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Table of Contents

Abbreviations & Acronyms

CARD	Council for Agriculture and Rural Development (of the Council of Ministers)
CC	Climate Change
CCCA	Cambodia Climate Change Alliance
CDC	Council for Development of Cambodia
CF	Community Forestry
CFi	Community Fisheries
CI	Conservation International
CIDA	Canadian International Development Agency
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CMDG	Cambodian Millennium Development Goals
CRDB	Cambodian Rehabilitation Development Board
CSES	Cambodia Socio-Economic Survey
D&D	Decentralization and De-concentration
DANIDA	Danish International Development Assistance
DFID	Department for International Development (UK)
DDT	dichlorodiphenyltrichloroethane
EIA	Environmental Impact Assessment
ELC	Economic Land Concession
ENR	Environment and natural resources
EU	European Union
FA	Forest Administration
FAO	Food and Agricultural Organization of the UN
FFI	Fauna and Flora International
FiA	Fisheries Administration
FLEGT	Forest Law Enforcement, Governance and Trade
FS	Food Security
GDCC	Government-Donor Coordination Committee
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GERES	Groupe Energies Renouvelables, Environnement et Solidarités
GHG	Greenhouse Gas
GMS	Greater Mekong Subregion
GPCC	General Population Census of Cambodia
IDRC	International Development Research Center
IMSCEE	Inter-Ministerial Steering Committee for Environmental Education
IPCC	Inter-governmental Panel on Climate Change
IWRM	Integrated Water Resources Management Strategy
JICA	Japanese International Cooperation Agency
JMI	Joint Monitoring Indicator
LDC	Least Developed Country
LEISA	Low-External-Input Sustainable Agriculture
LICADHO	Cambodian League for the Promotion and Defense of Human Rights
LPG	Liquefied Petroleum Gas
MAFF	Ministry of Agriculture, Forestry and Fisheries

MDG	Millennium Development Goal
MEC	Mines Exploration Concession
MEF	Ministry of Economy and Finance
MIME	Ministry of Industry, Mines and Energy
MLMUPC	Ministry of Land Management Urban Planning and Construction
MoE	Ministry of Environment
MoEYS	Ministry of Education, Youth and Sports
MoP	Ministry of Planning
MoU	Memorandum of Understanding
MRD	Ministry of Rural Development
NAPA	National Adaptation Plan of Action (under the UNFCCC)
NBP	National Bio-digester Programme
NCDD	National Committee for Sub-National Democratic Development
NCDM	National Committee for Disaster Management
NCPA	Nature Conservation and Protection Administration
NFP	National Forestry Program, RGC 2010
NFSP	National Fisheries Sector Policy
NGO	Non-Government Organization
NIS	National Institute of Statistics
NRWS	National Rural Water Supply
NZAID	New Zealand Agency for International Development
ODA	Overseas Development Assistance
PA	Protected Area
PES	Payment for Environmental Services
PIP	Public Investment Plan
PPCR	Pilot Programme on Climate Resilience
PSDD	Project Support for Decentralization and De-concentration
REDD	Reduced Emissions from Deforestation and forest Degradation
RGC	Royal Government of Cambodia
RWSS	Rural Water Supply and Sanitation
RWSSP	Rural Water Supply and Sanitation Policy
SA	Sustainable Agriculture
SFM	Sustainable Forest Management
SLC	Social Land Concession
SNEC	Supreme National Economic Council
SPFF	Strategic Planning Framework for Fisheries
TWG	Technical Working Group
TWG-AW	Technical Working Group on Agriculture and Water
TWG-F	Technical Working Group on Fisheries
TWG-FE	Technical Working Group on Forestry and Environment
TWG-L	Technical Working Group on Land
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation

UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Fund for Population Alliance
UNICEF	United Nations Children Fund
UNIDO	United Nations Industry Development Organization
WB	World Bank
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
WWF	World Wide Fund for Nature

Summary

* Environmental and natural resources (ENR) in Cambodia are threatened by short-sighted over-exploitation on an increasing and threatening scale. This reduces the Country's overall natural capital, yet whilst great benefits flow to the few; equally great burdens fall on the many.
* Continued over-exploitation of current scope and scale will undermine future socio-economic development, increase greenhouse gas emissions and may well induce social unrest and instability.
* Yet Cambodia still possess a very rich environmental and natural resource base which, with truly sustainable management can provide prosperity for multiple generations, restore the resiliency of the land and increase Cambodia's regional and worldwide standing.
* The most critical issues in ENR are: a) Surface water management, both as an age-old challenge and now increasingly critical because of planned and actual infrastructure building on the Mekong and the implications of climate change; b) Land allocation and use, especially on forested state land; c) Depletion of forests (including inundated forests), primarily through logging and concessions for resource extraction, and; d) Degradation of soil driven by unsuitable agricultural practices.
* Some of the strongest drivers of this destruction and degradation are based in neighbouring and nearby countries, though with willing and active partners in the highest levels of Cambodian society.
* Improving soil productivity is essential for sustained socio-economic development, which will continue to be heavily based on agriculture.
* Energy demand is steadily increasing and a significant scale-up in broad-based efforts to supply or mitigate this demand is required in order to reduce the resource pressures for fuel wood. Despite the great potential for a diverse and renewable energy mix, planned provisions are mainly from unsustainable sources such as large-scale destructive hydropower and fossil fuels.
* Awareness levels, education and understanding about environmental and natural systems, services, resource rights and current trends are critically low in all groups of the population.
* Donors are often in *'analysis paralysis'* and trying to do development by *'intelligent design'*, while collaboration among government agencies is challenging at best. Information about ENR and their proper management is scarce, incomplete and often ambiguous or contradictory. This makes concerted action more difficult, and reduces the harmony of voice and participation of both the civil service and wider population.
* Lessons from donor-supported activities are regularly drawn out and disseminated but not always used. Coordination among donors is much declared and desired but difficult to deliver, and implementation of donor support is too frequently in 'boutique' mode and not sustained over sufficient time.
* Through indigenous knowledge, domestic experience and donor-supported efforts it is often known what is needed in ENR management and how to do it. There are many skilled experts and many clever and experienced rural people are highly active and committed.
* Thus, good opportunities exist to *'go to scale'* in the EU partnership with the government and people of Cambodia both in terms of sustainable ENR management and enhancing voice and accountability.
* The EU is recommended to support direct and immediate improvement in the main ENR fields identified above: Management of surface water, management of state land and the forests on it and improvements in soil fertility. Whilst these fields may appear superficially separate, they have strong mutual interrelations and connect directly to the issue of increased public voice and education in ENR.
* The EU is further recommended to address such key ENR issues at international, regional and national levels, through all available instruments, from development cooperation to international agreements, trade arrangements and information dissemination. The EU should exploit the many opportunities for effective synergies in its partnerships and programming in Cambodia for these purposes.
* Such action will have immediate and longer-term positive effects in terms of safeguarding Cambodia's natural capital and environment and, through this process, support sustainable growth, poverty reduction, food security and the rights of participation for all Cambodians, including youth, women and ethnic minorities, in the governance of the environment and natural resources of their country.

1 Introduction

Preparing a Country Environment Profile is an exercise mandatory for any EU Delegation, both within the framework of programme formulation, but also and mostly for the preparation of the 2014-2020 Country Strategy Paper, which will directly or indirectly influence EU cooperation with Cambodia.

The latest (and only) comprehensive 'State of the Environment' report for Cambodia was published by the Ministry of Environment (MoE) in 2004, with technical and financial donor assistance from Denmark. MoE produced a partial update (relying much on same information as the 2004 effort) in 2009 with support from GEF, in the 'Environment Outlook'.

The factual information in this Country Environmental Profile (CEP) has thus been gathered from a multitude of sources with a view to presenting the most recent information, data and analysis available.

The analysis presented in the report is based on consultations and direct experiences and was shared with all relevant stakeholders at a one-day workshop on 6 February 2012 in Phnom Penh. The draft report was subsequently circulated among stakeholders in March 2012 and the suggestions and comments arising have been taken into consideration.

2 State of the Environment: Trends, Pressures and Driving Forces

This chapter describes the general state of the environment in Cambodia, with sub-sections introducing key trends, pressures and driving forces behind a wide range of environmental and natural resource (ENR) themes.

2.1 Definitions & General Considerations

Whilst the traditional worldview of environmental policies and practice was to reduce pollution - the *'do-no-harm'* approach - the paradigm of *'do-good'* is now being increasingly adopted, albeit not yet fully implemented. This expresses itself in concepts like 'green growth', 'natural capital' enhancement, etc. and is now being introduced into the Cambodian context. Thus, sustainable green growth must consciously use the natural capital without depleting it. It must rather strive to increase e.g. soil fertility, water availability and volumes, biodiversity and a balanced and non-toxic atmospheric composition. This report will apply a dualistic view of the natural environment as a source of livelihoods, economic activity, ecosystem services and quality of life, as well as a sink, for air, land and water pollutants. Climate change is considered a form of pollution , which even reduces the capacity of the environment to act as such a source.

2.2 Overview: Environmental Goals and Status

A study on the status of Cambodian Millennium Development Goal #7: *Ensure Environmental Sustainability* (Danida, DFID and NZAid, 2010) shows status across all indicators, as reported by Government agencies.

Indicators	Benchmarks		Most Recent Available			Targets		Progress	Distance to target
	Value	Year	Value	Year	Source	2010	2015		
7.1 Forest cover (% total area)	60	2002	57.59	2009	FA	60	60	-2.41	-2%
7.2 Surface of 23 protected areas (million ha)	3.3	1993	2.9	2009	MoE	3.3	3.3	-0.4	-12%
7.3 Surface of six new protection forests (million ha)	1.35	1996	1.53	2009	FA	1.35	1.35	0.18	13%
7.4 Number of rangers in protected areas	600	2001	480	2010	MoE	960	1200	-120	-60%

7.5 Number of rangers in protection forests	500	2001	315	2010	FA	500	500	-185	-37%
7.6 Proportion of fishing lots released to local communities	56.46	2000	56.74	2010	FiA	60	60	0.28	-5%
7.7 Number of community-based fisheries	264	2002	469	2010	FiA	464	470	205	-1%
7.8 Surface of fish sanctuaries (thousand ha)	23.5	2000	38.03	2009	FiA	46.6	60	14.53	-37%
7.9 Proportion of households dependent on fuel-wood	92	1993	91.1	2008	GPCC	61	52	0.9	-39%
7.10 Proportion of rural population with access to safe water source (Dry Season)	24	1998	43.1	2010	GPCC	40	50	19.1	-7%
7.11 Proportion of urban population with access to safe water source (Dry Season)	60	1998	81.6	2010	GPCC	74	80	21.6	2%
7.12 Proportion of rural population with access to improved sanitation	8.6	1998	23	2008	GPCC	20	30	14.4	-7%
7.13 Proportion of urban population with access to improved sanitation	49	1998	75.75	2010	GPCC	67	74	26.75	2%

Table 1: Status of Cambodian MDG#7 - Ensure Environmental Sustainability (2010)

2.3 Land

2.3.1 Land use, conversion and loss

Cambodia comprises an undulating plateau in its eastern part, a continuous flat plain (the Lake Tonle Sap lowland) interrupted only by isolated hills (*Phnoms*) and the Mekong River in the central part of the country, highlands to the north and northeast and the Cardamom Mountains in the south-west. The agricultural area was estimated at 5.5 million hectares (ha) in 2009, with estimated cultivated areas totalling 4.1 million ha. 96% of this area was used for annual crops and 3.8% for permanent crops[1].

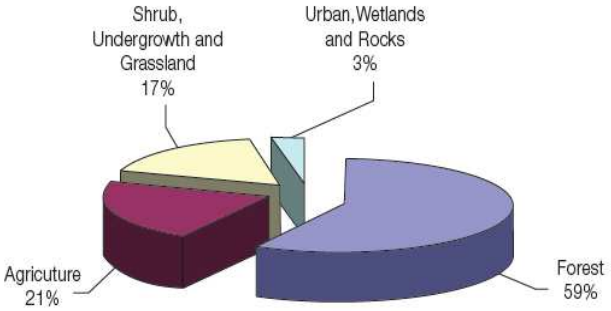


Figure 1: Land-use in Cambodia, MAFF (2001)

The Ministry of Agriculture, Forestry and Fisheries (MAFF) published a chart in 2001 to represent the overall distribution of land use in Cambodia, including 59% as forest land (Figure 1). Since then the Forestry Administration (FA) has reported a forest cover figure of 57% (2010), despite the obvious rapid expansion of urban areas for residential and industrial land use.

Accurate and up–to-date information is not easily available or verifiable, but there are many reports of enhanced pressure and encroachment on forestland, both from large-scale operators and individual households. The establishment of a land concession system has had profound effects on land use change over the last ten years. In 2008, approximately 2.8 million ha of land were under land concessions and mineral exploration licences[2]. Agricultural land near cities and towns is increasingly used for industry or

[1] FAO, 2010 (http://www.fao.org/nr/water/aquastat/countries/cambodia/index.stm). Accessed 15/02/2012.
[2] NGO Forum (2009) "A statistical Analysis of Land Disputes Occurring in Cambodia 2008", Special Report

habitation, not least around Phnom Penh, Sihanoukville and Siem Reap. This is restricting the space for traditional livelihood seeking for local communities and smallholders. Encroachment on agricultural and grazing land, and the resulting loss of livelihoods, is the most commonly voiced issue of concern for communities[3].

Road networks are bisecting more and more of the Country. Major road building programmes are stimulating economic development but have been criticized for the inadequacy of their social and environmental safeguards.

The Asian Development Bank's Greater Mekong Subregion (GMS) Environmental Operations Centre launched the *GMS Interactive Atlas* in 2011 and is gradually adding additional data layers to the existing base, which is very limited in terms of land use[4]. At present though, CambodiaAtlas[5] has the most detailed land use map available, albeit with data from 2004. Since then no national-scale maps have been produced[6]. A CIRAD project in Cambodia has produced a useful overview of key land use issues and relations between agricultural expansion and natural resources (CIRAD, 2011).

2.3.2 Land Rights

Private land in Cambodia is increasingly titled and entered into a new cadastral system. While this is still far from perfect, good progress is being seen, with substantial donor assistance, including previously from the EU, World Bank and others and with Finland, Canada and Germany[7] involved on a long-term basis. The Royal Government of Cambodia (RGC) ceased collaboration on this programme in response to a World Bank investigation into breaches of the Bank's safeguards policies relating to forced evictions and resettlement (BIC, 2010).

The problem in natural resources management that overshadows all others is the distribution of land, and especially the allocation of nominal state land (mainly forests) to concessions for mines or industrial agriculture.

The 2001 *Land Law* formalized the legal framework for granting concessions for economic purposes. An *'Economic Land Concession (ELC)'* is a long-term lease that allows the beneficiary to clear land in order to develop various activities, including large-scale plantations, raising animals and building factories to process agricultural products. MAFF is responsible for granting ELCs and no other authority can legally grant an ELC. According to law, details of all ELCs should be listed in the 'ELC Logbook'[8]. However, the MAFF is largely powerless when instructed from more powerful strata of Cambodian society, and will issue concessions even when these are in formal contrast to existing legislation e.g. concerning Protected Areas or indigenous land rights (MAFF, 2010). The issuance of concessions in protected areas violate international agreements.

Due to a widely acknowledged lack of transparency in the way ELCs and mining concessions are granted (as well as social concessions, which are sometimes granted for purposes other than those intended), it is very difficult to assess exactly how many concessions have been approved, which concessions are active and how much revenue has been raised in the process. The MAFF website states that as of April 2010, 956,690 hectares of land have been granted as ELCs. However, many new concessions have been granted since this date and the real figure is considered to be considerably higher[9]. The webpage of *Open Development Cambodia* is mapping ELCs in Cambodia according to official documents available[10] and also provides a list of concession holders. In a striking demonstration of the lack of transparency on this issue the human rights

[3] UN Cambodia Office of the High Commissioner for Human Rights: Economic Land Concessions in Cambodia - A Human Rights Perspective, June 2007
[4] http://www.gms-eoc.org/index.php/resources/gms-interactive-atlas.html
[5] http://www.cambodiaatlas.com/map
[6] Information from Aruna Technologies, February 2012.
[7] http://www.gtz.de/en/themen/laendliche-entwicklung/11786.htm
[8] This logbook is updated and maintained by MAFF and can be found at: http://maff.gov.kh/elc/.
[9] http://www.phnompenhpost.com/index.php/2011112152868/National-news/kingdoms-three-year-land-rush.html
[10] http://www.opendevelopmentcambodia.net/maps

organisation LICADHO has produced a rather more dramatic map (Section 9.1), which also includes instances of investigated land conflicts.

Formally, the process of granting an ELC has to consider if it will: a) Improve employment generation; b) Promote enhanced living standards of local and indigenous people, and; c) Offer continuous environmental protection and natural resource management[11]. The reality in rural Cambodia is that a stark problem of underused sites exists. Only some 10% of the ELCs granted are reported to be in productive use, with many held only as a kind of future option for speculative reasons (Loehr, 2011).

On the ENR front, forests in concessions will often be cleared, sometimes for no other reason than selling of the valuable timber. Such wholesale clearing has glaringly negative environmental consequences for soil erosion and fertility, for surface and groundwater, as well as for biodiversity. Forests are also often home to indigenous minority peoples. The clearing of the forest is regularly associated with involuntary or forced resettlement of such communities (Welthungerhilfe, 2010). This constitutes a human rights problem and could reach proportions where it threatens social stability, especially as forced evictions and land conflict also happen in urban, peri-urban and agricultural areas.

In urban areas redevelopment has been a major cause of forced evictions. In Phnom Penh alone, 133,000 people, or 11% of the population, were estimated to have been evicted from their homes between 1990 and 2009. Rural landlessness, often caused by forced evictions, rose from 13% in 1997 to 20-25% in 2007[12]. Of serious consequence is the fact that evictions increase the vulnerability of women to further acts of violence[13]. A long-term advisor to the Ministry of Land Management, Urban Planning and Construction (MLMUPC) estimates that, partly because of such evictions, a minimum 100,000 landless and land-poor households need land (Mueller, 2011).

2.3.3 Soil Quality

Soil types in Cambodia are presented in Figure 2 (MoE, 2004). Some projects have done more detailed analyses of soil types in agriculture, albeit in only limited areas[14]. In general, most of the soil types identified have a rather low natural fertility and in many provinces a process of soil degradation is apparent due to depletion of essential minerals. Traditionally Cambodian farmers use mainly animal waste and compost to improve and maintain soil fertility. More recently such practices are being supplanted by use of chemical fertilizers. Average household use of fertilizers has now reached 115kg for each production season.

[11] From NFP, 2010; Background Documentation
[12] UNCDF, 2010
[13] From APRODEV, 2011
[14] Cambodia-IRRI-Australia Project – CIAP - in 1996 and 1997

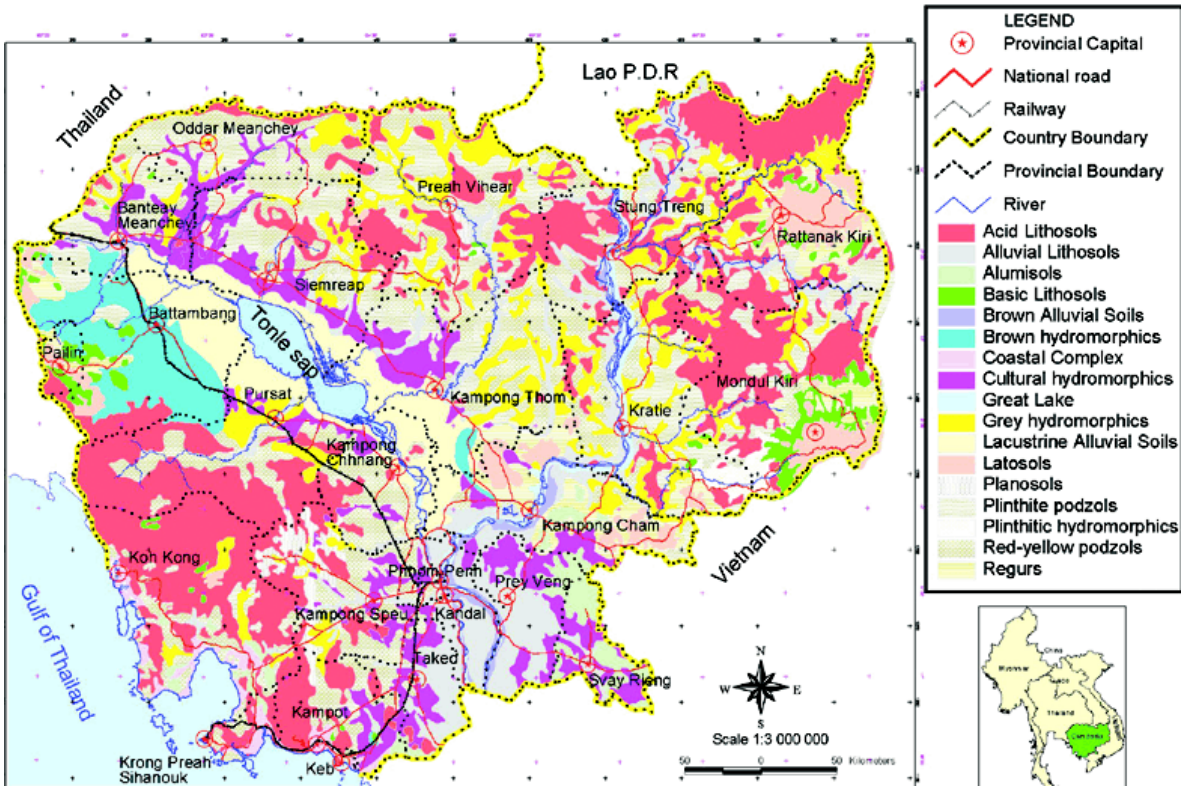


Figure 2: Soil Types in Cambodia (Moe, 2004)

About 90% of chemical fertilizers and pesticides in Cambodia are illegally imported from neighbouring countries such as Vietnam and Thailand, many of which are sold without labels in Khmer or English and without proper instruction on how to use them (JICA, 2011). In December 2011, Cambodia signed the *Law on Pesticide and Chemical Fertiliser Control* to enforce the registration and use of agrichemicals but implementation is, as yet, inadequate.

There are little reliable and recent data on soil erosion. It is without doubt a real problem in Cambodia, both erosion by water, wind and exposure to the sun. This erosion is exacerbated by deforestation, by felling of trees in the general landscape, by typical fallow in the dry season and by the increasing practice of burning rice stubble.

The *Global Mechanism of the UN Convention to Combat Desertification (UNCCD)* is working in close collaboration with the Global Environment Facility-financed *Sustainable Land Management (SLM) Project* to develop an integrated financing strategy for mobilizing funds for SLM activities. As part of the IFS development process UNDP has requested the Global Mechanism to undertake an economic valuation study on the costs of land degradation in Cambodia. This study has not yet been completed though an update has been requested[15].

2.3.4 Main Driving Factors and Linkages with Human Development

The main drivers of changes in land use and in land loss are conversion of state land to farming by large corporations and by landless people. The former affects very large areas (see Section 9.1), the latter much smaller areas. The expansion of towns happens for three, interconnected reasons: Expansion of housing, increase in commercial areas and land speculation. Erosion and other reductions in soil fertility are driven by unsuitable practices, both in traditional farming and especially in the case of concessions. Many land

[15] http://staging.global-mechanism.org/en/Events/Understanding-the-value-of-land-and-the-costs-of-land-degradation-in-Cambodia

concessions are given to Vietnamese and Chinese companies, most often in partnerships with senior figures in Cambodian society or their close relatives. Due to the opaqueness of the information on concessions, the exact shares are not known, but always reported to be high. Vietnam and China are reportedly receiving most of the illegally felled timber. Cambodian statistics does not reveal this but Vietnamese statistics report substantial timber imports from Cambodia.

In general, the interrelated processes of logging, fuel-wood extraction, land clearing and conversion are largely carried out by external actors and not by the long-term members of local communities. The principal underlying causes of these critical threats are the open-access "commons" nature of forest resources, poorly developed governance conditions, corrupt RGC officials and the existence of high levels of demand for land and forest products due to an expanding population (CDC, 2010).

Insecure land rights immediately, directly and negatively affect investments in terms of labour and financial capital into enhancing productivity of that land, be it agriculture, forestry, fish farming or otherwise. Land grabbing has reportedly reached levels where the original holder of an ELC cannot be sure not to be overpowered by 'bigger fish' and lose the ELC.

Erosion and other elements of decreased soil fertility brought about by poor land management further compound the problem of low agricultural productivity. The good news is that it is relatively easy to improve soil fertility and stop erosion, in the technical sense. This is happening in a very large number of communities, usually driven by local initiatives.

2.4 Water

2.4.1 Water Regime

The Cambodian hydrological system is dominated by the Mekong River and Tonle Sap Great Lake. From July to the end of October, when the level of the Mekong is high, water flows via the Tonle Sap River, increasing the size of the lake from 2,600 km^2 to about 10,500 km^2 at its maximum extent. The storage capacity of Tonle Sap Great Lake is about 72 km^3. When the level of the Mekong decreases, the Tonle Sap River reverses its flow and water flows back from the Tonle Sap Lake into the Mekong River. The Mekong flows from north to south, over a distance of around 480 km. About 86% of Cambodia's territory (156,000 km^2) is included in the Mekong's basin with the remaining 14% draining directly towards the Gulf of Thailand. Cambodia represents 20% of the total catchment area of the Mekong basin. Total internal renewable water resources have been estimated at over 120 km^3.[16]

Total system withdrawals of water are estimated to be 0.75 km^3 per annum, of which 94% is for agricultural purposes[17]. Water use in agriculture is set to expand dramatically with the on-going expansion of farmland area and larger scale irrigation development (CARD, 2011).

2.4.2 Groundwater

The alluvial deposits in the Tonle Sap and Mekong floodplain/delta are believed to be excellent shallow aquifers, with high recharge rates and a water table generally within 5-10 m of the surface. Shallow wells could be used in an estimated

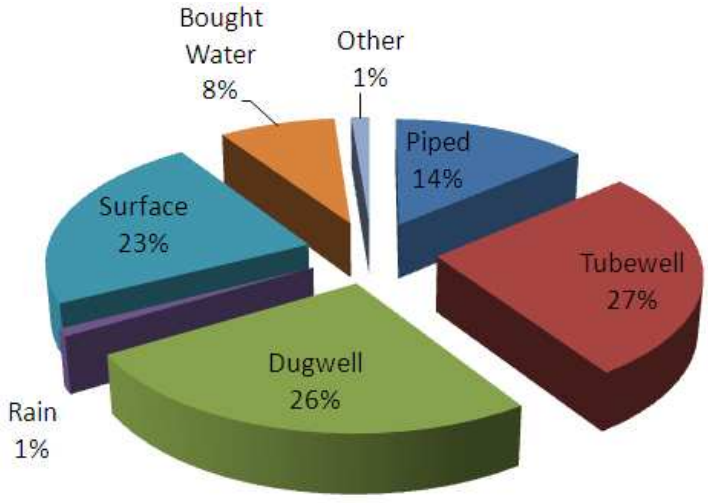


Figure 3: Dry season drinking water source (Census 2008, NIS)

[16] http://www.fao.org/nr/water/aquastat/
[17] MoE, 2009

48,000 km^2 of the country. (FAO-Aquastat, 2010). In Cambodia, groundwater is extensive and abundant in most places (one exception is a dry-zone in north-western regions), with estimated total annual groundwater resources of about 17.6 km^3. About 270,000 tube-wells with hand pumps are reported to be functioning for drinking water purposes, with 53% of Cambodian households accessing groundwater in the dry season. However, groundwater resources are still not readily accessible to a large portion of the rural population at key times[18].

The current trend is for expanding use of groundwater for industrial use and irrigation, with little regulatory framework in place to govern exploitation rules and rights. There are also significant threats from saltwater intrusion in the south-eastern provinces due to lowering of the water table. Groundwater quality mapping is reportedly underway by MRD but any results are not yet available.

2.4.3 Water Quality

While groundwater is often separated from animal and human faeces and disturbances at the surface, chemicals such as arsenic, fluoride, nitrate and manganese may be present in groundwater and can cause obvious environmental and human health problems. Arsenic is the most critical chemical groundwater contaminant in Cambodia, affecting a very large area and causing the most severe health consequences for those consuming contaminated water over a long period of time. Arsenic concentrations in Cambodia have been found as high as 3,000 ppb in places, remarkably higher than the WHO drinking water quality standard of 10 ppb (RDIC/MRD, 2008). *CambodiaAtlas*[19] and Resource Development International[20] provide maps of water quality in Cambodia, the latter for four selected provinces only.

Only some 40% of rural people have access to improved water sources, with the corresponding number in urban areas approximately 82% (ADB, 2010; Danida/DFID/NZAid, 2010). Drinking water quality outside cities and towns may be very low and quantities insufficient, especially in the dry season.

Although few comprehensive investigations on persistent organic pollutants (POP) in Cambodia are available due to a lack of monitoring, available studies reported that DDT has been extensively used to control parasites of fish in cage culture and relatively high residue levels of DDTs were observed in fish catches. Higher levels of DDT were also detected in inland resident bird species (CMES, 2011).

2.4.4 Rivers and Lakes

The Mekong River is among the world's longest, flowing 4,800 km from the Tibetan plateau through six nations to its delta in Vietnam and Cambodia. The Mekong River has rapid flows and shallows as far as Kratie Province, and it is difficult to navigate, while from there onwards the current flows moderately with a deep water depth and good suitability for navigation. The Mekong is very rich with freshwater fisheries producing 2.6 million tons annually, valued at some US$2.5 billion. Large portions of these fish have life cycles that require migrations of up to a thousand kilometres or more for reproduction.

In 2008, there were only two dams in Cambodia. One small dam (Ochum) in the north-eastern province of Rattanakiri is used as a hydropower station with an installed capacity of 1 MW. The Kirirom power plant, which was installed in 1968 in Kampong Speu province, has since been reconstructed with a capacity of 12 MW. A number of foreign private and state owned companies are currently conducting feasibility studies for hydropower projects in Cambodia along the Mekong mainstream and its tributaries. In other parts of the country Kamchay Hydropower Plant in Kampot province went online in December 2011 at 193MW and is Cambodia's first functioning large-scale installation (AKP, 2011[21]). At present there are at least four projects under development, not on the Mekong; Kirirom III (18MW), Lower Russei Chrum (338MW), Stung Tatay (246MW) and Stung Atay (120MW), all in Koh Kong. All five of these projects are being developed by

[18] http://www.wepa-db.net/policies/state/cambodia/drinking.htm
[19] http://www.cambodiaatlas.com/map
[20] http://www.rdic.org/dwqi-ground-water-summary.php
[21] Agence Kampuchea Press (http://www.akp.gov.kh/?p=13626), 07 December 2011 [accessed 09/01/2012]

Chinese companies, and set to generate over 900MW of power[22]. In all, the RGC is preparing to build ten hydroelectric and irrigation dams in the Northwestern provinces. (FAO-Aquastat, 2010).

With the lower Mekong basin mainstream dam projects, all reaches of the Mekong inundated by the mainstream reservoirs would no longer experience the ecologically important transition seasons. All other reaches of the Mekong River would experience a reduction in the duration of transition seasons, which play an important role in triggering biological processes within riverine and floodplain habitats. If all mainstream projects were to proceed, Vietnam and Cambodia are likely to suffer net short to medium term losses because the combined effects on fisheries and agriculture would outweigh any power benefits (MRC, 2010). Furthermore, the loss of fish and associated aquatic life due to dams on the Mekong would likely lead to damaging declines in protein intake and nutritional health in Lower Mekong Basin populations. Moreover, any increase in rural poverty is likely to act as another push factor for rural-urban migration compounding urban poverty issues. (MRC, 2010).

2.4.5 Fisheries & Aquaculture

The fisheries sector is well documented[23] in Cambodia and it is outside the scope of this report to present extensive information on stocks. However, the reports indicate that the country has reached it maximum sustainable yield of approx. 400,000 tons per year. In 2008, 81% of this total was freshwater capture fish, 12% marine capture fish and 7% aquaculture. However, 80% of total inland catch are small-sized fish (see Figure 4) and fish catch rates (kg per fisher) have decreased significantly in the Tonle Sap Lake region from est. 347 tons per fisher in 1940, 196 tons per fisher in 1995 and 116 tons per fisher in 2008. The Tonle Sap Lake accounts for over 60% of total fish production in Cambodia and affects most of the remaining 40% (IFReDI, 2010).

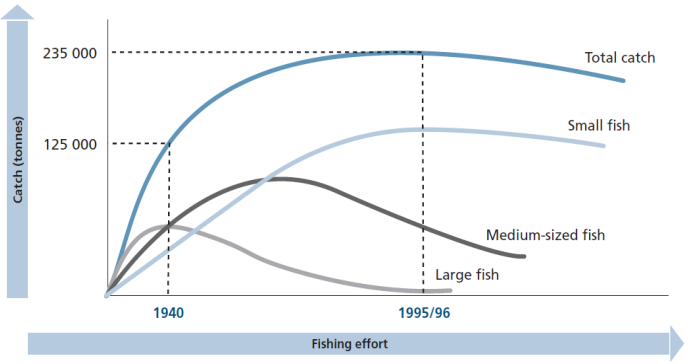


Figure 4: Wild fish catch composition in the Tonle Sap, Cambodia

Production of fish under culture was 59,935 tonnes and shrimp 65 tonnes in 2010-11 - an increase of over 20% compared to 2009-10 (RGC, 2011). The production of fish fingerlings was over 110 million heads, though reliance on supply of 'free' wild fish for both seed and feed is under threat from overfishing, climate change, habitat modification and hydropower development. This could mean less fish supplied from natural sources at the same time as pressures on the quantity and quality of wild catch demands increased aquaculture (WorldFish, 2011). Crocodile farming in 2010-11 reached 283,000 heads.

2.4.6 Agriculture

In the years between 2007 and 2009, MoWRAM doubled its irrigation investment (CARD, 2011). Total resources allocated to irrigation from government and external sources was US$ 31.8 million in 2007 and jumped to an average of almost US$ 60 million per year between 2008-2011. When compared with other expenditures for the agricultural sector, it is clear that there is a surge in investment to construct new irrigation schemes and rehabilitate existing ones. Cambodia has extensive plans for irrigated agriculture, especially irrigated rice. Unpublished but reliable reports talk of very major expansion of irrigation around the Tonle Sap Lake in the future, reportedly agreed between RGC and Vietnamese and Chinese companies. It is feared this will bring severe environmental consequences for the overall water regime and lead to pollution of the lake by agricultural chemicals.

[22] http://www.investincambodia.com/power.htm

[23] www.learninginstitute.org; http://www.fact.org.kh/; http://www.worldfishcenter.org/our-research/cgiar-research-programs/where-we-work/asia

There is a danger that Cambodia's current efforts to 'modernise' its agricultural sector are based upon high-input agricultural production systems that are increasingly out-dated in the world and even in the region.

A positive trend in this sector is the progression of Cambodia to be a leading proponent in the adoption of System of Rice Intensification (SRI) techniques. SRI reduces water consumption, minimises agrichemical inputs, improves drought resistance and provides higher and more stable crop yields (CARD, 2011; CIIFAD, 2011). Flooded rice is a major greenhouse gas emitter, especially of the highly potent nitrous oxide and methane. SRI and other forms of non-flooded rice emit much less GHGs (IFPRI, 2010).

Cambodia has emerged as the regional leader in organic agricultural production, with organic output almost entirely consumed domestically, which is unusual for a least developed country[24]. This tradition offers significant potential for Cambodia to opt for a more long-term strategy of sustainable agricultural development and food security and to distinguish itself regionally and globally.

2.4.7 Main Driving Factors and Linkages with Human Development

Hydropower development on the Mekong and its tributaries, is already taking place in Vietnam and China and major dams are planned in Laos and Thailand. The key, driving factor is of course a need for energy supply to keep up with demand in industrialising nations. However, a secondary element is the fact that proceeds from construction and operation of large dams are easier to concentrate to institutions and individuals than, for instance, benefits from improvements in energy efficiency or development of more decentralised energy sources, such as biomass and micro-hydro.

The drivers for large-scale irrigation are partly the same, i.e. the possibility of centralising the benefits and controlling them from national institutions. This trend is combined with a somewhat out-dated concept that 'modernisation' in agriculture needs large quantities of water and that water can most effectively be obtained from large-scale irrigation systems. Both these ideas are likely to be misguided within the current Cambodian context. This is the case when analysed from not just an economic perspective, but also on the agricultural, food security, environmental and climate change front.

There are widespread reports of a significant loss of healthy fish habitats due in a large part to conversion of flooded forests and wetlands into crop land, thus leading to an increase in use of pesticides in and around traditional capture fish production areas. Cambodia's flooded forest habitats originally extended over an area of more than 1 million ha, but had reduced to only 614,000 ha in the 1960s and 362,000 ha by 1991. The IFPRI estimates that 1.3 million litres of pesticide were used in and around the Tonle Sap Lake as long ago as 2000 (IFReDI, 2010), this figure is likely to have grown considerably.

Water is absolutely central to the development of Cambodia, for fishing, food production in agriculture, industry and in human settlements for drinking and water-borne sanitation. More than six million people work full-time in fisheries and fisheries-related activities and fish and rice are an integral part of the nation's staple diet. Fish and other aquatic animals provide more than 80% of the total animal protein and much of the essential minerals and vitamins in peoples' diets[25]. Danida, Oxfam and WWF are conducting a study on the nutritional and health impacts of possible dams on the Mekong to be concluded in April 2012[26].

The Program Design Document for the *Strategy for Agriculture and Water* expresses the linkages from water management to agriculture, food production and income:

> *"The core problem identified from the analysis is that currently agricultural productivity is stagnant and narrowly based on a few crops and that water resources remain underdeveloped and underperforming. The challenge for the project design is to turn the core problem and the associated primary causes into solutions. Reformulating the core problem into a core objective implies that a successful project would give rise to enhanced agricultural productivity and*

[24] International Federation of Organic Agriculture Movements (IFOAM), 2010.
[25] IFReDI, 2011
[26] Information from Danish representation in Cambodia, January 2012

diversification and improved water resources development and management. This would have consequent impacts in a greater diversity of production, higher success rates in agriculture and water sector programs, improved competitiveness, higher income in rural areas, increased employment in rural areas and finally higher economic growth in rural areas. The overall impact of the intervention would be a higher growth in productivity, a vibrant rural economy and a reduction in poverty." (TWGAW, 2010).

The issue of agriculture as a major emitter of GHG's is however neglected in this document, despite this being an important issue, especially if agriculture is 'modernized' through increased use of inputs, such as water for flooded rice, chemical fertilizers and pesticides (CARD, 2011).

Widespread and highly positive examples of local water harvesting and conservation exist, incorporating locally-tailored collection systems, dugout ponds and local irrigation systems. There is enormous, yet mainly untapped and un-mapped, potential for expanding this concept in Cambodia and the region, in association with a renewed focus on integrated watershed management.

Socially, there are claims that the aquaculture industry, when focusing on the predatory snakehead species, transforms low-value protein sources that could be used to feed the poor into an expensive commodity for the wealthy or export. For this reason, Cambodia prohibited the culture of Snakehead in 2004 (FAO, 2010).

2.5 Marine & Coastal Zone

The Cambodian coastal zone comprises four provinces (Kampong Som (Sihanoukville), Kampot, Koh Kong and Kep) extending along the northeastern shore of the shallow Gulf of Thailand between the Thai and Vietnamese borders for approximately 435 km. The coast consists of estuaries, bays and approximately 64 islands. The country has claimed its Exclusive Economic Zone (EEZ) of 200 nautical miles from the coastline to cover approximately 62,515 km^2 of the Gulf of Thailand although transgressions from more powerful neighbouring countries are a common complaint. Cambodia's marine and coastal zone plays an increasingly important role in the country's development, supporting the industrial, agriculture, fisheries and transport sectors and offering growing attraction for recreation and tourism.

Several areas along the coastline are undergoing land reclamation, including around a new port development in Kampot. Previous reclamation around the relatively urbanised areas of Sihanoukville, Kep, the Naval base in Ream and the port of Oknha Mong at Keo Phos have reportedly caused localised negative environmental impacts in terms of water quality and sediment transport dynamics.

The overall trend is of increasing overexploitation of Cambodia's marine and coastal zone in advance of any real attempt to properly analyse the scale and status of the ENR resources and services they offer. Whilst previous attempts to introduce principles of integrated coastal zone management (ICZM) under a DANIDA-funded programme[27] were partially successful, a comprehensive ICZM plan for Cambodia is still lacking. Marine protected area (MPA) planning is also underway in a number of locations and, although no official MPAs currently exist, Ream National Park and a region surrounding Koh Rung / Koh Rung Samloem are pioneering pilot sites.

The Ministry of Land Management and Urban Construction (MLMUC) have set up a technical working group supporting a study on a Master plan for Kep and Sihanoukville, whilst MAFF's Fisheries Administration has produced a *National Action Plan for Coral Reef and Seagrass Management in Cambodia (2006-2015)*. The MoE are long overdue in preparing an updated *'State of the Coastal Environment and Socio-Economy in Cambodia*' report and plan to do so during the course of 2012 under parallel UNEP and CCCA funding[28].

[27] http://www.czmcam.org
[28] Personal communication, MoE

2.5.1 Coral Reefs

Coral reef coverage is estimated to be 2700 ha along the Cambodian coastline and totalling 28km^2, with the most extensive coverage occurring in Kampot and Sihanoukville (UNEP, 2009). In addition, coral reefs are abundant around most of the islands off Cambodia's coast. Approximately 70 coral species are found within the coastal zone, though little is known about the relative distribution and composition of the reefs. These reefs are threatened by overfishing, harvesting of corals (for trade), degradation of the water quality and the use of destructive fishing practices (such as dynamite or 'blast fishing'). With estimates of live coral low at between 23% and 58%, they are generally considered to be in poor health[29].

2.5.2 Seagrass

Significant areas of Cambodia's shallow, protected coastal waters offer a suitable habitat for seagrasses, providing nursery grounds for many different species of fish, and crustaceans and other invertebrates (including endangered marine species such as, dugongs and seahorses). Cambodia's coastal zone houses one of the world's largest seagrass areas consisting of eight known seagrass species (UNEP, 2009). In 2004, it was estimated that seagrasses covered approximately 25,240 ha off the coast of Kampot province alone[30]. Little published data is available but there are strong indications of widespread seagrass habitat destruction due to degradation of water quality through increased turbidity (caused by forest clearing, sand dredging, reclamation activities, etc.) and destructive fishing practices (trawling and push nets)[31].

2.5.3 Mangroves and Coastal Forest

According to RGC figures submitted to FAO in 2010 only 56,000 ha of mangrove forest remained in all of Cambodia, 70% of the area present in 1990 (FAO, 2010). IUCN data indicates that the majority of the mangrove area in Cambodia is found in Koh Kong province and are considered to be wetlands of international importance, protected under their status as the *Koh Kapik and Associated Islets Ramsar Site* and the *Peam Krasop Wildlife Sanctuary* (over 10,000 ha mangroves). This area is also the habitat of two rare and endangered species of otter - the smooth-coated and the hairy-nosed otters.

Despite this status, annual rates of mangrove loss have accelerated from 1.6% between 1990 and 2000 to 1.9% between 2000 and 2010. Mangrove clearing is being undertaken illegally for use as firewood, charcoal production saltpan investments, land reclamations and intensive shrimp aquaculture among other uses. Mangroves are reported to be further damaged and degraded by offshore and estuarine sand dredging. The combined effect is of significant concern since mangrove ecosystems are highly productive and play an essential role in the lifecycle of many marine organisms. For example, they serve as spawning or nursery grounds for several commercially and biodiversity critical fish species. Mangroves also play an essential role in protecting the coastline and provide an effective buffer against climate change-related sea level rise, cyclonic activity and storm surges.

Land cover in the wider coastal zone is dominated by coastal forests. Between 1993 and 2005, coastal forest cover declined from 84% to 71%, largely as a result of deforestation to aid agricultural expansion. The highest forest cover occurs in the Koh Kong province (83% or 1 002 721 ha) and Kampong Som provinces (54% or 81,539 ha) (MoE, 2005).

2.5.4 Marine Fisheries

Whilst data is very limited in this sector, previous trends as published in the *'State of the Coastal Environment and Socio-Economy in Cambodia*' (MoE, 2005) and more recent observations suggest that marine fisheries are under threat from illegal fishing, habitat destruction and overexploitation.

[29] MAFF, 2006. 'National Action Plan for Coral Reef and Seagrass Management', 2006-2015, p. 1.
[30] Seagrass in the South China Sea: Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand. UNEP/GEF Regional Working Group on Seagrass. 2004.
[31] Marine Conservation Cambodia, 2010. Available from: http://www.marineconservationcambodia.org [accessed 08/02/2012]

While overall fish catch has been increasing since 1980 due to the increase in marine fishermen and industrial-scale technologies, fish catch per unit has been steadily declining, principally due to an increasing coastal population and unrestricted development in ecologically-sensitive habitats. Resource management in Cambodian coastal fishing communities may be boosted following the signing of 15 Community Fishing Area Management Plans in Preah Sihanouk province in May 2011. The plans detail activities and goals for improved resource management and community development (AECID/FAO, 2011) but lack a baseline assessment of current coastal and marine resources.

Marine aquaculture production (mostly Snapper and Grouper) is projected to increase by approximately 8% per year between 2009 (est. 2,880 tonnes) and 2030 (est. 15,000 tonnes), considerably less than the freshwater sector (WorldFish, 2011). Nonetheless, the potential environmental impacts or this expansion could include habitat destruction, increased pressure on wild feed sources.

2.5.5 Main Driving Factors and Linkages with Human Development

One of the key driving factors of the negative trends reported in this area is the rapid increase in the rate of sand dredging in the Koh Kong and Kampot coastal zones. Despite a total ban imposed in 2009 on marine dredging for export[32], operations appear to have continued unchecked across a wide area. Concessions have been allocated inside protected areas and in close proximity to internationally significant ecosystems such as Peam Krasop Wildlife Sanctuary (Global Witness, 2010).

Some of the most important drivers of degradation involve various forms of overfishing, both through industrial-scale trawling of offshore waters by foreign fishing vessels and smaller-scale trawling and push-netting in inshore waters by a very large fleet of Cambodian boats (MoE, 2010).

Increasingly, unrestricted development of transport and tourism infrastructure is a key driver of environmental degradation, especially in Sihanoukville. Whilst a Cambodia Shoreline Management Strategy (2006) is in existence, the focus here is only on the Sihanoukville Municipality, including usage and development zonation. Abidance to this strategy and other management plans (see above) is reportedly weak.

Tourism operators and NGOs have highlighted the damage caused by sand dredging in the Tatai River, Koh Kong province, affecting aquatic populations and ecotourism sites[33]. Dredging sand without adequate safeguards also risks damaging local livelihoods. Communities have reported reduced fish stocks and devastated harvests of swimming crabs. They also reported that oil spills from dredging vessels have polluted the water and that fishing-boat navigation in the area has become hazardous due to the sheer scale of the dredging and shipping transportation operations (Global Witness, 2010).

As with ENR exploitation elsewhere in Cambodia, the overall trend is to increasingly disenfranchise local small-scale and subsistence users of coastal and marine resources in favour of aggregating benefits for larger Cambodian and foreign companies. This is done with little knowledge or consideration of the real value of the resources in this zone or the *'precautionary principle'*, yet holds significant importance for poverty, food security and climate change vulnerability as the maintenance or improveent of ecosystem services is crucial to ensure food, water and energy security and to increase the resilience of local communities and in fact the nation in the face of climate change.

[32] Except where sand gathered and replenished itself naturally or where build-ups were obstructing waterways
[33] Phnom Penh Post, David Boyle and Phak Seangly, 24 June 2011

2.6 Biodiversity & Wildlife

In 2010, the MoE submitted its Forth National Report to the *Convention on Biological Diversity* (MoE/CBD, 2010) which includes information on overall biodiversity status, trends and threats; national strategies and action plans, and; an assessment of cross-sectoral integration of biodiversity considerations.

Cambodia's protected areas system includes seven national parks (742,250 ha), ten wildlife sanctuaries (2,030,000 ha), three protected landscapes (9,700 ha), six protection forests (1,350,000 ha) and eight fish sanctuaries (23,544 ha). Under the *Ramsar Convention on Wetlands*, Cambodia has three sites designated as 'Wetlands of International Importance', with a total surface area of 54,600 hectares[34]. Figure 5 indicates that the MoE expects to maintain a total of 3.1 million ha as Protected Areas, of which 140 would be designated as Community PAs by 2015.

	Unit	2008	2009	2010	2011	2012	2013	2015
Surface of 23 Protected Areas	Ha	3,100,199	3,100,199	3,111,041	3,111,041	3,111,041	3,111,041	3,111,041
Community Protected Areas	Nos	82	84	98	110	115	120	140

Figure 5: Projected Protected Areas in Cambodia, 2008-15 (NSDP-MTR, 2011)

However, as detailed elsewhere (e.g. Land, Section 2.3), the RGC's law enforcement and commitment to the integrity of some PAs is questionable.

Taxon	Total Number of Known Species	On IUCN Red List
Mammal species	123	39
Bird species	545	36
Reptile species	88	13
Vascular plants species	2,308	38
Fish species	874	-
Hard coral	24	-
Soft coral	14	-
Sea grass	10	-
Amphibian	63	12

Figure 6: Summary of known species in Cambodia (MoE, 2010)

Forests are the habitat for approximately 33% of the threatened species in Cambodia but wetlands are equally important for conservation of biodiversity, as are arable and pasture lands (UNCDF, 2010). Surveys by the International Rice Research Institute (IRRI) have identified over 2,000 different strains of rice used in Cambodia (2007) and yet here also, the trend is for high yielding rice varieties increasingly substituting local indigenous rice varieties[35].. In this context, women's traditional knowledge and skills in seed selection and preservation are critical[36]. The Mekong River is the second most biodiverse river system in the world, with at least 1,200 species of fish and possibly as many as 1,700.

2.6.1 Invasive Species

The IUCN's *Global Invasive Species Database*[37] reports the presence of a total of 66 invasive species in Cambodia. Of these, arguably the most important include: Snakehead fish (*Channa argus*); Coconut beetle (*Brontispa longissima*); Rhinoceros beetle (*Oryctes rhinoceros L.*); *Acacia farnesiana*; Giant mimosa (*Mimosa pigra*). At present there does not seem to be any scientifically-documented cases of detrimental effects caused by alien invasive species in Cambodia, though a number of known aggressive invaders are

[34] http://www.ramsar.org/cda/en/ramsar-pubs-annolist-anno-cambodia/main/ramsar/1-30-168%5E16689_4000_0__

[35] *'Pkha malis'* is translated as 'flower jasmine' is Cambodia's uniquely aromatic rice, passed down from generation to generation. It is not a variety but a blend of landraces that makes Cambodian rice uniquely biodiverse.

[36] FAO, 2011 (http://www.fao.org/sd/WPdirect/WPre0106.htm)

[37] http://www.issg.org/database/welcome/

increasingly reported as affecting farmers – notably the Coconut beetle. There are also some activities in agriculture, forestry, fisheries, horticulture and rural development that involve intentional introduction of alien species.

2.6.2 Threatened Species and Habitats

There is an apparent lack of a collated list of all endangered species in Cambodia. Cambodia is a sanctuary to about 1.6% of all globally threatened species on the IUCN *Red List* as deducted from *the* IUCN *Redlist* webpage[38]. This includes 2.5% of globally threatened mammals, 2% of globally threatened birds, 5% of globally threatened reptiles, 1.6% of globally threatened fish and less than 1% of globally threatened amphibians. The list includes 20 reptiles, 39 birds and 34 mammals. The Cardamom Mountain and Elephant Hills range alone is reportedly home to 14 endangered and threatened mammal species, including the Asian elephant (est. 15-25), Indochinese tiger (est. 10-20), Malayan sun bear and Pileated gibbon (ADB, 2011). Eld's deer populations have been confirmed in multiple locations and it is estimated that there is an additional population of 10-20 tigers and 300-400 elephants in patrol areas of Mondulkiri (MoE/CBD, 2010).

FishBase (2011) cites a list of 39 endangered or vulnerable fish species in Cambodia, including the freshwater: Giant Carp, Siamese Tiger Perch, Mekong Giant Catfish and a number of barbs, and; seawater: Banded Eagle Ray, Hammerhead shark and Narrowsnout Sawfish. Of 490 freshwater fish species, at least 45 species are currently commercially important and 23 threatened fish species are recognised for their conservation significance (MoE/CBD, 2010).

2.6.3 Main Driving Factors and Linkages with Human Development

Road developments are viewed as one of the key driving factors within surveyed areas, increasing accessibility and thus facilitating increase in other threats including: agricultural expansion and intensification; illegal logging[39] (for fuel wood and timber); mining; residential and tourism development; mining, and; dam developments (ADB, 2011). Increased access to previously isolated areas has resulted in a rash of new land claims, increased wildlife hunting and flourishing of wildlife trade networks on local and international levels (MoE/CBD, 2010). Driving forces for trends in lake, river and marine wildlife and biodiversity have been addressed in Sections 2.4 and 2.5.

2.7 Forests & Vegetation

The National Forest Programme (2010) states:

'The forests of Cambodia include evergreen, semi-evergreen, deciduous, swamp, mangrove and bamboo forest in various conditions from closed to disturbed and mosaic formations. There are also re-growth and plantation forests as well as open forest types including evergreen shrub land and dry deciduous shrub land. About 10% of Cambodia's flora is endemic. Cover is largely dominated by moist lowland evergreen forest, semi-evergreen forest and deciduous forest. A unique seasonally inundated forest is found along the flood plains surrounding the Tonle Sap Lake. Extensive and fairly intact mangroves are found along the southern marine coast.'

However, about 55% of all forests including 45% of forests in protected areas are considered to be degraded and extensive infrastructure development along the coast is rapidly destroying large areas of mangrove (See Section 2.5) [40].

[38] http://www.iucnredlist.org/
[39] http://www.economist.com/node/21541871
[40] UNCDF, 2010

2.7.1 Forestry

The 20-year National Forest Programme (NFP) was formally approved by RGC's Council of Ministers in May 2010 and is being promoted by government and development partners alike as a key guiding document for the sector. It identifies nine strategic priorities, including contribution to the economy, climate change, forest governance, conservation of forest resources, improved forest management and sustainable financing of the programme itself. The NFP prioritises six programmatic areas that will receive emphasis over the next two decades in order to achieve these objectives: i) Forest Demarcation, Classification and Registration; ii) Forest Conservation and Development of Forest Resource and Biodiversity; iii) Forest Law Enforcement and Governance; iv) Community Forestry; v) Capacity and Research Development, and; vi) Sustainable Forest Financing (MAFF, 2010).

Logging in Cambodia is technically not allowed, with few exceptions but is in fact taking place illegally at quite alarming rates and large volumes of timber and shrub are being cleared and burned in those land concessions that are active. Community Forestry is growing quite rapidly in Cambodia [41] and the NFP sets a target of two million ha of forestland allocated for Community Forestry (approximately 1,000 CF) groups fully recognised with CF agreements. Commercial timber production (plantations) barely exists, mainly because of the legal, governance-related and commercial challenges perceived by investors. As a national first, an international investor is establishing a hardwood (teak) plantation in Cambodia, wishing to adhere to sustainable forest management (SFM) and corporate social responsibility (CSR) practices[42]. This introduces a new, important step in implementation of the NFP and may also be viewed as a practical contribution towards 'Green Growth'.

The MAFF's FA agrees to 57% forest cover in 2012, which is less than the 60% policy goal. In recent years FA has redefined forest cover to include plantations of rubber, coffee and other tree crops.

2.7.2 Pastureland

Cambodia holds very limited, if any, dedicated pastureland. Rather any land may be used for grazing. Usually the cattle are tied up in the wet season so as not to destroy the rice crop. In the dry season, many cattle are allowed to roam quite freely, which constitutes a problem to some farmers who grow crops in this season, as well as to e.g. tree-planting efforts.

2.7.3 Main Driving Factors and Linkages with Human Development

Many land concessions are given to Vietnamese and Chinese companies, most often in partnerships with Cambodian notables. Due to the opaqueness of the information on concessions, the exact shares are not known, but always reported to be high. Vietnam and China are reportedly receiving most of the illegally felled timber. Cambodian statistics do not reveal this, but VN statistics report substantial timber import from Cambodia. While ELCs and mining do employ people, the jobs are very poorly paid and often dangerous. The communities serving these enterprises are usually without basic social services such as health and sanitation.

The damage to watersheds from deforestation leads to reduced water infiltration and drying up of groundwater. It also leads to increased soil erosion and hence reduced agricultural productivity. The wholesale felling of forests also damages the livelihoods of many forest-dependent communities and families, while conversely, the absence of a viable forest production sector and of forest-based enterprises (aside from illegal sawmills) constitutes a significant missed opportunity for regulated and sustainable productive use of Cambodia's forests for economic gain.

For instance, a study conducted by the Cambodia Development Resources Institute (CDRI) showed the net present value (NPV) of ecosystem services provided by selected forest types, at a 10% discount rate over 50 years, was US$1,194/ha for deciduous, US$ 2,445/ha for semi-evergreen and US$ 3,721/ha for evergreen

[41] in early 2011, almost 450 sites were in progress, including more than 100 that have achieved legal agreements (from RECOFTC homepage)

[42] www.iwc.dk/index.php?show_page=12 and personal information, March 2012.

forests (see Figure 7). In Cambodia's biodiversity hotspots of Mondulkiri and Koh Kong alone, this total NPV would amount to US$4.1 billion with annualized NPV of US$416 million per year. Separately, the ADB valued ecosystem services in a 1.5 million ha region of Cambodia at a conservative estimate of just under US$6 billion, including non-timber forest products, carbon storage, watershed protection, water quality regulation and soil erosion control services (ADB, 2010).

Forest Type	Ecosystem services	NPV@8%	NPV@10%	NPV@ 12%	Annualized NPV@10%
Deciduous	NTFP	459	365	301	37
	Sustainable timber	-306	-248	-207	-25
	Carbon sequestration	355	336	319	34
	Soil and water protection	932	741	612	75
	Total	**1441**	**1194**	**1025**	**120**
Semi-evergreen	NTFP	285	230	192	23
	Sustainable timber	403	367	333	37
	Carbon sequestration	412	401	389	40
	Soil and water protection	1611	1300	1087	131
	Total	**2299**	**2445**	**2128**	**247**
Evergreen	NTFP	149	119	100	12
	Sustainable timber	1931	1691	1497	171
	Carbon sequestration	636	610	588	62
	Soil and water protection	2245	1300	1088	131
	Total	**4325**	**3721**	**3273**	**375**

Figure 7: Summary of estimated net present value (NPV) of different forest types in Koh Kong and Mondulkiri / US$/ha[43]

2.8 Energy & Emissions

2.8.1 Energy

The main energy source in Cambodia is wood, accounting for 80% of national energy consumption (UNEP, 2010). Most households, even in urban areas, rely on traditional energy sources since fossil fuels are either not available or too expensive. 94% of the population living in rural areas relies on wood, charcoal, car batteries and kerosene (UNCDF, 2010). Most primitive fuels are sourced from forests; in rural areas in the form of fuel wood and in towns and cities as charcoal. The UNDP forecasts that wood-derived fuels will remain the main source of cooking energy in rural areas until 2030 (UNDP, 2008).

Approximately 22% of Cambodians have access to electricity, though Phnom Penh (around 10% of the population), uses more than 85% of total electricity consumed (UNCDF, 2010). Cambodia considers diesel fuel as the principal source of electricity generation and most of the commercial energy used for power generation, transport, industry, residences and commercial sectors comes from oil. In 2010 electricity imports from Thailand and Vietnam made up over 40% of the country's total supply[44]. The *Electricity Authority of Cambodia (EAC)* reported total electricity consumption in 2008 as 1859 GWh, with expected annual growth of 12% per year until 2024 and 5% per year until 2050. MIME plans electricity generation and expects that by 2020 68% will be generated by hydro dams and 15% by coal fired power plants.

Alternative energy sources include hydropower, natural gas and solar, with renewable resources in general considered to be relatively abundant. The potential of these resources remains largely untapped. Cambodia

[43] CDRI, 2006. Working paper 33: Natural Forest Benefits & Economic Analysis of Forest Conversion in Cambodia,
[44] Presentation by Victor Jona, general Department of Energy, Ministry of Industry, Mines and Energy, Cambodia Energy Status and its Development, 16 March 2011.

is endowed with a high technical potential for hydropower, estimated at 8,000 to 10,000 MW of installed capacity[45].

The technical potential for electricity generation from biomass has been estimated at 18,800 GWh per year, including forest products, agricultural crops and residues, municipal waste and sewerage (UNEP, 2010). There are on-going and quite substantive initiatives to introduce biogas systems in rural villages as well as a national programme for providing households with biodigesters that provide biogas for lighting and cooking from animal waste. As of Feb 2012, over 15,000 units had been installed, with another 23,000 planned by 2016 (MAFF, 2012).

By April 2011, the Rural Electrification Fund had supported installation of 49,023 Solar Home Systems (SHS) offered on a rent to own basis. The scheme was set to finish on 31 January 2012 and no further information is available on potential expansion (REF, 2011).

2.8.2 Emissions

Cambodia has recently become a net emitter of greenhouse gases (GHGs), with deforestation and increasing irrigation the primary driving factors. Analysis of these drivers has shown that very little data is available about their relative contribution to overall emissions. Overall GHG emissions from the energy sector are comparatively small due to the low energy intensity of the economy, resulting in low per capita GHG emissions and low carbon intensity (UNEP, 2010).

Emissions from electricity are predicted to decrease from 1.17 $kgCO_2$ in 2000 to 0.30 $kgCO_2$ per kWh in 2050 as a result of the planned increasing share of hydropower and reduction in diesel/oil-based generation (MoE, 2010). However, this assumes zero emissions from hydropower as per IPCC standards - in contrast to more recent studies, which report large amounts of methane being emitted from dams in tropical landscapes. These emissions occur from the anaerobic fermentation of biomass in the dam reservoir. The extent of the emissions varies by dam from between a few hundred grams to 2$kgCO_2$ eq. per kWh generated[46].

2.8.3 Main Driving Factors and Linkages with Human Development

Reliance on traditional fuels is not only impacting the health of the population due to emission of hazardous particles but is also causing deforestation.

On-going and potential GHG mitigation initiatives within energy production in Cambodia also offer wider and well-document benefits in terms of waste management, food security, soil fertility and pro-poor energy security. Current options are focused in the following areas: Use of biogas as a cooking fuel (and lighting) in rural households; Use of rice husk based gasifiers for diesel fuel replacement (partial or full) in rice mills; Energy efficient stoves for sugar production or other small-scale application; Enhancing energy efficiency; Use of solar photovoltaic systems for electricity generation and use in off-grid rural households (UNEP, 2010).

2.9 Geology & Mining

2.9.1 Mineral Resources

The Ministry of Industry, Mines and Energy report that copper, gold, iron ore, zinc, lead, tin, bauxite, sapphires, rubies, kaolin and limestone are among the untapped resources in Cambodia[47]. A presentation (unknown source, undated) in the TWG-FE provides much additional detail. The Cardamom Mountains hold deposits of titanium. The PM issued a mining concession inside a protected forest there, but later reversed

[45] Cambodia National Mekong Committee, MIME, National Sector Review 2003: Hydropower, June 2003.
[46] Kummu, M.,Varis, O., Räsänen, T. 2010. Greenhouse gas emissions from reservoirs – Case of Cambodia. Finland
[47] http://www.investincambodia.com/minerals.htm

the decision[48]. Mining of sand for construction, in river deltas along the ocean coast has become a controversial issue and covered in Section 2.5.

2.9.2 Oil and Natural Gas

Along the coast bordering Thailand deposits of oil and gas have been identified, but exploitation has been slow to get started, probably because of legal disputes with Thailand. There has been mapping of potential inland deposits of oil and natural gas, but no known investigative drilling as yet but China National Offshore Oil Corporation (CNOOC) were due to commence drilling of an exploratory well 37 km southwest of the coast of Sihanoukville in late 2011[49] but it was not possible to determine if this had in fact gone ahead. Chevron in Cambodia claims to expect to start production, based on a 30-year permit expected in late 2011 (Chevron, 2012) though this appears to have been delayed for at least one year[50].

2.9.3 Geological Risks

There are no known geological risks in Cambodia.

2.9.4 Main Driving Factors and Linkages with Human Development

The main drivers are very simply the wish to earn money from non-living natural resources through ELCs and mining concessions. Many mining concessions are given to Vietnamese and Chinese companies, most often in partnerships with Cambodian notables. Due to the opaqueness of the information on concessions, the exact shares are not known, but always reported to be high.

Mining concessions are as much of a problem as are ELCs in terms of destruction of forests (see Section 2.7.1). There is even less information available on mining concessions and their associated environmental consequences. The press regularly reports accidents and use of toxic chemicals and other dangerous practices and in Vietnam the bauxite mining in areas neighbouring[51] Cambodia is a highly controversial environmental and political issue (Asia Times, 2010).

2.10 Landscape

The intrinsic and aesthetic value of Cambodia's rural landscape and environmental and natural resources is seemingly high. The rural landscape is heavily represented in much of the local artwork dating from Angkorian-era bas-reliefs right up until today's artists. This landscape is also a cornerstone of Khmer proverbs, especially as they relate to the Tonle Sap's role as the 'beating heart' of the country. Natural resources and the environment feature prominently in both traditional and modern Khmer music, and widely used as the setting for Cambodian music videos. Cambodia's natural 'bounty' is much treasured by citizens and visitors alike, widely demonstrated reverence and associations with famous natural products and features (i.e. various prominent *'Phnoms'* or hills) from different parts of the country. There has been little formal study into these less tangible aspects of Cambodia's rural environment, although the Authority for the Protection and Management of Angkor and the Region of Siem Reap (APSARA)[52] does reference this topic as it relates to the overall experience of a visit to Angkor Wat Archaeological Park.

[48] http://www.businessweek.com/ap/financialnews/D9MI17C00.htm
[49] 2011. Cambodian Daily, p29 (11 October 2011)
[50] http://www.opendevelopmentcambodia.net/extractive-industrie/oil-production-delayed/
[51] http://en.wikipedia.org/wiki/Bauxite_mining_in_Vietnam
[52] http://www.autoriteapsara.org

2.11 Human Settlements

2.11.1 Air Quality

At present, provinces and cities, including Phnom Penh City have neither central incineration plants for solid waste nor special incineration for hazardous wastes. Mixed solid wastes are commonly burned in open areas, causing atmospheric pollution resulting from emission of carbon oxides, SO_2, NOx, including Dioxins and Furans.

The issue of air quality is often mentioned in Cambodia but little reliable data is available to elaborate comprehensively on the issue. There are many sources of air pollution but the predominant one relevant to Cambodia is from the increasing number of vehicles on the road and old generators, which utilise fuels to support industrial activities and services[53].

Respiratory diseases are among the leading causes of morbidity in Cambodia and particles in the air have been tagged as the potential cause. Vehicle emissions, as well as road dust re-suspension, contribute to increasing amounts of total suspended particulates. Despite concerns about the possible impacts of air pollution in Cambodia, there is a distinct lack of up-to-date information or studies that can support perceived negative trends. The last comprehensive study appears to be the ADB's *'Country Synthesis Report on Urban Air Quality Management*' (ADB, 2006) which contains data from 1995. The Clean Air Initiative for Asian Cities does not appear to report on Cambodia[54]. Air quality monitoring results are not reported to the public on regular basis nor are they routinely shared among the different government agencies and local environment units.

2.11.2 Sanitation

Most manufacturing and warehouses in Phnom Penh are located along the embankment of the Tonle Sap River north or the Bassac River south of the city, mixed with commercial and residential areas. Such locations allow direct access to river transport and high consumption of water. Only some effluents from the industrial sector are treated before being discharged into a sewage system and finally to the receiving sources (Sokha, 2008).

The current expansion of some urban areas has not been planned, and there is little investment for maintenance or improving of the urban environment and sanitation. There is also no investment in home improvement and new construction has outstripped re-investment in public infrastructure. Thus poor urban infrastructure has not been able to cope with the increase of urban population.

There is only one natural treatment plan in Cambodia in Battambang province (2004, present situation not known). In Phnom Penh, the wastewater discharge system is divided into two types: direct flushing of combined waste water and drainage into rivers (Tonle Bassac, Tonle Sap and Chatamuk) and a system consisting of a series of natural oxidation ponds in which combined wastewater flows into large pond/lake '*bouengs*' or low-lying areas (Boeung Salang, Boeung Trabek-Boeung Tumpong), where the organic portion of the waste is oxidised, or into which all the combined wastewater can be drained in the rainy season when the water course levels rise.

This type of system can operate effectively for small population centres with no additional contamination. However with Cambodia's current combined systems, any liquid wastes (oils, fats, chemicals etc.) dumped into the system cause problems or 'kill off' the natural system.

Most households are not connected to any type of waste water system, generally using a pit latrine. Latrines are connected by pipes to pit systems, where solids settle out and the liquid waste escapes into the surrounding areas. In many areas this is problematic due to the high water table during the rainy season.

[53] From SoER, 2004

[54] http://cleanairinitiative.org/portal/index.php

Commonly, dumpsites in Cambodia are unsuitable in respect to conventional technical standards or guidelines; therefore, the environmental and public health risks are serious.

In short, the pollution issues from waste in most provinces and cities originate from the challenges of limited national budget, weak legal instrument application, inadequate human resources, improper management of solid and liquid waste, which cause water quality degradation, result in loss of aquatic biodiversity and lead to human health impacts, etc. [55]

Solid waste collection in urban areas (using the most urbanized *sangkat* as a proxy) must have improved considerably over the 10 years to 2008, when the national mean value stood at 58.6% coverage for all municipalities. Conditions in Phnom Penh are better than elsewhere. Secondary cities such as Battambang (54.2% coverage) and Sihanoukville (53.4% coverage) were better off than Siem Reap (surprisingly low at only 29.2%) and most of the smaller municipalities (ranging from zero to 35.0%). Information on solid waste conditions in 1995 in ADB (1999) is very limited and not directly comparable with the 2008 data. There is no information on solid waste disposal, which is largely in open unregulated dumpsites, except for Phnom Penh (which receives about 1,000 tons per day).[56]

2.11.3 Residential Areas

Whilst considerable problems remain, urban housing conditions exhibit general trends towards improvement. There was a considerable increase in the use of permanent construction materials in urban residential buildings, from 69% in 1998 to 86% by 2008. Figures are much lower for rural areas. The availability of improved water sources, electric power and indoor toilets doubled across the country, from 8% in 1998 to 17% in 2008, with marked increases in urban areas (from 43% to 72%), especially in Phnom Penh. Data on slums in Cambodia is difficult to find but UN Statistics reported an estimated 72% of all urban inhabitants in Cambodia living in slums in 2001[57] though the nature of 'slum' was not elaborated and more recent figures are not available. *Slum Dwellers International* report extensively on conditions and activities in Cambodia slums[58].

2.11.4 Health

Access to safe drinking water and sanitation and good nutrition is crucial for a healthy life. The public health situation in Cambodia is serious. According to the Ministry of Planning, 42% of the rural population and 76% of the urban population have access to safe water resources. Poor households have much less access to safe water than higher-income households. 16% of rural and 55% of urban population respectively have access to improved sanitation. Sewerage cover is only about 10% in Phnom Penh.

Child mortality has increased since the mid-1990s but appears to be declining again. The main causes of under-five mortality are diarrhoea, acute respiratory infections and vaccine-preventable diseases such as measles. According to WHO estimates, there are more than 12,500 annual deaths in Cambodia due to: diarrhoea caused by polluted water/bad hygiene (85%); indoor air pollution (13%), and; outdoor air pollution (2%)[59].

There is persistent information from (unpublished) research of major public health issues from preservation of food, such as dried fish, with pesticides. A PowerPoint presentation by an official from MoH mentions additional problems such as: Food poisoning from high concentrations of monochloropropanol in fish sauce and soy sauce; sodium hydrosulfite-borax-formalin in food, and; mass contamination with arsenic in groundwater.

[55] This section is mainly from Cambodia Environmental Outlook, MoE, 2009
and the State of the Environment report (2004)
[56] From ADB 2010; Cambodia Urban Sector Assessment, Strategy, and Road Map
[57] http://www.indexmundi.com/cambodia/slum-population-as-percentage-of-urban,-percentage.html
[58] http://www.sdinet.org/country/cambodia/
[59] This section is mainly from SIDA, 2009

The MoE and UNEP implemented a project on Project on *'Management of Mercury and Mercury-Containing Waste'* between 2009 and 10 with support from the Government of Norway. The project supports the UNEP medium term strategy objective of reducing releases of mercury into the environment. The output was some field sampling (though no data was available at time of writing) and the *National Mercury Waste Management Plan* (UNEP/MOE, 2010).

2.11.5 Transport

The two main transport subsectors in terms of passenger and freight volumes are roads and railways. Inland and coastal ports play an important role in the transport sector, as do the three international airports (Phnom Penh, Siem Reap, and, from 2012, Sihanoukville). In 2007, Cambodia's road vehicles totalled 273,243 cars and light vehicles such as motorcycles and auto-rickshaws; 4,067 buses; 37,098 trucks; and 511 other vehicles. Since 2007, the annual growth rate for all categories of vehicles has been an estimated 5.1% (ADB, 2011). Freight rail services resumed in 2010 due to donor support to network rehabilitation and rail traffic is expected to grow by 7%–12% per year to 2030, with a projected increase in locomotives from the current 4 to 30. Gravel and earth roads form the majority of rural roads (6,441 km) but are problematic from an environmental and health perspective for populated zones due to dust/fine soil hazards. GHG emissions from the transport sector are projected to increase from est. 765 Gg in 2000 to 11,214 in 2050 with motorbikes, cars, pickups and trucks as the main emitters (Figure 8).

Transport	Year	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Road		700	1,238	1,986	2,448	3,020	3,726	4,601	5,683	7,025	8,688	10,750
Rail		9	11	14	17	20	25	30	36	44	54	66
Total		709	1,249	2,000	2,465	3,040	3,751	4,631	5,720	7,069	8,742	10,816

Figure 8: Estimated Transport Emissions 2000-2050/GgCO2 eq. (MoE, 2010)

2.11.6 Special Economic Zones

Relaxed conditions exist in Special Economic Zones, regarding environmental management: 'It must have water sewage network, waste water treatment network, location for storage and management of solid wastes, environment-protection measures and other related infrastructures as *deemed necessary'*.[60]

2.11.7 Vulnerability to Disasters

Cambodia is mainly exposed to disasters related to floods and droughts having been severely affected by droughts and floods almost every two years over the last decade. In 2000, flooding affected almost 3.2 million people in 21 of Cambodia's 24 provinces (UNISDR, 2011[61]). Floods accounted for 70% of rice production losses between 1998 and 2002, with droughts accounting for a further 20% during the same period, most severely in 2002, when more than 2 million people in eight provinces were affected. The total economic losses from natural disasters in Cambodia 1999 to 2008 was US$ 214 million[62]. PreventionWeb's (2012) country profile on Cambodia has useful and clear information on disaster risks, maps and statistics but requires updating. Geophysical hazard are few, even if there is a small risk from tsunamis[63]

2.11.8 Main Driving Factors and Linkages with Human Development

The main drivers of the trends in urban environment is the industrialisation taking place, the movement of the population towards cities and towns and in some areas, the rapidly growing road network. in some places, the tourism industry adds to this

[60] http//www.cambodiainvestment.gov.kh/legal-frame-for-the-special-economic-zone-sez-scheme.html
[61] http://www.unisdr.org/partners/countries/khm
[62] Oxfam-America. (2008). Regional Strategic Plan for 2008-2013 on Humanitarian Program in East Asia
[63] http://www.preventionweb.net/english/countries/statistics/?cid=29

2.12 Climate & Weather

Due to previous conflict and still not very comprehensive data gathering in Cambodia there are very few long-term and localized observations of climate, making it difficult to determine significant and reliable trends in climate, or potential signals of climate change. The lack of observations is also a constraint on the development of credible projections of climate change at the country-level; for example while there are downscaled projections from multiple models available for neighbouring countries such as Thailand, none currently exist for Cambodia.

2.12.1 Temperature

The IPCC provides a summary of projections from 21 climate models for SE Asia as a region, which states that temperatures will increase in the range of 1.5-3.7C for the period 2081-2100. Along with the increase in average temperatures it is expected that the number of extremely hot days and nights will increase and the number of cold days and nights will decrease.

2.12.2 Precipitation

Most models agree that rainfall will increase, ranging from a -2% decrease to a +15% increase. It also appears that there will be an increase in the intensity of precipitation.

2.12.3 Climate Change

It is important to note that the local response to climate change is likely to be significantly different to these general projections. In Cambodia this is likely to be particularly the case in upland areas and around the Tonle Sap Lake. In addition to these local responses, the effect of climate change on the monsoon system is unclear due to the many and complex interactions, which affect it. This has the effect of adding uncertainty to projections of change in precipitation in Cambodia and means it is crucially important to use projections from a range of climate models in planning adaptation to climate change, in order to gain an understanding of the range of possible climate responses. The lack of more detailed climate projections for Cambodia is a clear gap that needs to be addressed, however, as discussed below, should not constrain action on adaptation[64].

2.12.4 Main Driving Factors and Linkages with Human Development & Poverty

Main drivers for increased GHG emissions in Cambodia are expected to be forest degradation and land use change, followed by transport.

2.13 Environmental indicators

The CMDG contains overall environmental indicators (See section 2.2). The implementation framework of the NSDP, several sector programmes and plans (NFP, Fisheries Planning Framework, the Strategy for Agriculture and Water) all have indicators and the Green Growth Roadmap talks about development of eco-efficiency indicators. Furthermore the TWGs develop their own implementation plans, both longer- and shorter term, with relevant performance indicators.

The MoE is charged with reporting on a comprehensive set of environmental indicators developed in the first State of the Environment Report, while provision of information on many indicators area allocated to relevant line ministries.

'The CMDG indicators, as well as the areas of indicators used in the SoER are presented in Appendix XX. More recent information on the state of the environment is aggregated in the present report. The SoER, the Environmental Outlook and the present report all base themselves mainly on research papers or individual studies by donor agencies, international NGOs, projects or UN-agencies. There is no systematic collection of information on the majority of environmental indicators, let alone reporting on this

[64] The section on climate Trends is mainly taken from http://weadapt.org/knowledge-base/vulnerability/Cambodia

monitoring, by Government agencies.

During the process of producing the CEP several stakeholders (among donors and international agencies) have suggested capacity building in environmental monitoring within the RGC system. This seems of obvious logic. A very large donor-supported effort has however, already been undertaken in this field, resulting in increased technical and human capacity, clarification of roles and actual reporting on many indicators in the SoER (2004). The RGC has only feebly followed up on this, and been unable to produce any later SoER. This fact points to a deeper problem in monitoring in Cambodia, closely tangled with and dependent on deep-rooted governance and transparency issues.'

3 Climate Change Implications

3.1 Projections of climate change

A recent study by UNDP in Cambodia is quite specific about the expected effects of climate change, stating that The Mekong basin has been highlighted in global assessments as: *"…one of the river basins that will feel the effects of climate change most severely"*. The most recent studies predict various climate change impacts for water resources in Cambodia. These include:

- Climate change is likely to significantly alter the Mekong River hydrological regime, upon which inland fisheries and agriculture depend.
- Changes in seasonal distribution of rainfall, with drier and longer dry seasons, and shorter, more intense wet seasons
- Increased volume and intensity of wet season rainfall, leading to increased floods and a marginal decrease in dry-season rainfall.
- Reduced flow of the Mekong and its tributaries in the dry season and increased flow in the rainy season.
- Higher drought risks in most of Cambodia's agricultural areas as a result of future climate change from 2025 to 2050.
- Increased temperatures, with corresponding increases in evapotranspiration
- Increased frequency and intensity of extreme events, such as floods and droughts'

(UNDP, 2011)

3.2 Impacts

It is impossible to be certain about the precise nature of the impacts of climate change in Cambodia. Very few impacts of climate change will be completely novel, rather it is likely to compound and multiply current problems and stresses. The starting point therefore is in existing problems and hazards that may be amplified by climate change.

Even in the case of sea-level rise we see that the salinization of surface and groundwater resources is already identified as a problem in all of Cambodia's coastal provinces and one effect of climate change will be to amplify this existing problem. In addition to salinization, sea-level rise is expected to increase coastal erosion and may lead to the inundation of economically important coastal infrastructure such as ports and coastal resorts. Higher sea level is likely to increase flooding from storms and storm surges.

It is unclear exactly what effect climate change will have on floods and droughts, due in large part to uncertainty over changes to the monsoon regime. It is clear however that the hydrological regime will change, in particular in the case of the Mekong, which receives much of its flow from glacier melt upstream which will become increasingly less reliable. This may make the annual flooding of the Mekong River and Tonle Sap Lake less predictable, and at present it is the unpredictability of floods and droughts that causes the greatest problems, rather than the severity of the events themselves. As with current hazards, it is

marginalized and vulnerable communities, lacking the capacity to deal with climatic shocks, who are likely to be most affected by climate change. Communities who find it hard, or are unable, to cope with current climatic hazards will find it difficult to respond to the additional stresses that climate change may bring. The reliance on agricultural activities as the basis for many rural livelihoods means that they are directly affected by climatic conditions, and therefore sensitive to any changes in climatic conditions, which increases their vulnerability to climate change.

Sea level rise (SLR) will be an important issue for Cambodia both because of direct effects on the coastline and possible indirect effects from SLR in the rest of the region. The IPCC in 2007 assessed that sea level was likely to rise by 0.18-0.56m by 2100. However several recent reports conclude that this was an optimistic range and that a rise of around 1.0m is much more likely[65]. If SLR was to reach this level, approximately 44 km^2 of Koh Kong province and 56% of its provincial centre would be inundated[66]. The flood risk in coastal areas is nonetheless likely to increase due to the potential changes in the hydrological patterns of the coastal rivers, especially during the rainy season. SLR is likely to exacerbate coastal erosion and amplify the impact of storm surges and tidal action (NAPA, 2006).

A recent ADB study for South-East Asia (Philippines, Thailand, Vietnam and Indonesia) suggests that the cost of climate change could be 6.7% of GDP by 2100. No figure is available for Cambodia, but the ADB work should be viewed as indicating that the cost of climate change for Cambodia without adaptation could be significant. [67]

Given the relationship between Malaria transmission and warm and wet conditions it is expected that the incidence of Malaria will increase due to climate change. A Ministry of Health report in 2002 estimated that cases of malaria could increase by up to 16%. The same is true of other vector-borne diseases such as Dengue fever. An increase in vector-borne diseases is likely to predominantly affect poor rural communities who are currently most vulnerable to Malaria as they lack access to healthcare facilities.

3.3 Mitigation and Adaptation

Cambodia has produced a National Adaptation Plan of Action (NAPA)[68], in 2003. An increasing stream of international funding is following it up. Among the main ones are the Cambodia Climate Change Alliance (CCCA) and the Pilot Programme for Climate Resilience (PPCR)[69], for which Cambodia has been nominated as a priority country and had its PPCR Strategic Program endorsed in May 2011. Further, actual or planned adaptation funding is listed in Section 6.2.

In late 2011 a forum[70] was held, with active EUD participation, about how to change the climate change challenges into development opportunities.

With its still substantial forest cover Cambodia may seem a prime candidate for REDD. Some pilots with REDD have taken place through the activities of PACT, the Wildlife Conservation Society (WCS) and promoters (see Section 6.2). They have established pioneer projects but experienced problems with 'leakage' and the carbon credits have not yet found any buyers. Cambodia submitted a REDD Readiness Preparation Proposal to the Forest Carbon Partnership Facility and UN-REDD in January 2012.

As pointed out in other sections of this report, trends towards forest clearing, land use changes, major hydropower dams and water-intensive irrigation all threaten to dramatically increase Cambodia's GHG

[65] Ananthaswamy, A. Sea-level rise: It's worse than we thought. New Scientist 2715, 01 July 2009
[66] UNFCCC, Initial National Communication, 2002
[67] This is mainly taken from http//weadapt.org/knowledge-base/vulnerability/Cambodia
[68] http://www.camclimate.org.kh/index.php?page=detail&matc=&satc=atc25&article=atc25&lang=en
[69] http://www.climateinvestmentfunds.org/cif/ppcr
[70] http://www.camclimate.org.kh/index.php?page=sticky&matc=&satc=atc49&article=atc49&lang=en

emissions, and possibly negate the country's eligibility for climate change funds. On the other hand, adoption of large-scale biomass energy practices and even more, large scale adoption of low-external-input sustainable agriculture (IFOAM, 2010) and tree planting in the open landscapes hold enormous potential for carbon sequestration.

4 Institutions, Policies and Legislation

4.1 Institutional Overview

4.1.1 Royal Government of Cambodia (RGC)

The Council for the Development of Cambodia (CDC) serves as the point of contact between the RGC and donor countries, international organizations and NGOs and facilitates coordination of development assistance among ministries and other governmental institutions. The CDC is also responsible for all investment projects in Cambodia, including agriculture and agro-industries (CDC, 2010). Principle RGC actors in the environment, natural resources and climate change arena include: the Ministry of Environment (MoE); Ministry of Agriculture, Forestry and Fisheries (MAFF); Ministry of Water Resources and Meteorology (MOWRAM), and; Ministry of Industry, Mines and Energy (MIME). Section 9.2 includes a summary of RGC institutions and their respective remits and responsibilities as they relate to ENR. These include the following bodies:

The ***MoE*** has the main mandate for environmental protection and *"…to act as competent agency in the protection, prevention and control all activities which potentially affect the quality of the environment"*. This mandate includes conservation, protected areas (including forest / mangrove management therein), environmental quality, environmental impact assessment and rational use and management of natural resources. However, there are many aspects of ENR management covered by the mandates of other ministries. Roles and responsibilities among different agencies overlap in key functional areas, including land tenure administration, coastal and marine resource management, wildlife conservation and protected area management. The MoE is the focal point for the UN Convention on Biological Diversity and the UNFCCC through the work of its Climate Change Department (CCD)[71]. The CCD's roles and responsibilities include: implementation of the UNFCCC and other climate change-related tasks; advising the RGC on climate change negotiation positions; establishment of national CC policies, plans and legal instruments; identifying and assessing new appropriate technologies for Cambodia to adapt to climate change or to mitigate GHG emissions; promoting research activities and human capacity building, and; act as the Secretariat to the UNFCCC, Kyoto Protocol and the CDM focal points for Cambodia..

MAFF has jurisdiction over all agricultural crops, livestock, fisheries and forestry as well as management of ELCs. MAFF is composed of 12 departments / administrations and has authority over public institutions including the Royal University of Agriculture and the Cambodia Agricultural Research and Development Institute. MAFF is the RGC focal point for the United Nations Convention to Combat Desertification (UNCCD). The Forestry Administration (FA) is responsible for protection and management of forest resources, forest and wildlife inventories and wildlife conservation. The Fisheries Administration (FiA) is mandated to provide oversight to the inland and marine fisheries sector and aquaculture. This remit includes administration of community fisheries under the Department of Community Fisheries Development (CFDD) and of the Inland Fishery Research Development Institute. FiA also manages flooded forests and mangroves in Cambodia where they do not fall within Protected Areas.

MOWRAM is mandated to take the leading role in water-related activities, with the aim of ensuring social and economic development, equitable and sustainable use of water for livelihoods, and enhancement of

[71] http://www.camclimate.org.kh/

environmental quality under the following key performance areas: i) water resources management and development; ii) flood and drought management; iii) water-related legislation and regulation; iv) water resources information management. The *Tonle Sap Authority (TSA)* was created by Royal Decree in 2009 under MOWRAM, with an advisory and communication role among all stakeholders.

MLMUPC responsibility is to work through the cross-cutting sectors of land administration, land management and land distribution towards the RGC's declared vision of land policy: *"To administer, manage, utilize and distribute land in an equitable, transparent and sustainable manner in order to contribute to achieving national goals of poverty alleviation, ensuring food security, natural resources and environmental protection, national defense and socio-economic development orienting towards market economy" (MLMUPC, 2011)*.

MIME is responsible for developing, implementing and managing Government policy, strategy and plans with regard to energy, mineral extraction and industry (including SMEs). MIME has the responsibility to coordinate electricity sector policy, planning and development, though new projects and plans are subject to EIA under the jurisdiction of MoE.

The ***Ministry of Women's Affairs (MoWA)*** is the principle national mechanism for coordinating gender policy development and for monitoring and reporting, though a larger number of ministries are preparing and implementing gender mainstreaming programmes (NSDP-MTR, 2011).

Since 1995, the inter-governmental ***Mekong River Commission (MRC)*** has developed programmes and strategies to provide support for sustainable management and development of water and related resources in the Mekong River Basin – crucially addressing trans-boundary ENR issues in the region. With 11 on-going programme areas of activity, from agriculture and irrigation to flood management and mitigation; integrated water resources management to climate change adaptation; the MRC provides critical coordination capacity for sustainable development.

4.1.2 Institutional fine print.

Formal structures and titles in Cambodia do not necessarily reflect actual influence. Persons with close personal affiliation to leading politicians (such as advisors to the Prime Minister) may wield more power than people who are their nominative superiors. This may or may not be reflected in honorary titles in Khmer. See also section 6.1 and section 2.4.7 about compartmentalisation of public institutions

In general, ministerial capacities remain affected by low public servant wages, nepotism and corruption – especially relating to purchasing of promotions. Of specific relevance to the ENR sector is the lack of accountability and/or hiring of new staff for several years (e.g. FA and FiA).

Capabilities vary greatly from one department to another, even within the same ministry. Improvements can be seen in some areas and the Council for Administrative Reform is preparing a policy and programme framework to enhance capacity and the performance of the Civil Service. The Prime Minister allegedly commented in December 2011 that the institutional structures of the FA and FiA should be better aligned to the Organic Law (via provinces instead of cantonments).

4.1.3 Technical Working Groups

Numerous technical working groups have been established in Cambodia as vehicles for enhancing inter-ministerial coordination and civil society participation for planning and implementation of activities in key sectors.

The ***Technical Working Group on Agriculture and Water (TWG-A&W)***, has developed a joint *Strategy for Agriculture and Water (TWG-A&W, 2010)*, focusing heavily on water resource management[i]. However, the strategy is weak on the issue of climate change, only mentioning the need for adaptation and stressing use of resilient crop varieties.

The ***Technical Working Group on Forestry and Environment (TWG-FE)*** was established in 2004 to provide a mechanism for government-donor coordination for supporting and strengthening development activities within the forestry and environment sectors. Whilst the overall TWG-FE crucially comprises broad

representation and has established an important sub-working group on ELCs (TWG-F&E)[ii], this sub-working group does not (yet) include MLMUPC or MIME membership, which appears to be a significant weakness.

The ***Technical Working Group on Fisheries (TWG-F)*** aims to align the development of the fisheries sector with the NSDP. However, at the Government-Development Partner Coordination Committee meeting (2011), the TWG-F reported that the lack of inter-ministerial support and participation was hampering the efforts of the FiA and did not reflect the importance of fisheries in the RGC's plans and strategies for improving the livelihoods of rural and poor people.

The ***Technical Working Group on Land*** aims at working to improve land administration and land tenure security and increase equity in land distribution through inter-agency collaboration and strategic harmonisation. Recent developments reported at the 18th meeting of the Government-Development Partner Coordination Committee (2011) include agreement on the preparation of a Comprehensive Land Policy/White Paper and a draft policy on land valuation.

4.1.4 Civil Society

International and national non-state actor engagement in the environmental and natural resources sector is strong in Cambodia, across all sub-sectors and ranging from resource mobilisation to research, advocacy to action and capacity development. Actors include community-based organisations, not-for-profit agencies, donors and the private sector. This report does not have the scope to summarise all activities but in the interest of harmonisation, deals with donor cooperation separately in *Section 6*. Some of the long-standing non-state actors and/or institutions specific to the ENR sector in Cambodia and the region include the following:

The ***National Climate Change Network in Cambodia (NCCN)*** was founded by ***Oxfam*** America in 2009 along with a group of civil society organizations working on climate change related issues. This NCCN aims to minimize the impacts of climate change through advocacy, capacity building, piloting projects and improving networking, coordination and communication among stakeholders.

The ***Joint Climate Change Initiative (JCCI)*** is a collaborative effort of Cord, DanChurchAid/Christian Aid (DCA/CA) and Forum Syd with financial support from the Swedish International Development Cooperation Agency (Sida). The overall aim of the project is for people in Cambodia to benefit from local NGO interventions and influence decision makers regarding changes to policy and practice that support their resilience to climate change and secure their rights to a secure livelihood.

The ***NGO Forum*** on Cambodia is a membership organisation for local and international NGOs working on a number of development issues at multiple levels. Their 'Land and Livelihoods' and 'Environment' programmes deal with specific land and environmental issues, offering broad based support to their network of NGOs, especially in terms of engagement with the RGC.

4.2 Policies, Plans and Regulations

The ***'Rectangular Strategy for Growth, Employment, Equity and Efficiency – Phase II'*** is the RGC's over-arching socioeconomic development policy agenda for the Fourth Legislature of the National Assembly (2008-2013). The Rectangular Strategy is built on four fundamentals, including *'Ensuring environmental sustainability, especially through sustainable management and use of natural resources'*, and describes four growth areas that are prioritized by the RGC. Principle activities for the RGC in its fourth legislature include: i) accelerating land reform; ii) public financial management reform; iii) further implementation of the decentralization and deconcentration (D&D) policy to transfer power from the national to sub-national administrations; iv) fisheries reform, including strengthening national resource conservation and taking serious action against illegal encroachment of flooded forests in order to secure fisheries resources; and v) forestry reform, including law enforcement, effective management of Protected Areas, climate change actions and Community Forestry.

The ***National Strategic Development Plan (NSDP)*** is intended to serve as the implementation tool or roadmap for implementation of the Rectangular Strategy – Phase II. The updated NSDP 2009-2013 sets a national target of 60% forest cover, 450 approved community forests (noting that there are currently only 420 community forests at various stages of development) and reducing fuel wood dependence by 2013. It also mentions the importance of the new National Forest Programme (NFP) as the strategic framework for the forestry sector and the role of protection forests, protected areas (PA), community forests and improved management of forestry concessions towards achieving the national target of 60% forest cover.

A Royal Decree enacted in 2008 established the ***National Committee for Sub-National Democratic Development (NCDD)*** to coordinate and lead the implementation of the ***Organic Laws***[72], including reviewing functions and responsibilities of various line ministries/institutions, departments, units and other government authorities at all levels in order to identify the service delivery functions, responsibilities, powers and accountability that should be transferred to sub-national levels of government. The NCDD has drafted a 10-year policy framework, covering the period from 2010-2019, called the *National Program for Sub-National Democratic Development (NP-SNDD)* and associated implementation plans. Under the Organic Laws, direct authority over the use and management of most forestland resources in the country still resides primarily within MAFF, MoE and the Ministry of Economy and Finance (MEF). Communes are mandated only to protect and preserve environmental and natural resources under existing legislation and are responsible for developing 5-year *Commune Development Plans (CDP)* and *Commune Land-use Plans (CLUP)*, unless granted specific additional authority from the RGC.

The laws and regulations[73] of Cambodia are hierarchical, each deriving its validity from the rule placed above it, including: 1. Constitution; 2. Laws (*chhbab*); 3. Royal Decrees (*reachkret*); 4. Sub-decrees (*anukret*); 5. Ministerial decision (*prakas*); 6. Circulars (*sarachar*); 7. Local regulations (*deika*). A full list of the main regulations relating to the ENR sector is included as Annex 0.

4.2.1 Land

The *Land Law (2001)* sets out a comprehensive system of land classification and ownership rights. It includes provisions on social and economic land concessions, indigenous land rights, land registration and land dispute resolution. The Law also authorises the enactment of a series of important sub-decrees and other legislation. The significant elements of this law for the ENR sector are three-fold: a) definition of state public property; b) definition of state private property; c) definition of indigenous property under the collective ownership category[74].

The law distinguishes between state land in the public domain, such as forests and PAs, and state land in the private domain, which is used to provide land for economic and social development. Indigenous property is a communal title, which is vested in an incorporated community with bylaws so the land registration certificate is to be considered equal to the right of a private person. The lands in the communal title that are part of the Permanent Forest Estate may either be converted to private state land or remain public land meaning that the government can take back the land in the communal title which is state public land. The *Sub-Decree on State Land Management* provides the framework for state land identification, mapping, registration and classification and notes where additional administrative guidelines are required, however little actual progress has occurred in this important domain.

The *Sub-Decree on Economic Land Concessions*, adopted in December 2005 and amended in 2009, was an important advance in establishing the legal and regulatory framework for the granting and management of ELCs. It includes requirements to conduct public consultations and environmental and social impact assessments. However, these provisions have not been properly implemented and enforced; existing

[72] The term 'Organic Laws' is in common and constitutional usage and refers to the *Laws on Administrative Management of the Capital, Provinces, Municipalities, Districts and Commune/Sangkat*

[73] http://www.opendevelopmentcambodia.net/laws-regulations

[74] The NFP (background section, p. 27 onward) has a section explaining the intricate relations between the Land Law, the Forest Law and their management (NFP)

concessions have rarely been reviewed, and; ELCs have continued to be granted on forested areas and indigenous land, in direct violation of the law (Aprodev, 2011). Until April 2010, the MAFF requested to RGC for contract cancelation of 41 companies with total land area of 379,034 ha, though it is not known how many of these requests were enforced. Furthermore, 9 ELCs with land area of more than 10,000 ha are allegedly subject to negotiation to reduce their concessional areas to 10,000 ha (MAFF, 2010[75]).

The *Law on Pesticide and Chemical Fertiliser Control (2011)* was passed in December 2011 and is designed to regulate the sale and use of chemicals for use in agricultural production. A copy of this law was not available at the time of writing.

4.2.2 Water

The *Law on Water Resources Management* was approved in 2007, building on the National Policy on Water Resources Management and the Strategic Plan on Water Resources Management and Development (2005-2008). The Law is set within the framework of IWRM, recognising the different sector interests in water while calling for greater coordination and the need to balance social and environmental considerations. While the institutional framework at the Mekong Basin level is in effect, improvements in the link between the MRC and MoWRAM are needed. Integrated water resources management is still unimplemented and the national legal framework is still to be finalized with four sub-decrees on basin management, farmer water user communities, water licenses / fees and water quality (TWG-AW, 2010). According to *UNDP, 2011:*

"In practice current water resource planning tends to follow sectoral interests of particular Government agencies rather than the hoped for integrated approach. So far progress has been limited in putting in place the necessary institutional arrangements, either at national or river basin levels. There is an urgent need to involve local stakeholders in the analysis of problems and identification of appropriate actions…Irrigation and hydropower development both require water resources and viable catchments and, to varying degrees, alter natural hydrological patterns that are themselves subject to impacts from climate change. Understanding these interactions is therefore essential for effective planning to ensure the sustainability of water resources and to minimise negative impacts. So far, planning mechanisms for assessing water resource options under a changing climate, and the potential impacts and trade-offs, are not in place".

The *Fisheries Law* of 2006 aims to ensure fisheries resource management, including production and post-harvest processing, and promote the livelihood of local fishing communities. Under the Law, the state has the role of supporting traditional fisheries within the allocated area and retains overall ownership of the resource. However, under the *Sub-Decree on Community Fisheries Management* all Cambodian citizens have the right to form community fisheries in their own areas, which shall not be subject to sale, exchange, hire, donation or sub-division. The Law recognises the role of the Commune Councils (CC) and other local authorities in collaborating on law enforcement and provides a platform to ensure that sufficient authority is at the disposal of local police to ensure security and public order.

The *Strategic Planning Framework for Fisheries: 2010-2019. 'Fishing for the Future'* states the vision of ensuring the *"Management, conservation and development of sustainable fisheries resources to contribute to…food security and socio-economic development…".* This is defined under seven goals: i) the contribution of the fishery to national prosperity is high and sustained; ii) the livelihoods of people in the sector are improving and above the national average; iii) the fisheries domain and associated resources are in a healthy and resilient condition and sustainably managed; iv) fish is a plentiful, healthy and valuable source of food; v) fishing businesses are profitable, sustainable and responsible; vi) the fisheries domain is managed, developed and conserved in close cooperation with neighbouring countries; vii) the policy, legislative and support environment for the sector is sufficient, appropriate and enabling.

[75] http://www.elc.maff.gov.kh/en/news/12-elc-status.html

4.2.3 Biodiversity & Wildlife

The *Protected Area Law (2008)* was enacted to ensure the management, conservation of biodiversity and sustainable use of natural resources in protected areas, to be put into operation by: Developing strategic plans, action plans and technical guidelines for managing PAs; Making proposals for the establishment of any PA as required by the RGC or regional / international agreements; Taking action to investigate and control ENR offences in the PAs and file complaints; Promoting education and awareness of the public to participate in the conservation and protection of ENRs within Pas; Formulating agreements on community PAs.

The *National Biodiversity Strategy and Action Plan (NBSAP)* has been under implementation since 2004 (MoE/CBD, 2010). The Plan consists of 98 priority actions covering 17 different themes. It highlights the three pillars of sustainable development; ecological integrity; economic sustainability, and; social equity.

4.2.4 Forests & Vegetation

The policy and legislative framework for the forestry sector is mostly in place, though much of the framework has yet to be translated into operational guidelines for practice, whilst human and institutional capacities need to be strengthened. The areas where forests interact with other sectors, such as construction, mines, urban development, agriculture and water supply are particularly poorly regulated,

despite the fact that these cross-sectoral issues have large impact on overall governance effectiveness.

The 2002 *Forestry Law* defines the framework for management, harvesting, use, development and conservation of Cambodia's forests. The objective of the Law is to ensure sustainable management of forests for their social, economic and environmental benefits, including conservation of biological diversity and cultural heritage. The Law recognises traditional user rights of local communities living near forest reserves as those rights necessary for preserving livelihoods and traditional customs and beliefs. Local communities can harvest forest products for customary subsistence use without a permit (USAID, 2010). The *Sub-Decree on Community Forest Management (2003)* sets rules for the establishment, management and use of community forests.

In 2008 and 2009, the MAFF Forestry Administration, together with other stakeholders in the forest sector and development partners developed the National Forest Programme (NFP)[76] as a strategic framework, designed to guide the implementation of the policy reforms mandated by the Rectangular Strategy and the NSDP. See further in section 2.7.

4.2.5 Energy

The *Electricity Law* (2001) created the Electricity Authority of Cambodia as an independent regulatory authority. The overall energy strategy in Cambodia covers four main categories: electricity, renewable energy, power and wood energy. In addition, MIME has recently finalised a specific *Rural Energy Strategy*.

In 2006, the RGC approved the *Rural Electrification by Renewable Energy Policy* with the objective to create an enabling framework for renewable energy technologies to increase access to electricity in rural areas. The policy is linked to a master plan as the guiding document for the implementation of projects and programmes.

4.2.6 Geology & Mining

The *Law on Mineral Resource Management and Exploitation (2001)* provides the legal framework for management and exploitation of mineral resources[77] and all activities relating to mining operations in Cambodia. All mineral resources remain the property of the State.

[76] Cambodia's National Forest Programme, 2010. Forestry Administration, Phnom Penh. www.twgfe.org/nfp/
[77] Except petroleum and gas which fall under the *'Petroleum Regulations'* of 1991

4.2.7 Human Settlements

The Law on Environmental Protection and Natural Resources Management (1996) is designated to:

- protect and promote environmental quality and public health through prevention, reduction and control of point sources and non-point sources of pollution;
- assess the environmental impact of all proposed projects prior to the issuance of the decision by the government,
- encourage and enable the public to participate in environmental protection and natural resource management, and;
- suppress any act that causes harm to the environment.

The Law includes specific sub-decrees on: Environmental Impact Assessments; Solid Waste Management; Water Pollution Control; Air Pollution and Noise Disturbance Control, and; Management of Ozone Depleting Substances. Currently, the MoE supervises domestic solid waste management in collaboration with local/municipal authorities and has the role to monitor and assess air quality standards by taking measures to prevent and reduce pollution. Moreover, MoE has been cooperating with concerned ministries to propose activities to mitigate the air pollution from heavy traffic.

The website of *OpenDevelopmentCambodia* provides access to most relevant legislation and regulations.

4.3 Public Participation

Cambodia's legislative framework comprehensively and commendably covers the issue of public participation as it relates to ENR issues. For instance, Article 16 of the Law on Environmental Protection and NRM states that: *"The MoE shall, following proposals of the public, provide information on its activities, and shall encourage participation of the public in the environmental protection and natural resource management."* Furthermore, Article 1 of the sub-decree on EIA holds that a key goal of this piece of legislation is to: *"…encourage public participation in the implementation of the EIA process and take into account their input and suggestions in the process of project approval".* Elsewhere, the Sub-Decree on Economic Land Concessions says that none can be issued on land for which there have not been *"…public consultations, with regard to ELC projects or proposals, with territorial authorities and residents of the locality."*

Similar provisions can be identified in most if not all ENR-relevant regulations in Cambodia. However, practical experience suggests that their inclusion more likely represents the aspirations and capacity of legal / technical advisors supporting legislative preparation, than a reflection of widespread RGC commitment to genuinely prioritise public participation. Where participation becomes critically reduced or excluded is in the *application* of the laws and regulations. For instance, despite the above provisions (and perhaps due to lack of MoE resources), in most cases EIAs are outsourced to private sector consultants hired by project owners and thus rarely carried out according to the letter or the spirit of the law. The MoE will generally approve the consultants' assessment result, subject to the payment of a service fee to the Ministry (CDC, 2010)[78]. Special economic zones are exempt from this process, despite often being highly controversial in terms of their placement and practices and Section 2.3.2 describes the dubious process through which land concessions are awarded.

Such problems with participation are exacerbated by the absence of specific, unambiguous and up-to-date information on environmental and land use matters. This ensures that public awareness and engagement mainly occurs at distance, through the press, or in direct confrontation e.g. when a new concession is 'enforced'. In the latter case the concessioner will more often than not have armed persons available.

[78] http://www.caminfoservices.com/cdc/investors-information/environment-protection.html

Access to justice in ENR matters, as in most aspects of Cambodian life, is highly dependent on the respective 'status' of the claimants. It is not equal, fair or balanced. In addition to the imbalance between individual rights, freedom and state power, Cambodia faces a cultural imbalance between men and women. Poverty, illiteracy, discrimination, lack of encouragement and the absence of a specific policy on promoting and providing opportunities to women are obstacles for women who want to participate in political, social and environmental affairs (COMFREL, 2011). This is despite the NSDP putting *"…high priority on the enhancement of the role and social status of Cambodian women by focusing attention on the implementation of the Gender Strategy, capacity building for women in all sectors, changing of social attitudes that discriminate against women, and ensuring the rights of women to actively and equally participate in nation building"*.

The situation is improving in parts, and participation of civil society and peer RGC organisations has been increasingly apparent in the preparation of many recent plans and sub-decrees, usually through donor-supported or NGO-driven processes. These include the preparation of the NFP, of sub-decrees on community forestry and community fisheries and several others. A good example of this is seen in the membership of the multitude of technical working groups (TWG) currently active (see Section 4.1.3.). A further exception to the (lack of) rule is the process of identifying land ownership and titling. Even though this is a difficult process and line ministries are often very reluctant to participate, they will eventually show up before decision time. This process is now being piloted for state public land[79].

5 Integration of Environment and Climate Change in Policy

The National Climate Change Committee (NCCC) is a cross-ministerial policy-making body to address climate change issues in Cambodia.

Cambodia's NSDP recognises the importance of mobilising resources, support and financing to participate in global efforts to address the challenge of climate change, including REDD and GHG mitigation projects. (See further in section 4.2.)

Cambodia's Second National Communication to the UNFCCC has reportedly completed its work on climate change analysis and covers: (i) analysis of significant trends in historical climate data; (ii) climate change scenarios; (iii) sectors contributing to high GHG emissions; iv) enhancing public awareness and improving knowledge of Cambodian people on climate change, and; facilitating the integration of climate change concerns into development policies. However, a detailed report has not yet been disseminated for the public and only draft versions have been reported on for the purposes of this CEP. As with the First National Communication, poor data collection and management systems in most line ministries meant that there are heavy assumptions were necessary made in this second study due to unavailable data.

Goal 7 of the ***Cambodia Millennium Development Goals (CMDG)*** is to *'Ensure Environmental Sustainability'* and sets out nine indicators for the forestry and environment sector under its Target 13 to *'Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources*'. These indicators, targets and achievements are described in section 1.

[79] Personal information, MLMUPC, January 2012.

5.1 Green Growth

Currently the growth in Cambodia mainly comes from simple extraction of natural resources and from cheap, rather unskilled labour. The main benefits from this are siphoned to the wealthier strata of society through intricate and mainly hidden flows. Only few Cambodian companies apply more sophisticated economic models, which include skilled production, innovation and sustainable growth, and very few consider items such as energy efficiency, zero-waste technologies or training of labour beyond the meanest qualifications. The very few that do are highly needed as pioneers, role models and ground-breakers for a different economic and social model to take hold and serve as basis for longer-term, equitable and Green Growth.

A Green Growth Roadmap was produced in 2009 with support from UN agencies and donors, with later follow-up meetings. The Roadmap states: 'Effective environmental protection and natural resource management is a sectoral concern; many governmental actions to protect the environment and manage environmental impacts should be integrated with investment and policy priorities. There is also a need to incorporate sustainability impact assessments and compliance procedures in new project screening requirements. Therefore, the RGC should strengthen the capacity of MoE to plan and implement projects, including monitoring, enforcement, and strengthening of compliance according to the existing environmental legislation'. As may be derived from this quote, the Green Growth roadmap, so far has its institutional home in MoE, and more powerful institutions are invited as participants. Nonetheless the initiative has a strong potential by being a serious attempt at combining ENR and growth in positive ways.

The prime Ministers in the Greater Mekong Subregion in February 2012 held a conference on '*Balancing Economic Growth and Environmental Sustainability*'[80]

These, so far quite feeble, trend towards Green Growth may get boosts from initiatives such as EU's likely future 'Green Public Procurement' [81], and possible similar initiatives in other regions and countries.

5.2 Accounting for ENR

Non-legislative instruments are beginning to gain ground in some aspects of environmental and natural resource management. A system of sanitary and phyto-sanitary (SPS) standards is under development and will include elements relating to persistent organic pollutants (POPs) and chemical residues. Payment for environmental services is being tested in one minor hydropower project (funded by EU, see section 6.2), but other (non-legislative) instruments such 'green budgeting', environmental fiscal reform, voluntary schemes (e.g. environmental management systems, environmental labelling, industry-government agreements) etc. are still largely unknown, albeit brought up in discussions in the country.

5.3 Disaster Risk Reduction

The National Committee for Disaster Management coordinates Cambodia's disaster response and preparedness. It has previously focused squarely on response (especially to floods) but has currently in terms of Disaster Risk Reduction set the following targets (Global Platform, 2011)[82]:

- 'Review and improve the legislations, policies, guiding principles to accommodate, promote and improve disaster management; including resources and budget allocation;
- Improve and establish systems and mechanisms of disaster management including guidelines, standard operation procedures, and plan that enable to adequately prepare for and respond to the needs at all levels.

[80] http//www.gms-eoc.org/
[81] http://ec.europa.eu/environment/gpp/index_en.htm
[82] http://www.preventionweb.net/english/policies/v.php?id=21780&cid=29

- Mainstream disaster risk reduction into social-economic development and poverty alleviation agenda; including acceleration of the formulation the National Platform for Disaster Management, the establishment of the disaster management team within the inter-governmental ministries and institutions, academia, civil society and the private sector.
- Invest in long-term disaster management knowledge building; including awareness, skill enhancement, and formal education for the future leaderships and professionals in disaster management for the country.
- Participate, promote and strengthen regional and international collaboration and cooperation in disaster management, including implementation of ASEAN Agreement on Disaster Management and Emergency Response, the Hyogo Framework for Action and others.'

6 Development Cooperation in the Environment Sector

Cooperation between RGC and development partners is in general guided by the Strategic Framework for Development Cooperation Management (CDC, 2006)[83], which includes a Harmonisation, Alignment and Results Action Plan. Under this framework a number of technical working groups (TWGs) coordinate and plan work in various sectors (see Section 4.1.3). A major shortcoming so far is the absence of China and Vietnam in these groups. The CDC hosts semi-annual meetings through the Government Donor Coordination Committee (GDCC[84]) to discuss issues of common concern, as well as give directions for improved collaboration. The RGC cancelled the planned meeting for 2nd half of 2011 and has proposed that the next meeting may not be held until 2014.

6.1 Past experiences

Danida, for a period in conjunction with DFID, has been the main donor within ENR in Cambodia and has chaired the TWGs on Forestry and Environment and on Fisheries. This support is now being withdrawn and will cease completely in 2012. The support has been in two programme phases, the first (NREM-programme) exclusively by Danida (2001-2006) and the latter (2006-2011) jointly between the two donors and with participation by NZAid. The first phase was comprised of a number of large, multi-year projects. Among these, one built capacity in environmental management and monitoring within MoE and relevant line ministries. A key function was to assist MoE in producing the first (and so far only) *State of the Environment Report* (2004). Another project supported integrated coastal zone management, building capacity, knowledge and laboratories and instigating the formation of a management body for the entire coastal area. It also supported a network of livelihoods activities between communities and communes in the coastal area. This, latter activity is currently carried on through a UNEP-executed project funded by the CCCA and RGC, while traces of other activities in this project (and in the one mentioned before) are difficult to identify. Unfortunately no reports on lessons learned or impact are available. A further Danida-project concerned tree seed management in forestry. Its successor supported the production of the National Forest Programme. The first Danida programme phase also included a project on integrated pest management in agriculture, which led to creation of the Agriculture Technology Services Association[85], which executes donor-supported projects. Finally, the first phase programme had a pilot project on community- and commune-based environmental and natural resource management. The second programme phase built on this and focused on ENR through the decentralising government system. This phase was based on a programme designed to exploit synergies between decentralised planning, budgeting and execution of ENR projects, strengthening of voice and business know-how of local peoples' organisations, institutional support to the FA, FiA and land management unit in MLMUPC and support to policy development and donor harmonisation into programmatic approaches in ENR. The programme

[83] http://www.cdc-crdb.gov.kh/cdc/policy_docu_guide/default_eng.htm
[84] http://www.cdc-crdb.gov.kh/cdc/gdcc/default.htm
[85] http://www.atsacambodia.org/index.html

achieved some positive results partly in local livelihoods improvements (NRMLP, 2010) partly in policy development, but was too short and probably too complicated in its setup and ambitions according to a lesson learned study (Danida, 2010).

The ***World Bank*** has some pertinent experiences with land management and forestry In Cambodia. Within both fields, NGO voice has led the bank to launch independent inspection panels regarding two projects. Briefly, the lessons, as summed up by the World Bank (WB, 2010), are that: *'in general, there is a well-developed policy and regulatory framework for Land- and Natural Resources Management and leadership for policy implementation from within the respective line Ministries; however, there are both critical capacity constraints and political interference that result in inconsistent application of the legal framework. The weakness of formal government institutions relative to political parties and personal patronage networks means that resource allocation decisions at both central and provincial levels lack transparency.*
Despite these challenges, progress has been made in some key aspects during the period under review, including these steps; Community consultation guidelines; Expansion of Community Forestry; Strengthening indigenous peoples' communal land rights (a Sub-Decree on Procedures for Registering Land of Indigenous Communities to guide implementation of the Land Law's provisions related to indigenous peoples' land rights was finalized in 2009); Finalization of the National Forest Programme; Piloting forest boundary demarcation and a law and regulations on resettlement. '

6.2 On-going and planned support

The exceptional degree of reliance of a large proportion of Cambodians on environmental and natural resources for subsistence, livelihoods options and environmental services, is well recognised by the degree of development cooperation focused on this sector. In response to RGC strategic plans (see Section 4.2), all major donors and development partners have programmes here, either directly or through their relationships with multilateral agencies, primarily the EU, ADB and UNDP/UNEP. This section will not detail all activities but outlines some of the most relevant under various donors/partnerships before summarising planned sector cooperation in Section 9.5. The CDC maintains a database of current development cooperation, in a donor-supported activity[86].

The ***EUROPEAN UNION (EU)*** is gradually taking an increasingly overarching role in collaboration with its Member States. Denmark, the United Kingdom and Finland have all taken steps to disengage from direct bilateral support to Cambodia. The Swedish International Development Cooperation Agency (Sida), Spain's AECID, the Agence Française de Développement (AFD) and Germany's GIZ and KfW continue to manage their own operations in-country in addition to contributions to multilateral agencies. Current EU cooperation with Cambodia is mainly in the form of targeted budget support in addition to the following project-based support:

The ***Cambodia Climate Change Alliance (CCCA)*** with Denmark, European Union, Sweden and UNDP is a comprehensive and innovative joint programme to address climate change and disaster risks in Cambodia at national and sub-national levels. On the one hand it aims at creating conditions in the form of capacity building and institutional strengthening to prepare for and mitigate climate change risks, and on the other hand, to directly help vulnerable communities by enhancing their resilience to climate change and other natural hazards. The CCCA is anchored in the Government's National Climate Change Committee (NCCC). The CCCA includes a unified engagement point for development partners and a multi-donor financial facility to provide resources for climate change capacity building at national and local government level. It also includes a mechanism for knowledge sharing and learning which extends beyond the Government to

[86] http://cdc.khmer.biz/

civil society and the broader Community of Practice. The CCCA is currently supporting the development of a National Climate Change Strategy and Action Plan and mainstreaming of climate change into key priority sectors. The EU is the largest contributor with €2,205,817.

The *Powering Harbour Development in South-East Asia* initiative is aimed at supplying renewable energy to the harbour of Sihanoukville using a medium-scale hybrid wind turbine system. *Flanders International Technical Agency (FITA). EU contribution: €300,000.*

Promoting Climate Resilient Livelihoods for Small-Scale Farmers in Most Vulnerable Dry Land Areas. This project contributes to the eradication of extreme poverty and hunger among small-scale farmer families in dry land areas in Siem Reap and Kampong Cham provinces by enhancing their resilience against climate change, drought and soil degradation. *Plan International (UK); CEDAC. EU contribution: €1,849,709.*

Poverty Alleviation through Improved Conservation in Virachey National Park is raising awareness and promoting dialogue related to biodiversity conservation. The project's aim is that 9,500 mainly ethnic minority people in 24 villages reliant on natural resources in and bordering the Virachey National Park will benefit from improved biodiversity conservation and ecosystem services. *Deutsche Welthungerhilfe; Save Cambodia's Wildlife. EU contribution: €713,000.*

The ***Sustainable Provision of Ecosystem Services in the Cardamom Mountains Landscape*** project supports payment for ecosystems services (PES), which is a key element in their strategy to address deforestation and forest degradation, mainstreaming and enhancing forest biodiversity conservation and maintaining and improving ecosystem services in the Cardamom Mountains. *Fauna & Flora International (FFI); Learning Institute; Royal University of Phnom Penh: Department of Environmental Science & Department of Biology. EU contribution: €2,138,500. ****

Sustainable Forest Management and Rural Livelihood Enhancement through Community Forestry and REDD Initiatives in Cambodia aims to scale up the reach and impact of community forestry in Cambodia. *RECOFTC; OXFAM-GB. EU contribution: €1,634,724*.

Promoting Community Forestry in Cambodia aimed at contributing to sustainable management of forests in Cambodia, based on full community participation. *OXFAM-GB. EU contribution: €1,212,126*.

Waste to Energy for the Rice Milling Sector in Cambodia aims to promote sustainable growth, contribute to economic prosperity and poverty reduction and to contribute to mitigation of the effects of climate change by enhancing competitiveness of the rice sector through increased uptake of environmentally responsible waste to energy technologies. *Stichting Nederlandse Ontwikkelingsorganisatie (SNV). EU contribution: €1,902,546*.

The ***REDD+ Community Carbon Pools Programme*** is a regional EU-funded FFI initiative in Southeast Asia to: improve and strengthen REDD+-related forest governance; institutionalise tenure rights for indigenous people and forest-dependent communities, and; create Community Carbon Pools. In Cambodia FFI works with the MoE to develop policies for community forestry REDD+ in protected areas, while the Non-Timber Forest Products Exchange Programme supports a network of forest user groups throughout Cambodia to participate in the development of REDD+ policies for community forestry through the National REDD+ Working Group. *Fauna & Flora International (FFI)*

The ***ASIAN DEVELOPMENT BANK (ADB)*** is one of the largest cooperation partners with Cambodia through provision of grants, loans and TA support. ADB priority sectors identified for the current Country Partnership Strategy (2011-13) include: transport; water supply, sanitation, and urban development; agriculture and natural resources; education, and; finance – though ENR protection and improvement also feature strongly in the proposed Country Operations Business Plan. For instance, the *Greater Mekong Subregion: Biodiversity Corridor Conservation Project (2012-19)* will enhance trans-boundary cooperation for preventing and mitigating fragmentation of biodiversity rich forest landscapes of the Cardamom Mountains (Koh Kong) and Eastern Plains Dry Forest (Mondulkiri) of Cambodia (linking with the Central Annamites in Viet Nam and tri-border forest areas in Laos). Through an ADB grant of US$ 19 million, MOE's General Department of Administration for Nature Conservation and Protection and thereafter, MAFF's FA

and provincial governors will work towards: strengthening institutions and communities in biodiversity management; restoring, protecting and maintaining ecosystem services, and; improving livelihoods in target communes (56 in Cambodia) (ADB, 2010). Additional ADB planned development cooperation with Cambodia is available online[87].

The ***UNDP*** is well-engaged in the ENR sector through their 'Energy & Environment Programme', which consists of project funded by donors, such as the Danida-funded *Strengthening SFM and Bioenergy Markets to Promote Environmental Sustainability and to Reduce GHG Emissions in Cambodia initiative (2011-15).* The project is aligned with the FA's NFP (Section 4.2.4) goal to have 2 million ha under decentralized forest management and aims to strengthen Community Forest and Community Protected Areas policy, planning and implementation through inclusion of SFM principles and practice[88]. UNDP is also implementing the Sida-funded *Cambodian Community Based Adaptation Program (CCBAP).*

The objective of the ***Cambodia UN-REDD National Programme*** (2011-13; US$3 million) is to support Cambodia to be ready for REDD+ implementation, including development of necessary institutions, policies and capacity. Four key outcomes will be pursued, including: ensuring that national management of the REDD+ readiness process and stakeholder engagement is in accordance with the roadmap principles; developing a National REDD+ Strategy and Implementation Framework; improving capacity to manage REDD+ at sub-national levels, and; designing a monitoring system and capacity for implementation.

The ***UN-FAO*** established the *National Forest Programme Facility (NFP Facility)*[89] with Cambodia in 2007. The main objective of the partnership is to reduce poverty in Cambodia's rural areas through development and promotion of forest-based enterprises. The FAO is also implementing the Spanish-funded ***Regional Fisheries Livelihood Programme for South and Southeast Asia (RFLP, 2009-13)*** in combination with the FiA. RFLP aims to strengthen capacity among participating small-scale fishing communities and their supporting institutions with the focus on improving livelihoods of fisher folk and their families while fostering sustainable fishery resource management practices.

*The **United Nations Educational, Scientific and Cultural Organisation (UNESCO)** has recently joined the TWG-FE and will be supporting the promotion of environmental sustainability through biosphere reserves and fostering policies and capacity-building in science, technology and innovation for sustainable development.*

JAPAN is providing development cooperation to Cambodia across a number of sectors, including water resources management and control of agricultural chemicals. The Japan Social Development Fund and World Bank cooperated in funding RECOFTC to implement the *Capacity Building for Sustainable Forest and Land Management Project.*

The ***USA-funded*** *HARVEST Project*[90] (*Helping Address Rural Vulnerabilities and Ecosystem Stability*), is working with public, private and civil society stakeholders to strengthen food security, increase agricultural productivity, raise rural incomes and assist with climate change adaptation.

The ***Dutch Ministry of Foreign Affairs*** provides financial assistance to the *National Biodigester Programme (NBP)*[91] - a joint initiative between MAFF and the SNV. After a success phase from 2005-09 the programme is extending till 2012 and scaling up to 12 provinces. The Department of Animal Health and Production (DAHP) is coordinating agency for the programme with SNV providing TA.

The ***Community Forestry Carbon Offset Project*** aims to sequester 8.7 million metric tonnes of CO_2 over 30 years as the first 'avoided deforestation' project in Cambodia. The project is being implemented by the RGC's FA and Oddar Meanchey Provincial Government, with support from PACT, Clinton Climate Initiative

[87] http://beta.adb.org/countries/cambodia/main
[88] http://www.un.org.kh/undp/what-we-do/projects/sustainable-forest-management?app_id=17
[89] http://foris.fao.org/nfp-facility/public/partnership/114374.do
[90] http://cambodia.usembassy.gov/pr_011011.html
[91] http://www.nbp.org.kh/

(CCI), MacArthur Foundation and Terra Global Capital. The ***Wildlife Conservation Society (WCS) Cambodia***, is also engaged in REDD project development in the Seima Protection Forest (Mondulkiri) and the Northern Plains of Preah Vihear, two forest landscapes of national and global importance.

Whilst ***China*** is providing substantial levels of donor support to and investment into Cambodia, there is no record of support to the ENR sector. Almost all identified projects focus on infrastructure improvement, with questionable attention paid to national and internationally-agreed environmental and social safeguards.

Section 9.5 provides a summary of all planned and on-going assistance to the ENR sector in Cambodia from 2012 onwards. The list is impressive, with large numbers of activities. These are however mainly in the form of projects and the absence of a longer-term, comprehensive and concerted programmatic approach is striking.

7 Conclusions & Recommendations

7.1 Conclusions

The still very rich natural capital of Cambodia is being exploited and destroyed at a rapid and increasing rate. Many current plans in the Country and region will only accelerate the pace and enhance the scope of the erosion-.

The most threatening aspects are the expected changes in the water regime and the destruction of much of the forest cover. The former may be brought about by changes in the flow of the Mekong River by planned large dams and by the likely effects of climate change. The latter is brought about by felling forests to secure short-term economic gains for few individuals and groups, through land concessions that are awarded either for farming or mineral extraction.

Both trends will damage Cambodia's growth prospects and do so in ways that will increase inequality, undermine accountability and suppress participation and fundamental resource rights. Associated changes are likely to increase future material and social poverty and food insecurity among the most disadvantaged people and possibly even of broader sections of the population, through destruction of vital ecosystem services and soil fertility.

Cambodia is equipped with relatively strong legislation in the field of environment and natural resources, as well as in land management, but this body of law is largely being ignored or side-stepped in what has every sign of being a rush to cash in on common property resources for personal gain, before somebody else does so. The lack of credible and timely information, both within RGC and the public domain is a major reason it is not always possible for ordinary citizens to act with sufficient force against this 'public-private plunder'. Public participation in ENR management and decision-making, even if foreseen in the legislation, is usually not asked for, or actively discouraged.

The above situation leads to a need for strong partner support at all levels, from regional policies and collaboration, to local peoples' organisations, in order to: reverse negative trends; build a foundation for sustainable growth that reduces poverty and includes an ever more active population, and enhances natural and social capital in a climate-smart fashion. This support should seek urgently to demonstrate viable alternatives to the depletion of natural capital. It should also work with a clear strategy of 'doing good', i.e. increase natural capital, and enhance green growth, inclusion and job creation.

7.2 Recommendation: Support action in key ENR themes

The European Union, with its focus on coherence between development assistance, policy dialogue and sustainable production, trade and consumption markets - from industry, agriculture and fisheries to environment, climate, energy and migration along with its understanding that the; '*objectives of development, democracy, human rights, good governance and security are intertwined',* holds a potentially strong position in terms of contributing significantly to the necessary changes. Other development cooperation partners in Cambodia are working along similar lines, and the past decades of development and donor support has ensured that many skilled professionals and committed people in all levels of society are prepared to lead and participate.

It is recommended that the EU support efforts to improve governance and management of these three key ENR themes:

- Surface water - in rivers, streams, lakes, watersheds, and flooded areas;
- State land and the forests that grow on this land;
- Soil fertility.

It is further recommended that the EU, in its support to the education sector, make strong efforts to assist the RGC in improving environmental education and its linkages to life skills awareness.

It is recommended that the EU support the acquisition, disclosure and reporting to the general public and decision makers of timely, unambiguous and specific information about critical threats to the environment and natural resources, especially within the identified priority themes. This could be further augmented by strong support to peoples' organisations, which may (also) be active within ENR and poverty reduction.

Other funding streams provided by the EU could also benefit from synergies with the suggested ENR focus. This is particularly obvious for support to the fisheries sector (currently being planned), trade and in early sustainable energy (see further in Section 9.4)

EU may also promote transparent certification schemes for natural resource products that are multi-stakeholder and science-based to move forward sustainable consumption and production.

EU may work with government to support setting up an investment vehicle to facilitate the transition to and implementation and documentation of green growth and EU should support the government to ensure that national development strategies take full account of the state of national assets and ecosystems and their role in sustaining human well-being and economic activity. One element of this could well be good mapping and national level assessments of ecosystem services and their economic contribution.

7.2.1 Components of the three main themes

Good governance and management of *fresh surface water resources* has several components:

a) The flow of the Mekong River, and consequences of planned construction of major dams on the river and its tributaries. This has the potential to exacerbate with expected effects of climate change.
b) The use of water for irrigation, which by some is planned on a large scale. This could put unnecessary burdens on Cambodia's national budget and have strong negative effects on GHG emissions and on long-term natural soil fertility.
c) The use of methods that grow rice and other crops using less water yet improve yields and natural soil fertility are widely used in Cambodia and the area under such sustainable agriculture methods could easily be expanded;
d) The virtual absence of integrated watershed management practices at any significant scale;
e) The large – and mostly untapped – potential for water harvesting, from household to landscape levels;
f) Points a), b) and c) above have major implications for biodiversity with especially a) being a very major threat.
g) Cambodia is endowed with very rich resources of biomass, which could be a foundation for a distributed, pro-poor sustainable domestic energy sector, thus reducing or eliminating dependency on large, destructive dams and diesel;

h) Collaboration between relevant ministries (MOWRAM, MAFF, MRD) relevant for water management is challenging.

Good governance and management of *state land and forests* has the following elements:

a) The issuance of concessions in disregard to existing legislation and protocols;
b) The lack of clear identification and demarcation of the State land itself, the permanent forest estate, the various concessions and indigenous land within the State land areas as well as the insufficient recognition of most indigenous rights to land;
c) Clearance of forest from these concessions, which has strong negative effects on the water regime and soil fertility and leads to emissions of very significant amounts of CO_2;
d) The absence of responsible investments into a productive forest sector, managed according to SFM principles;
e) Illegal logging of timber being exported to neighbouring and nearby countries;
f) Points c) and e) above lead to loss of biodiversity, native to the forest;
g) Loss of forest-dependent livelihoods and food sources;
h) Loss of culturally important sites and landscapes;
i) Collaboration between ministries relevant to management of state land and forests is challenging.

The *soil fertility* issue has the following elements

a) Natural soil fertility is low in most of Cambodia. This is a limitation for growth in the agricultural sector and in food supply and export;
b) It is rather simple – albeit quite labour intensive – to remedy this problem, with adequate, organic inputs and this is being applied by thousands of farmers;
c) The most frequently sought remedy is however, external, chemical inputs and water-intensive irrigation;
d) These are expensive inputs, at household and at national level and lead to reduced economic and ecological resilience of the farming;
e) These also lead to increased release of GHGs and other pollutants from the chemical inputs, both when produced and when applied;
f) There is scope for positive synergy between biomass-based energy production and improvements of soil fertility, in low-external-input sustainable agriculture.

It is recommended that any support to climate change mitigation or adaptation is closely coordinated with the above priorities. Al three themes are intimately linked to climate change and support in these fields can include both mitigation and adaptation measures, mainly with strong relevance to poverty reduction, sustainable livelihoods and equitable growth.

7.3 Recommendation: Address ENR issues through effective mechanisms & exploit synergies

The crisis of Cambodia's ENR is pressing. There is no time for lengthy analysis, and, except for highly complex issues such as the dams on the Mekong, the solutions are known and proven, but usually on too small a scale. Therefore implementation is recommended:

a) To assume the technical knowledge is already there (a careful scan will identify it) or will be developed during implementation;
b) To use existing guidelines, policies and strategies and use experiences during implementation to inform their revision or production of new ones. Do not wait for policies or guidelines before acting;
c) To focus on the efficiency of the support. Implement through mechanisms with known and documented efficiency, in terms of numbers reached and changes achieved per invested €uro;
d) To exploit all possible synergies between ENR and voice/accountability, education and awareness. Some elements of this are:
   - when supporting work at local level, apply practical, participatory methods such as action research/exploratory learning and promote formation of associations. These are ways to increase

confidence and voice. In turn this will lead to demands for accountability, also for other issues than ENR;

- provide information (see 5 above) to peoples' organisations and their networks for use in advocacy. One element would be to update existing land use databases and make information readily accessible to all actors.
- in education support, possibly interact with local peoples' organisation, for mutual learning;
- in education support, try and encourage learning by exploring and analysing the local environment; investigate ways in which the pupils and schools gather, analyse and store basic environmental information. They could then release this to the wider public, and thereby provide crucial (and currently missing) environmental information. Learning could become part of ENR monitoring and vice versa.

e) To exploit all possible synergies between ENR and Trade support as well as support to deconcentration and decentralisation, e.g.

- seek positive synergies between on-going EU support in the field of trade and RGC performance in fisheries, agriculture and forestry. As stated above, explore this also at regional level.
- support relevant deconcentration of ENR, e.g. planning and management of watersheds, infrastructure and land use at relevant government levels.

7.4 Recommendation: Work at all levels.

7.4.1 At regional level

The EU has the advantage of being able to address ENR issues in conjunction with e.g. trade. A key example is forestry, where the EU, by promoting FLEGT in Vietnam and Thailand, can influence illegal logging and forest clearing in Cambodia. By further increasing transparency, law enforcement (on land issues and logging) and promoting legal timber production in Cambodia, a strong, positive synergy can be sought;

The issue of dams on the Mekong can best be addressed regionally and in political dialogue. The EU has the strength, depth and breadth of scope to drive this dialogue.

In more general terms, the EU as a regional body itself can help the nations of the Mekong work together on reinforcing trans-boundary laws, regulations and enforcement. EU can also help the countries develop consistent measures for assessing and monitoring shared natural capital, particularly related to surface water management in shared watersheds. The EU may support enhancement of Cambodia's ability to use regional platforms to further ENR objectives: in particular the GMS and ASEAN/EAS.

7.4.2 National

Go for optimal solutions, i.e. green growth. This may not always be the ones preferred by authorities, which may wish investments that allow centralised flows of resources, controlled by individual institutions.

Be patient. Work with same partners over a long time, initially at lower intensity till a productive relationship has developed. If it doesn't develop, stop or modify the approach.

Demand and assist collaboration between relevant institutions, also at ministry level. If possible, identify strong and committed champions to lead this collaboration. In the 'Green Growth' initiative, work for active participation or even leadership by key ministries such as MEF, MoC, MoP, MIME and MAFF as well as strong commercial groups in Cambodia. Ensure that key ministries are actively engaged in this process and are indeed promoting it within the government

Strengthen donor coordination within ENR, voice and accountability and other fields and work with RGC donors and CS on obtaining effective monitoring and reporting on environment and natural capital. One possibility may be creation of a semi-independent institution.

Use and strengthen mechanisms for public consultation and participation, and emphasize participation of women.

Support responsible private sector roles and trade that are consistent with 'Green Growth' principles. Promote these as examples to follow, in contrast to the destructive approach to environment and natural resources current practiced. Emphasise mechanisms that create employment and education for youth.

Support inclusion of sustainable ENR management considerations into financial policy, planning, mechanisms and practices, possibly through support to fiscal management.

First step in the point above may be further development of systems for Payment for Ecosystem Services (PES) and/or integration of ENR sustainability indicators into EU budget support programmes.

Benefits to the national economy from environmental resources need to reach the provincial level in order for management to be effective. Greater contribution from RGC budget to ENR management should be built through these systems.

7.4.3 Sub-National

Some ENR management may best be undertaken at province, district or commune level. Possibly support this through NCDD or other means.

Make sure the public is actively involved in planning and monitoring.

7.4.4 Local

Build knowledge, management skills and voice through a variety of CBOs dealing with aspects of ENR (forestry, fishery, environmental knowledge, sustainable agriculture etc.), as well as networks among them.

Carefully consider the points under 7.3

This will usually mean: Further Cambodian organisations with strong and proven track record of building sustainable and active CBOs and networks.

7.5 Recommendation: Work in programmatic ways.

The themes and approaches outlined above require long, sustained presence of committed partners. There are national plans/strategies and polices in place to guide at least the general direction of each of these themes.

The TWGs generally develop action plans to further guide implementation and it's monitoring.

Even in cases where EU-funding is predefined to be provided in project mode it is often possible to work through partners who work in programmatic ways.

A matrix provided in Section 9.4 elaborates on the potential synergies between support in the three identified ENR fields.

7.6 Risks & Risk Mitigation

7.6.1 External risks, at regional level

External actors play key roles in relation to the hydropower development on the Mekong and tributaries, as markets for timber, investors in mining and land concessions. Hence, some of the major threats and risks are seemingly coming from beyond the Cambodian context.

However, with the EU's global presence and increasingly strong linkages between international policy commitments, markets and trade and development partnerships, the EU is in a unique position to address risks at regional and international levels. The challenges related to management of the Mekong River Basin may be best addressed through increased efficacy of the MRC, other regional bodies and in other bilateral- or multilateral diplomacy and cooperation fora.

7.6.2 Internal risks, at country level

For the past decade and at the current time, the political situation in Cambodia has been rather stable, albeit with strong undercurrents of strain. Some of the issues pointed out in this report; rampant destruction of ENR as the livelihoods basis for many people, severe shortcomings in governance, and, not least, land conflicts, could lead to a situation where the existing firm grip on political power may be challenged. There are signs of increasing tensions, especially over the land issue, where even mid-level members of the ruling elite may see their land being taken over by higher-ups. Such tension is increasingly acknowledged also in security-considerations (CNAS, 2011)[iii]

The recommendations in this report aim at addressing underlying tensions and hence the risks to EU programming and to development in Cambodia. By addressing management of surface water, potential threats to the livelihoods of millions of people may be reduced or avoided and by focusing on the issue of equitable land management in forest areas the festering conflicts may be addressed in more transparent ways and potentially defused. The recommendation to link these efforts to increased transparency, information access and voice of peoples' organisations are intended to ensure that the process above take place in ways that reduce conflicts and seek longer-term viable solutions.

8 Country Strategy Paper Environmental Summary

Cambodia is endowed with a rich natural environment, with ample water, healthy forests, productive rivers, lakes and plains, diverse flora and fauna and stunning rural landscapes.

Current economic activity is mainly based on crude extraction of natural resources with almost no apparent consideration for the depletion of natural capital and destruction of prospects for longer-term sustainable growth. This finds expression in increasingly rapid and wide-ranging destruction of forests, coastal areas and even some agricultural areas. The threat of large-scale hydropower developments, augmented by the expected effects of climate change, puts the entire hydrological system of the Country, and with it, rich inland fish habitats, at risk. Current plans to expand power provision short-sightedly focus mainly on large-scale hydropower and use of fossil fuels. Deforestation adds to this threat and also contributes towards further depletion of soil fertility. Deforestation and expansion of input-intensive agriculture threatens to dramatically increase Cambodia's GHG emissions. Drivers of these unsustainable trends are short-sighted business and political interests in the Country, often in collusion with likeminded groups or individuals from neighbouring, nearby or overseas countries. A widespread lack of environmental knowledge and awareness, combined with ineffective or directly corrupt governance and a profound lack of accurate environmental information augments the problems.

On the other hand, strong groups, individuals and some committed officials, combined with extensive, positive experiences in sustainable ENR management combined with the resiliency of the remaining rich environmental resources, provide a good foundation for a change of course towards green, sustainable and climate-smart growth.

The EU and its Member States, through the possibility of exploiting synergies between their international diplomacy, market access and strategic development partnership activities with the Royal Government of Cambodia and its people, is in a unique position, to support such positive development. It is recommended that the support focus on the most pressing ENR challenges, which are:

- Management of surface fresh water
- Management of state land, and the forests growing on it
- Management of soil fertility

There are strong positive links between these three themes and obvious synergies with the planned support for peoples' organisations, voice and accountability, which is instrumental in improving ENR governance. In addition, the theme of water management forms one foundation for the planned EU support to the fisheries sector. The on-going support to the education sector could very well be adapted to

seek a curriculum emphasis on environmental learning and study, which could enhance both environmental awareness, as well as the quality of the education.

It is necessary, and possible, to provide support in ways that are: a) programmatic, i.e. patient, comprehensive and adaptive to changing circumstances or learned experiences, as well as championed by committed and sufficiently powerful national agents; b) Multilevel, i.e. addressing international and regional aspects through diplomacy, regional bodies and trade policies for example, whilst addressing national and sub-national levels in adequate multi-stakeholder setups coordinating with other donors, not least the EU Member states, and; c) addressing local and community level activity through agents with proven track records, reach and efficiency.

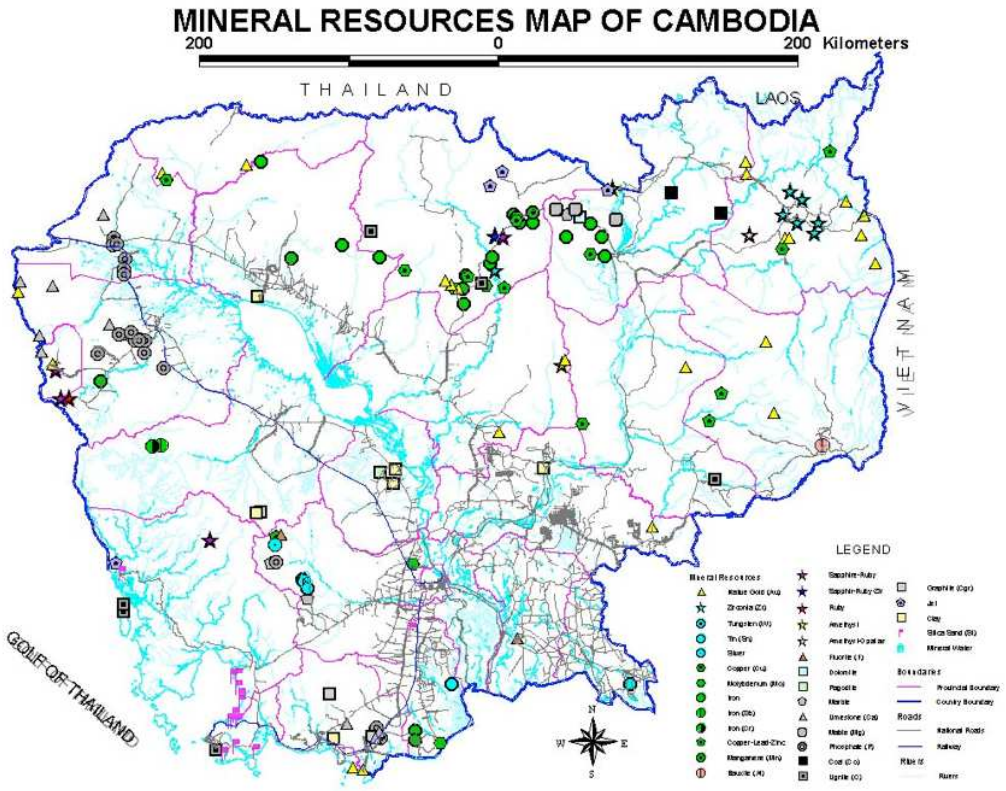
9 Technical Appendixes

9.1 Environmental maps of the country

If not otherwise detailed in the report, the main maps of Cambodia, with layers for most ENR-relevant themes, can be found at: http://www.cambodiaatlas.com/map

Other maps, potentially more updated on some elements ENR, may be found at http://www.opendevelopmentcambodia.net/maps/

Here are only provided maps not available on these Internet pages:



Unknown source and date, but presented in the TWG-FE as part of a PowerPoint presentation.

The NGO LICADHO in 2011 produced a map in an attempt to summarize information about Land- and Mining Concessions:

9.2 Summary of RGC Institutions relating to ENR

Institution	Type	ENR Roles & Responsibilities	Remarks
Ministry of Environment (MoE)	Ministry	Mandate over environmental issues, including conservation/protected areas, environmental quality/environmental impact assessment, and rational use and management of natural resources.	Focal Point for Climate Change and Biodiversity Conventions, and GEF.
Ministry of Agricultural, Forestry and Fisheries (MAFF)	Ministry	Mandate over agriculture, including forestry and fisheries.	Focal point of the United Nations Convention to Combat Desertification (UNCCD)
Forest Administration	MAFF Department	Responsibilities include forest and wildlife inventory; protection and management of forest resource, and wildlife conservation.	Formerly known as Department of Forestry and Wildlife. Part of MAFF.
Fisheries Administration	MAFF Department		
Ministry of Industry, Mines and Energy	Ministry	Develops and manages energy policy, strategy and planning, including renewable energy.	
Ministry of Water Resources and Meteorology	Ministry	Responsibilities include development and implementation of water resource strategy, determination of water potential, collection and management of meteorological data.	WMO focal point.
Ministry of Rural Development (MRD)	Ministry	Coordinating operational efforts of the various line ministries and assistance programs.	
Ministry of Public Works and Transport	Ministry	Manages execution of national policy on public works, including roads, bridges, ports, railways, waterways and buildings.	
Ministry of Health	Ministry	Mandate over public health. Ultimate objective to eliminate vector borne disease.	
Council for the Development of Cambodia (CDC)	Government Agency	One-stop service for rehabilitation, development, and investment activities. Facilitates and coordinates government-donor relations.	
Cambodian Agricultural Research and Development Institute (CARD)	Government Research Institute	Research body for sustainable agricultural and economic development, with primary aim of food security through increased rice production.	

9.3 Summary of environmental laws, policies, statements and action plans

9.3.1 Laws and Regulations

Law on Environmental Protection and Natural Resources Management (1996)

Sub-Decree on Environmental Impact Assessment (1999)

Sub-Decree on Solid Waste Management (1999)

Sub-Decree on Water Pollution Control (1999)

Sub-Decree on Air Pollution and Noise Disturbance Control (2000)

Sub-Decree on the Management of Ozone Depleting Substances (2005).

Land Law (2001)

Sub-Decree on State Land Management (2005)

Sub-Decree on Economic Land Concessions (2005), amended 2009

Law on Mineral Resource Management and Exploitation (2001)

Law on Water Resources Management (2007)

Law on Fisheries (2006)

Sub-Decree on Community Fisheries (2007)

Forestry Law (2002)

Sub-Decree on Forest Concession Management (2000)

Sub-Decree on Community Forestry Management (2003)

Sub-Decree on Procedures for Establishment Classification and Registration of Permanent Forest Estate (2005)

Sub-Decree on the Establishment of the Protected Forest for Biodiversity Conservation, Elephant Corridor Protection and Wildlife Rehabilitation Centre in Koh Kong Province (2004)

Sub-Decree on Timber and Non-Timber Forest Products Allowed for Export and Import (2006)

Law on Protected Areas in the Tonle Sap Lake (2001)

Protected Area Law (2008)

Royal Decree on the Protection of Natural Areas (1993)

Law on Biosafety (2008)

Law on Pesticide and Chemical Fertiliser Control (2011)

9.3.2 Policies, Strategies and Plans

National Forest Programme (2010)

Cambodia Climate Change Strategic Plan (CCCSP) – pending 2012

National Green Growth Roadmap (2009)

National Adaptation Plan of Action (NAPA) to Climate Change (2006)

Strategy for Agriculture and Water

National Action Plan for Coral Reef and Seagrass Management in Cambodia (2006-2015)

Strategic Plan on Management of Mercury in Artisanal and Small Scale Gold Mining (SPASGM)

9.3.3 International Conventions and Agreements

Kyoto Protocol ratified - 2002
United Nations Framework Convention on Climate Change (UNFCCC) ratified - 1995; Initial National Communication - 2000; Second National Communication (pending – expected 2012)
Convention on Biological Diversity (CBD)- 1995;
Cartagena Protocol on Biosafety - 2003[92]
UN Convention to Combat Desertification (UNCCD) ratified – 1997
Ramsar Convention on Wetlands – 1999
CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) – 1997
World Heritage Convention - 1991
ASEAN Heritage Convention (National Parks: Bokor and Virakchey) (regional) - 2003
Convention on the Prevention of Marine Pollution from Ships -1994
Measures on prevention of climate change, ozone depletion, on freshwater resource protection and on sustainable forest
ASEAN -1999
Convention on Wetlands of International Importance (RAMSAR) - 1999
Basel Convention on Control, Transport and Disposal of Trans-boundary Hazardous Waste- 2001
Stockholm Convention on Persistent Organic Pollutants - 2001
Vienna Convention and Montreal Protocol on Substances that Deplete Ozone Layer- 2001

[92] Cambodia is not a party to the ***Nagoya Protocol*** on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (2010)

9.4 Potential synergies between interventions in the three main ENR fields:

	Water	*Soil*	*Agriculture*	*Fisheries*	*Livelihoods-food security*	*Climate Change*	*Energy*	*Voice and accountability*	*Public information and awareness*	*Policy (and practice) Implications*	*Trade*
Integrated Water Resource Management	Dams on Mekong and water-intensive irrigation may change entire hydrology of Cambodia. The effects are compounded by Climate Change	Dams will withhold silt, which leads to decreased soil fertility in plains. Dams will alter floods and decreased natural irrigation in flooded areas on floodplains and around Tonle Sap	Water-intensive irrigation not needed – not even in rice. Support local water harvesting and alternatives to water-intensive cropping Decreased natural fertilisation will lead to increased need for fertiliser inputs, which has negative effects on water pollution and Climate Change	Dams and water-intensive irrigation will reduce populations of fish and other freshwater animals, through disappearance of breeding grounds and habitats.	Less fish and other aquatic animals lead to increased food insecurity, especially for the poorest. Less silt leads to decreased agricultural yields. Large irrigation schemes may lead to concentration of land ownership and water access	Water-intensive irrigation for rice will drastically increase GHG emissions. Silt withheld by dams release methane.	Huge potential in biomass energy – may substitute energy from dams.	Strengthen organisations of water users, fisherfolk and concerned citizens. Strengthen public consultations and participation on water management.	Disclose and disseminate information and basic knowledge about water management, dams, irrigation, fisheries. Strengthen environmental education	**National Level:** Develop a coherent (surface?) water policy and strategy **Region:** Work intensively on the issue of dams on Mekong. **National Level: Agriculture**: Apply alternatives to water-intensive irrigation. **National Level: Energy**: Apply alternatives (biomass, smaller hydropower) to large dams. PES, from hydropower and water supplies to land managers	

										(i.e. forest). Support improved energy efficiency	
	Water	***Soil***	***Agriculture***	***Fisheries***	***Livelihoods-food security***	***Climate Change***	***Energy***	***Voice and accountability***	***Public information and awareness***	***Policy (and practice) Implications***	***Trade***
State Land and Forests	Land and mining concessions lead to deforestation, negative impact on watersheds Erosion from felled forest leads to siltation of rivers and lakes. Felling of forests reduce infiltration of water into aquifers, which may lead to more pronounced groundwater problems	Deforestation increase risks of landslides, drought and soil erosion.	Difficult issues on land allocation between agriculture and forest. Felling of forest in watershed disturb water flow (surface and groundwater) to farming.	Flooded forests and mangroves are breeding grounds. If felled or disturbed there will be less aquatic life.	Forests improve agricultural production and provide direct livelihoods and food, especially for poor. People losing land open up new land in forest areas (frequently as beachheads for wealthier interests..) SFM could lead to sustainable livelihoods. Industrial farms on land concessions employ farm workers (landless). This is usually a very poor livelihood.	Clearing of forests leads to increased carbon footprint. There *may* be scope for carbon financing to forests, but current practices in the forestry sector scare away investors	Some forests (plantations) could provide biomass for energy. Forests can protect investments in hydropower and receive PES.	Strengthening communities is a major way of slowing deforestation especially as it happens through land grabbing	Actions against forest clearing need accurate, un-ambiguous and sometime anonymous information and channels for submitting and publishing this info. Increased public appreciation of services from forests may slow degradation.	**Regional:** Promote FLEGT in neighbouring countries, and include the issue of illegal import from Cambodia **National:** Promote sustainable forest management, responsible plantations, a viable wood-based industry. Promote FLEGT, PES and responsible private plantations and associated industry.	FLEGT in Cambodia and in VN, and China has potential to limit export from Cambodia of illegal timber and thus illegal logging

	Water	***Soil***	***Agriculture***	***Fisheries***	***Livelihoods-food security***	***Climate Change***	***Energy***	***Voice and accountability***	***Public information and awareness***	***Policy (and practice) Implications***	***Trade***
Soil Fertility	Soils need water. Constantly water-covered soils loose fertility. Water harvesting is very feasible in almost all of rural Cambodia.	Cambodian soils are mainly poor, need better structure, increased nutrients and water holding capacity. Good practices are quite widespread	Application of organic matter, trees in agricultural landscape, natural fertilisers. Prudent use of water	Use of chemical fertilisers will pollute waters, thus reducing aquatic life	Soil productivity is main key to sufficient food availability and improved fertility increases income from farming	Constantly flooded fields are major GHG emitters. Trees in farming landscape has huge mitigation potential, as has many SA practices	Biomass energy can be done in ways that help increase soil fertility – and in ways that reduce it. Extremely high potential for synergy between tree planting in agricultural landscape, soil improvement and biomass energy.	SA practised in associations lead to strong increase in voice, and participation in local governance	Increasing soil fertility in sustainable ways is knowledge-intensive. It involves deeper understanding of ecology and environment If knowledge is acquired in experimental learning it leads to increased confidence and voice	**Agricultural master plans** should embrace Low-External Input Sustainable Agriculture (LEISA) and focus on soil fertility management.	LEISA reduces imports of fertilisers and pesticides.
	Water	***Soil***	***Agriculture***	***Fisheries***	***Livelihoods-food security***	***Climate Change***	***Energy***	***Voice and accountability***	***Public information and awareness***	***Policy (and practice) Implications***	***Trade***

9.5 Planned Donor Support

Partner	Project / Program
EU	▪ SWITCH-Asia: Promoting Sustainable Consumption and Production (2012-) ▪ Promoting appropriate technology for smallholders to increase food security among indigenous peoples in Cambodia and Lao PDR (2012-15) ▪ Sustainable Development through Land Use Planning & Support to Vulnerable Communities ▪ Powering Harbour Development in South-East Asia/ Flanders International Technical Agency ▪ Waste to Energy for the Rice Milling Sector in Cambodia / SNV ▪ Promoting Community Forestry in Cambodia / OXFAM-GB ▪ SFM & Rural Livelihood Enhancement through CF & REDD / RECOFTC; OXFAM ▪ Sustainable PES in the Cardamom Mountains Landscape / FFI; Learning Institute; RUPP ▪ Poverty Alleviation through Improved Conservation in Virachey National Park / Deutsche Welthungerhilfe; Save Cambodia's Wildlife ▪ Promoting Climate Resilient Livelihoods for Small-Scale Farmers in Most Vulnerable Dry Land Areas / Plan International (UK); CEDAC ▪ Sustainable Forest Management and Rural Livelihood Enhancement through Community Forestry and REDD initiatives in Cambodia (2010 – 2015) - RECOFTC & Oxfam ▪ Sustainable livelihoods of Indigenous People in Rattanakiri and Mondulkiri Through Effective Land Management (2012-14) ▪ Secure Water to Secure Food and Nutrition (2012-15)
ADB	▪ Capacity Building for Efficient Use of Biomass for Bioenergy & Food Security (2012-) ▪ Rural Renewable Energy Initiative in the GMS ▪ Tonle Sap Lowlands Rural Development Project (2011-2016) ▪ Core Environment Program : GMS Biodiversity Conservation Corridors Project (2011-)[93] ▪ Sustainable Urban Development in Tonle Sap Basin (2011-) ▪ Tonle Sap Lowlands Rural Development Project (2011-2016) ▪ Tonle Sap Watershed Management Project ▪ Promoting Low Carbon/Climate Resilient Economies in the GMS (2012-) ▪ Rural Water Supply and Sanitation II and III (2010-) ▪ Water Resources Management Sector Development Program (2011-2015) ▪ Climate Resilient Rice Commercialization Sector Development Program (2012-) ▪ SME Development II: SPS Sub-Projects (2010-) ▪ Integrated Women's Empowerment Centres (Grant #9081) ▪ Support for Preparation of Harmonized Sector Assessments, Strategies & Roadmaps
World	▪ Rural Energy Strategy Program & Sustainable Charcoal Pilot Project / GERES; MIME; FA

[93] http://www.adb.org/Projects/project.asp?id=40253

Bank	▪ Community Based Agricultural Productivity Project (2011-2015)
UNDP	▪ Addressing climate change for poverty reduction and pro-poor growth (2009-10) ▪ Promoting Climate Resilient Water Management and Agricultural Practices in Rural Cambodia (2009-13) ▪ Strengthening Sustainable Forest Management & Bioenergy Markets to Promote Environmental Sustainability & Reduce GHG Emissions in Cambodia (2011-15) / DANIDA
SIDA	▪ Joint Climate Change Initiative (JCCI)
AusAID	▪ Cambodia Agriculture Value Chain Program (2009-2013)
JICA	▪ Improvement of Agricultural River Basin Management & Development (2009-13) ▪ Capacity Building for Quality Standard Controls of Agricultural Materials (2009-)[94]
USAID	▪ Helping Address Rural Vulnerabilities & Ecosystem Stability (HARVEST) Project (2011-15)
KOICA	▪ Forestry Support (no details)
Multi-Donor	▪ Vulnerability Assessment and Adaptation Programme for CC in the Coastal Zone of Cambodia Considering Livelihood Improvement and Ecosystems (2010-) / GEF; UNEP ▪ Strategic Program for Climate Resilience for Cambodia95 / CIF; PPCR ▪ Regional Fisheries Livelihood Programme for South and Southeast Asia / AECID; FAO; FiA[96] ▪ Cambodia Climate Change Alliance (CCCA) / EU; UNDP; SIDA; DANIDA ▪ Strengthening adaptive capacity & resilience of rural communities using micro watershed approaches to CC & variability to attain sustainable food security (2012-) /GEF; EU; FAO; RGC ▪ Central Cardamom Mountains Program/Trust Fund (2012) / AFD; FFI; CI ▪ Reducing GHG Emissions through Improved Energy Efficiency in Industrial Sector/GEF; MIME ▪ Environmentally Sound Management of PCBs (2011-) / GEF; MoE

[94] http://www.jica.go.jp/project/english/cambodia/006/index.html
[95] http://www.climateinvestmentfunds.org/cifnet/?q=country-program-info/cambodias-ppcr-programming
[96] http://www.rflp.org/cambodia

10 Appendices

10.1 Appendix I Study methodology

Overall: The consultant understands the assignment as first and foremost provision of operational support to the EC delegation in its programming. Hence, coordination and consultation with the delegation will be as thorough and frequents a wished by the delegation. Second the assignment must ensure adherence to EC policies and guidelines. Not least, the produced Country Environmental Profile should assist the EC delegation in designing and carrying out programming which to the largest possible extent further the sustainable development of Cambodia.

In order to meet these goals, the consultant foresees the following steps: Liaise with EU delegation to Cambodia, agree on expectations, set overall frame conditions for assignment and agree on tentative work plan and on methodology, including reporting to the delegation during the assignment (content and form). Revisit EU/EC policies, practices and guidelines on environment and climate change (including the GCCA) in development support as well as strategies for EC country delegation, and documents from individual sectors, especially trade and private sector, food security, climate change, governance, democracy and human rights and rural development. Asses linkages and commitments in regional collaboration on environment and climate change, both for RGC and for EU, Develop an overview over Cambodia's international obligations within the fields of environment and climate change, Revisit relevant Cambodia documents such as National Social Development Plan (updated), the Ministry of Planning Strategic Plan (updated), MoE strategic documents and reports and donor reports or research on Cambodian environment. Consult with all main Cambodian stakeholders; i.e. MoE, MAFF, MOWRAM, MIME, MoP, Council of Ministers, CDC etc., as well as donors and civil society, about environmental policies, strategies, planning, coordination and activities and about management of development assistance to the environment and climate change. Assess the integration or mainstreaming (extent, mechanisms, effectiveness) of environment and climate change into relevant policies, plans and sectors. Assess tools of management for results (monitoring, reporting, learning) on RGC and donor sides. Seek secondary information on all aspects of the state of the environment, trends and pressures. Assess validity of this information and select information to be included into the CEP. Re-asses the need for additional information to fill potential gaps, and seek it. Draft report, following the structure provided in the ToR. Discuss draft with EU delegation and key stakeholders and receive comments and possible directions in stakeholder workshop and other fora. Revise draft and submit to EU Delegation. Receive written comments from EU delegation and key stakeholders. Assess comments and finalise Country Environmental Profile.

10.2 Appendix II: List of persons/organisations consulted and participants in Workshop

#	Name	Position	Agency	Email	Consulted
1	Alan Brooks	Director	WorldFish Center	a.brooks@cgiar.org	meeting/workshop
2	Amanda BRADLEY	CFP Director	PACT Cambodia	abradley@pactworld.org	workshop

3	Angela Hogg	Private Enterprise Officer	USAID Cambodia	ahogg@usaid.gov	meeting/workshop invite
4	Bou Noeun	Programme Officer	Delegation of the EU Cambodia	bou.noeun@@eeas.europa.eu	workshop
5	BY Sokunthea	Rural Development Officer	Delegation of the EU Cambodia	Sokunthea.BY@eeas.europa.eu	meeting/workshop
6	Caroline BAUS	Advisor	ADG Cambodia	caroline.baus@ong-adg.be	workshop
7	CHAN Saruth	Director - Dep. of Agri Engineering/GDA	MAFF	saruthchan@hotmail.com	workshop
8	Charlotte Nivollet	Deputy Country Director	GERES Cambodia	c.nivollet@geres.eu	workshop
9	CHEA Lily	Project Assistant - EU PES	Fauna & Flora International	Lily.Chea@fauna-flora.org;	workshop
10	CHHOEUR Socheat	Project Manager	Marie Stopes International	socheat.chhoeur@mariestopes.org.kh	workshop
11	Chhuon Vanna	Vice-Chief Env - Dep. Curriculum Dev	MoEYS	N/A	workshop
12	Christophe GOOSSENS	Country Representative	ADG Cambodia	christophe.goossens@ong-adg.be	workshop
13	Dara Rith	EIIO	DPA	dara.rith@dpacom.org	workshop
14	Eng Kimly	Director - Dep. Curriculum Dev	MoEYS	kimly_e@hotmail.com	meeting/workshop invite
15	Georges Dehoux	Attaché - NRM and Rural Development	Delegation of the EU Cambodia	georges.dehoux@eeas.europa.eu	meeting/workshop
16	Greg MUNFORD	Consultant (EU-CEP)	Landell Mills Ltd (LML)	gregm@landell-mills.com	workshop
17	H.E. Jean-Francois CAUTAIN	Ambassador	Delegation of the EU Cambodia	N/A	workshop
18	H.E. KHONG Sam Nuon	Secretary of State	Ministry of Environment (MoE)	N/A	workshop
19	Hang Suntra	Director Dep. of Forest Industry & International Cooperation	Forestry Administration (FA)	hsuntra@yahoo.com	workshop
20	Hang Sytha	STO	WVC	sytha_hang@wvi.org	workshop
21	Hean Bunhieng	Forestry Specialist	NGO Forum	bunhieng@ngoforum.org.kh	meeting/workshop invite
22	HOU Kalyan	Country Representative	RECOFTC	kalyan@recoftc.org	workshop
23	HOUR Limchhun	Clinton Climate Change Initiative	Clinton Foundation	hlimchhun@clintonfoundation.org	workshop
24	HUOT Chhun	Executive Director	ARD	huotchhun867@gmail.com	workshop
25	Jacob JEPSEN	Counsellor	DANIDA	jajeps@um.dk	meeting/workshop invite
26	Jan GEUSENS	Country Programme Manager	VVOB Cambodia	jan.geusens@vvobcambodia.org	workshop
27	Jerry CHEN	Senior Project Manager - EU PES proj.	Fauna & Flora International	Jerry.Chen@fauna-flora.org	workshop
28	Juan Pita	General Coordinator	Spanish Agency for International Cooperation	juan.pita@aecid.org.kh	workshop
29	Kao Sochivi	DDG	Fisheries Administration	kaosochivi2007@yahoo.com	workshop
30	Keo Bunly	Programme Officer	The Learning Institute	bunly@learninginstitute.	workshop

				org	
31	KEO Piseth	Technical Officer	MoE - Climate Change Department	pisethy@yahoo.com	workshop
32	Khim Lay	Assistant Country Director (E&E)	UNDP	Khim.Lay@undp.org	meeting/workshop invite
33	KHOUN Son Muchhim	President	Khmer Buddhist Society in Cambodia	muchhim@hotmail.com	workshop
34	KIM Chhorn	Representative	COMFREL	chhorn@comfrel.org	workshop
35	Kirtiman Sherchan	R2000 Coordinator	FFI	kirtiman.sherchan@fauna-flora.org	workshop
36	Koen EVERAERT	Attaché - NRM and Climate Change	Delegation of the EU Cambodia	koen.everaert@ec.europa.eu	meeting/workshop
37	Kong Ratha	Project Officer	KYSD	ypr@kysd.org	workshop
38	LAV Bunrithy	Regional Impact Monitoring Officer	Welthugerhilfe/GAA	gaa.rithy@gmail.com	workshop
39	LENG Bunlong	Environmental Specialist	World Bank / Sustainable Development Dep	bleng@worldbank.org	meeting/workshop
40	Leurent Aurore	Intern	Delegation of the EU Cambodia	aurore.laurent@ees.europa.eu	workshop
41	Lim Sotharith	Chief office of DCD	MoEYS	lim.sotharith@moeys.gov.kh	workshop
42	LONG Vanda	Project Manager	ZOA Cambodia	vand.alv@yahoo.com	workshop
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44	Maria Fariello	Attaché - Good Governance and Human Rights	Delegation of the EU Cambodia	maria.fariello@eeas.europa.eu	meeting/workshop invite
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47	Michelle LABEEU	Head of Operations	Delegation of the EU Cambodia	michelle.labeeu@eeas.europa.eu	meeting/workshop
48	Michelle OWEN	Programme Manager	WWF	michelle.owen@wwf.panda.org	meeting/workshop
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51	MUONG Sideth	Project Officer	AFD	muongs@afd.fr	workshop
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53	Nico JANSSEN	Sector Leader Agriculture	SNV	njanssen@snvworld.org	meeting/workshop
54	Nina BRANDSTRUP	Country Representative	Food & Agriculture Organisation	nina.brandstrup@fao.org	meeting/workshop
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56	NOU Vonika	Deputy Director	National Veterinary Research Institute	nvonika@yahoo.com	workshop
57	NUTH Chesda	Assistant	Khmer Buddhist Society	Muchhim@hotmail.com	workshop

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59	Paul GAGER	Technical Director	ARUNA Technologies	paul.gager@arunatechnology.com	meeting/workshop invite
60	PEL Piseth	National Manager	Concern	piseth.pel@concern.net	workshop
61	Pelle GATKE	Technical Advisor	Fisheries Action Coalition Team	pgatke@gmail.com	workshop
62	Petra SCHILL	Deputy Country Director	GIZ	petra.schill@giz.de	meeting/workshop invite
63	PHENG Reth	Livelihoods Programme Manager	Voluntary Service Overseas	pheng.reth@vsoint.org	workshop
64	Philippe ARNAUD	Energy Consultant - World Bank	Energy Consultant - World Bank	philarnou@gmail.com	workshop
65	PHOUNG Ponreay	Biodiversity Team Leader	USAID Cambodia: MSME Project	Ponreay_Phoung@dai.com	workshop
66	Prac Sarun	KBSC/Trainer	Khmer Buddhist Society	Muchhim@hotmail.com	workshop
67	PRAIVAN Limpanboon	Officer	The Asia Foundation	praivan@asiafound.org	workshop
68	Régis BINARD	Consultant	HelpAge International	ragebin@hotmail.com	workshop
69	Richard WINTERTON	Management Advisor	Fisheries Administration	Winterton007@gmail.com	workshop
70	ROS Bansok	Research Associate - ENR Programme	CDRI	bansok@cdri.org.kh	workshop
71	SAK Sambath	Senior Economist – Agriculture and Rural Development	USAid	ssak@usaid.gov	meeting/workshop invite
72	SAM Vitou		CEDAC	SAMVitou@cedac.org.kh	workshop
73	Sarah CARTEr	Project Manager	NEXUS Carbon for Development	s.carter@nexus-c4d.org	workshop
74	SAY Treuk Phaline	Agriculture Technical Coordination Off.	World Vision	treukphaline_say@wvi.org	workshop
75	SENG Teak	Country Director	WWF	teak.seng@wwf.panda.org	workshop
76	SIM Chan Borina	Executive Director	Ponleur Kumar (PK)	sborina@pkcambodia.org	workshop
77	SIM Samoeun	Project Director	CEDAC	simsm@cedac.org.kh	workshop
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80	SOK Sreun	Coordinator	TWG-FSE	twgfe@eucam.com.kh	workshop
81	SOMA Dor	Programme Officer (Climate Change)	Embassy of Sweden (SIDA)	Soma.Dor@foreign.ministry.se	meeting/workshop
82	Sophie DAUGE	Intern	EU	dauge.sophie@ees.europa.eu	workshop
83	SOUN Sophol	Director of Land Administration Dep.	MLMUPC	Sopha_Lmap@camnet.com.kh	meeting/workshop invite
84	SOUT Chanthea	PA	KYSD	assistant@kysd.org	workshop
85	SRUN Darith	Deputy Secretary General	CARD	srundarith@yahoo.com	workshop
86	Steffen JOHNSEN	Consultant (EU-CEP)	Nordeco	sj@nordeco.dk	workshop

87	Stephen DEVENISH	Regional Director - Forestry	Clinton Climate Initiative	sdevenish@clintonfoundation.org	meeting/workshop invite
88	SUM Touch	Finance/Admin Officer	IUCN	sum.touch@iucn.org	workshop
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90	THAY Somony	National Project Coordinator (Regional Fisheries Livelihood Program)	FAO Cambodia	somony.thay@fao.org	meeting/workshop invite
91	Toby EASTOE	Protection Advisor	FFI	tobyeastoe@gmail.com	workshop
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93	VANN Monyneath	Deputy Director General	MoE	monyneath@czmcam.org ; vannmonyneath@yahoo.com	meeting/workshop invite
94	VEN Sarith	Project Manager	HelpAge International	vensarith-hai@online.com.kh	workshop
95	Vincent VIRE	Attaché – Social Development, Education and Health	Delegation of the EU Cambodia	vincent.vire@eeas.europa.eu	meeting/workshop invite
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104	Jean-Christophe DIEPART	Research Advisor	The Learning Institute	jc.diepart@gmail.com	email/internet
105	John SOUSSAN	Professor	Stockholm Environment Institute	johnsoussan@hotmail.com	email/internet

10.3 Appendix III Curricula vitae of consultants

Dr. Steffen JOHNSEN: Team Leader / Environmental Expert (Category I)

1. **Date of birth:** 01 December 1954 **2. Citizenship:** Danish
3. **Education:** Ph.D. Applied Systems Analysis, University of California, USA [1990]; MSc. Environmental Biology, Uni. of Copenhagen, [1984];
4. **Language skills:** Danish (Mother Tongue); English (Excellent); German (Excellent); Spanish (Fair)
5. **Specific country experience:** *Cambodia,* Viet Nam, Thailand, Bangladesh, India, Philippines, Indonesia, Nepal, Pakistan; Africa; Latin America.
6. **Professional experience:**

Date	Location	Organisation	Position	Description
2011	Viet Nam	SDC Vietnam	Team Leader	Mid-term Review of ADB/Donor-financed 'Forest Livelihoods Improvements in the Central Highlands (FLITCH) project'
2010-11	Cambodia	EU	Team Leader	Baseline survey and Mid-term Review of the EU's 'Improving Food Security of the Most Vulnerable Families in Prey Veng Province'
2011	Niger	Danida / Caritas	Team Leader	Appraisal of a multi-country, rights-based programme: 'Voices for Change in Rural Africa'.
2010-11	Global	Danida / Red Cross	Team Leader	Capacity analysis and thematic review of Danish Red Cross systems and practices capacity to implement development support based on the theme of disaster risk reduction (DRR).
2010	Global	MFA, Denmark	Team Leader	Assessment of Danish multilateral and bilateral support to Disaster Risk Reduction
2010	Bangladesh	MFA, Denmark	Agriculture & Environment Expert	National project aimed at avoiding emissions of the Greenhouse Gas methane from urban, organic waste.
2009	Viet Nam	Finnish Embassy	Forests & Climate Change Expert	Evaluating multi-donor Trust Fund for Forestry and providing recommendations on future TFF support to sustainable forest management, forests, REDD and climate change.
2009	Cambodia	Forestry Administration	Forestry Expert	Supporting the Government in developing the overall framework strategic document for a 20-year National Forestry Programme (NFP).
2007-08	Viet Nam	World Bank	Monitoring & Evaluation Expert	Delivered M&E guidelines for the Forest Sector Development Project, including technical, policy, regulatory issues.
2005-07	Cambodia	FAO / MAFF	Technical Expert	TA for development of National Programme on Household Food Security as part of implementation of National Strategic Development Plan and the joint donor-government strategy for agriculture and water.
2003-05	Cambodia	Danida	Advisor	Natural Resources and Livelihoods Programme Advisor

Date	Location	Organisation	Position	Description
1998-03	Thailand	Ramboll, Dk	Chief Consultant	TA for sustainable agriculture, biodiversity and natural resource management.
1994-97	Viet Nam	Danida	Advisor	TA for improvement of integrated pest management (IPM), agro-biodiversity, etc.

Mr. Greg James MUNFORD: Environmental Expert (Category II)

1. Date of birth: 01 July 1981 **2. Citizenship:** United Kingdom

3. Education: MSc. International Development, Uni. of Bath, UK [2006]; BSc. Oceanography & Geography, Uni. of Southampton, UK [2002]

4. Language skills: English (Mother Tongue); Khmer (Good); Spanish (Good)

5. Membership of professional bodies: Institute of Environmental Management and Assessment (IEMA), UK [2003-present].

6. Other skills: Microsoft Office; Adobe Photoshop, and; Geographical Information Systems (ArcGIS).

7. Specific country experience: *Cambodia*; China; Kazakhstan; Laos; Nepal; Pakistan; Philippines; Timor-Leste; Viet Nam;

8. Professional experience:

Date	Location	Organisation	Position	Description
2011-12	Cambodia / VietNam / Lao	Landell Mills Limited (LML)	Junior Environmental Expert	Capacity Building for Bioenergy and Food Security Improvement (ADB)
2009-11	Pakistan	LML	Junior Environmental Expert	Renewable Energy Policy Formulation in Pakistan (ADB)
2009-14	Timor-Leste	LML	Junior Rural Development Expert	Rural Development Programme III (European Union)
2008-09	China	LML	Junior NRM Expert	Silk Road Ecosystem Restoration Project (ADB/GEF)
2008-09	China	LML	Junior Environment Expert	Development of Biomass Power Generation in Rural Areas (ADB)
2008-11	Pakistan	LML	Junior Rural Development Advisor	Sustainable Livelihoods in Barani Areas Project (ADB)
2007-08	Viet Nam	LML	Junior Project Management Expert	Preparation of the Livestock Competitiveness and Food Safety Project (World Bank)
2005-06	Cambodia	Oxfam / VSO	Environment Expert	Kampuchea Environmental Education Project (KEEP)
2005-06	Cambodia	VSG	Organisational Development	

9. Other activities : Publications, trainings, etc

University of Oxford / MetOffice, UK [07/2011]	Climate Change: Introduction to Climate Science & Modelling

Natural England and exegesis, UK [06/2009]	Conservation Management System (CMS)
GeoData Institute, University of Southampton, UK [07/2008]	Advanced Coastal and Marine Geographical Information Systems (ArcGIS)
VSO, UK [07/2008]	Training of Trainers / Group Facilitation
Euronet Consulting, Belgium [02/2006)	Project Cycle Management (PCM)

10.4 Appendix IV Terms of Reference for the CEP

SPECIFIC TERMS OF REFERENCE

Country Environmental Profile - Cambodia

FWC BENEFICIARIES 2009 - LOT n°6: Environment

EuropeAid/127054/C/SER/multi

Request for Services 2011/279504

1. Background

A comprehensive country analysis is an initial step in programming. This analysis focuses on the national situation and policies and includes an overview of past and ongoing cooperation with the EC as well as with other donors. Integrating the environment in this analysis provides opportunities to undertake policy dialogue and programming on a better understanding of the challenges posed by sustainable development, which is the long-term objective of EC cooperation. The Country Environmental Profile (CEP) provides the necessary information to integrate environmental concerns in the country analysis. More specifically, it provides a foundation for the analysis of the country's environmental situation, and supports the identification of links between the economic, social and environmental situations.

It is of great importance that the findings and recommendations of the CEP are communicated to the full EU Delegation staff and other stakeholders, and discussed within the team involved in developing the country strategy. In addition to supporting the EC country strategy preparation, the CEP can be used as a tool for strengthening the capacities of cooperation partners on environment and climate change. The CEP should notably provide key information on climate-related issues for individual countries and regions, and also identify more detailed sources of information, where

they exist. An understanding of the risks and challenges faced by different sectors is essential to ensure that the development investments considered during programming are adapted to current and future conditions (to the extent that forecasts are possible), and generally that identified vulnerabilities are addressed and adaptive capacity is strengthened.

The CEP is based on a compilation of available environmental information, the *validity and consistency of which should be determined*. It is not expected that 'raw' data should be collected during the preparation of a CEP, but where key data is not available this should be reported. The cost and amount of work involved in preparing a CEP will depend on the existence and the quality of any previous versions or of other (non-EC) profiles such as national State of the Environment reports, the Country Environmental Analysis of the World Bank and Asian Development Bank[97] (which focus on institutional and governance aspects), and the Environmental Profiles of the United Nations Environment Programme, the Food and Agriculture Organisation[98] and the World Resources Institute[99]. Information on the environment is also provided in national sustainable development strategies[100], or national environmental strategies.

The CEP should provide the necessary environmental information to prepare a balanced EC country strategy, incorporating *social, economic and environmental* considerations. The CSP in turn informs the National Indicative Programme. The response strategy of the CSP and the NIP will include 'environmental integration outcomes' (i.e. elements that testify to the fact that environmental issues were taken into account, and will receive further attention as appropriate) for the subsequent phases of the cycle of operations. The environment should be considered in the response strategy as a cross-cutting issue influencing the specific interventions for different focal and non-focal sectors and may also be considered as a possible sector of intervention which merits consideration in itself.

2. Objective

The global (overall) objective of this Country Environmental Profile (CEP) is to identify and assess environmental issues to be considered during the preparation of the 2014-2020 Country Strategy Paper, which will directly or indirectly influence EC cooperation with Cambodia. It is specifically expected that the Country Environmental Profile will provide decision makers in Cambodia and in the European Commission with clear information on the key environmental challenges (including those resulting from increasing climate variability and climate change), the current policy, legislative and institutional framework and the strategies and programmes (including those of the EC and other donors) designed to address them. This information will ensure that the EC cooperation strategies systematically integrate environmental considerations into its focal sectors (fisheries, forestry and livestock) and cooperation objectives/strategies, and establish the necessary environment safeguards for all cooperation activities undertaken in the country. The Profile will describe the key linkages between the environment, including climate change, and poverty reduction. It will constitute an important source of baseline information and contribute to focusing political dialogue and cooperation with the country on key areas of concern including sustainable development as well as raising awareness among policy makers.

[97] http://www.adb.org/Documents/Reports/CEA/cam-may-2004.pdf
[98] http://www.fao.org/countryprofiles/index.asp?lang=en&ISO3=KHM
[99] http://www.wri.org/search?s=cambodia&start=10&restrict=wri_publications
[100] http://www.un.org/esa/dsd/

3. Results

This country environmental profile will deliver the following results:

- an assessment of the state of the environment and key environmental factors and trends, including those related to climate change, influencing the country's sustainable development and stability;
- an assessment of the main links between the environment and human development in its multiple dimensions (income and green growth, consumption, health, security, vulnerability, etc …);
- an assessment of national environmental policy and legislation, institutional structures and capacity, and the involvement of civil society actors in environmental issues;
- an assessment of available analysis on the impact of increasing climate variability and climate change on different sectors and the strategies and processes in place or under development to respond to them;
- an assessment of the integration of environmental concerns in development policy and sectors with key linkages with environmental issues;
- an overview of past and ongoing international (including EC) cooperation in environment as an area for cooperation and environmental integration;
- recommendations and, guidelines or criteria for mainstreaming environmental concerns including those concerning adaptation to increasing climate variability and climate change in cooperation areas. These recommendations should support the preparation of the Country Strategy Paper 2013-2020/National Indicative Programme and include guidelines or criteria to be used for environmental mainstreaming in subsequent phases of the cycle of operations;
- a national workshop (approximately 150 participants) attended by national authorities, development partners, experts and representatives of civil society with the aim of clarifying and validating key environmental concerns, especially in the focal sectors fisheries, forestry and livestock.

4. Issues to be assessed

The following issues should be assessed using existing sources of information and key stakeholder perspectives. It is not expected that the preparation of the Profile will involve the collection of original environmental data. **Please note that the sub-headings below are the same as the recommended profile format.**

4.1. State of the environment, trends and pressures

This chapter should identify the **state** and **trends** of key environmental resources or components in the country, including (as relevant), but not necessarily limited to:

Themes	*Aspects*
Land	Soil erosion and degradation
	Desertification
	Land use, arable land, losses due to urbanization or infrastructure building
Water	Water regime
	Groundwater
	Water quality
Air quality	Urban air quality
	Indoor air quality
Forest, vegetation, Ecosystems	Forest cover and volume
	Pastureland
	State of particular ecosystems (e.g. savannahs, mangroves, coral reefs)
Biodiversity, wildlife	Local status of globally threatened species/habitats
	Alien invasive species
	Fish stocks
	Species with special value

Pressures on the environment explaining the main negative trends should be identified, as well as pressures contributing to global environmental problems, using the following table as a guiding checklist.

Environmental pressure	*Possible aspects to consider*
Mining, extraction of hydrocarbons and and waste	Extraction, processing and transport of minerals hydrocarbons, and the resulting pollution
Water use and management	Water extraction (surface and groundwater) Wastewater discharges, water treatment Water use
Land use and management environmental concessions	Land use planning including strategic implications and economic land
Forest exploitation, hunting, fisheries, biodiversity	Forest product extraction Forest and fisheries management practices Hunting and fishing activities, poaching Use of non-timber forest products Fires Introduction of alien species
Livestock management	Overgrazing Rangeland management, use of fire, water Livestock waste and pollution management
Agriculture	Extension of agricultural land Shifting cultivation Intensification Irrigation and water use Pest control

As far as possible the **driving forces** influencing these pressures should be identified, such as economic incentives, demographic pressure, access rights to natural resources and land tenure systems.

Environmental trends should be assessed with regard to their social and economic impact, including:

- any decline in economic production or productivity (e.g. agriculture, forestry, fisheries);
- threats to human health;
- human exposure to environmental disasters (e.g. floods, drought);
- conflicts and security issues;
- impact on poverty, differentiated impact on women and men, impact on vulnerable groups (including children and indigenous peoples);
- sustainability of resources use;
- cultural values.

The concluding paragraphs of this section should summarise the main problems identified, described in terms of situations or trends that are undesirable due to their current socio-economic consequences (e.g. falling productivity, health problems, natural risks, social crises, conflicts), their future consequences (e.g. decline in natural resources, cumulative pollution) or their contribution to global environmental problems. The main links between the environment and human development (in its multiple dimensions: income, consumption, health, security, vulnerability …) should be highlighted, preferably in the form of a matrix or 'problem tree'.

The consultant should refer to environmental indicators that could be used for monitoring changes Cambodia. To the extent that data are available, **trends in MDG 7 indicators should be provided**; trends in additional indicators related to country-specific environmental issues should also be provided, as available, to highlight those that are significant.

4.2. Environmental policy, legislation, and institutions

A presentation of the main features of the institutional, policy and regulatory framework leading to the identification of weaknesses and constraints in the capacity to address main environmental concerns.

This section should include a review of the legislation and procedures regarding impact assessments, and a review of the international obligations in the area of environmental protection.

A brief description and review should be provided of the main government responses to deal with environmental problems. This section should address the strengths and weaknesses of the following aspects:

Aspects	*Examples of issues to consider*
Policies (Note that climate-related resources), policies and strategies may be briefly described here but are also covered in more detail in section 4.4.) concerns and	Existence of national policies, strategies and action plans for the environment, including possible National Strategic Development Plan (NSDP) and/or National Green Growth Roadmap. Policy response to global issues, sustainability issues (depletion of natural and specific environmental issues identified above. Consistency between policies. Policies on gender and environment. Important measures taken by the government to solve environmental types of policy instruments used for implementation Effectiveness in achieving targets.
Regulatory framework, including Environmental Assessment (EIA) and Strategic Environmental Assessment (SEA) legislation	Ratification status and implementation of Multilateral Environmental Agreements such as those concerning climate change, biodiversity and desertification (with reference to any official plans, programmes, communications or reports issued in the context of these conventions). Adequacy of (current and in preparation) environmental legislation, including land tenure (eg ELCs) and land reform, access rights to natural resources, management of natural resources, requirements for environmental assessment such as for EIA and SEA, pollution control, development control. Provision and procedures for public participation in environmental issues. Effectiveness of legislation enforcement. Use of other (non-legislative) instruments, e.g. 'green budgeting', environmental fiscal reform, payment for ecosystem services and market-based mechanisms, voluntary schemes (e.g. environmental management systems, environmental labelling, industry-government agreements). Potential impact of non-environmental legislation.
Institutions with environmental legislation, responsibilities enforcement.	Identity, number and quality of institutions involved in policy making, planning, environmental protection, monitoring and Level of coordination and decentralisation.

4.3. Implications of climate change

The CEP report should include an overall estimation of both vulnerability (identification of vulnerability factors) and capacity to respond to the consequences of climate variability and change.

Policies should be reviewed (e.g. climate-resilient development strategies, national adaptation programmes, low carbon development strategies), together with their institutional components. Sources of information may include National Communications under the United Nations Framework Convention on Climate Change (UNFCCC), and for the least developed countries National Adaptation Programmes of Action (NAPAs). Existing national or subregional studies on the expected effects of climate change should be considered including proposed responses, which may include technical, policy and institutional components.

This section of the report will highlight the effects of climate change in exacerbating existing pressures or impacts and the linkages between environmental degradation (ecosystem services) and vulnerability, with a focus on the poorest and most exposed social groups. The overall implications of climate change for focal areas of cooperation should be assessed[101], including any safeguards or need for additional analyses to ensure that investments are adapted to increasing climate variability and predicted climate change effects.

4.4. Integration of environmental and climate change concerns into the main policies and sectors

This assessment should examine the integration of environment and climate change in the overall development policy and in sector policies, particularly those that might be identified for EC support, taking into account the focal areas of the current Country Strategy Paper as well as and any pre-identified options for future cooperation (fisheries, forestry and livestock).

This section should examine whether Strategic Environmental Assessments (or similar assessments) are available for the national strategic development plan (NSDP) and for the future 'focal' sectors of interest of EC support (fisheries, forestry and livestock). If such SEA's exist, they should be briefly described including the main recommendations. The main legislation and institutional arrangements and measures of the sector which address environmental issues, especially those identified in section 4.1 above, should be examined.

4.5. EC cooperation with the country from an environmental perspective

This section should briefly review the past and current experience with development cooperation interventions related to environmental and natural resource management including climate change, as well as the steps taken to integrate the environment into other cooperation areas (e.g. SEA or EIA studies conducted in the context of EC-funded programmes/projects). Where information is available, the environmental impacts or potential risks of past or ongoing

[101] Through close consultation with (i) the Cambodia Climate Change Alliance (CCCA) Team which is based in the Climate Change Department (co-funded by the Government, Danida, EU, Sida, UNEP and UNDP), and (ii) relevant Technical Working Groups

cooperation should be identified for the benefit of future programmes. The findings and conclusions of existing evaluations/reviews should be summarised.

4.6. Cooperation funded by other donors from an environmental perspective

This section should review the past and current involvement of other donors (in particular, EU Member States, but also other significant donors/partners such as ADB, Australia, Japan, USA, UN agencies and Worldbank should also be included) and their experience in the country, and include a list of recent and planned projects/programmes with an environmental and/or climate-related focus or anticipated impact. Coordination mechanisms between donors and the EC with respect to the environment should be assessed.

5. Conclusions and recommendations

The key aspects of the state and trends of the environment in the country, including policy, regulatory and institutional constraints and challenges, should be identified as clearly as possible. The implications of climate variability and climate change on vulnerability and adaptation strategies should also be included. These key aspects may be presented in a matrix, comparing environmental concerns and the main sectors or policies.

Based on a comprehensive assessment of available information and on extensive consultations with stakeholders, conclusions and recommendations should be formulated on how the Commission and the partner government can best address identified environmental challenges (***including climate-related ones***) in the Country Strategy Paper, taking into account current cooperation and any pre-identified options for future cooperation. Conclusions and recommendations should feed into the country analysis and response strategy of focal cooperation sectors. They should address (but not necessarily be limited to) the following aspects:

- Rationale for considering the environment as an area for cooperation, and/or (more frequently) the need to consider safeguards and complementary actions in other areas of cooperation, in order to address environmental constraints and opportunities as appropriate. Measures may include, for example, proposals for institutional strengthening and capacity building (including the enhancement of the regulatory framework and enforcement capacities) particularly in relation to environmentally sensitive sector programmes (eg fisheries and forestry) and budget support programmes. Opportunities may include supporting low-carbon development plans and programmes.
- Recommendations to ensure that environmentally sensitive projects and programmes are adapted to increasing climate variability and the anticipated effects of climate change, and can thus deliver sustained developmental benefits. Information gaps preventing this work from being accomplished should be identified.
- Opportunities for coordination on environmental issues with other donors, seeking to achieve complementarities and synergies in order to more effectively deliver development objectives.
- Proposals for environmentally-relevant indicators to be used in the National Indicative Programme or to be considered during the formulation of cooperation actions. The proposed indicators should be chosen taking account of the availability of data and actual capacity to monitor their evolution. The report should mention whether the proposed

indicators are included in the performance assessment framework of national (e.g. poverty reduction strategy) or sectoral strategies/programmes.

Individual recommendations should be clearly articulated and linked to the problems to be solved and grouped according to the sector or institutional stakeholder concerned. The relative priority of the recommendations and an indication of the challenges to their implementation should be given.

Any constraints to preparing the profile resulting from limited information should be described.

10.5 Appendix V Environmental monitoring and indicators.

As indicated in the main report (section 2.13) environmental monitoring in Cambodia is a not regularly or systematically undertaken. The RGC has included into its CMDG some environmental indicators. Through an effort by the TWG-FE these were reported on in 2010 (for actual values, see section 2.2):

Indicator		Latest update	Source
7.1	Forest cover (% total area)	2009	FA
7.2	Surface of 23 protected areas (million ha)	2009	MoE
7.3	Surface of six new protection forests (million ha)	2009	FA
7.4	Number of rangers in protected areas	2010	MoE
7.5	Number of rangers in protection forests	2010	FA
7.6	Proportion of fishing lots released to local communities	2010	FiA
7.7	Number of community-based fisheries	2010	FiA
7.8	Surface of fish sanctuaries (thousand ha)	2009	FiA
7.9	Proportion of households dependent on fuel-wood	2008	GPCC
7.10	Proportion of rural population with access to safe water source (Dry Season)	2010	GPCC
7.11	Proportion of urban population with access to safe water source (Dry Season)	2010	GPCC
7.12	Proportion of rural population with access to improved sanitation	2008	GPCC
7.13	Proportion of urban population with access to improved sanitation	2010	GPCC

This, very general picture, unfortunately does not provide information on the key critical themes identified (such as pressures on state public land, including protected areas; surface water management, and soil fertility) in this CEP. Aside for this, the latest systematic reporting is from 2004, in the State of the Environment Report. This was produced in a persistent, long-term process, supported by a donor covers all aspects of ENR, which were considered relevant, in international practice (arising from the Rio summit), at the time. At the end of this Appendix is a list of the environmental issues covered by this SoER.

In addition, some TWG's have produced own indicators, which however are mainly milestones for the work of the TWGs' rather than environmental indicators as such. For example The AW strategy design document (TWGAW, 2010) includes a section on monitoring. This avoids addressing environmental monitoring[102]

The NFP contains a comprehensive monitoring section, with indicators for forest condition, production and management. It also leaves out the key themes identified in this CEP.

It may be expected – or hoped for and strived for – that the Roadmap for Green growth as it unfolds, may come to contain a monitoring mechanism. This may be inspired by the coming Rio+20 summit, which will most likely also call for an updated monitoring mechanism or system.

In the meantime, this CEP will suggest use of the SoER framework for monitoring traditional environmental parameters (e.g. particles in the air, water quality, number of vehicles) and add the following themes/indicators. Here are also provided possible sources for the information and possible obstacles.

Theme	***Indicator***	***Responsible agency***	***Possible other source***
LAND AND FOREST			
Registration and demarcation of state public land	% of state public which has been registered and demarcated	MLMUPC/MAFF	NGO forum, donor – RGC project reports
Trend in issuance and use of land concessions in general	Area of active and inactive concessions (ELC, mining, social)	MAFF	NGO forum, donor – RGC project reports, Individual NGOs
Trend in issuance and use of land concessions in protected areas	Area of active and inactive concessions (ELC, mining, social)	MoE	NGO forum, donor – RGC project reports, Individual NGOs
Trend in land conflicts	Number and severity of land conflicts	MoI, MoJ	NGO forum, Individual NGOs, press reports
Deforestation rates, forest cover	Trends in deforestation, actual forest cover	MAFF/FA	RGC-Donor projects, TWG-FE, International research (e.g. analysing satellite images)
Forest Governance	Volume of illegal logging. Status of FLEGT process Land grabs - See land conflicts	MAFF, MoC	NGO forum, donor – RGC project reports, Individual NGOs, EUD (on FLEGT)
WATER			
Trends in hydropower dam development	Status of various dam projects (planning financing, construction) and expected environmental and livelihoods impact	MOWRAM, Council of Ministers, MoEF, MoE	MRC, press

[102] '25. Monitoring and evaluation arrangements would be managed through the MTEF system and built into the organizational structure established for each agriculture and water implementing project in the SAW program, under the overall authority of MAFF and MOWRAM. It would be essential that monitoring is closely linked with the implementation planning process and the unit responsible for it. Details of the structure and procedures and methodology should follow the MTEF guidelines. Reports of monitoring, including information on management actions on the issues flagged by monitoring would be reported to MAFF and MOWRAM.'

Trends in flooding patterns	Duration and extent of floods. Effects on natural resources.	MOWRAM, NCDM	MRC, WFP, Press
CLIMATE CHANGE			
Carbon emissions	Net country carbon emissions, by sector	CCD/MoE	RGC-Donor projects, TWG-FE, International research
Mitigation efforts	Trends in combined volume of mitigation projects and actions	CCD/MoE	RGC-Donor projects, TWG-FE, International research
'GREEN ECONOMIC GROWTH'			
Carbon efficiency of agricultural and industrial production	Sector-specific carbon efficiencies.	CCD/MoE	RGC-Donor projects, TWG-FE, International research
Value of Natural Capital	Trends in value, and actual size of various elements.	MEF, Provinces	RGC-Donor projects, TWG-FE, International research
Quality of green accounting in public and private systems	Comprehensiveness, accuracy, disclosure	Not yet	Green Growth Process…
Quality of environmental reporting and trends in key environmental indicators	Quality (comprehensiveness, accuracy of information) of SoER reporting and other environmental reporting. Degree of disclosure	MoE	RGC-Donor projects, TWG-FE, International research, Green Growth Process

For each of the above themes the EUD may wish to follow progress by noting, a) whether the theme is included in any credible monitoring and reporting mechanism by the RGC, b) whether data are actually being gathered and analysed, c) whether data are being disclosed and d) whether information is being acted upon in the form of corrective measures in direction of sustainable environmental and social development.

Table 10.V.1: Areas covered in State of the Environment Report (MoE), 2004:

Area/Theme/Subject
Human settlements
Population and Settlement Patterns
Population characteristics
Migration
Land Allocated for Human Settlement
Land-use management & planning
Air Quality
Water Demand
Water supply
Waste water
Solid waste

Energy
Fossil Fuels
Oil, Gas and Coal
Biomass fuel
Hydropower
Fuel wood consumption in production
Transport
Vehicles
Road Traffic
Water transport
Rail transport
Air travel
Agriculture
Agricultural land distribution
Areas of agricultural crops
Areas of tree plantations
Irrigation
Soil Classification
Agricultural Inputs (fertilizers, pesticides)
Livestock populations and trends, feed
Aquatic animals from paddy
Land Use
Area classification
Changes in Land Use
Soils
Land Registration and Tenure
Water
Water Resource Use
Hydropower
Water Quality
Fisheries
Inland fisheries
The Fisheries Catch Yield
Fishing Effort and Illegal Fisheries
Aquaculture

Threatened Species
Marine fisheries
Fishing Gear and methods
Marine Fisheries Production and Demand
Forest Resources
Classification and Forest cover
Species
Forest Production
Fuel wood Energy
Non timber products
Protected Areas
Concessions
Hunting and Wildlife Protection
Reforestation
Strengthening of Forestry Law Enforcement and Governance
Biodiversity
State of biodiversity
Fauna
Flora
Habitats
Pressures Threatening Biodiversity
Species under pressure
Harvesting and Trading of Wildlife
Terrestrial Habitat
Aquatic Habitat
Water Quality
Hydro-electric dams
Flood prevention structures
Introduced species
Biodiversity Management

The SoER, in addition, discusses envriomental trends and pressures in chapters such as 'Land Use Issues', 'Forest and Livelihoods' and the like. They are not included here, as they do not contain environmental indicator information as such.

Endnotes:

[i] The RGC Strategy for Agriculture and Water (integrated, which in itself is quite telling), lists the following priorities:
• Increased production of rice export
• Increased production of crops like fruits and vegetables
• Cropping systems that make the *best use of limited water resources* and reduce risk to farmers from year-to-year variations
• Best crops to be grown every season in terms of soil condition, export potential, etc.
• Livestock as major source of income and protein in rural communities
• Controlling *water for agricultural purpose*, by means of storage, drainage or irrigation as appropriate
• Rehabilitate and reconstruct the existing *irrigation* and *drainage* systems;
• Expand *surface water storage* facilities and promote *water harvesting* technologies;
• Promote *sustainable development of ground water resources,* particularly for high value and horticultural crops;
• Strengthen and expand Farmer User Communities with both women and men members to ensure efficient and *equitable water use* and ensuring wide community participation in water management;
• identifying, determining the potential utility of, and opening up for settlement cultivable land that presently is unused, using techniques such as Agro-Ecosystems Analysis, Land Use Capability Classification, and *river basin planning*
• identifying land use planning and mapping
• studying and assessing climate and water potential including climate change, potential of *surface water and ground water* for crop forecasting and seasonal planning for agricultural production.
• determining the potential utility of presently under-utilised cultivable land, and encouraging more productive use
• sustaining and improving soil fertility by promoting soil and *water conservation* and appropriate technology for fertility management
• managing water resources in an integrated way(*Integrated Water Resources Management*-IWRM)

[ii] The Goals of the Sub-Group on ELCs are:

1. To create an impartial forum/platform for sharing and documenting relevant, updated information on the development, use, and implementation of ELCs, as a tool in support of continued economic and social growth and progress in Cambodia. (Nov. 2011)

2. To conduct or commission, and make available, evidence-based technical research/studies that demonstrates best practices, socio-economic opportunities/challenges, and integrated planning processes to promote the development of ELC "anchors" of sustainable socio-economic growth and equity, taking into account the integrity, resilience and productivity of social and bio-physical ecosystems. (On-going)

3. Engage in strategic technical dialogue with the RGC, private sector, civil society, and development partners to strengthen ELCs. (On-going)

[iii] 'In the 21st century, the security of nations will depend increasingly on the security of natural resources, or "natural security." The global economy, developing countries and local economies throughout the world all rely on the availability of potable water, arable land, fish stocks, biodiversity, energy, minerals and other renewable and non-renewable resources to meet the rising expectations of a growing world population. Yet the availability of these resources is by no means assured'.