved from an extremely low base. The target of rural population access to safe drinking water appears to have been achieved but the adequacy of the target deserves to be questioned. Cambodia has by far the lowest overall percentage of access to safe drinking water among all GMS countries.

4.2 Water for Agriculture

4.2.1 The Context

100. Cambodia's economy is agrarian with about 85% of its population living in rural areas and most of them engaged in rain-fed and subsistence agriculture with one crop a year. Agriculture accounts for 39% of Cambodia's GDP (2001). Water plays an important role in agriculture productivity, largely coming from rainfall, and water extraction from the Mekong.

Table 4.1 : Water Use by Sector

Sector	Km^3/year
Domestic	0.136
Livestock	0.100
Agriculture	0.455
Industry	0.030
Miscellaneous	0.079
Total	**0.750**

Source: MOWRAM, 2001

101. The overall estimated water resources from the Mekong and tributaries are about 500 km^3 p.a. but total withdrawals of water are estimated to be a mere 0.75km^3/annum, of which 94% is for agricultural purposes (MRC, 2003; MOWRAM, 2001).

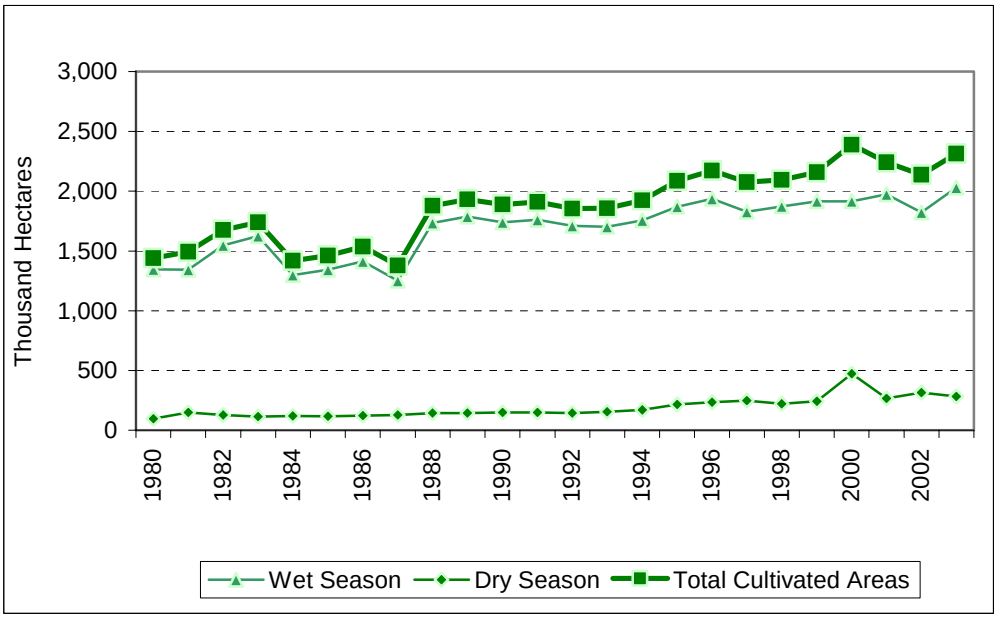
4.2.2 The State

Indicator: Areas under Rice Cultivation 1980-2003

102. Given the dominance of irrigation in the overall pattern of surface water use in Cambodia, the area under irrigated rice was taken as an indicator of the state of surface water resources.

103. At present, the cultivable land area of Cambodia is approximately 4.8 million ha, or 26% of the total land area; about 2.4 million ha is used to grow paddy. Of this, about 2 million ha are under wet season cultivation. Both wet and dry season rice are irrigated where irrigation infrastructure exists. In other areas, the cultivation is rain-fed.

Figure 4.6: Total Area under Rice Cultivation – 1980 to 2003



104. The total area under rice cultivation increased significantly from 1.4 million ha in 1980 to 2.4 million ha in 2000 (Figure 4.6). The growth in the area under rice has led to increased demand for irrigation supplies, especially during the dry season despite the fact that only 16.6% of the total rice-growing areas were irrigated at the end of 1990s. Irrigation capacity is still low in Cambodia and the capacity to store water for the dry season is limited. Most agricultural areas continue to be rain-fed only. Irrigated areas produce approximately 40% of the total rice production (MOWRAM, 2001). Although the country is largely self-sufficient in food in an average or good year, seasonal and year-to-year variations in rainfall can easily upset the self-sufficiency.

105. The RGC's *"Socio-Economic Development Requirements and Proposals for 2001-2005"* envisaged an increase in the irrigated area from 16.6% to 20% of the total by 2003, and an average rice yield of 2 t/ha by 2001 (MOWRAM, 2001).

Rating: Average and stabilizing
Justification: The area under rice cultivation has slowly but steadily grown from 1.4 million ha in 1980 to 2.4 million ha in 2003. Most rice producing areas are rain-fed only. The percentage of rice-growing areas regularly irrigated was 16.6% in the late 1990s. Increases in the rice-growing areas recorded in the last fifteen years exposed the limited capacity for irrigation water storage.

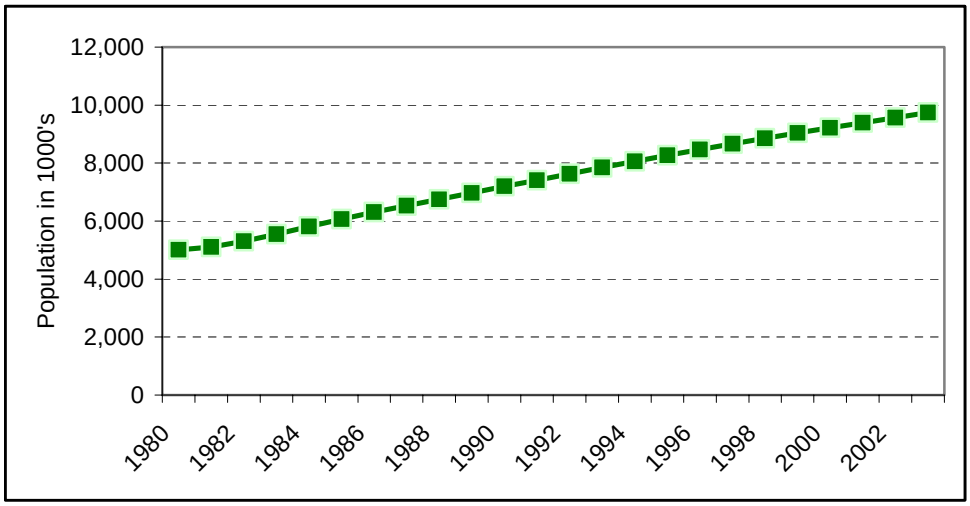
4.2.3 The Pressure

Indicator: Agricultural Population – 1980 to 2003

106. Growing population leads to a higher demand for food and land on which to grow food. Agriculture continues to be the principal user of surface water in Cambodia. Given these simple but powerful relationships, agricultural population was chosen as an indicator of the pressure on existing water resources usable by agriculture.

107. A Figure 4.7 plots the trend of agricultural population over the period 1980 and 2002. On average, agricultural population increased by about 200,000 people every year.

Figure 4.7: Total Agricultural Population – 1980 to 2003



108. Within GMS (see table 4.2), Cambodia is third ranked amongst the six GMS countries in terms of the proportion of the population which is termed agricultural.

Table 4.2 Agricultural Population in GMS Countries, 2003

Country	Agricultural Population (000)	Non-Agricultural Population (000)	Percent Agricultural
Lao PDR	4,297	1,360	76.0
Cambodia	9,747	4,397	68.9
Thailand	29,269	33,564	46.6
Myanmar	34,278	15,208	69.3
Vietnam	53,797	27,580	66.1
China	851,028	460,682	64.9
Source: FAOSTAT, Last update: 02 March 2005			

109. The agricultural population in Cambodia, as shown in Figure 4.7, has grown at a rate of 2.4% p.a., inevitably increasing the demand for irrigation water. MAFF's target for 2005-06 was to increase rice production by 18% from the 1999/2000 levels. Expansion of the area under irrigation is considered by RGC the principal means of achieving this target.

110. On the assumption that irrigation can contribute to a 50% increase in yields, MOWRAM estimated that an additional 180,000 ha of irrigated area would be required up to 2000-05 (i.e. 36,000 ha per year). A number of irrigation rehabilitation projects are underway or under investigation, such as Stung Chinit (7,000 ha), but the total area still falls short of the aforementioned target (MOWRAM, 2001).

Rating: Medium and Increasing
Justification: Demand for agriculture water is on the rise as population engaged in agriculture increases. Cambodia has the highest share of rural population in all of GMS countries. Indications are that the pressure on agriculture water demand from a growing population will continue to rise.

4.2.4 The Response

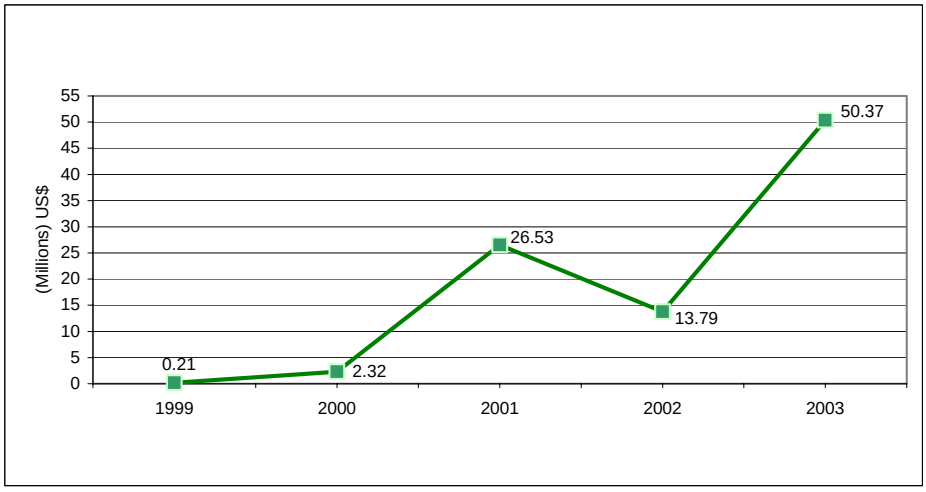
Indicator: Expenditure on Irrigation System Construction and Maintenance, 1999 to 2003

111. This indicator gives a picture of the government's (and donors') efforts to improve the state of irrigated agriculture, the assumption being that increased expenditure for irrigation would increase the areas irrigated and ensure better maintenance of existing systems. There have been a number of assessments of the scope for irrigation extension and rehabilitation, and extensive investments by RGC and its development partners in recent years.

112. Agriculture is still the key economic driver in Cambodia, and improving the state of irrigation infrastructure an important element of overall efforts. In the five years from 1998 to 2003, the plan was to increase the percentage of irrigated lands from 16.6 % to 20% of total farmland, or about 4% annually *(RGC, 1998-2003).*

113. Information is only available since 1999, the year after the election that gave a measure of political stability to Cambodia. Most of the existing irrigation systems had deteriorated until then due to inadequate maintenance and lack of support for improved irrigation management. Government's expenditure since 1999 has been significant, increasing from US$ 0.21 million in 1999 to US$ 50 million in to 2003 (see Figure 4.8). Data on average rice yields and percentage of lands irrigated are not yet available to say how effective those investments have been.

Figure 4.8: Expenditure on Irrigation System Construction and Maintenance – 1999 to 2003



114. Government's support for irrigation system construction and maintenance has amongst others included investment for drainage and flood protection works, dyke rehabilitation, canal building and maintenance and installation of pumping stations. This expenditure has been continuous though fluctuating from year to year.

Rating: *Non-comparable and intermittent*
Justification: Most existing irrigation systems do not function well as a result of decay during the time of Khmer Rouge and insufficient budgets in the decade immediately following. The RGC has since increased expenditure to rehabilitate and construct new irrigation systems in an effort to increase the percentage and

area of lands served by irrigation. During the period 1999-2003, RGC's target was to increase the percentage to 20%.

4.2.5 Conclusions

115. In a predominantly agrarian economy with rice cultivation as a major element, water availability becomes an important factor in determining Cambodia's self-sufficiency in the crop as well as maintaining its contribution to national economy. For now, agriculture (including rice cultivation) in Cambodia is largely rain-fed.

116. The area under rice cultivation has steadily grown leading to greater demand for water. In addition, rural agricultural population continues to grow, adding to that pressure. Over the years, government's efforts have been directed at reducing the nation's reliance upon rain-fed agriculture and expanding the irrigation network. This is demonstrated by the rise in government's expenditure on the sub-sector that increased from $0.21 million in 1999 to $50 million in 2003. The percentage of agricultural land now irrigated is believed to have reached 20%.

Rating: 2-STARS
Justification: Cultivated land for both irrigated and non-irrigated cultivation has increased. Growth in rural population has added to the demand for water for agriculture. The RGC has been steadily increasing its agriculture sector expenditure in particular to improve the irrigation infrastructure systems and reduce the reliance on rain-fed agriculture. However, compared with several other GMS countries, Cambodia still has some way to go in expanding and modernizing its irrigation management.

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5. Agricultural Land Management (Land Degradation)

5.1 The Context

117. The total land area of Cambodia is approximately 18.1 million hectares, of which 2.7 million hectares are cultivated under subsistence (WB, 2002). An estimated 85% of the people live in rural areas; some 70% of the people live in the lowland provinces along the Mekong and the Tonle Sap, which occupy 25% of the land area of the country (UNDP, 1990). Most of rural population is engaged in agriculture as primary occupation and access to agricultural land is important for rural population.

118. Up to early 1970s, allocation of farmland presented few complications (Thion, 1993). Following the upheavals of the Khmer Rouge period and instability of the period immediately after that the situation became more complex. In 1989, the Government decided to redistribute land with ceilings of 0.2 ha per family for residential construction, and 5 ha for cultivated land, and awarded concession rights to plantation land greater than 5 ha (WB, 2002). The decision resulted in land speculation. Coupled with poor implementation of the policy, the result was widespread dispossession of some peasants and various abuses. Arable land is clearly coming under pressure especially since 60 per cent of the total land area is under forest and is to remain under forest leaving only 40 per cent of the total land area or about 7.2 million ha to be managed by about 11 million rural inhabitants, i.e. with about 0.68 ha of arable land per capita before deductions are made for areas occupied by settlements and infrastructure. RGC considers that Cambodia's population density is still low.

The concern addressed here is the extent to which the increasing demand for land resources can be accommodated through productivity increases rather than through expansion of farming into fragile, let alone protected, ecosystems.

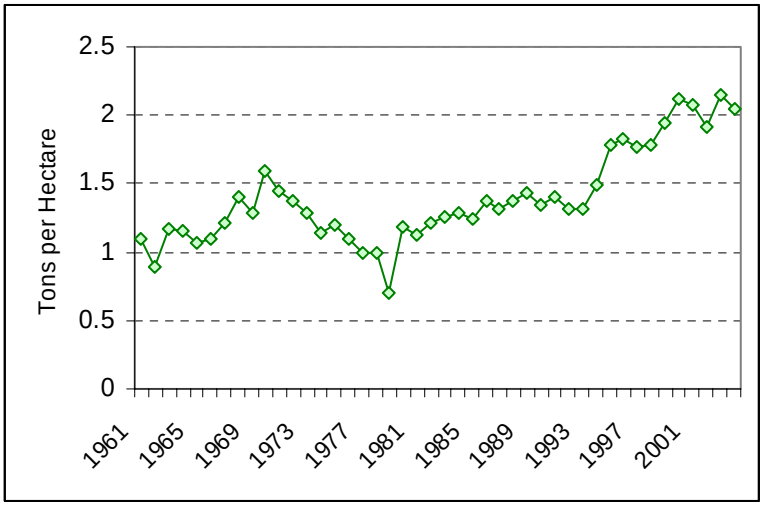
5.2 The State

Indicator: Average Rice Yield - 1961 to 2004

119. This indicator measures the changes in the productivity of cultivated lands helping to judge the degree to which greater pressure on land can be met without requiring further area expansion. Average rice yield data are available on an annual basis from 1961 to 2004. Rice is the staple food of Cambodia, providing 75% of the average daily caloric intake of Cambodian people. Most of the country's agricultural land is used for rice production, employing 77% of rural population. The RGC's *"Socio-Economic Development Requirements and Proposals for 2001-2005"* sets a yield target of 2 t/ha.

120. As shown in Figure 5.1 the average rice yield has approximately doubled over a period of 40 years, from about 1-1.2 tons/ha in the early 1960s to about 2.0 tons now, broadly meeting the target of the RGC's. Still, the Cambodian average yields are the lowest of all GMS countries, reflecting a low percentage of lands regularly irrigated. Also, the yield increases have lagged behind the population growth.

Figure 5.1: Rough Rice Yields in Meter Tons per Hectare – 1960 to 2004



121. The increase in rice yield in the 1990s is due mainly to higher fertilizer use and adoption of improved varieties. Improvements to the irrigation network were too limited to have played a significant role.

Rating: Relatively poor but Improving
Justification: Although the lowest in GMS, rice yields in Cambodia have shown signs of improvement since the early 1990s. Nevertheless it has taken about 40 years between 1960 and 2004 to increase rice yield from 1 to 2 metric tons per hectare. Rice yields have lagged behind population increases recorded during the same period.

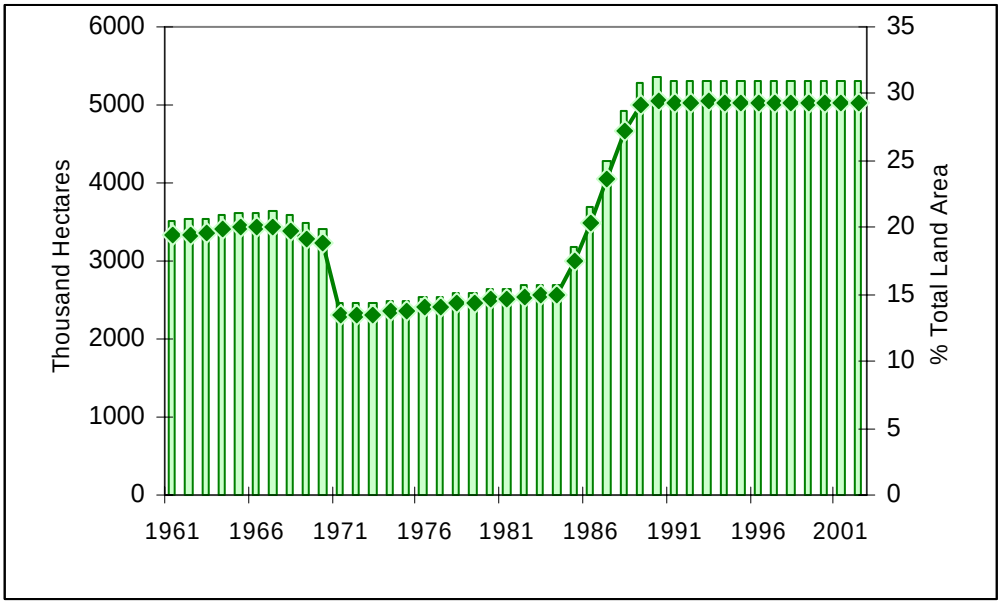
5.3 The Pressure

Indicators: Agriculture Land as Percent of Total Land – 1961 to 2002 **Agricultural Land per Capita – 1961-2002**

122. Availability of agriculture land, expressed either in per capita terms or as a percentage of total land area, is a simple and widely accepted way of describing the pressure on land resources.

123. Demand for farmland often comes into conflict with the demand for the same land from other segments of the economy especially once limits are place on further area expansion as they are in Cambodia by the official objective to keep at least 60 per cent of the total land under forest. Figure 5.2 plots the long term percentage of agricultural land in the total land area. That percentage fluctuated over the years, from 20% of the total land in the 1960s to about 13-15% in the war years of 1970s and 1980s and back to 19% in the beginning of the 1990s with the return of political stability.

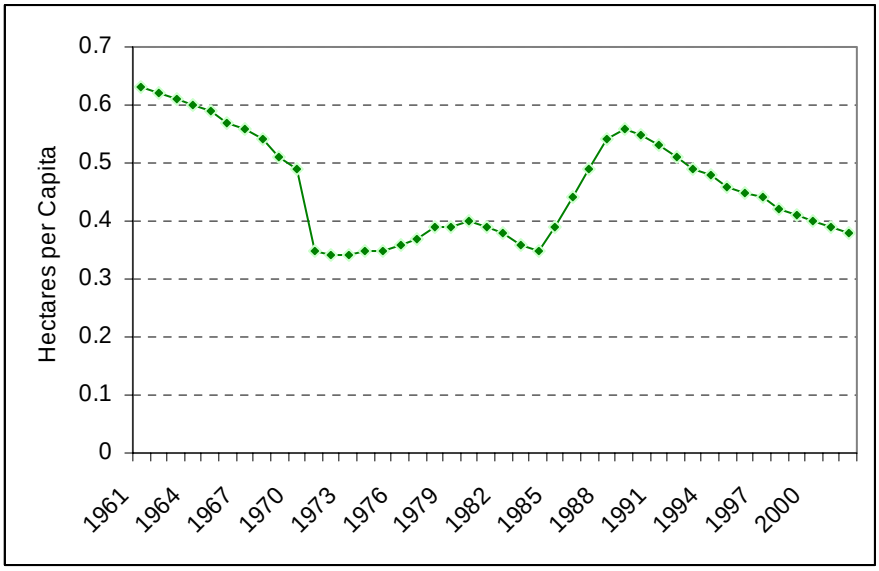
Figure 5.2: Agricultural Land as percent of Total Land Area – 1961 to 2002



124. Since then, the share of agricultural land increased further to 29.3% of the total land area mainly as a result of forest clearance. Compared with its GMS neighbors, the share of agricultural land in Cambodia is among the highest.

125. While the percentage of agricultural land in the total land areas grew, agricultural land per capita has shown a reverse trend, due to the increase in rural population. Rural population in Cambodia accounts for about 84% of the national total.

Figure 5.3: Agricultural land per Capita – 1961 to 2002



126. Agricultural land per capita declined from 0.63 ha in 1961 to about 0.35 ha in early 1970s. (Figure 5.3). The figure began to increase in the late 1980s from 0.39 ha in 1985 to about 0.56 ha in 1990 as a result of the land redistribution program initiated by the Government of Cambodia that re-instituted private ownership of land. Since the beginning of the 1990s, however, the population explosion in the countryside took the per capita endowment back to where it was in the early 1970s.

Important to note is that despite the decline, Cambodia's per capita endowment of farmland is among the highest in GMS

Rating: Low but increasing
Justification: Cambodia used to be a land-abundant country. However, agricultural land per capita saw a decline from about 0.65 per capita in 1961 to about 0.37 ha per capita in 2003 due to a rapid growth of rural population and constraints placed on area expansion. Efficiency of land use has come to be an important policy consideration.

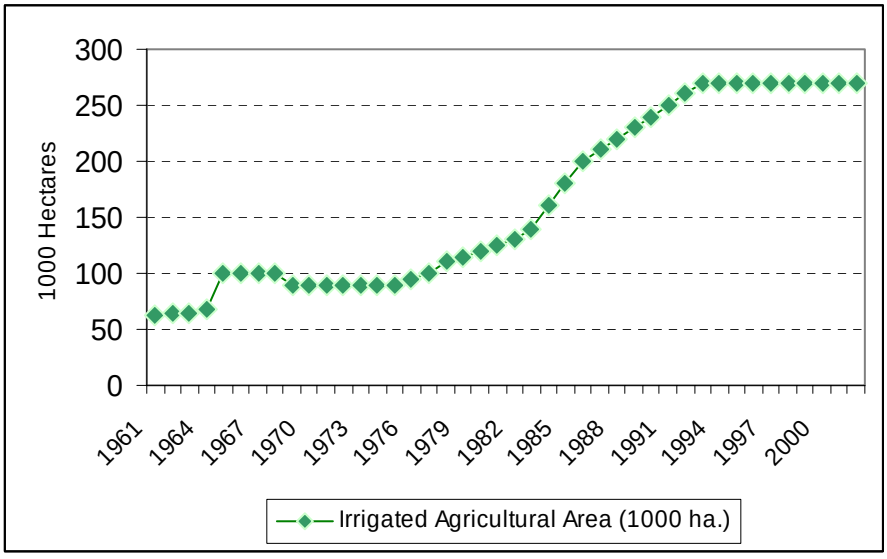
5.4 The Response

1st Indicator: Growth of Agricultural Irrigated Area 1961-2004

127. Provision of irrigation supplies is a standard response to potential scarcity of land. It normally involves creation of irrigation infrastructure to serve areas already farmed. In some cases, it may involve opening of new land for farming. As was mentioned earlier, the Government's target is20% of farmland irrigated by 2003.

128. Figure 5.4 provides the trend of irrigated agricultural area over a period of 40 years between 1960 and 2000 based on FAO data. The area irrigated increased from 62,000 hectares in 1961 to 270,000 ha in 1994.

Figure 5.4: Agricultural Irrigated Area – 1961 to 2003



129. In 2000, MOWRAM estimated that a 180,000 ha increase in total irrigated area would be required by 2005 to reach Government objectives for the rural sector (MOWRAM, 2001). This translates into an increase of irrigated agricultural areas by about 36,000 ha per year. Most of this increase was to come from RGC's program of rehabilitation of existing irrigation schemes.

130. To pursue the target, the RGC has nearly doubled the expenditure on irrigation construction, rehabilitation and maintenance between 2001 and 2003. The effectiveness of these investments is yet to be verified.

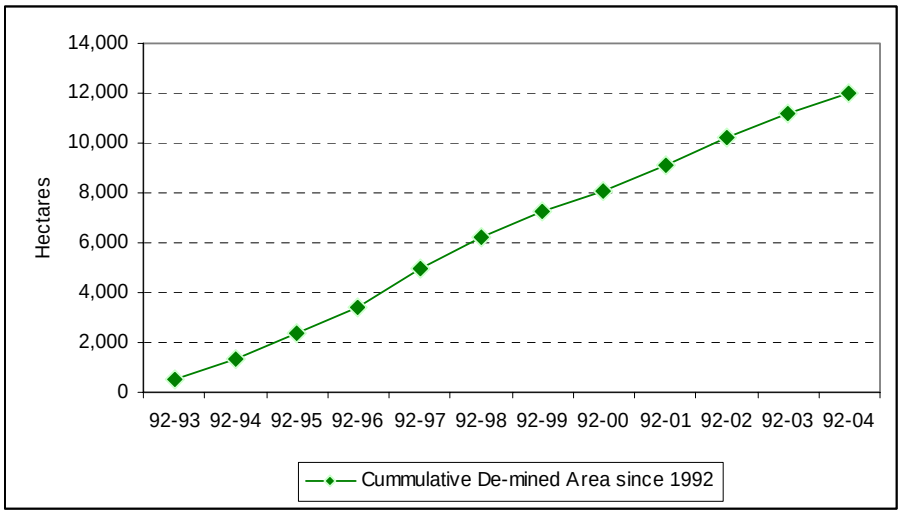
Rating: Significant and Intermittent
Justification: There has been a significant increase of the areas of irrigated farmlands in Cambodia since the late 1970s to a total of about 270,000 ha. It is not clear whether the increase is sustainable and accompanied by adequate maintenance of the larger areas irrigated. Since 1990, the Government has stepped up its investments in the improvement of irrigation infrastructure.

2nd Indicator: De-mined Areas 1992-2004

131. In Cambodian conditions, clearing farmland of unexploded ordinance (UXOs), is a way of adding to productive agricultural land besides its obvious role in reducing the risk to life and property. Most if not all of the land cleared of UXO reverts to farming. Demand for land, especially agricultural land, has been increasing and will continue to do so.

132. Following the end of the civil war large areas of land had been put beyond use under the cover of landmines and lay abandoned. Cambodia Mine Action Center (CMAC) has been conducting land mine/UXO de-contamination in Cambodia, so that the maximum number of people - predominantly rural but also urban - can go about their lives free from the threat of UXO, thus permitting reconstruction, re-integration and development activities to take place in a safe environment, making further progress towards the target of zero landmine victims by 2020.

Figure 5.5: Cummulative De-mined Area – 1992 to 2004



133. Figure 5.5 illustrates the total area under landmines cleared between 1992 and 2004. This increased steadily from 500 hectares in 1992 to reach 12 thousands hectares by 2004. This amounts to approximately 1,000 hectares of land recovered annually.

Rating: *Significant and Consistent*
Justification: Cambodia Mine Action Center has been clearing mine-contaminated land at a rate of about 1000 hectares annually. This has added meaningfully to the area of land available for farming besides eliminating the danger to life.

2.5.5 Conclusions

134. Cambodia's rural population has been outpacing the additions to farmland. Rapid population growth in 1990s in response to greater political stability and end of civil strife has led to a healthy growth if agricultural output and a growing demand for farmland. Farmland is no longer as plentiful as it used to be and its per capita availability, though still comfortable by GMS standards, has been declining. Greater attention given to environmental protection and a determined action by RGC in establishing and expanding the system of protected areas has placed limits on simple farmland area expansion.

135. Making land available for agriculture especially for rice cultivation therefore remains a challenge for RGC. Land reform and re-institution of private ownership of farmland has been one element of RCG's policy. The other has been attention to farmland productivity. Here, increasing the percentage of land area that is irrigated has played the central role. Investments in improved irrigation and irrigation rehabilitation have been stepped up, especially in the last five years. Average rice yields have been improving and are now at a historically high level of about 2 tons/ha.

Suggested Rating: 2 – STARS
Justification: The total area of agricultural lands has been increasing in Cambodia as land reform and other complementary measures such as land de-mining have exerted a positive influence overall though land conflict and land grabbing have not been adequately addressed. Because of a rapidly growing rural population, the per capita farmland availability has declined during the last decade and looks set to decline further. RGC policy has appropriately made increased productivity through expansion of irrigation the cornerstone of its policy of reconciling the increasing demands for farmland with its environmental objectives. RCG's budget has been re-oriented in line with the stated priority.

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6. Climate Change

6.1 The Context

136. Cambodia has been a participant in the international debate about climate change, its causes and possible consequences. In a country with a costal zone the prime concern has been a possible impact of global warming and sea level rise on that 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 Cambodia has acted upon it obligations under UNFCC.

6.2 The State

137. The status of climate change is determined by factors that are overwhelmingly outside the control of Cambodia or GMS authorities. In principle, a single report on climate changes is prepared for the whole world by the likes of IPCC. For that reason, this EPA report does not attempt to formulate a separate state indicator at a national level. A general decsription of Cambodia's climatic cycle is presented in the relevant factsheet.

6.3 The Pressure

Indicator: Greenhouse Gases Emissions - 1994

138. 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_2), methane (CH_4) and nitrous oxide (N_2O). As customary under UNFCCC reporting, the emissions are expressed in Gigagrams (Gg) of CO_2 equivalent.

Table 6.1: Past and Projected GHG Emissions by Sector - 1994 to 2020

	1994		2000		2010		2020	
Emissions	**Gg**	**%**	**Gg**	**%**	**Gg**	**%**	**Gg**	**%**
Energy	1,853	2.8	2,622	3.6	4,780	5.9	8,761	9
Industry	50	0.1	-		-		-	
Agriculture	10,560	15.5	12,030	16.4	17,789	22.1	26,821	27.5
Waste	273	0.4	331	0.4	425	0.5	523	0.5
LUCF	55,216	81.2	58,379	79.6	57,627	71.5	61,512	63
Total Emissions	67,952	100	73,362	100	80,621	100	97,617	100
Removal by LUCF	-73,122		-67,118		-61,090		-53,769	
Net Emissions	-5,170		6,244		19,531		43,848	

- Figures of 1994 were inventoried GHG Emissions (IPCC Methodology)
- Figures of 2000-2020 were projected based on 1994.
- LUCF – Land Use Change and Forestry.

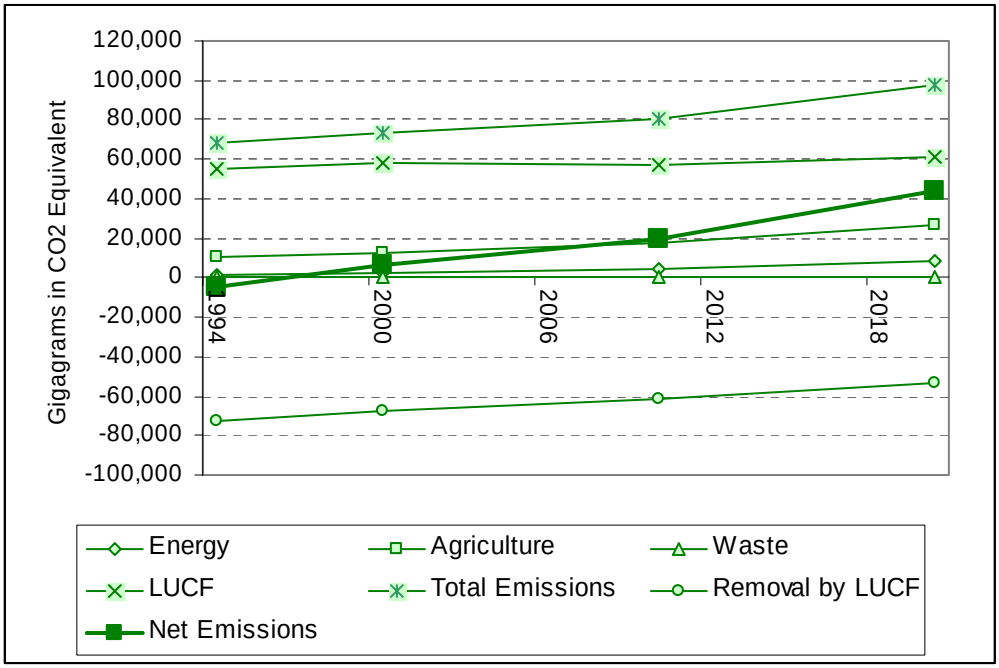
Source: Climate Change Enabling Activity Project, Ministry of Environment, August 2002.

139. In 1994, Cambodia contributed about 68 thousand Gigagrams (Gg) of CO_2-equivalent emissions, primarily form land use change and forestry (LUCF) sector (see Table 6.1). As can be observed, LUCF contributed for approximately 81% of total GHG emissions, while agriculture and energy contributed to approximately 16%

and 3% respectively. Contribution of the industrial sector to total GHG emissions was insignificant.

140. However, Cambodia also sequestered almost 73 thousand Gg of CO_2-equivalent through land use change and forestry sector. Therefore, in 1994, Cambodia was a net sink country. The overall assessment of Cambodia's contribution to greenhouse gas emissions using Global Warming Potential showed that Cambodia could offset approximately 5 thousand Gg of CO_2-equivalents of global GHG emissions in 1994.

Figure 6.1: Past and Projected GHG Emissions by Sector – 1994 to 2020



141. The results of the simulation analysis of greenhouse gas emissions and removals by sectors (see Figure 6.1 and table 6.1) indicate that in 2000 Cambodia may have already been a net emitter of GHGs with net emissions of approximately 6 thousand Gg of CO_2-equivalent. In 2020, the net emissions were projected to increase to about 44 thousand Gg of CO_2-equivalent. Among the sectors, LUCF would remain the main source of GHG emissions (63%), followed by agriculture (28%). Energy would only contribute approximately 9% of the total national emissions. Increase of GHG emissions by the agriculture sector would be higher than that of others sectors, from 16% to 28% of total national GHG emissions.

Rating: Low and Increasing
Justification: By 2000, Cambodia was likely to have changed from a net GHG sink to a net contributor of GHG emissions. Agriculture and land use/forestry were the principal emitters. Projections are for net emissions to increase up to 2020.

6.4 The Response

142. Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in December 1995. The Convention entered into force in Cambodia in March 1996.

143. A Climate Change Office was established in the MoE to provide technical information to the government about possible impacts resulting from climate change. National greenhouse gas inventory had been completed shortly before that, in 1994, as a step towards implementing Cambodia's commitments under UNFCCC. The donor community (GEF, ADB, WB, UNDP, FAO, DANIDA, Belgian Government, German Government, and the European Union), and nongovernmental organizations played a decisive role in organizing the information related to GHG emissions, supporting small research projects and developing research capacity during the last decade.

144. The UNDP/GEF-funded CCEAP is the only project on climate change in Cambodia so far. A supplmeentary UNDP/GEF financing for Second National Communication was approved in early 2002. As a least developed country, Cambodia participated in a UNITAR-executed project "Building Human and Institutional Capacities to Address Climate Change Issues in Least-Developed Countries". This project was complementary to information technology capacity building activities that were initiated by the CCEAP. The ADB's Promotion of Renewable Energy, Energy Efficiency and GHG Abatement (PREGA) project is still at an initial stage.

145. There are other projects that are not normally considered climate change projects but can reduce GHG emissions, once implemented. These include WB/MIME "Cambodia Renewable Energy Promotion Project", JICA's "Transport Master Plan Of Phnom Penh" and DANIDA's "Natural Resource and Environment Programme". Preparation of several climate change-related project proposals is underway and will be submitted to potential donors for funding.

146. The Japanese New Energy and Industrial Technology Development Organization (NEDO) has expressed interest in climate change projects under the Clean Development Mechanism (CDM). The Worldwide Fund for Nature (WWF) will possibly initiate its climate change programme in Cambodia with a focus on the linkage between climate change impacts and biodiversity in the Mekong drainage basin.

Rating: Low and Intermittent
Justification: Climate change will increasingly become a concern for Cambodia as its economy expands. The current programs of donor-assisted studies and projects have helped created conditions for the formulation of necessary mitigation strategies.

6.5 Conclusions

147. Climate change is recognized as a policy concern by the Cambodian authorities that have responded positively under Cambodia's participation in UNFCCC. Because of the importance of land use change and forestry and agriculture in GHG emissions, attention has been directed mainly at them. Existing estimates of actual emissions are based on work conducted in 1994 and all remaining figures are projection only.

Suggested Rating: 2 – STARS
Justification: Cambodia is a signatory to UNFCCC and initial efforts have been made to understand GHG emissions and other aspects of climate change as they

relate to Cambodia.

As Cambodia embarks upon the path of industrialization and urbanization, it will move from being a net “sink” to a net contributor of GHGs. The task ahead will be to adopt more stringent measures on controlling GHG emissions and creating an industrial base that respects climate change concerns.

To enable Cambodia to fully and actively participate in the implementation of climate change convention, additional technical and institutional capacity building programs are very important.

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III. CROSS CUTTING ISSUES IN AN ENVIRONMENTAL PERFORMANCE ASSESSMENT

3.1. Integration of Environmental Concerns in Economic Decisions

148. The primary objective of the Second Socio-Economic Development Plan (SEDP II, 2001-2005), the overarching development plan document for Cambodia, is to reduce poverty in the country through: (i) broad based, sustainable economic growth with equity; (ii) social and cultural development; and (iii) sustainable management and use of natural resources and the environment. SEDP II highlights the need to maintain macro economic stability and good governance to promote equitable and sustainable economic growth. SEDP II addresses most of the concerns assessed in the national EPA, particularly forestry, fisheries, water- and land resources. Special emphasis is placed on the role of natural resources in supporting rural livelihoods and national economic growth. The need to balance local and national needs as well as ensure protection of the environment is recognized in the national development planning process.

149. In relation to land tenure and land titling, SEDP II emphasizes the need to rationalize existing land and natural resource law in order to create the basis for market driven agricultural development, and to resolve the growing numbers of land disputes. This requires strengthening the institutional capacity of the Department of Land Titling and improved land use planning and zoning based on economic and environmental considerations.

150. In fisheries, the SEDP II notes that both inland and marine catches have stagnated since 1992. However, aquaculture production has increased. The main strategy is to expand and improve rice-fish farming in lowland farming areas and further development of aquaculture combined with improved protection of aquatic resources from over-exploitation. It recognizes the stagnation of inland fisheries production due to over-exploitation, conversion of inundated forest into agricultural land, poor management and environment degradation.

151. For forestry, SEDP II notes that Cambodia's forest resources if managed well could generate a sustainable flow of Government revenues to the tune of $100 million annually. A new Forestry Policy is being drafted that will take into account food security concerns and poverty alleviation and the potential of community based forestry for improved rural livelihoods.

152. SEDP II attaches considerable importance to good governance by advocating the implementation of the Governance Action Plan (GAP) (1998) which covers four cross-cutting areas of judicial and legal reform, public finance, civil service reform and anti-corruption as well as two related issues of natural resources management and demobilizations of armed forces. In the context of natural resource management, good governance assumes added meaning. Forest sector management and prevention of illegal logging is largely dependent upon the political and institutional will of intuitions like MAFF.

153. In addition to SEDP II, MoE's National Environmental Action Plan (NEAP) deals in detail with sustainable development of forestry, biodiversity and protected

areas, fisheries and floodplain agriculture in the Tonle Sap Lake. The annual inflow into Tonle Sap is essential for the national and sub-regional economy and the 1995 Agreement on Cooperation for Sustainable Development of the Mekong River Basin involving four out of six riparian countries assumes particular importance in this context. Royal Decree on the Creation of the Tonle Sap Biosphere Reserve was issued in February 2001.

3.1.1 Policy and Institutional Integration

Policy Framework

154. The new Constitution tasks the State with ensuring rational use of natural resources and environmental protection. Legislation to support sustainable development exists and is centered on the Law on Environmental Protection and Natural Resources. Other major environment-related acts are the Royal Decree on the Creation and Designation of Protected Areas, Land Law, Mineral Law, Forestry Law, Fisheries Law, Pollution Control Sub-decrees, and Sub-decree on Environmental Impact Assessment. Others under preparation are: Wildlife Law and Law on Protected Area Management.

155. The first environmental act of Cambodia was the 1993 Royal Decree on the Creation and Designation of Protected Areas, adopted World Conservation Union's (IUCN's) concepts of protected area management. It designated 23 areas of fragile and critical habitats constituting approximately 18% of the total area of Cambodia, one of the largest percentages in the region. The Government has since increased that area to 25% by establishing additional forest reserves.

156. The 1996 Law on Environmental Protection and Natural Resource Management contains the general principles to be followed by the Government in developing the legal basis of environmental management. The Law also requires the RGC to prepare national and regional environmental plans and formulate sub-decrees concerning a wide range of environmental issues, including environmental impact assessment, pollution prevention and control, public participation and access to information.

157. Sub-decrees on water pollution control, solid waste management, air pollution control and noise disturbance, and environmental impact assessment (EIA) have recently been promulgated. A new Land Law was promulgated in 2001. Other key pieces of legislation include the Forestry Law, Fisheries Law, Wildlife Law, and Law on Protected Area Management.

158. The Government is currently implementing major reforms in key natural resources management sectors, i.e. forestry, fisheries, and land. RGC's campaign to prevent illegal logging and uncontrolled deforestation in Cambodia began in 1995. In 1996, a National Steering Committee to manage forest policy within the Department of Forestry and Wildlife was formed to steer the forest reform process. The drafting of the new forest legislation to govern the allocation and management of forest resources, began in 1998 and is on-going. The new legislation will include a new Forestry Law, a sub-decree on Forest Concession Planning, Management and Control, and a Sub-decree on Community Forestry.

159. Reform in the fisheries sector is currently underway with the introduction and expansion of community-based fisheries management. Land reform, which started recently, aims at supporting the poor by providing land titles and strengthening traditional land use rights.

160. The translation of the above legislative framework into detailed regulations and guidelines is far from complete and the regulatory gaps need to be closed if the legislative framework is to become fully functional.

Institutional Framework

161. Cambodia has made significant efforts to create institutions to support sustainable development. In 1993, the Government established the Ministry of Environment and gave it a broad mandate to promote environmental protection and conserve natural resources throughout the country. Two new ministries with direct mandates to ensure sustainable use of natural resources were created after the 1998 election, i.e., Ministry of Water Resources and Meteorology and Ministry of Land Management, Urban Planning and Construction. To support implementation of programs related to sustainable development, the Government has created several cross-sectoral National Committees, such as those for Biodiversity, Protected Areas, Coastal and Marine Management, and the Management of the Tonle Sap Biosphere Reserve.

162. The overall direction of the Ministry of Environment's activities is an extension of the general principles to which the Cambodian Government is committed. These include: (i) recognition of the links between poverty and environmental degradation; (ii) commitment to a participatory approach to deal with environmental issues; (iii) acceptance of the need for an integrated approach to solving environmental problems; and (iv) importance attached to strengthening relevant institutions and awareness building. The Ministry of Environment is responsible for promoting environmental protection and conservation of natural resources throughout the Kingdom, contributing to improving environmental quality, public welfare, national culture and the economy. It facilitates the formulation and implementation of policies, plans and legal instruments relating to the use of the country's natural resources. Simultaneously, the Ministry has the role of informing and motivating the public and supporting public participation in decision-making to resolve environmental and natural resource use issues.

163. The Ministry of Agriculture, Forestry and Fisheries (MAFF) has a significant role to play in sustainable development in Cambodia since its mandate covers the management of forest and fisheries resources. MAFF is engaged in the development of policies and strategies for agriculture, forestry, and fisheries that have significant implications for the management of the water resources required for irrigation and capture fisheries/aquaculture.

164. The Ministry of Land Management, Urban Planning and Construction (MLMUPC) [5] established in 1998 is responsible for land management, urban planning, construction and titling, in coordination with other ministries. MLMUPC's responsibilities extend to industrial zoning, and resolution of conflicts relating to mapping and land titling.

165. In the water sector, the principal vehicles for inter-agency co-operation are the Cambodian National Mekong Committee, the Ministry of Economy and Finance, and the Council for the Development of Cambodia. The Cambodia National Mekong Committee (CNMC) is a national institution formed as a response to the 1995

[5] MLMUPC has five departments, namely (1) Administration, (2) Land Management and Urban Planning, (3) Construction, (4) Cadastre and Geography and (5) Inspection.

Mekong Agreement to coordinate the work of 10 ministries[6] related to policy, management, conservation, rehabilitation and research involving water and related natural resources of the Mekong River Basin.

166. In addition, Ministry of Water Resources and Meteorology (MOWRAM) was established in 1998. Its responsibilities include development of strategies and plans for water resource development and conservation, managing common water resources, mitigating water-related disaster and conducting research and monitoring of water resources.

167. Cambodia's National Biodiversity Strategy and Action Plan was completed in 2001 but many of its recommendations remain unimplemented. This, however, is not unusual given the status of NAPBC in most GMS countries as documents prepared in response to the country's international obligations under UNCBD rather than a document tight woven into the Government budget and Public Investment Program. Important in the present context is the ongoing UNDP/GEF Cambodia National Capacity Self-Assessment for Global Environmental Management (2004-2006) conceived to coordinate responses to the threats of biodiversity loss, climate change, and land degradation. The project is overseen by the National Biodiversity Steering Committee (NBSC). Chaired by Minister for Environment and vice-chaired by the Secretary of State for Agriculture, Forestry and Fisheries the Committee with its 15 members plus 3 members from MOC, MOH, and MEF represents a serious attempt at institutional integration.

168. Each of the key ministries has departments at the provincial level within a structure headed by Provincial governors (who are responsible to the Minister of the Interior). Provincial departments receive their budget allocations from their parent ministries and in principle receive technical support from and report to them. However their linkages to national parent ministries are often overshadowed by those within the provinces, with a balance of advantages and disadvantages this represents. Coordination among ministry/departmental staff at provincial level may be stronger than at national level, because of more immediate oversight by governors. Coordination is particularly strong in the context of project implementation at Provincial and local levels, e.g. of projects like PRASAC. Provincial Rural Development Committees also provide a coordinating mechanism, at provincial level.

169. Cross sector activities in the environment field are carried out mostly through international funded projects and coordination or steering committees created to facilitate these projects' implementation. The work of such committees is usually donor-funded.

170. With a high level of involvement of international organizations (IOs) and NGOs in Cambodia's water sector, coordination of their activities with those of government agencies is a major issue. The Government has expressed dissatisfaction with the extent to which many NGOs and IOs operate quasi-independently, and outside the framework of the SEDRP and PIP. However, much of the NGO/IO activity is administered through provincial-level agencies. A consequence of weak inter-agency coordination is that NGO/IO interventions themselves are frequently also not well coordinated (despite the existence of three NGO umbrella agencies and six sectoral

[6] These ministries include Ministry of Public Works and Transport, Ministry of Water Resources and Meteorology, Ministry of Environment, Ministry of Agriculture Forestry and Fisheries, Ministry of Foreign Affairs and International Cooperation, Ministry of Industry, Mines and Energy, Ministry of Planning, Ministry of Land Management, Urban Planning and Construction, Ministry of Rural Development, and Ministry of Tourism.

committees). An example in the water sector is the weak coordination between the national strategy for agriculture developed by MAFF/FAO/UNDP before 2001 and the directions developed since then by MOWRAM and several IOs that channel their assistance through MOWRAM.

171. The Environment Impact Assessment (EIA) process was officially launched in Cambodia in March 2000, providing a framework for assessing the environment impacts of development projects. EIA is an important legal tool for environment assessment and planning aiming at safeguarding the environment at each stage of project or program development. MoE's Department of EIA is responsible for the implementation of EIA Sub-decree and to do this, it needs to collaborate with other departments within the MoE and other ministries. The EIA procedures embodies a principle of initial screening that determines the intensity of subsequent environmental assessment and is modeled on practices common world-wide.

EPA Manager Institution

172. The preparation of the present EPA and the continuity of the EPA process has raised the question of who should be responsible for future EPAs in Cambodia. With its broad mandate for environmental management and conservation and experience acquired during the preparation of the current EPA, MoE seems the natural home of future EPAs. Within MoE, various departments have something to say about environmental management including the Department of Natural Resources Assessment and Environmental Data Management (DONRAEDAM) and Department of Environment Impact Assessment (DEIA). The Department of EIA is responsible for assessing the impacts of projects on the environment while DONRAEDAM is responsible for the overall assessment of performance related to the environment management. DONRAEDAM is also equipped with the facilities for GIS, mapping and data analysis.

173. Within the MoE "home", the Department of Natural Resources Assessment and Environmental Data Management would be responsible for the EPA task, in association with MoE technical departments and conjunctions with concerned institutions.

174. As MAFF also plays a vital even if indirect role in environmental management, MAFF should have a role in the conduct of future EPAs. Department of Fisheries, Forestry Administration and other departments under MAFF could play an important role in EPA and provide essential inputs.

3.1.2 Environmental Expenditure and Financing

175. The RGC's combined budget resources are limited and this is reflected in budget allocations to the agencies directly or indirectly involved in environmental management. Table 3.1 summarizes the expenditure incurred by various sectors over the period 1995-2003. Environmental management does not receive a separate allocation and instead, its elements are found mainly under agriculture and marginally under other expenditures. Even without unraveling the details, the totals make it clear that financial resources for environment management are a very small percentage of the total.

Table 3.1 Expenditure by Sector, Central Government (Million Riel)

	1995	1999	2000	2001	2002	2003
General public service	72.6	133.7	187.9	253.7	268	285

Defence	456.1	473.5	455	404.4	423	413
Education	77.9	166.8	183.2	212.3	268	323
Health	26.1	76.3	121	130.3	149	202
Social security and welfare	37.6	25.4	26.9	29.6	30	33
Housing and community amenities	0	0	0	0	0	0
Agriculture	13.1	24	26	31.4	38	34
Industry	4.7	5.3	6.1	6	6.9	8
Electricity, gas and water	0	0	0	0	0	0
Transport and communication	18.7	83	41.9	61.4	66	57.7
Other services	18.9	38.3	10	78.4	73.1	81.3
Others	11	83	71	47.1	243	319
Total	736.7	1109.3	1129	1254.6	1565	1756
***Source:* ADB, 2004**						

176. Table 3.2 shows MoE's budgets for the period 2001-2003. Within its modest totals, the bulk of expenditure is for administration, staff salaries and support of provincial departments.

Table 3.2: Ministry of Environment Budget, 2001-2003 (Million Riels)

Expense Category	Amount 2001	%	Amount 2002	%	Amount 2003	%
Salaries	670	13.9	790	11.3	1,230	14.2
Administration and small scale repairs	2,390	49.8	4,370	62.6	5100	58.8
Social and cultural expenses	110	2.3	100	1.4	100	1.1
Provincial Department budgets	1,600	33.3	1,680	24.1	2,195	25.3
Contributions	30	0.6	40	0.6	50	0.6
Total	**4,800**	**100.0**	**6,980**	**100.0**	**8,675**	**100.0**
***Source:* MoE Strategic Plan 2004-2008**						

177. In these circumstances, it is not surprising to learn that most development activities in fields such as biodiversity conservation and protected areas management, climate change, as well sustainable fisheries and forest management are funded by international donors.

178. Foreign aid financed about 75% of the US$100 million capital expenditures in 1998 as well as a large program of Technical Assistance (TA), budgetary support and emergency relief. In 2001, donors pledged a total of around US$645 million to Cambodia. Several major aid agencies are involved in development activities in Cambodia. Japan, the largest donor, mainly supports construction of bridges, roads and ports, power and health care. ADB, The World Bank, the United Nations agencies, the European Commission, Sweden, France, Australia, DANIDA, and about 400 non-government organizations are working in Cambodia.

179. Environment and conservation receives an allocation of 3.6 percent split roughly equally between investment projects (notably construction of a new sanitary landfill for Phnom Penh and sustainable development of coastal wetlands) and technical assistance projects for capacity building in environmental management. Ministry of Environment has been receiving support from international donor agencies since its birth in 1993 and has since implemented a number of different environment-related projects, in some cases jointly with other line ministries.

180. The UNDP provided early support to environmental education and awareness building under the "Environmental Technical Advisory Program (ETAP)". The World Bank also provided support for a forest reform and underwrote the preparation of the National Environmental Action Plan in 1998. U.K.'s Department of International

Development (DFID) has contributed significantly to fisheries management in Cambodia. The ADB provided support for marine and coastal management in the early 1990s. In mid-1990s, ADB launched a GMS-wide program of technical assistance supporting also long term capacity building in environmental management (the present SEF II Project one of its recent components). Many other agencies and international NGOs have contributed financially and otherwise and their full listing is not attempted here.

181. Instead, Table 3.3 contains only the largest recent donor-funded projects in the environment management sector. It is estimated that more than US$35 million are being currently (2003-2006) spent in Cambodia for environment-related projects; mostly implemented by MoE. This total does not include activities funded under DANIDA's sub-regional fund for fisheries management implemented by MRC and a similar fund for forestry established by GTZ. ADB's assistance to Ministry of Water Resources and Meteorology, especially for the preparation of a water resource management strategy is also not included.

Table 3.3 On-Going International Assistance for Environmental Program in Cambodia

Program	Donor	Amount (US$)	Year
Tonle Sap Environnemental Management Project	ADB	15,000,000	2003-2008
Biodiversity Management and Conservation in the Tonle Sap Biosphere Reserve	UNDP	4,000,000	2003-2008
Environmental Management of the Coastal Zone (Step III)	DANIDA	3,170,000	2002-2006
Capacity development for the Clean Development Mechanism (CDM)	GEF	305,000	2003-2004
Formulation of the National Adaptation Program of Action to Climate Change (NAPA)	GEF	199,500	2003-2006
Community Forestry research Project in Cambodia (Phase III)	IDRC	234,000	2003-2006
Development of Bio-safety Framework	UNEP/GEF	223,000	2004-2006
WWW Conservation Program in Cambodia	WWF.USA	3,515,000	1999-2006
Biodiversity and Protected Area Management	WB/RGC	4,910,000	2000-2002
Support in the Installation of Additional Equipment for LAB	JICA	2,500,000	2001-2004
Strengthening the Industrial Pollution Monitoring	DANIDA	500,000	2002-2006
Stung tren RAMSAR Site Management	GEF	300,000	2001-2003
Support Program for LAB	French	20,964	2002-2003
Basel Project	Basel	39,342	2003-2004
Ozone Project	UNEP	130,000	2002-2005
POPs Project	UNEP/GEF	490,000	2003-2005
Capacity Strengthening and development in Urban Waste Management	DANIDA	200,000	2001-2006
Total Budget		35,736,806	
Source: **MoE, 2004**			

182. International assistance has long played a key role in supporting environment management in Cambodia but coordination between the funding agencies is poor and leads to overlapping projects and agendas. In terms of state-of-the-environment assessment and reporting an initial assessment was prepared in 1994 by UNDP. In 2004, DANIDA sponsored an update due for completion in 2005. The current EPA with its different approach explained in Part II of this report is the first of its kind in Cambodia.

3.2 Implementation Issues

183. In spite of various institutional and financial constraints, RGC has been making a steady progress in several dimensions of the country's environmental management. Key legislation targeting environmental concerns is in place or is being finalized. Other legislation being revised includes the Fisheries Law, Water Law and the Wildlife Law. No legislation is perfect and most needs periodic revisions even in the best of circumstances but at least the obvious gaps that once marked Cambodian reality are no more.

184. Implementation of environmental policies is constrained to a large degree by lack of financial resources, limited capacity and poor inter-agency coordination. This is a major challenge for the RGC, especially the MoE which has a critical role to play in harmonizing the approach to environmental management in the country. The Environmental Law (1996) makes it MoE's responsibility to ensure adequate coordination with other relevant ministries such as MAFF, MOWRAM, MIME, MLMUPC. However, the technical and other resources of MoE are not always sufficient to discharge this task adequately.

3.2.1 Regulatory and Economic Instruments

185. The regulatory framework for environmental management in Cambodia is getting more comprehensive by the day as mentioned earlier. The challenge now is to effectively implement and enforce these regulations.

186. In terms of command and control approach to environmental management most Cambodian laws contain articles either specifying charges for different forms of use or fines for violations of regulatory provisions. For instance, the Forestry Law (2002) allows transport of forest and non-timber forest products under permits issued by the Forestry Administration (Article 69). The Law also utilizes the system of fines for offenders who violate the relevant provisions (article 90 to 101). The Fisheries Law (1987) classifies fishing operations into commercial, medium and small scale so as to regulate the sector. The Fisheries Law applies a permit system and provides for payments for the transportation of fisheries products as well. Land Law uses the permit system as a basis of temporary land concessions of up to 10,000 ha against payments of rental fees to the government. (Land Law, Article 48 to 59).

187. A Sub-decree on EIA identifies projects that are subject to EIA e.g. all types of garment factories, forest land concession and processing industry, land concession, agriculture concession and tourist development. All forest concessions and land concession greater than 500 ha are subject to EIA provisions.

188. The Sub-Decree on Solid Waste Management and Sub-Decree on Air Pollution Control and Noise Disturbance creates a permit system to control and manage solid waste and pollution. The two sub-decrees refer to public health and WHO standards although exact benchmarks are not provided. A Sub-Decree on Solid Waste Management restricts the trans-boundary movement of hazardous waste in compliance with the Basel Convention.

189. While these regulatory and economic instruments exist, the effectiveness of their use remains low. This is due mostly to lack of appropriate technical and institutional capacity in the government. Institutions lack the necessary technical know-how and equipment often needed to implement the regulatory provisions. Lack of budget is a major, though not the sole, cause.

3.2.2 Enforcement

190. As mentioned earlier, enforcement of regulations and policies remains a weak link in the chain to improved environmental management. Key factors include weak institutional capacity of the responsible agencies; multiplicity of authorities and overlapping mandates. In spite of that, some advances have been made and groundwork is being laid for further improvements. Among other things, the preparation of this EPA report has demonstrated that despite various limitations discussed above, RGC and its agencies can organize information in a purposeful manner in support of environment performance monitoring. This is a good beginning.

191. In ***forestry***, the RGC has adopted appropriate measures that led to cancellation of poorly performing forest concessions and a more disciplined approach to forest concession supervision. The requirement for forest concessionaires to develop a management plan including environmental protection and community forestry elements indicates that RGC has endeavored to adopt a balanced but firm approach in forests concession management and further reform the sector.

192. The RGC has undertaken reforms in the ***fisheries*** sector as well, releasing 56% of the commercial fishing lot areas for community fisheries development reinforcing fisheries management and protection of aquatic resources. In the ***water*** sector, the RGC has undertaken measures to improve drinking water provision for both urban and rural areas. The RGC also plans to rehabilitate and build new ***irrigation*** systems to improve rice and ***agricultural*** production. ***Land*** management has seen reforms as well including land registration and private ownership.

193. Despite these advances it is recognized that effective implementation of policies and enforcement of regulations still has a way to go. Improving internal consistency of policies, laws and regulations related to some of the priority concerns addressed in the EPA would facilitate this journey. Some examples of inconsistencies are presented below:

- The *Law on Commune Administration*, *Article 43* assigns the responsibility for protection and conservation of natural resources to Commune Councils, but *Article 45* indicates that Commune Council has no authority over forest.

- The *Law on Environmental Protection and Natural Resource Management* assigns the overarching role and responsibility for environment protection and management to MoE. However, there are institutional and regulatory overlaps with Forestry Administration and the Department of Fisheries of MAFF that also have a mandate on forestry, fisheries and water resources. MoE's jurisdiction extends to 23 protected areas declared by the Royal Decree in 1993. MAFF, at the same time, has the overriding authority on forest and fishery including protected forests.

- Within Forestry Administration in MAFF, a Community Forestry Unit has been established to facilitate community forestry development. A similar unit has been set up in the MoE. It is questionable whether MoE's Community Forestry's Office uses the Environmental Law or the Sub-decree on community forestry to enforce the principles of Community Forestry.

- In the Tonle Sap Lake, three sites designated as Biosphere Reserves namely Prek Toal, Boung Tonle Schmar and Stung Sen, are included in the 23 protected areas list. However, the same areas are also listed among the Department of

Fisheries' fishing lots making parts of the areas potentially available for auctioning off to fishing operators. This raises the question of enforcement jurisdiction of MoE and DoF over the same area. Likewise, several national parks (such as Bokor, Kirirom, and Boeung Per) are located inside valid forest concessions.

- MOWRAM is responsible for water resource management and has planned irrigation systems throughout the country e.g. the Stung Chinit Irrigation Project being built under a loan from the ADB. Other schemes have been proposed such as the Northwestern Irrigation Project in the floodplain of the Tonle Sap Lake. However, the Fisheries Law (1987) prohibits any form of irrigation activity inside the floodplain as it could impact the fishery habitats in the floodplain. This is a case where DoF and/or MAFF need to work more closely with MOWRAM to address any potential conflicts and impacts arising from such development.

- The Land Law and Sub-decree on EIA apply to land concessions of up to 10,000 ha. These regulations were adopted after concessions much bigger than 10,000 ha had been granted to private concessionaires. This raises the issue of enforcement and monitoring limits set by these regulations. The RGC has now drafted a Law on Economic Land Concessions which addresses the issues of large forest and agricultural land concession allocation of such type. The draft is yet to be adopted.

- Areas of potential conflict also exist between national and provincial level authorities. In the case of community fisheries and forestry, for instance, key initiatives have been adopted by the agencies at the local level; however technical support and legal sanction from the national offices are not readily forthcoming. The coordination between provincial level and national level is poor, especially in resource management.

194. Given Cambodia's natural resource wealth, its vulnerability to conflicting demands is understandable. As RGC's sustainable development agenda matures, it is expected that the regulatory framework and institutional roles will gain in coherence. Community participation will taker firmer hold as time progresses as RGC's community based natural resource management programs becomes more securely integrated into the development planning process and the Cambodian Millennium Development Goals framework.

3.3 Environment and Civil Society

195. Civil society plays an important role in environmental and natural resource management in Cambodia. Sustainable use of natural resources demands such a role. Directly or indirectly, NGOs have affected environmental management in Cambodia for some time. The NGO forum in Cambodia is made up of local and international non-governmental organizations grounded in their experience of humanitarian and development assistance to Cambodia. The NGO Forum exists for information sharing, debate and advocacy on priority issues affecting Cambodia's development. The NGO Forum highlights the impact of development processes and economic, social and political changes on Cambodians. It has several programs under its purview including those with important repercussions for land use, livelihood and natural resource conservation.

196. The NGOs have been active participants in the shaping and implementation of the national sustainable development agenda. Besides various forms of field

involvement, not least in education and environmental awareness, the NGOs have regularly commented on many aspects of the nation's quest for sustainable development. These reports have sometimes been critical and harsh. Yet the overall impact has been positive, the constructive elements and the often good knowledge of local conditions outweighing the less constructive and ideological ingredients.

3.3.1 Environment, Health and Safety

197. Healthy population is a dimension of sustainable development. The link between the two is becoming increasingly apparent in many parts of the world. In the East Asia and Pacific region, major diseases such as dengue fever or cholera and infectious diseases such as HIV/AIDS and TB often accompany industrial growth and environmental stresses. Waste management is an issue of growing concern throughout the region. Production of fish, aquatic products and livestock is accompanied by wide use of antibiotics and growth hormones. The SARS epidemic has served as a reminder of the fragility and dangers of certain resource management practices. In the East Asia and Pacific region, a large proportion of the poor works in the informal sector without the benefit of health insurance coverage. Workplace safety and environmental standards can be compromised by the concessions that governments make to attract private sector investments.

198. Public health is influenced in complex ways by environmental conditions. That influence is fairly straightforward in the case of access to safe drinking water. The impact of environmental degradation on agricultural productivity and through it, on nutrition is more complex intertwined as it is by vast differences in income status and access to resources. About 20% of Cambodia's population was undernourished in 1998. (GPCC 1998). In 2000, 2001 and 2002, Cambodia suffered from severe floods bringing with them water borne diseases. Droughts of the more recent years have caused shortages of water and contributed to a rise in pulmonary diseases. Absence of adequate sanitation is known to contribute to the incidence of water born diseases though –surprisingly-- the subject has not been studied in detail in Cambodia.

199. Access to even basic health care is not easily available to the poor. Poor health contributes to poverty through reduced productivity and increased household indebtedness, mostly in rural areas. In Cambodia, the levels of morbidity and mortality from infectious communicable disease such as malaria, dengue, tuberculosis, diarrhea, acute respiratory infections, and sexually transmitted diseases is amongst the highest in the world. Problems are aggravated by inadequate water supply, sanitation and health services (SEDP-II, 2001-2005). Poverty is linked to environmental degradation. The poor are losing their means of livelihood following the degradation of natural resources. They are forced to exploit the diminishing resources to support their day to day living. About 36% of Cambodia's population lived below the poverty line at the turn of the decade, down from 39% in 1993-94. Poverty incidence in secondary cities fell from 37% to 30%, in rural areas from 43% to 40%, and it remained at 11% in Phnom Penh during the same period. Rural households account for almost 90% of Cambodia's poor (SEDP-II, 2001-2005). Despite an expanding economy, more than a third of the population has income less than USD1 per day (ADB, 2003).

200. The highest poverty rate, 44%, is found among households headed by farmers whose livelihood depended primarily on the natural resources. Households headed by government officials have a poverty rate of 18%. Poverty rates are high among households whose head have no formal education (42%) or have only primary

schooling (40%). These two groups account for four-fifths of the poor. The prevalence of poverty among households whose heads had completed lower and higher secondary education level fell to 24% and 12% respectively (UNDP, 1998; SEDP-II, 2001-2005). The Tonle Sap Region has the highest population of 38% living below poverty line i.e. higher than the national average (36%) with around 50% of the villages in the Tonle Sap Region and 40-60% of households living below the poverty line (ADB, 2002).

3.3.2 Access to Information and Public Accountability

201. Civil society consists of groups outside formal government, including local community, associations, private sector and NGOs. The influence of civil society on the management of environment and natural resource has been increasing. The 1996 Law on Environmental Protection and Natural Resource Management recognizes the importance of the civil society's participation in natural resource management. MoE encourages public participation in the protection and management of natural resources (Article 16). The 1998 National Environmental Action Plan was formulated with inputs from representatives of civil society (as well as international agencies like UNDP, World Bank and IUCN).

202. The preparation of the National Biodiversity Strategy and Action Plan, too, benefited from inputs by large sections of the civil society. The Plan recognizes that success is likely to rest to an important degree on the involvement of the local populations in critical decisions affecting biodiversity. The drafting of SEDP II is yet another example of a wider consultation effort that took place during the period 2001-2005. To gain a deeper understanding of the lives of the poor, 169 focused group discussions were convened among low-income groups in 154 villages throughout rural areas and 15 non-rural socially disadvantaged groups. This face-to-face method of working was an innovation that the Government has since adopted more widely to supplement formal surveys.

203. The Forestry Law, Sub-decree on Community Forestry and Fisheries and Draft Fisheries Law were widely discussed with local community representatives, NGOs and the private sector even if the quality of civil society representation left something to be desired.

204. In general, participation of stakeholders is promoted by various projects, depending on the nature of the project and the institutions involved. Most donor-funded projects actively encourage stakeholder participation. However, the question of participation's quality and real influence on decision-making or design of a project still needs to be firmly established. Also, the question of the type of consultation that might be appropriate (or even mandatory) for private sector-led projects involving resource management (e.g. tree crop plantations) is yet to be answered.

205. Despite widening consultation, access to environmental information remains limited in Cambodia. Release of information held by government agencies requires permission and authorization from various levels of government authority. The process is slow and frustrating.

206. Information exchange within the NGO community is more open (and often used by the Government especially in reporting to the donors). It is organized around networks such as the NGO Forum, the Cooperation Committee for Cambodia, the Environmental NGO Network, the Fisheries NGO Network, the Forestry NGO Network and the Agriculture NGO Network.

3.3.3 Environmental Awareness and Education

207. Public awareness about the environmental problem is increasing. The media have been widely covering the environmental problems ranging from forest to fisheries and from water to wastewater. In the MoE, there is a Department of Environment Education. In 1998, the Department worked closely with UNDP's Program on Environmental Technical Advisory Program (ETAP) to raise public awareness of environmental issues. The Program was instrumental in the Government's decision to include environmental matters into the primary school curriculum.

208. ETAP supported 12 NGOs to work on monk environmental education in collaboration with the Department of Environment Education of MoE. These NGOs have programs to provide environmental education in various provinces of Cambodia using monks as leaders. The NGO network on monk environmental education has produced a book called the *'Cry of the Forest'* in which Buddhist religious concepts are used to explain environmental problems and seek environmental improvement through the Buddhist way of life.

209. The Environment Day is celebrated every year on 5th June in an effort to raise awareness of environmental issues. The Environment Day activities are extended to the provincial levels as well. NGOs work closely with the Ministry of Environment to implement these activities at the grassroots level. The local NGO known as *Mlup Baitong* has developed a radio program on the environment that often raises pertinent local issues such as over-fishing, deforestation, wildlife poaching and land degradation.

210. As to higher education, the Department of Environmental Science was set up in 2000 at the Royal University of Phnom Penh to provide bachelor-level degree courses in environmental sciences.

IV. CONCLUSIONS AND RECOMMENDATIONS

211. The natural resources of Cambodia are under pressure from different segments of the society in an expanding economy and in conditions of rapidly growing population. In a still mainly rural based country the brunt of economic growth is likely to be borne by the natural and biological resources unless suitable safeguards are built into existing policies and institutional arrangements.

212. Supported by international donors, the RGC has been taking steps to address the environmental and sustainability issues and draw a balance between the economic growth and environmental protection. However, more work is still required. Management of natural resources (especially fish and forests) is undergoing a difficult transition from a revenue-driven to sustainability-oriented approach. The share of national budget devoted to environmental management is low relative to the values at stake. Cambodia continues to rely on the donor community for most of its environmental funding.

213. Civil society and the NGOs are emerging as an important voice in the implementation of the environmental and sustainable development agenda in the country. However, their contribution to environment protection is still limited at the central level and constrained by insufficient decentralization of natural resource utilization decisions.

214. With Cambodia more clearly moving in the direction of market economy, the need for environmental safeguards has become increasingly apparent. The road to improved environmental performance in Cambodia passes through a more complete integration of environmental concerns into sectoral and economic decision-making, improved institutional capacity, policy development and involvement of civil society in environment management together with greater budget support for environmental management.

The sections below highlight the key conclusions of the assessment of Part 2 of the report and make recommendations.

4.1 Forestry Resources

215. Part II described the success of the country's authorities in meeting, ahead of schedule, their target of maintaining the forest cover of at least 60% between 2005 and 2025. Part III mentioned some of the institutional improvements. However, this progress needs to be consolidated. No less important, the quality of the assessment in future EPA's can be further improved. The following recommendations are made:

A. <u>The EPA process and data</u>

1) Future assessments should contain information about the quality of the standing forest, not merely about the area defined to be "under forest". The quality parameters of greatest relevance include the percentage of canopy cover and suitably organized information about the composition of the standing stock.

2) Cambodia may want to take the lead in (finally!) working towards GMS-wide comparability in the one area (i.e. forest cover) that is of the greatest public interest in each of the countries and globally. This is not an easy task technically and

bureaucratically but the status quo (no or little comparability) seems less defensible with each year that passes by.

3) Cambodia seems to have somewhat better data on the habitat composition of different protected areas than most other GMS countries. Despite that, recent expansion of the protected realm would justify efforts to update estimates of the standing forest –appropriately defined—contained in each of the protected areas.

4) Make the monitoring of the conditions of cancelled forest concessions the acid test of the effectiveness of Government's enforcement. Create a performance indicator specifically targeting these areas.

B. Other recommendations

5) The policy on selection of reforestation and forest rehabilitation projects undertaken by the Government and choice of community-based projects has not been formulated. The case for reforestation in a country with a high forest cover can be made but it has not been so far. It should be. Ensure that the Community Forestry Sub-decree is in line with such a policy.

6) Once the case for community forestry has been strengthened, integrate forest management into RGC's "*Seila"* Program and ensure that local government, especially the Commune Councils, play a role in resource management at local level.

7) Eliminate dysfunctional arrangements and amend conflicting legislation following the examples given in the report and any other. In particular improve (a) institutional coordination and reconcile the policies of the Forestry Administration and the Ministry of Environment with respect to the management of forest in protected areas; and (b) compatibility between forestry policies and the Law on Commune Administration.

8) Propose the best way of monitoring compliance with forest concessionaires' development and management plans that would make room for local populations (that can either gain or lose depending on how the concession holders operate). Ensure that such monitoring does not detract from attention to non-concession violations of the Forest Law.

4.2 Threat to Biodiversity

216. The assessment of Part II notes the substantial areas of different habitats and areas placed under protection in Cambodia while Part III mentions the beginnings of efforts to situate biodiversity conservation within a broader "multi-convention" space alongside UNCCD and UNFCCC. Here, too, more needs to be done.

A. The EPA process and data

1) Information is needed for the next EPA that would allow the authorities and the public to judge how effective the protected status has been in conserving the biodiversity potential of the designated areas. As a minimum, this requires data, at well chosen intervals, of the changes of the areas of key and subsidiary habitats within each protected area as well as subsidiary parameters such as protection expenditure.

B. Other recommendations

The following proposals are made:

2) Study the best ways of reconciling the targets of the National Biodiversity Strategy and Action Plan with RGC's budget and the Public Investment Program. Use the insights to begin to modify the approach to the preparation of new national action plans under international environmental conventions or their updates. The plans need to change from being "shopping lists" for donors to being components of documents (such as poverty reduction strategies that command a consensus of the Government and the donor community) that drive the budget process.

3) Monitor the achievement of RGC's Cambodia Development Millennium Goal stated target of increasing the number of park rangers from 600 to 1,200 between 2001 and 2015.

4) Approve and pass the latest draft of the Law on Wildlife with its intent to discourage trade in endangered wildlife and hunting of endangered species. Following the adoption of the Law on Wildlife, prepare appropriate sub-decrees or *prakas* including those dealing with community based biodiversity protection and management. Accompany such regulations by a supply of equipment to forest and park rangers.

4.3 Fisheries Resources

217. Fishery resources were described in Part II as being under pressure by a growing population, and an apparently non-diminishing use of destructive fishing practices. Yet the inland fish catch has been increasing but the sources of this increase are not well described. The marine catch and its importance are poorly documented. This suggests the following agenda ahead of the next EPA:

A. <u>The EPA process and data</u>

1) Gather better data on the output of small-scale and rice-field fisheries and explain if it is they or something else that has been supporting the apparent increase in per capita fish consumption in Cambodia.

2) Produce a complete time-series of the estimates of fish production in Tonle Sap by different categories of operators. The seeming inability to derive such a series is hard to justify.

3) Assemble information about the output and exports of marine fisheries.

4) Consider the scope for using direct and indirect indicators of the pressure exerted by illegal fishing practices and it change over time.

B. <u>Other recommendations</u>

5) Assemble available evidence that demonstrates that the community model of fisheries results in a more sustainable management of the resource. Once satisfied, support the Fisheries Law that sanctions the ongoing fishery sector reform with its sub-decree on community fisheries.

6) Promote decentralized fisheries management to Commune Councils and local community consistent with the RGC program of decentralization.

7) Improve coordination and cooperation between DoF, MoE and Ministry of Water Resources and Meteorology to avoid the overlapping roles and responsibilities following the examples given in this EPA.

8) Explain to the public why it is difficult to reduce destructive fishing practices.

9) Place greater emphasis on the protection of the wetlands now overshadowed by the attention to Tonle Sap.

4.4 Water Resources

218. The earlier sections of this EPA described the moderate improvements in access to safe potable water in Cambodia in the last few years from extremely low levels. They also noted the diversity of the ways in which rural water supply can be improved that makes the quantification of this improvement difficult. Looking at irrigation water, Part II suggested that shortages of irrigation capacity, especially water storage capacity, have been a constraint on further growth of agricultural productivity. The environmental importance of irrigating more in Cambodia lies in the potential for increased agricultural productivity that may well hold the key to de-fusing a potential conflict between a growing demand for farmland and the policy of increasing the area of protected habitats. At the same time, judging water resource adequacy only by reference to irrigation performance or agricultural productivity may be too narrow an approach. The recommendations are the following:

A. <u>The EPA process and data</u>

1) Review the application of the existing methodology to estimating the percentage of access to safe potable water supply in rural areas and provide an indication of the margin of error inherent in that methodology. Make the case for improving the accuracy of the existing estimates. Make an attempt to separate the improvements in water supply due to government and donor efforts and those made by the rural households without outside assistance.

2) Begin to assemble data about the quality of rural water supply, in particular information about possible deterioration or contamination of rural water supply attributable to economic and other anthropogenic activities.

3) In future EPAs, consider modifying the indicator of response from expenditure on irrigation management to expenditure on integrated water resource development, having first agreed on its definition.

4) Given the importance of Tanle Sap, include into future EPAs an assessment of performance with respect to the pollution of the Tonle Sap by non-point sources, with particular attention to fertilizer and agro-chemicals' use.

B. <u>Other recommendations</u>

5) Ministry of Water Resources & Meteorology (MOWRAM) has recently been established with the task of developing and implementing a long-term development strategy for water resources in Cambodia. Facilitate regular consultations between MOWRAM and MoE on the most meaningful ways of measuring the quality of overall water resource management.

4.5 Management of Agricultural Land

Part II structured performance assessment around the effect of farmland availability and irrigation coverage on average yields, and through them on additional pressure (or not) for converting non-farm lands to agriculture. The assessment pointed to increasing average farmland productivity that however lagged behind the population growth. The increase in irrigation coverage and areas de-contaminated of UXO added to the supply of farmland. The structure of indicators chosen puts agricultural productivity at the center of the assessment without looking further into the question of whether increases in farm productivity are sustainable or whether they come at the

cost of adverse environmental impacts (such as excessive use of agro-chemicals etc.). Future EPAs may want to explore some of these questions, in particular

A. The EPA process and data

1) Consider developing secondary indicators of the state of agricultural land such soil erosion or humus content

2) Assemble evidence on the levels of pollution by fertilizer and agro-chemicals' run-off

B. Other recommendations

3) Provide data on the cost effectiveness of de-mining operations to judge whether a good case can be made for an acceleration of this activity.

4) Strengthen the land management committees at all administrative levels to help resolve land conflict issues

4.6 Climate Change

219. Cambodia has prepared an initial estimate of its GHG emissions and sequestration. These estimates, made only once in 1994, however, are now increasingly out of date. The following are recommended:

A. The EPA process and data

1) Re-estimate the actual GHG emissions in today's economic circumstances.

B. Other recommendations

2) Pay attention to renewable energy development 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, the climate change repercussions of different variants of the Tonle Sap ecosystem management, etc.

3) Support the work of UNDP/GEF Cambodia National Capacity Self-Assessment for Global Environmental Management Project (2004-2006) conceived to address the threats of biodiversity loss, climate change, and land degradation in a coordinated and planned manner. Place new institutional initiatives in the area of climate change within a broader multi-convention framework.

4) Continue to support climate change awareness raising programme and technology transfer.

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