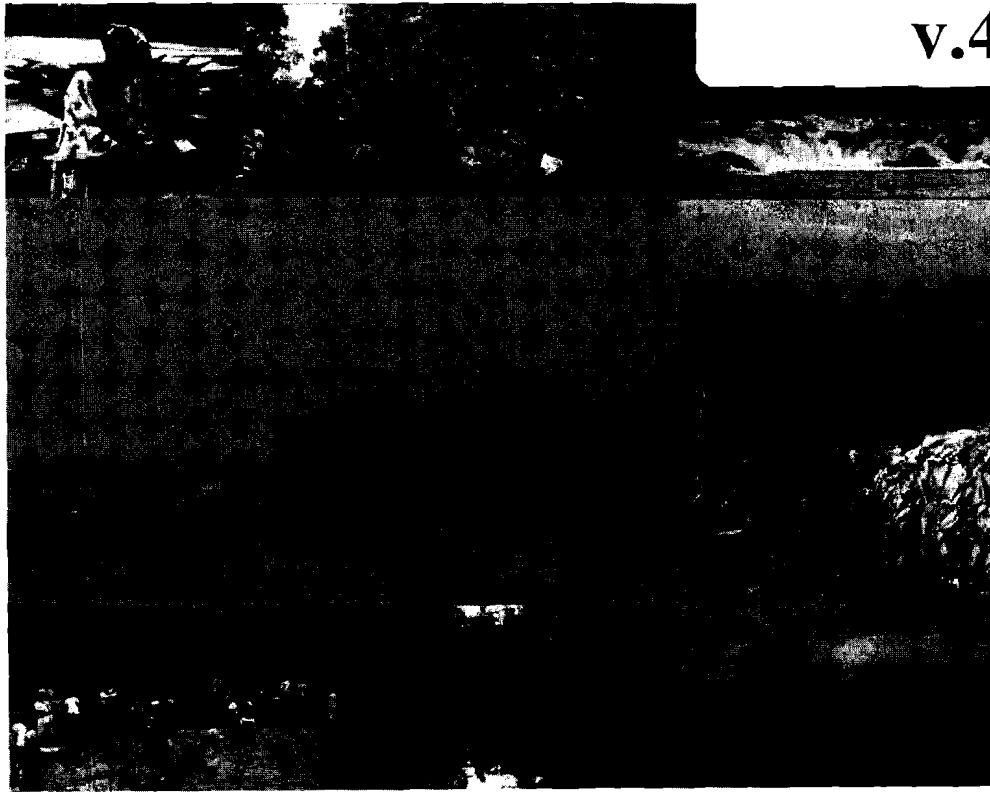


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**Regional Environmental Assessment (REA) of
the Kribi Region**

National Hydrocarbon Corporation (SNH)

25 February 2008

Report

9S9906



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Abbreviation used in report	English Abbreviation	English Full text	French Abbreviation	French Full text
NP	NP	National park	PN	Parc national
OITBC			OITBC	Office Intercommunale de Tourisme de la Bande Côtière
PAP	PAP	Project Affected People		
PASEM			PASEM	Projet d'accompagnement socio économique (du barrage Memve'ele)
PNUD/UNDP	UNDP	United Nations Development Program	PNUD	Programme des Nations Unies pour le Développement
PPPA		Plan for the preservation of indigeneous people	PPPA	Plan pour la preservation des peuples autochtones
PRS	PRS	Pressure Reduction Station		
RAP	RAP	Resettlement Action Plan	PAR	Plan d'Action de Réinstallation
RCA	RCA	Republic of Central Africa		République Centrafricaine
ReCESSE		Project of Environmental and Social Capacity Enhancement in the Energy	ReCESSE	Projet de Renforcement des Capacités Environnementales et Sociales pour le Secteur de l'Énergie
SNH		National hydrocarbon Corporation	SNH	Société National des Hydrocarbures
ToR		Terms of references	TdR	Termes de références
UN	UN	United Nations	NU	Nations Unies
UNIDO	UNIDO	United nations Industrial Development Organisation		
USAID	USAID	United States Agency for International Development		
UTO		Integrated management area of Campo-Ma'an	UTO	Unite Technique Operationnelle Campo Ma'an
VESHCS	VESHCS	Valued envitronmental, social and health components		
WB	WB	World Bank	BM	Banque Mondiale

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CHAPTER 1 INTRODUCTION AND PROJECT CONTEXT

1.1 The Kribi region

The Kribi region lies at the Gulf of Guinea coast, in Cameroon. Administratively, it is located in both the department of the Ocean, Province of the South and in the department of the Sanaga-Maritime, from the Province of Littoral.

The region is relatively densely populated along the coast and is known for its tourist activities.

The town of Kribi is a beach resort and sea port at the mouth of the Kienké River. It has an estimated population of 60,000(2007). It services sea traffic in the Gulf of Guinea.

Lately, few Oil and Gas developments have taken place (e.g. Chad-Cameroon pipeline, which terminus ends South of Kribi town) and more developments are planned (especially development of the gas field Sanaga South and construction of the AES SONEL power station, as indicated in the Terms of Reference).

AES Sonel and SNH / PERENCO have prepared two project based Environmental Assessment Reports (EAs). These EAs analyze the direct impacts of the respective projects, but do not analyze the indirect, induced and cumulative environmental and social impacts on a wider regional scale taking into account economic activities which are already existing, which are under construction and which are being planned in a 10 to 15 year time frame.

1.2 Political and strategic background

- **Electricity shortage**

The country of Cameroon faces a serious problem on energy supply, and especially electricity supply. It is expected that if no other power is supplied, the country will encounter extreme shortage of electricity in three years time.

To remedy this in the short term, a power plant of a 88 MW will be urgently set up in the coming years, South of Douala. This plant will be powered by oil.

In this respect, the implementation of the AES Sonel power plant in Kribi, which will supply 155 MW (at first, and can be later increased to 300MW) is essential for the development of the country as a whole. In this, the stake of this project, goes beyond the Kribi region, and is of national interest.

- **WB project**

In line with the above mentioned energy problem, the REA Kribi Project is also meant to give a basis for a new World Bank (WB) programme "Project of Environmental and Social Capacity Enhancement in the Energy sector" in Cameroon, named in short ReCESSE, which stands in French for "Projet de Renforcement des Capacités Environnementales et Sociales pour le Secteur de l'Énergie".

This WB Project was formulated after a mission of the World Bank in Cameroon in November 2007. The objective of this programme is to:

“Align the investments in the energy and hydrocarbons are to international norms and practices in environmental and social management.”

The project should have the following components in order to achieve the above objective:

- 1) Support of the CPSP in order to sustain the gain of the CAPECE Project.
- 2) Support to the Ministry of the Environment and Nature Protection of (MINEP) in order to ensure that MINEP can play its role properly (i.e. control of environmental and social aspects) in the big infrastructure projects.
- 3) Support to the Ministry of Energy and Water (MINEE) in order to enable it to implement the Energy Master Plan (PDSE, from the French “Plan de Développement du Secteur de l’Énergie”).
- 4) Set up of a national framework for the management of social aspects in big projects according to International norms and practices by the Ministries of Social, Health, Culture, and Territory Affairs. This should be done together with the support of NGOs and the civil society.

In this, the project under consideration, i.e. REA Kribi, should bear in mind ReCESSE objectives and components and aim to provide a basis for later implementation of the ReCESSE four components.

1.3 Client and stakeholders

The National Hydrocarbons Corporation (SNH) is the client. The project was advised by the World Bank which may support SNH technically in managing this study. This study involves the consultation of the public on the results of the REA. That means that local stakeholders, potentially affected people, national NGOs and interested parties will be consulted.

1.4 Definition and purpose of an REA

According to the World Bank, the definition of an REA is as follow:

Regional environmental assessment (REA) is a tool to help development planners design investment strategies, programs and projects that are environmentally sustainable for a region as a whole. REAs take into account the opportunities and limitations represented by the environment of a region and assesses on-going and planned activities from a regional perspective.
REA Sourcebook update nb 15 of the World Bank (1996)

An REA is a Strategic Environmental Assessment (SEA) for a region. The definition of a SEA is, according to the World Bank:

Strategic Environmental Assessment (SEA) is a tool for including environmental considerations into policies, plans, and programs at the earliest stages of decisionmaking. SEA extends the application of environmental assessments (EAs) from projects to policies, programs, and plans. Ideally, SEA is participatory, giving voice to those affected by policy, programs, and plans.
*Environmental Strategy Notes nb 14, (June 2005),
 Strategic Environmental Assessment – Concept and Practice*

An SEA serves for planning purposes. It is a great tool to integrate all existing government orientations, directions and policies as well as requirements of existing and

applicable national and international regulations in a concrete land use planning and/or environmental strategy.

The essence of a SEA or REA is to compare the carrying (or absorption) capacity of an area to the types of impacts induced by a certain number of projects planned. The absorption capacity for these developments also determines to what extent negative effects will occur; it can have important impacts on people living in the area. The carrying capacity of an area is a combination of:

- Its ecological carrying capacity (i.e. how much pollution can a fish absorb before it dies)
- The managing capacity (if potential impacts can be properly mitigated, less impacts can be expected. However, if the managing capacity is low, high impacts can be expected.)

In this, recommendations of this REA study focus on

- Minimising the negative impacts by proposing mitigations and/or compensation measures
- Enhancing the carrying capacity of the region by environmental conservation, ESH management and capacity enhancement and institutional strengthening.

1.5 Objectives of the REA

The main objective of the Regional Environmental Assessment is to look beyond the Environmental, Health and Socio-economic impact assessments (ESHIA) of the known energy-related projects/activities¹ and specifically analyze the indirect, induced and cumulative environmental and social impacts in the Kribi region (with a focus on the core Kribi region) from existing projects, projects under construction and planned within a 10 to 15 year time frame.

The REA shall also evaluate how the region would look like in 15 years from now if no adequate action is taken. Based on this analysis an Action Plan needs to be developed to keep the economic development of the Kribi region on a sustainable development path.

1.6 Scope

1.6.1 Geographical scope

After the first scoping mission, the geographical scope was agreed on, as well as the distinction between the 'Kribi region' and the 'Core Kribi region'. These two geographical areas are defined below for the purpose of this study.

- **the Kribi region:**

The Kribi region is approximately defined by the Ocean department (South province) and the Western part of the Sanaga Maritime department (Littoral province).

¹ The known energy-related projects/activities in the Kribi region are defined by:

- Projects (i) the Sanaga Sud offshore gas exploitation and related onshore gas treatment plant (project of SNH / Perenco), and (ii) the power plant and transmission line (project of AES Sonel) and,
- On-going activities: (i) the Chad – Cameroon Oil Pipeline (COTCO), (ii) Ebomé oil exploitation platform (Perenco)

- Northern border: till and including the Edéa-Douala Fauna reserve,
- Southern border: till the boarder with Equatorial Guinea
- Western border: the marine area off the coast will be considered. There is no exact limit agreed on how far off the coast, however, marine activities which have influence on the Kribi region should be considered.
- Eastern border: the one of the Ocean department

The REA study will describe the environmental, socio-economic and health context within the Kribi region, within the limitation of time, resources and information available.

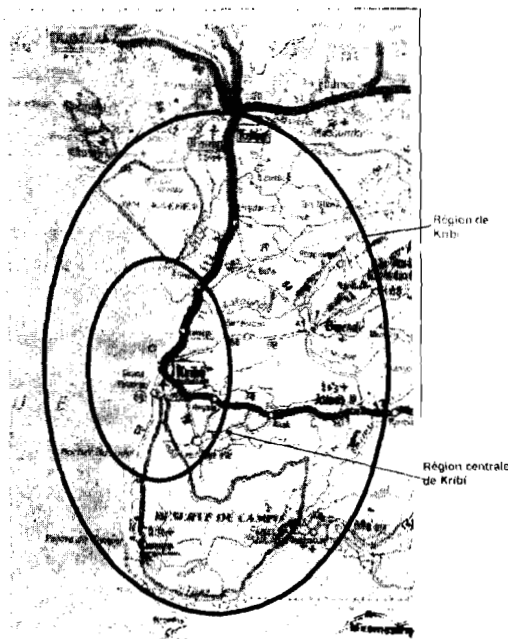
• **the 'Core Kribi region':**

The Core Kribi region focuses on the closer surrounding of Kribi city, about 40 Kms North, South, East and West of Kribi city.

- Northern border: till and including the SNH site, for the gas exploitation and treatment project. This area is called Bipaga.
- Southern border: till and including the mine exploitation project site of CamIron. This area is called 'Les Mamelles', close to 'Le Rocher du Loup'.
- Western border: the marine area off the coast up to and including the offshore petroleum installations (FSU, Perenco oil platforms).
- Eastern border: about 20 Kms East of Kribi town

The REA study will assess the environmental, socio-economic and health impacts of the projects and activities within the Core Kribi region, considering the broader context of the Kribi region. The Core Kribi region will be the focus of this study, as indicated in the Terms of Reference (ToR, see Annex 1).

Figure 1-1 Vissualisation of the Core Kribi region and the Kribi region



1.6.2 Aspects covered

The REA will cover environmental and socio-economic aspects, which will be defined as follows for the purpose of this project:

- the natural environment (on terrestrial and marine ecosystems, water quality in the rivers and streams, flora and fauna, protected areas)
- the physical environment (water, air, soil,)
- human health ((e.g. AIDS and other health impacts, requirements for medical facilities) and
- the socio-economic setting (e.g. safety, community, cultural, heritage, regional economical activities, quality of life, recreational areas)

1.6.3 Project considered

The study will consider the projects having possible impacts on the Kribi region (see previous section for geographical definition).

In this, national projects further away from the Kribi region will not be considered, but the infrastructure passing through the Kribi region will be considered (when known).

A lot of projects have been identified. The implementation of some projects of those is sometimes ambiguous. This will be mentioned and further research will attempt to get a more concrete idea of the realistic implementation of those projects.

1.6.4 Document and information considered

The REA study will take as a basis, as indicated in the ToR:

- the two EA reports prepared by AES Sonel and SNH / PERENCO,
- the EA prepared by Exxon for the Chad – Cameroon Oil Pipeline,
- EAs prepared for other projects in the Kribi region and
- the MEAO (Mission d'Etude pour l'Aménagement de l'Océan à Kribi) documents which deals with the planning of the zoning and sustainable development in the Kribi region.

Further, a lot of information and documents were sought through Internet. Documents used and sources of information are listed in the Chapter 9, References.

1.7 Structure of this REA report

The structure of the REA report will follow the steps of the REA study, as indicated in Table 1-1. The methodology is further explained in section 5.1.

Table 1-1. Methodology steps of the REA for this project

REA step	REA steps description	REA sub-steps	Corresponding Task in the ToR	Chapter in this REA report
Step 1.	Scoping	1.1 Identify spatial and temporal boundaries 1.2 Identify issues of concern and select appropriate Valued Environmental, Socio-economic and Health Components (VESHCs), (see VESHCs definition below).	Task 1	Chapter 1
Step 2.	Policy, legal and administrative framework	2.1 Policy and legal framework 2.2 Institutional framework (incl. Environmental and socio-economic management and monitoring existing capacity) 2.3 Administrative, formal and informal organization	Task 1	Chapter 2
Step 3.	Baseline conditions	3.1 Abiotic environmental conditions 3.2 Biotic environmental conditions and 3.3 Socio-economic baseline 3.4 Health conditions	Task 1 Task 3 Task 4	Chapter 3
Step 4.	Projects planned and developments plans	4.1 Projects planned in the region 4.2 Existing plans in the region	Task 1	Chapter 4
Step 5.	Cumulative impact assessment	Scenario in 10-15 years time, if no ESH measure is taken: 5.1 Assess effects of all selected actions on abiotic, biotic, socio-economic and cultural environment and health (especially on selected VESHCs) 5.2 Greenhouse gas cumulative analysis of the planned developments	Task 1 Task 2	Chapter 5
Step 6.	Recommendations towards an optimal regional investment plan	Coherent and comprehensive action plan (mainly through recommendation for the improvement of existing plan) to ensure long-term economic and environmental sustainability.	Task 1 Task 2 Task 4	Chapter 7
Step 7.	Recommendations towards an environmental management strategy.	Based on the findings, the REA will propose a strategy for strengthening environmental management within the region.	Task 3	Chapter 8
Step 8.	Recommendations and alternatives for projects.	In order to apply concretely concepts and strategy dealt with in the last two chapters, recommendations are made to specific projects.	Task 1 Task 2	Chapter 6

CHAPTER 2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Introduction

Internationally, the World Bank provides guidelines on Strategic Environmental Assessment and REA (REA sourcebook, update nb 15, dated June 1996).

Only few countries in the world have integrated the regional and/or cumulative assessment in their impact assessment regulation and recommended methods. Canada has specific regulation on cumulative impacts and has developed methodology guidelines for cumulative assessment. The Netherlands, the concept of cumulative impacts is integrated in the impacts assessment regulation.

In Cameroon, there is no legislation, nor guideline on Regional Environmental Assessment and/or cumulative impacts. However, there is legislation on Environmental Impacts Assessment (EIA). Being at its early days, the EIA legislation is getting slowly in the Cameroons business culture. Notably, the EIA fees that project developers need to pay make the application of the EIA legislation possible only to large companies / projects for the time being.

The chapter "Policy, legal and administrative framework" of the REA report will list the policy and regulation which affects the most this project, for instance, the Cameroons EIA regulation and the applicable World Bank guidelines. Moreover, the administrative institutions concerned will be listed.

2.2 Legislative framework

2.2.1 Cameroon legislation framework

Introduction to Cameroon's legislative framework

The legal system

The legal framework in Cameroon is made up of legislative and regulatory instruments:

- *Legislative instruments* are made up of Laws; and
- *Regulatory Instruments* are composed of Decrees and Rules.

Laws are prepared by Sectorial Ministries and forwarded to the national assembly. During working sessions, these are adopted by members of parliament and later on enacted by the head of state.

A law is generally a framework of intervention within a specific sector. To be implemented, it needs regulatory instruments, which are called decrees of application. Ministries who have prepared the concerned law prepare decrees, which are then signed by the Prime Minister Head of Government.

To be more detailed, a Decree sometimes needs implementation Rules. The Rule is prepared by the Ministry and signed by the Minister, after a visa from the Services of Prime Minister.

The application of all legislative and regulatory instruments is compulsory for all citizens and project promoters. These instruments are therefore provided with sanctions for defaulters, which vary from prison sentence to fine payment, dependent on the gravity of the fault.

Awareness of environmental issues

All land use, construction, equipment or settlement projects which are likely to be prejudicial to the environment in Cameroon due to their size, their nature or the impacts of associated activities on natural environment, have been, since the 1990's, governed by the environmental regulation, with the issuance of the law n° 96/12 of 5th August, 1996 on environmental management. This law was reinforced with implementation rules in 2005, including the decree n° 2005 / 0577/pm of 23rd February, 2005 on the procedures for the implementation of environmental impacts assessments, and the order n° 0069/MINEP of 8th March, 2005 to determine the different types of activities to be carried out according to prescribed specifications, an impact assessment to evaluate the direct or indirect impacts of such activities on the environmental equilibrium of the establishment area or any other region, the living environment of the populations and the quality of their life, as well as the impacts on environment in general

The consideration of environmental concerns by the State falls in line with the Rio Earth Summit in 1992 as this resulted in the establishment, in the same year (1992), of the Ministère de l'Environnement et des Forêts (MINEP) (Ministry of Environment and Forest resources) by Decree n° 92/069 of 9th April, 1992. This environmental awareness was translated into facts in the mid of 1990's through the establishment of specific bodies in charge of environmental issues within the organisational charts of several ministries and State-own-companies ; these include the ministries in charge of mines, Water, Energy and Public works,, ... the enactment of the law on environmental management sanctioned the adoption of a number of principles applicable to all economic operators, including those in the oil and gas industry, officially making them responsible for not offsetting/eliminating environmental risks that are potentially linked to their activities.

Overview of Cameroon legislation, standards and guidelines

The main laws and regulations of relevance to this project are summarised in Table 2-1 below. There are currently no specific national standards for water quality, air quality and noise limits. Acceptable levels for environmental noise are in preparation. In the absence of national standards, recognised international standards can be adopted.

Table 2-1. Relevant Cameroonian Legislation

Subject	Law/Decree/Order
Environmental Management	<p><i>Law N°96/12 of 5th August 1996 Relating to Environmental Management in Cameroon</i></p> <ul style="list-style-type: none"> • <i>Decree N° 2001/718/PM of 3 September 2001 The organization and functioning of the Interministerial committee on the Environment</i> • <i>Decree 94/259/PM of 31 May 1994. Creation of a National consultative Commission on the Environmental and sustainable Development.</i> • <i>Decree N° 2005/0577/PM of 23 February 2005 Defining the conditions for undertaking EIA</i> • <i>Ministerial Order N° 0069/MINEP of 08 March 2005 - Defining the categories of operations subject to EIA</i> • <i>Rule n° 0070/MINEP of 22nd April 2005 fixing the different categories of operations submitted to the realization of an EIA (article 19 of the law)</i>
Cultural Heritage	<p><i>Law N° 91/008 of 30 July 1991 - The protection of cultural and national heritage.</i></p> <p><i>This law identifies the procedures for protection of sites and materials of cultural and</i></p>

	national heritage. It applies to cultural sites that may be found along the projected line corridor.
Dangerous Substances	<p><i>Law n°98/015 of 14 July 1998 - Relating to installations classified as dangerous, insalubrious, and inconvenient</i></p> <ul style="list-style-type: none"> • <i>Decree N°98/818/PM of November 1999 - Laying down conditions for construction and operation of installations classified as dangerous, insalubrious, and inconvenient</i>
Water	<p><i>Law No. 98/005 dated 14 April 1998 – relating to water (the “Water Act”);</i></p> <ul style="list-style-type: none"> • <i>Decree No. 2001/164/PM dated 8 May 2001 – “Decree on Utilisation of Water”, which sets the conditions of utilisation of water for business or industrial purposes</i> • <i>Decree No. 2001/165/PM of 8 May 2001 decree on the “Protection of Water”, which sets the conditions of the protection of surface and groundwater against pollution</i>
Wildlife and Forestry	<p><i>Law N°94/01 of 20th January 1994 to lay down Forestry, Wildlife and Fisheries Regulations</i></p> <p>This law and the implementing instruments thereof lay down forestry, wildlife and fisheries policy, within the framework of an integrated management ensuring sustainable conservation and use of the said resources and of various ecosystems. Under this law, forests means any land covered by vegetation, with a predominance of trees, shrubs and other species capable of providing products other than agricultural produce. Wildlife within the context of this law means all the species belonging to any natural ecosystem as well as all animal species captured from their natural habitat for domestication purposes. Fisheries or fishing, within the context of this law, means the act of capturing or of harvesting any fishery resources or any activity that may lead to the harvesting or capturing of fishery resources, including the proper management and use of the aquatic environment, with a view to protecting the animal species therein by the total or partial control of their life cycle. Fishery resources within the context of this law, means fish, seafood, molluscs and algae from the marine, estuarine and fresh water environments, including sedentary animals in such environments.</p> <ul style="list-style-type: none"> • <i>Decree n°95-531-PM of 23rd August 1995 to determine the conditions for implementation of Forestry Regulations</i> • <i>The Decree n°95-466-PM of 20th July 1995 to lay down the conditions for the implementation of Wildlife Regulations</i> • <i>Decree n°95-678-PM of 18th December 1995 to establish an indicative framework for land use in the southern forested areas.</i>
Electricity	<p><i>Law N°98/022 of 24 December 1998. The Regulation of the Electricity Industry.</i></p> <p>The law enables the government to operate the electricity generation and supply industry through a concession and establishes the Agence de Regulation du Secteur Electricité – ARSEL (the Electricity Regulation Agency) to regulate the industry. ARSEL is required to ensure that electricity operations respect environmental legislation.</p> <ul style="list-style-type: none"> • <i>Decree N°99/125 of 15 Jan 1999; The Organization and functioning of the Agency for the Regulation of the Electricity Industry; Electricity</i> • <i>Decree 2000/464 of 20 June 2000 Register of Activities of the Electricity Industry.</i>
Land	<p><i>Ordinance No. 74-2 dated 6 July 1974 – relating to the status of the public domain in Cameroon (the “Land Code”).</i></p> <ul style="list-style-type: none"> • <i>Decree No. 76-166 dated 27 April 1976-relating to the management of the national domain (the “National Domain Decree”);</i> • <i>Decree No. 76-167 dated 27 April 1976 – relating to the management of the private domain (the “Private Domain Decree”).</i>
Compulsory Acquisition	<p><i>Law n°85/009 of 4 July 1985 - Compulsory Acquisition of a Public Utility Decree (PUD) and payment of compensation the Environment.</i></p> <ul style="list-style-type: none"> • <i>Ministerial Order N°0136/Y.14.4/MINDAF/D220 and 0137/Y.14.4/MINDAF/D220 of 26th August 2005 - Declaring Public Utility for the Construction of the Kribi Gas fired power plant and the 225KV Transmission line from Kribi to Edéa respectively.</i>
Valuation	<ul style="list-style-type: none"> • <i>Rule n°00832/4-15-1/MINUH/D.000 of 1985 providing the basis for calculation of constructions values</i> • <i>Rule n°13-MINAGRI/DAG of 19th February 1982 modifying the Rule n°58/MINAGRI of 13th August 1981 fixing the indemnity tariffs to owners of crops and houses destroyed during a project implementation</i>

Focus on environmental law

General provisions of the framework law

The Cameroonian Constitution's preamble provides that each individual has the right to clean environment and that, even though environmental protection is a duty for each citizen, the State is ultimately responsible for the management and the protection of the environment.

The "Plan National de Gestion Environnementale" (National Environmental Management Plan) in Cameroon (PNGE) was developed and adopted in 1996. This plan is supported by the framework law n ° 96/12 of 5th August, 1996 on environmental management in the country. The Ministry of Environment and Nature Protection is in charge of the implementation of the PNGE.

The Law 96/12 of 5th August, 1996 establishes the general legal framework for environmental management in Cameroon, and provides for the issuance of implementation decrees, a couple of which were issued in 2005 through the Prime Minister's Decree n ° 2005 / 0577/pm of 23rd February, 2005, which laid down the procedures for the implementation of the Environmental Impacts Assessments, and the ministerial order n ° 0069 / MINEP of 8th March, 2005 determining the different types of activities that are subject to preliminary environmental impact assessments.

- 1) Public and private institutions shall, within the framework of their competencies, sensitize all the populations on environmental issues;
- 2) Therefore, institutions shall include in their programmes activities aiming at disseminating better environmental knowledge.

The promoter or owner of any development activity, labour, equipments or projects which can be a threat to the environment due to their size, their nature or the impact of these activities on the natural environment, shall carry out an impact assessment, in accordance with the prescribed specifications. This assessment determines the direct or indirect impact of this project on the environmental equilibrium of the area where the factory is located or in any other region, the physical environment of the populations and the quality of their life, as well as the impact on the environment in general.

Specifications of the environmental regulation

The implementation decree (n ° 2005 / 0577/PM of February 23rd 2005) of the framework law, stipulates the regulatory procedures for the realisation of an environmental impact assessment (EIA) in Cameroon.

Focus on the legal framework for forestry management in Cameroon

The Forestry law (No 94-01) of January 1994 lays down the regulations of forest management in Cameroon. Several decrees of implementation have since followed that give a more detailed description of various aspects of the forestry law. Examples are decree No 95-531-PM of August 1995 (conditions of implementation of forestry regulations), decree no 95-678-PM of 18 December 1995 (establish an indicative framework for land use in the Southern Forested areas) and decree no 96-238-PM of 10 April 1996 (to determine the enumeration for services rendered under the implementation of forestry and wildlife regulations) [FGF, 2007]. In addition to the national legal framework, Cameroon has signed several international treaties that affect forest management in Cameroon, notably the 1992 'Rio convention on biodiversity',

1995 'Ramsar convention on wetlands of international importance' and the Convention on international trade in endangered species (CITES).

The 1994 Forestry law recognizes two main types of forest [Cominsud, 2007]:

- 1) Permanent forest, land that is used solely for forestry or as a wildlife habitat.
- 2) Non permanent forest, forested land that may be used for other purposes than forestry.

Within the permanent forest domain, there are dominial forests, owned by the state or private entities, and communal forests, owned by a municipality.

Within the non-permanent forest domain, there are community forests, managed by a community but owned by the state, and other forests, which may include private forests or forests that await designation.

The forestry law identifies two categories of protected areas and forest reserves:

1. Protected areas for wildlife:
 - o National parks
 - o Game reserves
 - o Hunting areas
 - o Game ranches belonging to the state
 - o Wildlife sanctuaries
 - o Buffer zones
 - o Zoological gardens belonging to the state
2. Forest reserves:
 - o Integrated ecological reserves
 - o Production forests
 - o Protected forest
 - o Recreation forest
 - o Teaching and research forest
 - o Plant life sanctuary
 - o Forest plantation [Cominsud, 2007]

2.2.2 International legislation

World Bank and IFC standards

This REA being financed by the World Bank (WB), WB standards apply and will prevail.

The WB standards applicable are:

- The World Bank Safeguard Policies, the most relevant for this project are:
 - o Operational Policy 4.01: Environmental Assessment, January 1999
 - o Operational Policy 4.04: Natural Habitats, January 2001
 - o Operational Policy 4.36: Forestry, January 2002
 - o Operational Policy 4.10: Indigenous Peoples, July 2005
 - o Operational Policy 7.60: Projects in Disputed Areas, January 2001
- Pollution Prevention and Abatement Handbook Guidelines, 1998

Some other specific guidance of the WB relevant for this project are:

- Environmental Assessment Source book and updates, and particularly:
- Update No. 7 - Coastal Zone Management and Environmental Assessment, March 1994 (
- Update No. 15 - Regional Environmental Assessment, June 1996(
- Update No. 20 - Biodiversity and Environmental Assessment, October 1997

In addition, some of the private developers of the projects part of this REA have applied or may apply for IFC financing. It is the case of the Kribi power project from AES Sonel. The following IFCs documents and policies may be applicable (depending on the projects and financing):

- IFCs 1998 Procedure for Environmental and Social Review Projects;
- IFCs Policy on Social and Environmental Sustainability (30 April 2006);
- IFCs Performance Standards on Social and Environmental Sustainability (30 April 2006);
- IFC Environmental, Health and Safety Guidelines
- IFCs Policy on Disclosure of Information (30 April 2006); and

International Protocols, Agreements and Treaties

In line with OP4.01, Tables 2.3.2 and 2.3.3 identify the international environmental and social Protocols, Agreements and Treaties to which Cameroon is a party respectively. In addition, Cameroon is a party to the following regional agreements:

- African Convention on the conservation of Nature and Natural Resources (Maputo Convention of 11th July 2003)
- Bamako Convention on the ban of the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa (or Agreement of implementation of Basel convention in Africa).
- Treaty relative to the conservation of biodiversity and sustainable management of forest ecosystems in Central Africa (April 2006).

Table 2-2. International Environmental Agreements relevant to Cameroon

Issue	Convention and Objective Cameroon	Status
Biodiversity	<i>Convention on Biological Diversity</i> Objective: To develop national strategies for the conservation and sustainable use of biological diversity (Opened for signature: 5 June 1992, in force as of: 29 December 1993)	Ratified 19 October 1994
Climate Change	<i>United Nations Framework Convention on Climate Change</i> Objective: To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with climate system (Opened for signature: 9 May 1992, in force : 21 March 1994)	Ratified 19 October 1994
Desertification	<i>United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa</i> Objective: to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements (Opened for signature: 14 October 1994, in force as of: 26 December 1996)	Ratified, 1994
Endangered Species	<i>Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)</i> Objective: to protect certain endangered species from overexploitation by means of an import/export permits (Opened for signature: 3 March 1973, in force: 1 July 1975)	Party to.
Endangered Species	<i>Convention on the Conservation of Migratory Species of Wild Animals</i>	Party to
Hazardous Wastes	<i>Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal</i> Objective: to reduce transboundary movements of wastes	Party to.

Issue	Convention and Objective Cameroon	Status
	subject to the Convention to a minimum consistent with the environmentally sound and efficient management of such wastes; to minimize the amount and toxicity of wastes generated and ensure their environmentally sound management as closely as possible to the source of generation; and to assist Least Developed Countries (LDCs) in environmentally sound management of the hazardous and other wastes they generate (Opened for signature: 22 March 1989, in force as of: 5 May 1992)	
Law of the sea	<i>United Nations Convention on the Law of the Sea</i> Objective: to set up a comprehensive new legal regime for the sea and oceans; to include rules concerning environmental standards as well as enforcement provisions dealing with pollution of the marine environment (Opened for signature: 10 December 1982, in force as of: 16 November 1994)	Party to.
Natural and Cultural Heritage	Convention on Protection of Natural and Cultural Heritage	Ratified 1982
Nature and Natural Resources	<i>African Convention on the Conservation of Nature and Natural Resources</i> Objective is to ensure the conservation, utilisation and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people (Algiers, 1968)	Ratified 29 September 1978
Ozone layer protection	<i>Montreal Protocol on Substances That Deplete the Ozone Layer</i> Objective: To protect the ozone layer by controlling emissions of substances that deplete it (Opened for signature: 16 September 1987, in force as of: 1 January 1989)	Ratified 30 August 1989
Timber	<i>International Tropical Timber Agreement, 1994</i> to ensure that by the year 2000 exports of tropical timber originate from sustainably managed sources; to establish a fund to assist tropical timber producers in obtaining the resources necessary to reach this objective (opened for signature - 26 January 1994, entered into force - 1 January 1997)	Party to
Wetlands	<i>Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar)</i> Objective: to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value (Opened for signature: 2 February 1971, in force as of: 21 December 1975)	Ratified 2006
Women's Rights	<i>United Nations Convention on the elimination of all Forms of Discrimination against Women 1979</i> 'For the purposes of the present Convention, the term "discrimination against women" shall mean any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field.'	Ratified, 23 August 1994
Rights of Children	<i>United Nations Convention on the Rights of the Child 1989.</i> This outlines children's civil, political and basic human rights	Ratified, January 1993

Issue	Convention and Objective Cameroon	Status
	and includes their right to education and to end child labour and other forms of economic and or sexual exploitation.	
Torture	<i>The Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (1984)</i> Objective to achieve the abolition of torture and ill treatment worldwide	Acceded, 19 December 1986

2.3 Institutional framework

2.3.1 Cameroons administrative institutions involved

While the President of the Republic is the supreme authority responsible for the formulation of the National Environmental Policy in Cameroon, the Government (i.e, the different ministries), in collaboration with decentralized territorial communities, are in charge of the implementation of the said policy. Regarding the upstream hydrocarbon sector (exploration and production), the Ministry of mines, as the manager of the national mining sector, is the governmental partner to investors. This ministry is technically supported by the "Société Nationale des Hydrocarbures (SNH)" (National Hydrocarbon Company) which monitors and manages the interests of the State in this area of activity. Within the framework of the move to take environmental concerns into account, the Ministry of Environment coordinates the intervention of the State and is assisted by other technical ministries, including those in charge of Emergency Preparedness, fisheries, forest resources and fauna, In the event that the proposed project covers downstream activities with an impact on the production of electrical energy, there is a need to recall the roles and responsibilities of the institutions in charge of this area of activity. These mainly include the Ministry of Industry, the different Regulatory Agencies.

2.3.2 Main Cameroons institutions for this project

The main t institutions involved in the implementation and monitoring of environment law in Cameroon and relevant to this REA project are:

- The Ministry of environment and nature protection (MINEP).
- The Ministry of plannification, development and land use (MINPLAPDAT)
- The Ministry of energy and water resources (MINEE)
- The Ministry of mines, industry and technical development (MINIMIDT)
- The Inter-Ministerial Committee of Environment which is under the responsibility of Ministry of Environment and Forestry;
- Consultative national commission of environment and sustainable development;
- The National Hydrocarbon Corporation (SNH)

A short description of those Ministries is given below.

The Ministry of Environment and Nature Protection

Established in 2005, the Ministry of Environment and Nature Protection (MINEP) is responsible for the development and the implementation of the national environmental policy, the mapping out of strategies for a sustainable management of natural resources and the prevention of pollution. MINEP is responsible for the monitoring of the Environmental Impact Assessment (EIA).

The MINEP has integrated the responsibilities of the formal MINEF of the Permanent Secretariat for Environment whose specific mandate is to :

- Approve reports on both the EIA and the Environmental Management Plan;
- Ensure the management of the national funds for environment and sustainable development;
- Develop environmental standards and regulations aimed at protecting the quality of the environment and to ensure their administration;
- Conduct environmental inspections;
- Promote environmental and sensitization education;
- Participate in initiatives aiming at preventing and managing natural disasters and risks.

The Inter-ministerial Commission for Environment (ICE) is under the tutelage of the MINEP; this commission is established by Prime Minister Decree n ° 2001/718/PM of 3rd September, 2001. It assists the government in the development, the coordination, the implementation and the control of national environmental and sustainable development policies (art. 2 (1)).

The ministry of Industry, Mines and Technological Development (MINIMDT)

The Ministry of Industry, Mines and Technological Development promotes mining and geological activities; it is also responsible for the surveillance of oil exploration and production activities.

Regarding environmental issues, the role of the ministry includes :

- The identification of natural hazards as well as the surveillance and the protection of individuals and goods, in collaboration with all other ministries involved in natural hazard and disaster management;
- The surveillance of industrial and commercial facilities with regard to risks of pollution, security, hygiene and industrial nuisances.

The ministry of Territorial Administration and Decentralisation (MINPLDAT)

It intervenes through its Department in charge of Emergency Preparedness. They are responsible for the protection of individuals, goods and the environment against the risks of serious accidents or disasters and their impacts.

The National Hydrocarbon Company

The National Hydrocarbon Company (Société Nationale des Hydrocarbures - SNH) is the National Oil Company of Cameroon, falling under the direct supervision of the office the President of the Republic. SNH is responsible for:

- the management of the State's interest in the oil sector;
- The promotion of all activities pertaining to hydrocarbons in Cameroon. SNH represents the State in all oil and gas exploration activities as well as in production partnership. The State vested it with the responsibility to ensure that independent oil exploration and production companies comply with the standards and regulations related to the conduct of hydrocarbons activities, with a special concern for environmental protection.

2.3.3 Other institutions involved

In addition, other ministries of relevance are listed in Table 2-3.

Table 2-3. Other ministries relevant for this project

MINADER	Ministère de l'agriculture et de développement rural / Ministry of agriculture and rural development
MINATD	Ministère de l'administration territoriale et de la décentralisation / Ministry of territorial administration and decentralization
MINDAF	Ministère des domaines et des affaires foncières / Ministry of land use affairs
MINDUH	Ministère de développement urbain et de l'habitat / Ministry of urban development and public housing
MINEE	Ministère de l'eau et de l'énergie / Ministry of energy and water resources
MINEP	Ministère de l'environnement et de la protection de la nature / Ministry of environment and nature protection
MINEPIA	Ministère de l'élevage, des pêches et des industries animales / Ministry of livestock, fishing and animal industries
MINFOF	Ministère des forêts et de la faune / Ministry of forestry and wildlife
MINIMIDT	Ministère de l'industrie, des mines et du développement technologique / Ministry of mines, industry and technical development
MINJUSTICE	Ministère de justice / Ministry of justice
MINPLAPDAT	Ministère de la planification du développement et de l'aménagement du territoire / Ministry of planning and regional development
MINRESI	Ministère de la recherche scientifique et technique / Ministry of scientific and technical research
MINSANTE	Ministère de la santé publique / Ministry of public health
MINTRANS	Ministère des transports / Ministry of transports
MINTOUR	Ministère de tourisme / Ministry of tourism
MINTP	Ministère des travaux publiques / Ministry of public works

Other relevant institutions are *ARSEL* (*Agence de régulation du secteur de l'électricité* – authority responsible for regulation of the energy sector);

2.4 Administrative, formal and informal organisation

2.4.1 Administrative and local organisation of the populations

This section describes the administrative structure, as empowered by the central government followed by the various traditional structures that exist in and between communities.

2.4.2 Administrative structure

The administrative structure in Cameroon follows the following order:

Table 2-4. Political structure in Cameroon: from the president to the village chief.

French denomination	English denomination	Headed by / State representation	Ministries / Government / Ministry representatives	Observations
Etat	State	Président	Minsiters (central services)	Elected by the population
> Province	Province	Gouverneur	Provincial delegates representing the Ministers	Named by the government
> Département	Division	Préfet	Departmental delegates representing the ministries	Named by the government The prefect is at the department level and the departmental, the arrondissement delegations as well as the municipalities and the districts are under his/her administrative authority.
> Arrondissement	Sub-division	Sous-préfet	Arrondissement delegates representing the ministries	Named by the government The sub prefect is under the administrative authority of the prefect. He/she exercises his/her functions/power at both the arrondissement and district levels, i.e. administratively, the arrondissement delegates, the municipalities and the head of the district report to him/her.
> District	District	Chef de district	None	Named by the government
>canton/ groupement		Chef de canton /groupement	None	Elected by the local population, unlimited term
>Commune		Maire	None	Elected by municipal councillors, 5 year term
> village	Village	Chef du village	None	Elected by the local population, unlimited term

The ministries follow the same organization:

The official organization powered by the central state, concerns province throughout the district, where the general government names the people in charge. The other functionaries are elected by the local population and in general named for their lifetime. Village chiefs are classed into three groups, according to their importance: 1st degree, 2nd degree and 3rd degree. Mayors are elected for 5 years by the council of directly elected "conseillers municipaux", and usually serve only one term². Many different ethnic groups live in the project area but they may be re-grouped in about four categories, who speak related languages, and have related cultures: Each of the main ethnic groups has its own, officially recognized, "Chef de groupement", usually a inherited position³.

² <http://www.mairiedekribi.net/chiffre.php> MAIRIE DE KRIBI. (2007) The present maire de Kribi, since September 2007 and until 2012, is Martin Hervé Bell Benaé.

³ Carte des groupements 1/200.000, J. Robert Kameni, INC, Yaoundé, 1998. and E. Dounias (1993), adapté d'anciennes sources.

2.4.3 Organisation at village level

Available data

Envi-report (2007)⁴ describes the villages as “stateless societies” without a strong central power structure. Lineages of people live in “quarters”, and authority is mainly exercised within the extended family. Adult men of such a group tend to eat together in special designated hut “Abba”, where they receive food of the various households and discuss common matters. The spheres of influence concern family-lineage-clan in its execution of diplomacy, defence, management of persons and goods), law maker, judge (especially land disputes which re numerous in the region). The religious sphere polices and censors behaviour, to guarantee the social order and stability. Members of secret societies have knowledge of and use myth and traditional practices.

Most villages are made up of one ethnic group, clan and even usually clan, and not much trade is passing between the various villages. The only uniting force is the matrimony system which obliges people to take their spouse in another village, to which they then become indebted through the bonds and obligations of marital duties⁵, that are especially visible in moments of grief when all people who recognize themselves as kin come together.

Village chiefs are elected, generally from the same family – even women chiefs, though rare, are possible – and decisions are taken by an assembly in which the elders (“anciens” or “notables”) and important people who have left the village (“élites extérieures”) play a rôle. (Envi, 2007).

Analysis and discussion

The absence of a well defined leadership in the villages is an important constraint for any project: it does not suffice to consult a chief or a couple of elders of the village, and obtain their agreement to have the same agreement of the population. Chiefs and elders may also retain information as something valuable through which they can have power on their fellow villagers. Villagers know that the chief has first his own relatives, and then only the other villagers. So everybody wants to be informed and consulted individually – in a meeting or privately – about any outside developments.

The lack of authority, and the lack of trust in the authority means that people often rather trust the rumours than the words of their leadership. The Cameroonian term for “Rumours” is “kongosa” which means a “truth vehicled by word of mouth in a community” which it is very difficult, if not impossible to counter by corrective information⁶.

2.4.4 Formal and informal organisations

Available data

Envi (2007) describes the most important local formal and informal organisations: churches, traditional societies, GICs, rotating systems and political parties. Data on the first 4 groups are presented below.

⁴ Section 3.4.4 page 47.

⁵ Adapted from the analysis described by Salem-Murdock, Muneera, Mfoulou J. and Ndonko F.. (1999) Human environment: Socioeconomic and cultural survey in the Project Area.

⁶ A few of the more national “kongosa” during the last decades have been the fear that infant vaccination would render girls sterile, the belief that one of Cotco’s subcontractors measured the height of its employees in order to prepare their gaskets because they were sure to die on the job. People don’t come for aids-tests in Yaoundé, because one Cameroonian professor has discovered a cure that will free you from aids within 12 days...

Churches. - The most important organisations in the area are the churches, which are mostly Christian (catholic, various protestant denominations) and many newer churches like the neo-apostolics, Jehovah witnesses, ... Envi (2007) notes that despite a very apparent and vibrant religious practice, the mentality of the population remains strongly marked by sorcery and great attachment to the graves of their ancestors. SW (2007a) observes that churches are most often cited as the most important place where people go for leisure activities.

Traditional societies. – Organisations like *ngondo* exist, groups of people born the same year exist with Yassa and Batanga. (see Envi, 2007)

Groupes d'Intérêt Commun (GIC). – Agriculture and artisanal groups unite in a GIC (groupe d'intérêt commun = common interest group) which is legalised through simple notification at the prefects office, and may be assisted by several governmental and agricultural services. Envi (2007) cites that especially GICs uniting fishermen have gained importance: 77 GICs are present and affiliated to the FAPA⁷ Artisanal Fishermen Associations. GICs uniting crafts were not observed. Hunting, except for domestic use being mostly considered poaching, whatever organisation may exist is also not formalized. Envi provides no data on the organization of farmers.

Rotating Saving Groups. – Saving is usually practiced through rotating saving groups: tontines or njangi in pidgin. They have a mixed social and financial function of saving and borrowing money. It is basically a membership-based organization that requires each of its members to pay a certain sum of money on a regular basis (weekly, bi-weekly, or monthly), which enters into a common savings "account." Which distributed among the members or partly borrowed for maximum a few months, in order to profit from interests which may be up to 10% per month⁸.

Analysis and discussion

In terms savings and loans, tontines essentially serve short-time needs going from one month to one year, but they are easy to manage for people who have no access to formal credit without collateral. An other, less often cited advantage of borrowing from a tontine is, that as the money has to be repaid rapidly, people rarely accumulate so much debt that they can't repay anymore, like is often the case with bank generated easy loans.

2.5 Other important stakeholders for this study

The relevant stakeholders for this study are listed in Table 2-5.

Table 2-5. Stakeholders for the Kribi region to review

Stakeholder type	Stakeholder name
International organisations	
Funding organisation	WB IFC
General	UN FAO
Sector related	IPIECA

⁷ Recensement Fédération des Associations de la Pêche Artisanale. Cited in Envi, 3.5.3.8 page 87).

⁸ <http://www.entrepreneurnewsonline.com/2006/12/five-million-ca.html>. Sika et al. (2006). Five Million Cameroonians Rely on Tontines and Njangi to Fight Poverty. See this article for a detailed description of the financial functioning of various tontines.

Stakeholder type	Stakeholder name
Governmental authorities	
State representation at different level	Prefet, Sub-prefet, Maires of most important municipalities of the Kribi region (Kribi urban, Kribi rural, Campo, Akom II, Lolodorf)
Governmental representatives / Ministries delegates at different level (see section 2.4 listed above)	provincial, departmental, district
Semi-Governmental organisations	
Port authorities	Port Autonome de Kribi Port Autonome de Douala
Maritime authorities (for maritime traffic)	
Private sector / businesses (industries, commerces, etc.)	
Industrial activities	
Industrial federation	GICAM
Agro-industry	Ferme Suisse, Socapalm (Palm plantation) Hévécam (Rubber plantation)
Forest exploiting companies	Wijma, HFC, MMG, CUF, SCIEB and EFFA,
Oil & Gas exploration and exploitation and related development	Perenco, (Oil exploitation Ebomé, Gas exploitation Sanaga Sud, CPF) COTCO (FSU, Chad/Cameroon pipeline)
Energy companies	AES Sonel Operator of the Membe'le dam
Ore mining exploiting company	Sundance/ Cam Iron (in Mbalam, deep sea port), SteelCam (in Mamelles hills)
Coastal sand mining exploiting company	
Industrial fishery	Fishing Centre in Kribi Large fishery industries (fishery industries based in Douala)
Port developments: Deep sea harbour	Sundance / Cam iron Ministry of Transport
Other industries (processing of agro-products near Kribi port + new industrial estate on the SNH site and around the deep sea port)	
Commercial / trading sector	
Transport companies	
Marine transport companies (cargos, tankers)	
Road transport companies (trucks)	
Tourism	
hotel and other tourism facilities developers	
tour operators	
Eco-tourism	
Advisory bodies (Consultancies, Knowledge institutes, Unversities)	
Research centre	IRAD, Kribi
Universities	University of Yaoundé
Renown scientists	Mr. Folack Prof. P. Tchawa
NGOs	
NGOs which have been active or follow the	CWCS

Stakeholder type	Stakeholder name
development in the Kribi region and which are involved in protected areas conservation	Tropenboos World Wide Fund for Nature (WWF) Union Mondiale pour la Nature (UICN) Wildlife Conservation Society (WCS) Global Forest Watch (GFW) Bird Life International Centre International des Etudes Forestières et Environnementales (CIEFE?) Fondation Camerounaise d'Actions Rationalisées et de Formation sur l'Environnement (FOCARFE) Cameroon Environmental Watch (CEW) (Nguiffo) Groupe de Concertation et d'Action (GCA) Etude, Réalisation et Assainissement au Cameroun (ERA Cam) Responsable de l'Organisation Néerlandaise de Développement (SNV) Centre pour l'Environnement et le Développement (CED) (Samuel Nguiffo) Fondation pour l'Environnement et du Développement au Cameroun (FEDEC) Service d'Appui aux Initiatives Locales de Développement (SAILD)
CBOs and population	
Representatives from different villages in the Kribi region and having different subsistence activities: (Subsistence) farming (crops and old coffee plantation) Subsistence fishing Hunting Crafts (relevant ?);	Villagers from Campo, Ebodjé Llolabé Grand Batanga Kribi Londji Eboudawaé Bidou I
Representative of the different pigmies ethnic groups	The fishermen: Batanga, Yassa Kwasio agriculturalists Various Beti-fang groups Various related groups: Basa and Bakoko Bagyeli-Bakola hunter-gathers Various other Cameroonian groups (Bamileke, Nigerians, other small minorities)

CHAPTER 3 BASELINE

3.1 Abiotic environment

The Kribi region is located in the Southern province mainly made up of the Cameroonain Southern plateau, especially on the costal plains stretching westward at an altitude between 0 and 300 m.

3.1.1 Geology and pedology

The geology of the Kribi region is dominated by a foliated crystalline basement composed of lithostratic units known as 'the Ntem complex'. This complex is composed of lower precambrian formations with foliated crystalline rocks (pyroxene gneiss, pyroxenites, pyroxeno-amphilites and grenue galbres) as well as metamorphic rocks; the main metamorphic rocks are made up of schists, micaschists, gneiss. More precisely, the geological formations known of the Nyong's mouth at Campo include:

- Quaternary deposits made up of coastal sands and sludge of the mangroves in the mouth of Nyong river at Londji;
- Originator series (conglomerates, limestone, schists and marls) in the Campo basin with a limited surface area of 45 Km².

With regards to its soils, Core kribi region is mainly made up of several types of ferralitic soils, including:

- Yellow ferralitic soils that are predominant in the region mainly in the surrounding of Kribi. These soils are permeable, highly bleached out and have a poor mineral and organic potential. They are not much fertile, with a low bearing capacity.
- Yellow ferralitic soils on gneiss outcrop covering the bulk of the area between Campo and Kribi. They are not much humid and their surface texture is made up of sand and clay, due to the degradation of the parent rock. Therefore, their content in organic materials is low (3 to 4 % in surface). These soils present an acidic pH and a low exchange capacity due to abundant iron and aluminium hydroxides.

3.1.2 Climatic conditions

Rainfall

The Kribi region is located in the wet equatorial climate zone. This climate is determined by the dynamics of the Inter Tropical Convergence. It receives the Guinean monsoon from the South-West, which strongly influences both air moisture and rainfall. This climate is characterized by two main seasons:

- A rainy season with variable intensity, covering the months of March, April, May, June, September, October and half of November;
 - A dry season from the second half of November, December, January, February.
- The Ombrothermal graph in the Kribi region is bimodal, and this translates into four seasons distributed as follows:
- A short rainy season (March - June) ;
 - A short dry season (July – August);
 - A longer rainy season (September – November);
 - A longer dry season (November– February).

Core Kribi region receives an average annual rainfall of 2900 mm distributed over 204 days. However, a maximum rainfall of 3000 mm / year is recorded. Generally, the rainfall decreases from South to North and from the coast into the inland.

Table 3-1. Rainfal (in mm) in the Kribi region

Station	J	F	M	A	M	J	J	A	S	O	N	D	Total
Kribi	92	118	201	260	343	274	112	231	502	492	201	94	2836
Campo	113	132	201	269	327	182	66	140	426	500	243	86	2696

Source: Master plan for the development of the southern coast of the Cameroonian littoral

Temperatures

The average air temperature recorded at the Kribi station is 25 °C. This temperature is highly influenced by the forest ecosystem as well as the air blast within the low strata of the tropical Atlantic. These averages often increase to reach 27 °C in the dry season with a maximum of 31.5 °C in March. The average minimal temperatures are in the region of 23.4 °C, with 32.5 °C as monthly maxima.

Winds

The speed of the winds is generally lower and moderate (0.5 to 2 m/s), they rarely exceed 19 m/s (Ibe *et al.*, 1999).

Generally speaking, morning breezes blow from South–West to North-East (monsoon), followed by a shift of direction during the day. However, winds blowing from North-west to South-east (trade winds) are predominant in the afternoon.

3.1.3 Hydrology and hydrology

Surface water

Many streams of different importance flow across the Kribi region. These streams are influenced by the equatorial climate characterised by two periods of high water (longer and shorter rainy seasons) and two low-water periods (longer and shorter dry seasons), corresponding to the four seasons of the equatorial season..

These streams include the Nyong, the Lokoundjé, the Kienké, the Lobé, the Ntem. These surface waters are scarcely used by the local populations as they are of brackish. Some of them flow into the Atlantic Ocean and have a high biological load due to plant residue from the littoral forest. The watercourses, though not much navigable, are often used by the populations as waterways, using canoes or other navigation fleet. They are equally used for traditional fishing for household consumption.

Groundwater

Information on groundwater (description below) was sourced out Sanaga South EIA (Perenco) and Kribi power project (AES Sonel). No other information on groundwater was found in other sources consulted.

Previous studies show that, the Kribi region, as being in a coastal basin, presents a series of groundwater layers on the vertical plane.. According to investigation made by AES Sonel on the Mpolongwé site, groundwater was found between 3 and 11m depth. A second groundwater layer can be captured North of the Kribi region, and is deeper: 60 to 70 m from the ground level.

According to planimetric coordinates, the upper groundwater layer almost reacts instantly with the arrival of rains. This can be explained by the presence of many swampy zones in both rural and urbanised zones. It can have a local artesian character that is relatively weak.

The observation conducted on some wells suggests that there is a high iron concentration. However, it should be noted that it is not yet proved that the surface brackish waters flow into the wells.

Groundwater (from the upper layer) is mostly exploited by industrials and richer households established in the basin. The deepest groundwater layers are almost not exploited. There is no authority in charge of the surveillance of groundwater in the region.

3.1.4 Marine environment and littoral

The littoral area in the study zone is in general divided into three coastal ecosystems:

- In the region between the Nyong River and Londji, the littoral is made up of low lands and large beaches with mangroves at the mouths of Nyong, Lokoundjé Rivers and estuarine swamps.
- From Londji to Grand Batanga, the continental shelf is rocky. It encompasses a coastal plain with sandy beaches including rocks and upland zones.
- From Grand Batanga to Campo, there are high coasts and sandy beaches interrupted by big rocks.

The Kribi Kribi – Campo region is affected by a serious erosion (Folack, 1998). According to S.Morin and M.Kuété (1989), this erosion is due to the movement of the oceanic waves, which run aground the Kribian coasts. This natural phenomenon occurs during the equinoctial gale where the wave action entails an important backlash. The current zones that are mostly affected include the Palm Beach visitor reception centre and the area from Grand Batanga to Eboundja.

The erosion of the Kribi region is compounded by the destruction of the mangroves, the permissive occupation of the sea frontage. The latter is due to human action in connexion with land demand for the construction of all sorts of structures, with arable land demand and the exploitation of sand quarries.

Tides

In the Kribi region, the amplitude of the tides is low. They are semi diurnal in the region and are estimated at 1.5 m.

Swells

Swells come from the South to South-west sector and originate from afar (Chaubert et al, 1977). They are caused by the South Atlantic Ocean's *westerlies* and are not much influenced by the prevailing winds (Guilcher, 1954). Observations on the southern zone show heights varying between 1.5 and 3m, with a period of 7 to 8s (LCHF, 1985).

Currents

Generally speaking, ocean currents on the Kribian coast are more or less calm. It is a convergence zone between the north equatorial current and the Guinean current. The latter is influenced by both monsoon and harmattan. The Guinean current reaches two maxima, the first maxima of 60 cm/s in July- August and the second maxima of 40cm/s in February (Gouriou, 1993). When this current flow is closer to the coasts, it is

influenced by the floods of the rivers (Wouri, Sanaga, Nyong etc.), as previously mentioned.

Marine water quality

The Kribi region is an industrialised zone. It includes the big agro-industrial plantations (Hévécam, Socapalm) and the proposed industrial ports (deep water port of Grand Batanga). The disposal of industrial waste and urban refuse as well as other toxic products from the neighbouring cities, the big plantations and oil tankers, contributes to the degradation of the aquatic ecosystems. The presence and the distribution of tar balls on the beaches due to offshore disposal of oil tankers, and to other hydrocarbon exploitation activities, show that the coasts are highly polluted. The highest concentration of tar balls on the Cameroonian coasts (16,34 g/m²) was noted around the mouth of Lokoundjé River, at only 6 km south of the mouth of Nyong River (Folack et Ngassa, 1994). This pollution was equally noted in the field: during the exploratory programme, tar balls were found on the sand bar at the mouth of the Nyong River.

3.2 Biotic environment

3.2.1 Terrestrial environment

Flora and fauna

Cameroon's forests and other habitats are renowned for their rich diversity of flora and fauna. At least 8,000 species of higher plants are found in Cameroon, while over half of Africa's bird and mammal species are reportedly within the country.

The interior region consists mostly of tropical moist evergreen forests. In the coastal area wetlands and mangroves can be found. Wetlands (as well as estuaries, mangroves, and floodplains) act as natural pollution filters, and provide unique habitat for aquatic species. Mangroves act as an important interface between terrestrial and marine ecosystems, often providing food and refuge for marine organisms, such as the endangered manatee, as well as providing an effective coastal defense mechanism against floods.

Roughly 6 percent of the forest area is, at least on paper, protected within national parks and reserves covering over one million hectares of land; however, e.g. agricultural encroachment, poaching, and logging threaten all these areas.

Although species number data are known to be incomplete, Cameroon ranks among the top six countries in Africa in terms of total numbers of mammals, birds, and higher plants, with much of this diversity found within lowland forests and in the Atlantic coastal forests.

The Kribi region is known to contain a large number of animal species, including large mammals such as forest elephants, chimpanzees, Western lowland gorillas and mandrills, of which mainly the species in the Campo Ma'an National Park and to a lesser extent in the Doula-Edea wildlife reserve have been reasonably documented.

With regard to avian fauna, the presence of red-tailed grey parrots as well as large variety of (migratory) water birds is indicated. Among the 924 bird species observed or

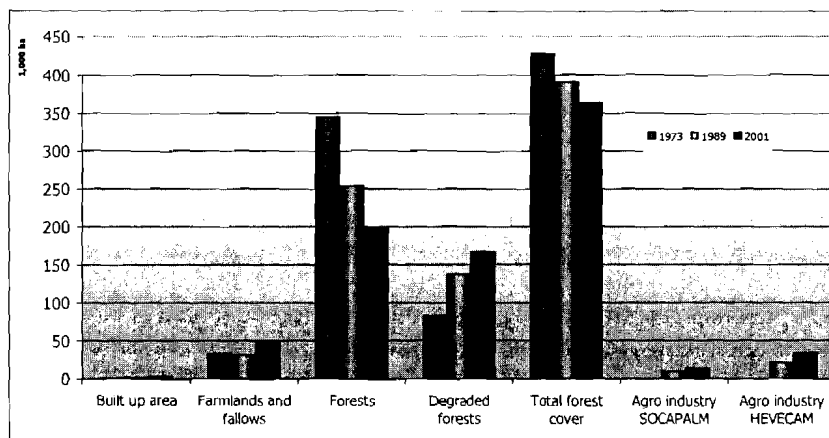
heard in Cameroon, 300 have been observed in the southern-western part of the country⁹.

The vegetation is characterized by its valuable and diverse species, with the dominant forest types consisting of swamp forests, mangroves and Atlantic moist evergreen forests.

Forest cover

Land use in the Kribi region has significantly evolved over the last decades, as shown in the next figure. Total forest cover in the region has diminished by about 15%. Degraded forests, which amounted about 20% in 1973, have increased to 46%. Major increases in deforestation have come through the two major agro-industrial complexes, and in a lesser way through village agriculture.

Figure 3-1. Land cover



Logging roads increased from 210 km in 1973, to 582 km in 1989 and 1251 km in 2001¹⁰. The logging industry has been mainly responsible for the transformation of moist evergreen forests into degraded forests.

Mangrove wood is mainly being used for fish smoking and construction purposes. An impact assessment by the Cameroon Wildlife Conservation Society showed that in the Doula-Edea region mangrove wood extracted for this purpose between 1998 and 2004 contributed to an annual loss of 180,000 m³ or 140 hectares. This represents an annual decline in the total mangrove forest cover in the region of almost 1% per year¹¹.

⁹ Languy and Demey R, 2000 ornithological inventories in Campo- Ma'an region

¹⁰ Graphically adapted from data of Tchawa P. (2007) Regional course on integrated Coastal management. Environmental Management in Cameroon: Problematic Situations and Success stories. <http://www.ics.trieste.it/Portal/ActivityDocument.aspx?id=5079> consulted 19 Dec. 2007.

¹¹ WWF / IUCN / Friends of the Earth, Good practices from the nature and poverty program, February 2007

3.2.2 Protected areas and areas of high biodiversity

Protected Areas

In the Kribi region there are two officially protected areas, being the Douala – Edea wildlife reserve and the Campo-Ma'an National Park.

Douala-Edéa wildlife reserve

In 1932, the Douala – Edea areas was gazetted as a forest reserve. By 1971 Cameroon responding to international pressure, designated the Douala-Edea forest reserve in the central coastal area as Wildlife Reserve for scientific purposes. Wildlife exploitation was prohibited, timber exploiters evicted and local residents economically dependent upon the exploiters re-educated. By 1974 the Douala-Edea reserve had a conservator appointed and a guard post, however, full park status has been frustrated by discovery of oil in the Cameroonian coastal areas and the possibility that the Douala-Edea area may hold important oil reserves¹²⁵. The Park received full research status in 1997. The reserve however has for decades been ill-equipped and staffed.

The reserve is located in the Littoral province, department of the river Sanaga. The wildlife reserve covers a surface area of about 1,600 km² and is made up of two uneven parts. The larger part, in the south, is located between the mouths of the river Sanaga in the north and the Nyong river in the south; the other, smaller part stretches along the northern coast of the river Sanaga to the point of Souelaba and is limited in the east by the Kwa Kwa creek.

The reserve is located on low sedimentary land, with a 0 to 50 m altitude above sea level (occasionally reaching upto 80 m height), containing various watercourses and swamps. The major part of the northern area of the reserve is exposed to tidal waters.

In addition to the dominance of coastal Atlantic forest, also swamp and flood forests, mangroves, and a range of tropical littoral vegetation on the dunes and the former barrier breaches, behind the dunes can be found.

Near the villages concentrated along the rivers and the lakes, the vegetation is made up of diverse crops and secondary forests. Especially at the northern and eastern boundaries of the reserve, degraded forests zones exist as a result of logging and the construction of a network of exploration roads during oil drilling activities in the early 1980's.

As in many sites in Cameroon, no systematic inventory of wildlife has been undertaken. Nevertheless, the variety of species among the mammalian population is reasonably well known. Arboreal monkeys, typical of the African forests, are well represented. The abundance of the swampy zones does however not favour terrestrial primates. The chimpanzee (*Pan Troglodytes*) is present but not common. The mandrill (*Mandrillus sphinx*) and the gorilla (*Gorilla gorilla*) seem to be non-existent. Several threatened mammal species such as forest elephants (*Loxodonta africana cyclotis*) and West-African manatees (*Trichechus senegalensis*) are present in the reserve.

In 1980, there were a considerable number of elephants mainly in the coastal swamp forests, but it is likely that they have been decimated. The reserve is also home to a primate species that is endemic to the southern part of the Cameroon-Gabon forest; the

black colobus monkey (*Colobus satanas*), which is present within the northern boundary of the reserve.

The reserve is also home to over 10,000 people in some 60 villages, including indigenous groups such as Bakoko and Malimbe, which are mainly found along the Sanaga river, and villages with a migrant population of Nigerian, Beninese and Ghanaian fishermen, established along the Atlantic coast. Important economic activities for the villages are fishing (of river species such as cichlids (*Tilapia* and others), catfish and shrimps, as well as from the sea, such as Atlantic herring 'mbonga'), the cultivation of crops and hunting. Hunting camps are scattered through out the reserve, with meat being transported inside the reserve by the network of watercourses

At least two plant species in the reserve are endemic to the Cameroonian coastal forests (*Leonardoxa africana*) or to the Cameroon-Gabon forest *Librevillea klainei*). The presence of the latter species has been indicated in Cameroon on only two sites that are localised on highly sandy coastal soils.

The Douala-Edéa reserve is one of three classified sites of the Cameroon-Gabon coastal forest in Cameroon, a region of high biological endemism and diversity. Within this zone, the Douala-Edéa Wildlife Reserve is particularly important as the area is relatively 'young' considering its sediments and still in continuous transition, including different stages of plant invasion and succession from active dunes to the biao forest. Another point of interest is the fact that the Sanaga River creates a natural boundary to several primate species or subspecies, with genetically diversified populations on both banks of the river.

Campo Ma'an National Park

The Campo-Ma'an National Park is located in the south-western part of the Kribi region province and covers a surface area of 2,640 km². The Park is part of the Campo Ma'an UTO (Unité Technique Opérationnelle), an 'integrated management area' of 7772 km² that borders the Atlantic Ocean to the west and Equatorial Guinea to the South and is covered mainly with Guinea-Congolian rainforest, ranging between 0 to 1100 m. In January 2000, the National Park was established within the UTO, consisting of 2640 km², or 34% of the area. Logging concessions and agricultural plantations are part of the UTO and frequently conflict with sustainable management of the area, including the National Park. Poaching is a major issue in the area.

The Campo Ma'an National Park is an environmental compensation zone, as a result of the Chad-Cameroon pipeline. The World Bank, GEF, the European Union, SNV, GTZ, WWF and IUCN have financed projects in the area. The *Fonds pour l'Environnement et le Développement du Cameroun* (FEDEC) and the WWF are presently financing conservation projects in the National park.

The park is marked by outstanding biological diversity, with Atlantic biao forest, Atlantic littoral, mixed Atlantic, semi-deciduous, subtropical montane, mangrove and swamp forests. Campo-Ma'an is home to about 80 species of large and medium-sized mammals, including elephants (*Loxodonta africana cyclotis*), buffalo (*Syncerus caffer nanus*), gorillas (*Gorilla gorilla*), giant pangolin (*Manis gigantea*), chimpanzees (*Pan troglodytes*) and panthers (*Panthera pardus*). Of the 29 species of primates found in Cameroon, 19 are in the Campo-Ma'an area. It is also home to 302 species of birds, 122 species of reptiles, more than 80 species of amphibians, and 249 fish species. In

addition, some 390 species of invertebrates have been identified, including seven species not yet officially recorded in Cameroon¹².

Out of the 80 mammal species recorded, 23 are considered threatened under the IUCN-World Conservation Union Red List. They include

- forest elephant (*Loxodonta africana cyclotis*),
- leopard (*Panthera pardus*),
- gorilla (*Gorilla gorilla*),
- chimpanzee (*Pan troglodytes*),
- mandrill (*Mandrillus sphinx*),
- black colobus (*Colobus satanas*),
- giant pangolin (*Manis gigantea*),
- spotted-necked otter (*Lutra maculicollis*),
- giant otter shrew (*Potamogale velox*), and
- manatee (*Trichechus senegalensis*).

According to Birdlife International, the Campo-Ma'an area is also a key area for bird conservation, home to e.g. the grey-necked rockfowl (*Picathartes oreas*) and Bates' weaver (*Ploceus batesi*) - two species threatened by extinction - and the forest swallow (*Hirundo fuliginosa*) and Rachel's malimbe (*Malimbus racheliae*) - two species which only live in the Atlantic coastal forest of northern Gabon and south-western Cameroon.

With 122 species of reptiles, the area is also considered one of the richest herpetological sites throughout the African continent. Three crocodile species threatened by extinction according to the IUCN Red List live here:

- the African slender-snouted crocodile (*Crocodylus cataphractus*),
- Nile crocodile (*Crocodylus niloticus*), and
- African dwarf crocodile (*Osteolaemus tetrapis*).

In addition, four threatened species of turtles have also been recorded on the coast near the Campo-Ma'an park, being:

- hawksbill (*Eretmochelys imbricata*),
- leatherback (*Dermochelys coriacea*),
- green (*Chelonia mydas*) and
- olive ridley (*Lepidochelys olivacea*).

The Campo-Ma'an UTO, including the coastal zone, is home to 249 fish species. This represents 46 per cent of all fish species already recorded in Cameroon. Four of these species can only be found here.

The reserve is made up of five units, including:

- National park 34%;
- Agro-forestry zone 25.5%;
- Forest management units 31.4%;
- Rubber and palm oil plantations 7.5% ;
- Protected forest 1.6%

¹² WWF Campo Ma'an project

For the seven ethnic groups in the Campo-Ma'an area, with over 60,000 people, slash-and-burn subsistence agriculture, fishing, hunting and gathering, logging and agro-industry are the leading sources of income. The population though often faces extreme poverty and lack basic infrastructure.

Non-protected biodiversity hotspots

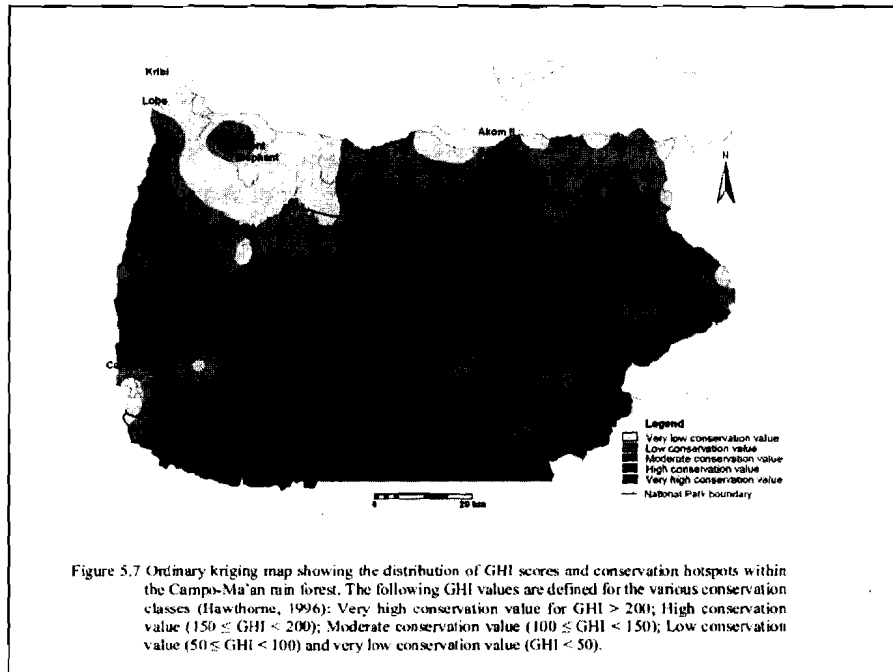
Campo Ma'an area

High biodiversity (and thereby conservation) hotspots have been indicated at the Massif des Mamelles and Mont d'Eléphant, which are not located within the boundaries of the Campo Ma'an National Park, but are part of the UTO.

These areas are 'non-permanent' forest estates, which according to law can be allocated for human activities such as logging, agro-industry, agriculture, agro-forestry, community forest, communal forest or private forest. Moreover, hunting, fishing, mineral exploitation or any other form of economic activities is allowed if done in accordance to the 1994 forest law. These areas do not have any conservation status¹³.

A map of high conservation hotspots in Campo Ma'an and surroundings is shown below¹³.

Figure 3-2. Map of high conservation hotspots in Campo Ma'an



¹³ Biodiversity hotspots and conservation priorities in Central-African rain forests, Gildas Peguy Tchouto Mbatchou Tropenbos

FMU 09-028

The FMU (Forest Management Unit) 09-028 next to Douala – Edea wildlife reserve is expected to have the potential to contain a high biodiversity of animal species as it is located adjacent to the reserve. As no reliable data exists, currently biodiversity investigations should take place. The presence of manatees in its coastal area has been recorded.

Coastal zone, Ntem basin, Lobe and Memve'ele waterfalls

The coastal zone is a narrow strip (65 km long) along the Atlantic Ocean from the Lobe waterfalls to the Ntem estuary in the Dipikar Island that extends about 2-3 km inland. It has suffered and continues to suffer from increasing human pressure which has led to the destruction of much of its natural vegetation. Valuable coastal forests still exist though, especially in the areas adjacent to the 2 protected areas Campo Ma'an and Doula - Edea.

Other areas

From other (forest) areas in the region very few data on their biodiversity level exist. However, in 1999 surveys were executed for the Kribi-Yaounde portion of the Chad Cameroon pipeline. The pipeline route runs roughly from Kribi via Bipindi and Lolodorf to Yaounde (and continues to Chad). Most surveys were executed along the stretch of Kribi to Bipindi, with several surveys executed along the coast just south of Douala – Edea wildlife reserve, north of Kribi, to the town of Campo¹⁴.

From these studies a few of the animals reported to be present along the Kribi – Yaounde stretch included a wide range of monkeys, such as colobus monkeys and mangabeys, and large mammals like forest elephants, gorillas, chimpanzees, hippopotamus, leopards, buffalos and giant pangolin. Also a high number of bird species, amphibians and reptiles such as crocodiles were recorded.

More in specific, small numbers of large animals were reported to be present several kilometers (in less-disturbed areas) north and south of the Kribi – Lolodorf road, especially in the Lokoundje area, including gorillas, chimpanzees, mandrills, and possibly black colobus monkeys, leopards and forest elephants. Species abundance and diversity increase eastwards into the forests, away from the coast. Gorillas were reported 10 kilometers northeast of Bipindi, as well as between Bipindi and Ebimimbang (southeast of Bipindi), with in the latter area chimpanzees being reported as well.

These animals live in areas that are not protected and are under increasing pressure of e.g. human settlements, roads, agriculture and fallow land, forest degradation and poaching. Especially the forest between Kribi and Bipindi is heavily disturbed, and villages occur several kilometers into the forests. The area is still relatively rich in game meat though. A high number of markets for bushmeat in the Kribi – Yaounde region were identified in these studies as well, including methods to transport the bush meat to these markets. The latter mainly took place by means of logging trucks and other vehicles using all-weather roads, and by making use of regular trains, to which the meat is delivered at train stations and unofficial stopping points along the railway by logging trucks, canoes across the Sanaga river, porters on foot and other vehicles. In this way dozens of metric tons of bushmeat are supplied to the markets every week.

¹⁴ CHAD EXPORT PROJECT, SUPPORTING DOCUMENTS, VOLUME 5: CAMEROON BIOLOGICAL STUDIES, MAY 1999

3.2.3 Marine environment

Benthic fauna

The benthic biomass is relatively poor. The productivity is essentially linked to the amount of terrestrial organic materials and to salinity variation. The fauna is mainly made up of invertebrates. Among these, polychaeta are the most represented, followed by amphipoda and other small crustaceans. Polychaeta are particular to mud bottoms with low turbidity. These species encountered constitute the basic diet for scienidae the main species of which is *Pseudolithus sp* (Youmbi, 1989). Among these, bristle worms (polychaeta) are the most represented, followed by mollusks, amphipods and other small crustaceans. Bristle worms are particular to mud bottoms with low turbidity.

Shrimps

There mainly four shrimp species on the continental shelf. Their distribution is related to the bathymetry. From coast to offshore, the following species are found (Corsi, 1991):

- *Palaemon hastatus*
- *Penaeus kerathurus*
- *Parapenaeopsis atlantica*
- *Penaeus duorarum*

Juvenile stages occur in lagoons and estuaries, and then the species migrate offshore during the adult phase. The mangroves in the mouths of the Nyong, Lokoundje and Ntem rivers play a vital role in the cycle of shrimps and molluscs. There is no biological study available on shrimps on the Cameroonian coasts.

The *Palaemon hastatus* is the main shrimp species targeted by artisanal fishing and constitutes about one-sixth of the total landing of artisanal fisheries. On the Cameroonian south- west coasts, landings in 2003 were estimated at 12 000 tons over a total of 62 000 ton landed.

The other 3 shrimp species are mainly caught by the industrial fishing industry from Douala. In 2003, the shrimp catch counted for 530 tons out of a total industrial fishing catch of 7,400 tons, with a value of 7.6 million US dollar (3,448 millions FCFA)

Fish species

Fifty three species of river fish are found in the Nyong River. These species belong to 30 families and are particular to coastal rivers in the south of Cameroon.

As far as sea fish is concerned, about 381 species are listed in the Cameroonian coastal waters (UNEP, 1999), including euryhaline species (species that can adapt to a wide range of salinities) related to the ecosystem in the estuaries. A total of 57 endemic fish species are listed for Cameroon.

In the Campo Ma'an zone 249 fish species were identified. On the coasts of the Douala - Edea wildlife reserve, an incomplete observation by Gabche (1997) mentioned 43 commercial species.

Cetaceans

No detailed studies have been conducted concerning cetaceans on the Cameroonian coasts. However, in general however the following species of cetaceans have been recorded off the coast of Cameroon¹⁵:

- Humpback whales (*Megaptera novaeangliae*)
- Cameroon dolphin or Atlantic hump-backed dolphin (*Sousa teuszi*)
- Blainville's Beaked Whale (*Mesoplodon densirostris*)
- Clymene Dolphin (*Stenella clymene*)
- Atlantic Spotted Dolphin (*Stenella frontalis*)
- Spinner Dolphin (*Stenella longirostris*)
- Fraser's Dolphin (*Lagenodelphis hosei*)
- Pygmy Killer Whale (*Feresa attenuata*)

Humpback Dolphin (protected species, IUCN Red List)

The favorite habitat for the Cameroon dolphin, or *Sousa teuszi*, are coastal and estuary waters, less than 20m deep, with a temperature between 17° and 28 °C. It particularly likes mangrove estuaries as well as migrates along watercourses during high tides for feeding purposes. Its reproduction period is between March and April.

In the project zone, this species is likely to be found in the mouths of the Lokoundje and Lobe rivers. Potential disturbances in these estuary and mangrove areas may impact on these species.

Humpback whale (protected species)

The Guinean Gulf zone is the main feeding area for whales. Former studies indicate an abundant presence of humpback whales in this area between 1900 -1950. The current trend of their abundance is unknown. These species are capable of distant migrations to provide for their biological needs (the indicated species on the Cameroonian coasts migrate all the way to the northern hemisphere). Humpback whales are most likely to be found in September - October. No study is available on Cameroon, however, their presence in Gabon has been confirmed and both countries have similar ecologic conditions.

Marine turtles

There are four threatened (and protected) species of turtles occurring in the waters off the coast of Kribi:

- hawksbill (*Eretmochelys imbricata*),
- leatherback (*Dermochelys coriacea*),
- green (*Chelonia mydas*) and
- olive ridley (*Lepidochelys olivacea*)

Different studies indicate the presence of turtle eggs on the beaches in the Kribi coastal zone. They lay their eggs during the dry season, from November to March.

Manatee (protected species)

Manatees (*Trichechus senegalensis*) occur within mangrove areas and estuaries on the coast of Kribi. They reproduce during the annual low water period (December –March),

¹⁵ The IUCN Red List of Threatened Species: Mammals of Cameroon, IUCN (2001)

after which the calf stays with its mother for more than one year. Manatees are exclusively herbivorous and feed on aquatic and terrestrial plants.

3.2.4 Biotic environment in the Kribi core region

The core Kribi region is located in the Biafreen district of the Nigerian-Camerounese-Gabonese evergreen forest, which lies as an arc around the Bay of Biafra. This forest is known to be part of one of the most species-rich areas in Africa and therefore is very important for conservation. It hosts species of high conservation priorities (e.g. endemic, rare, new and threatened species).

The core region is located within several international conservation priorities, including Conservation International's "Congo Forests of Central Africa High Biodiversity Wilderness Area"; WWF's "Atlantic Equatorial Coastal Forest ecoregion"; and BirdLife's "Cameroon-Gabon Lowlands Endemic Bird Area".

The coastal section is however a vulnerable ecosystem due to its limited area and ease of access. From north to south the coastal forest extends from Nigeria to Gabon. From west to east the width rarely exceeds 150 km. However the first roads in this region were built along this belt and in the century since the road building started, a large proportion of suitable land along the road network has been disturbed, resulting in intense human pressure on the habitat and the natural flora and fauna¹⁶.

Kribi Power Project – AES Sonel

The plant site and the transmission line corridor are both situated within heavily disturbed habitat. A large majority of the plant species therefore identified within the project area are common in littoral forests with low conservation value due primarily to the level of existing disturbance from nearby villages and their residents resulting in a severely degraded habitat.

The fauna of the project site is restricted to small mammals, snakes and insects. Hunting in the area is common, especially in neighboring forests as animals species are rare at the project site. Fauna species identified included several species of monkeys, pangolins, porcupine and various species of duikers (small deer), snakes, monitor lizards and mongooses.

None of the animals identified were protected species. Most of the endangered larger mammals, reptiles and birds of the region were absent, even in the neighbouring forests¹⁶.

Sanaga Sud gas exploitation and Central Processing Facility (CPF) - SNH

Four habitats within the area of influence of this project harbour IUCN red-listed species¹⁷:

- Sandy shoreline provides nesting habitat for at least two IUCN-listed species of marine turtle (Leatherback *Dermochelys coriacea* and Olive Ridley *Lepidochelys olivacea*).

¹⁶ Scott Wilson (October 2006) - Kribi Power Project (AES Sonel): 150MW Gas Plant & 225kV Transmission Line, Environmental and Social Impact Assessment Report

¹⁷ Sanaga Gas Project Biodiversity Assessment, Second Draft Report 14 January 2008, The Biodiversity Consultancy

- Pelagic waters almost certainly provide developmental habitat or migration routes for at least four IUCN listed turtle species (Leatherback *Dermochelys coriacea*, Olive Ridley *Lepidochelys olivacea*, Hawksbill *Eretmochelys imbricata* and Atlantic Green *Chelonia mydas*) and some cetaceans (Sperm Whale *Physeter macrocephalus*, possibly Atlantic Hump-backed Dolphin *Sousa tseuzii*, and possibly others dependent on migratio routes). Pelagic waters are also of unquantified importance for local livelihood use (subsistence fishing).
- Coastal humid forest (and associated small freshwater systems) provides habitat for at least six species of IUCN listed mammals and two crocodiles..
- A small area of mangrove and lagoon downstream of the CPF site is within the project area of influence and provides habitat for two species of IUCN listed crocodiles (*Osteolaemus tetraspis* and *Crocodylus cataphractus*) and possibly some other fauna of global conservation concern. However, the populations are not large.

Therefore key species determined to be present within the project area of influence include the following fauna:

- Leatherback Turtle *Dermochelys coriacea* (Critically Endangered)
- Olive Ridley Turtle *Lepidochelys olivacea* (Endangered)
- Green Turtle *Chelonia mydas* (Endangered)
- Hawksbill Turtle *Eretmochelys imbricata* (Critically Endangered)
- Sperm Whale *Physeter macrocephalus* (Vulnerable)
- African Dwarf *Crocodile Osteolaemus tetraspis* (Vulnerable)
- Allen's Bushbaby *Galago alleni* (Near Threatened)
- Collared Mangabey *Cercocebus torquatus* (Near Threatened)
- Yellow-backed Duiker *Cephalophus silvicultor* (Near Threatened)
- Bay Duiker *Cephalophus dorsalis* (Near Threatened)
- Sitatunga *Tragelaphus spekeii* (Near Threatened)

Species listed by the Convention on International Trade of Endangered Species (CITES) and the Convention on Migratory Species (CMS) were also found. African Manatee (*Trichechus senegalensis*) was not determined to be within the immediate project area of influence, but a population exists ca. 20 km north in the mouth of the Nyong river.

The following IUCN listed flora species were also found in the terrestrial impact sites:

- *Lophira alata* (Vulnerable)
- *Diospyros crassiflora* (Endangered)
- *Daniellia oblonga* (Vulnerable)

3.3 Socio-economic

3.3.1 Demography

Available data

Official population data are based on the general National Censuses (RGPH) carried out in 1987 and in 2005. Only data of 1987 have been officially published and its crude data were available for this study (RGPH, 1987). Of the more recently carried out census (2005), no results were available at the time of writing this report.

In 1987, the average household size was 4.7, and about 39% of the population was younger than 15 years¹⁸.

Population in the area is mainly scattered along the major routes with main population centres in Kribi and Edea, and smaller ones in Londji, Bipindi, Campo, Ipono. In 1987, only 15 population centres had more than 100 households, two of which directly linked to agro-industrial complexes. Kribi (then nearly 20,000 inhabitants) was by far the largest agglomeration, followed by Lolodorf, Bidjouka, Akom II town, and Campo town. In this list, only Bidjouka is not an administrative centre, and has no secondary school. Other medium sized villages are located along the Kribi-Lolodorf and the Kribi-Eseka roads.

Table 3-2. Biggest towns and villages in the Ocean division according to the national census of 1987

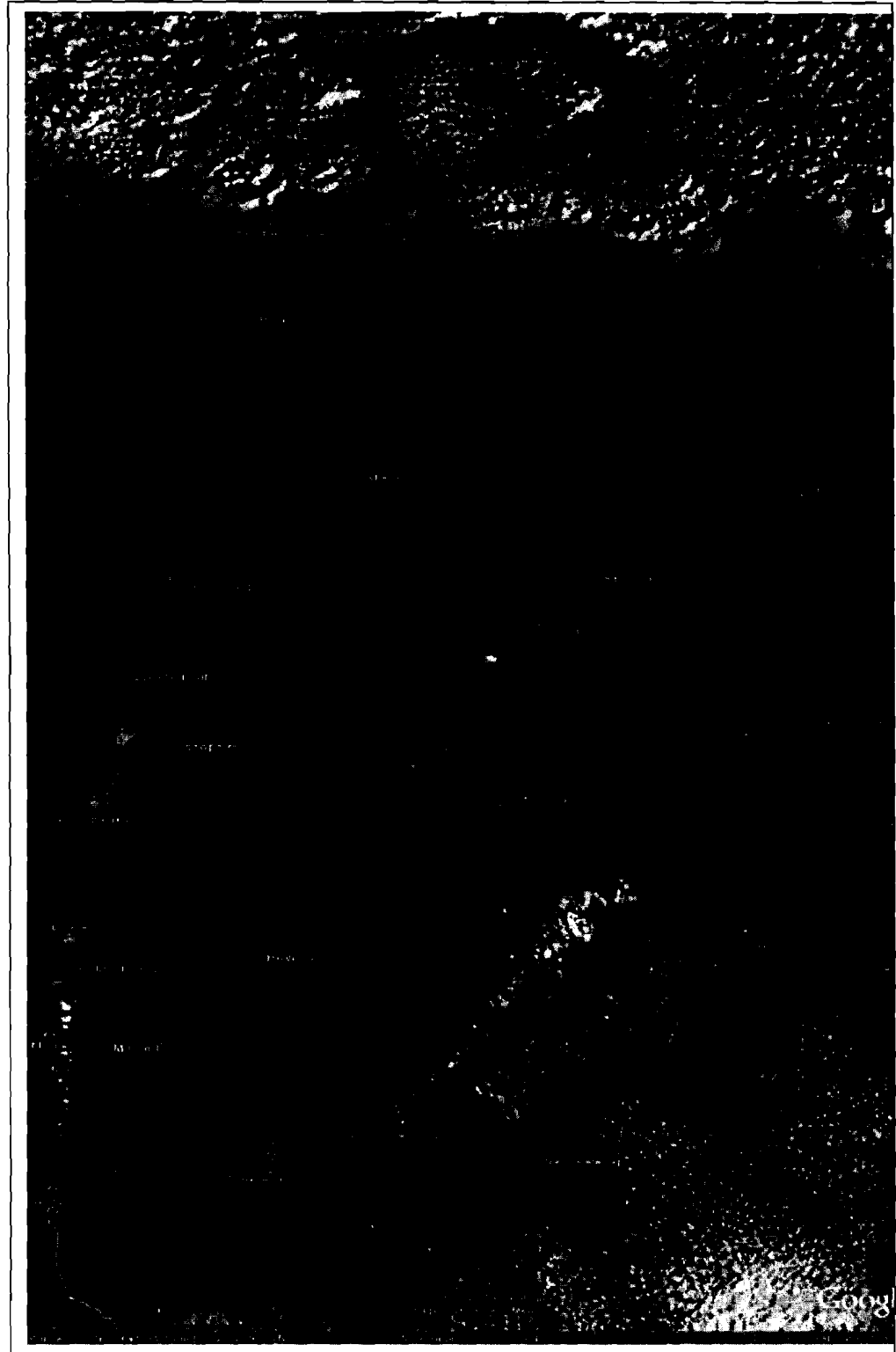
Village	Number of households in 1987	Total population in 1987
Kribi-ville	3763	19.778
Hévécam	2248	7.167
Socapalm	806	2.451
Lolodorf	432	2.243
Bidjouka	269	1.336
Akom II ville	177	936
Campo-Ville	175	1.003
Bella	161	714
Bikala	151	739
Bingambo	147	681
Bibia	122	543
Akom II village	107	576
Bibondi	106	486
Bikoka	104	558
Lobe	103	494

Analysis and discussion

Apart from extrapolation of demographic data from 1987 to 2007 using estimated growth percentages for urban and rural areas, satellite data from Google earth – though mostly based on satellite images dated 2000-2002 – can be used to get an impression of the impact of the population on the environment: areas of degraded forest are visible near the main axis: as are Kribi-Edea, Kribi-Bipindi-Lolodorf, Bipindi-Bela-Elog Batindi, Bipindi-Eseka, Elog-Batindi Eseka, Kribi-Campo, Campo-Nko'elon. Land use, as visible on the images extends in general less than 1 km inland from the roads.

¹⁸ RGPH, 1987, crude data obtained from official sources.

Figure 3-3. Land use visualization through Google Earth map



The rubber plantations of Hévécam are clearly visible as light green areas, while the oil palm plantations of Socapalm and the Ferme Suisse can also be discerned on the image (see indicated).

Other extensive impact on the environment results from the various logging roads, that are also visible on the image. Logging concerns only few trees (less than 5 trees/ha are of commercial value), and the smaller roads tend to overgrow within a few years, but damage occurs on remaining trees, and the tree biodiversity is reduced. Compared to the use of the environment for livelihood supporting activities by the local population, logging and commercial farming have a far greater impact.

The Bakola/Bagyeli hunter-gathers usually live between 30 minutes and 2 hours from the main road, as is the case for about 50% of the settlements. Between 1997 and 2000, more than 150 settlements existed in the area. They do not settle in thick undisturbed forest, but tend to use logging roads and lumber storage sites for their settlements. This choice has two advantages: they can travel more easily to these places, and there is less risk of falling trees on the settlements during heavy rain and thunderstorms. Often, both Pygmies and logging companies, use the tracks made by elephants to find their way through the forest more easily. Only temporary hunting camps tend to be located in the deep forest, but also then often near clearances and water sources.

3.3.2 Population groups in the area

In terms of major livelihood, three local groups of populations can be distinguished: the fishermen along the coast, most of whom practice some limited cassava production; the agriculturalist-hunters, who grow multiple food crops everywhere, and cocoa when inland; and bakola-bagyeli hunter-gatherers, often referred to as "Pygmies". A fourth group are the non locals: mostly foreign fishermen and nationals involved in commerce, trade, and the administrative sector. Each population group is composed of different, more or less related ethnic groups.

The fishermen: Batanga, Yassa

There are two ethnic groups (Batanga Nord and Batanga Sud) which includes the Yassa of Ebodié. Batanga and Yassa are mainly fishermen who practice limited agriculture almost entirely based on cassava, with hardly any other crops. Contrary to the other groups, whose exogamy means change of residence for women, their villages are often inhabited by different clans, young men and women can marry within the village.

Yassa live in a few villages around Ebodié and Campo beach, and further south in Equatorial Guinea while Batanga live along the coast from north of Ebodié to the estuary of the Nyong.

Kwasio agriculturalists:

In the project area, the groupement Mabea includes the area around Kribi, and Ngoumba Fang the road Kribi-Bipindi. They are mostly agriculturalist (cassava, cocoa) and hunters.

- A small group of Mabi lives along the coast (Kribi area and a village near Campo)
- A bigger group of Ngoumba towards the interior of Bipindi-Lolodorf

Various Beti-fang groups

These groups speak various dialects of a more or less common language. They are eager agriculturalist and hunters. The main groups are

- Ewondo and Evouzok: north of Lolodorf and along the Kribi-Edea highway, where they have two groupements;
- Fang: a few villages along the Kribi-Bipindi and Kribi Akom II roads (Chef de groupement in Bidou I);
- Boulou: an important group in the south-western quarter of the study area, along the Kribi-Alom II road and further in the south western area; they area characterized by vast cocoa plantations;
- Mvae-Doumessandjang: Campo (Mintom), a few villages between Campo and Ebodjé, villages between Campo and the ferry over the Ntem in Ebianemeyong (chef de groupement Doum Essandjang lives in Akak). Other Mvae live further to the east in Cameroon, and to the south in Equatorial Guinea. Their main activities are agriculture, hunting and fishing, but they grow little cocoa as the “sea winds does not allow for good yields”;
- Ntougou, in the Ntem Valley and further south in Equatorial Guinea. They specialise in agriculture, cocoa, hunting and fishing.

Various related groups: Basa and Bakoko¹⁹

Bakoko were the first inhabitants of the area. They are divided in several clans (*Elog*), each with its ancestor, of which Adié is at the origin of the name Edea and the Canton (sub-division) Adié. The Bassa, being mainly agriculturalists, have migrated during the 17th and 18th centuries from the Admawa Plateau, to Douala, where they left the Duala, and continued their movement to the Sanaga Maritime and the Nyong and Kelle divisions. Being more numerous than the other groups, their language has become the main language of the area.

Bagyeli-Bakola hunter-gathers

The Bagyeli-Bakola hunter-gathers (“Pygmies²⁰”) speak an almost inter-comprehensible language with the Kwasio group, with whom they are supposed to have come to the area from the Congo basin during a long voyage to the Lokoundjé valley where they arrived during the nineteenth century²¹. They distinguish two groups among themselves, with slightly different dialects: the Bagyeli (along the coast and up to Bipindi-Bidjouka), and the Bakola (around Lolodorf –Nyong River).

Bakola live from the southern bank of the Nyong river to the Ntem river on border between Cameroon and Equatorial Guinea. Eastward, they do not cross 11° E. Not very numerous, counting less than 4,000 persons, the majority of the groups live between the Nyong River and the Kribi - Akom II road. The Bagyeli-Bakola mainly inhabit the area along the Kribi-Lolodorf-Eseka road, while small communities have occupied other areas. A small number of settlements is present in the Bassa area north of Bipindi,

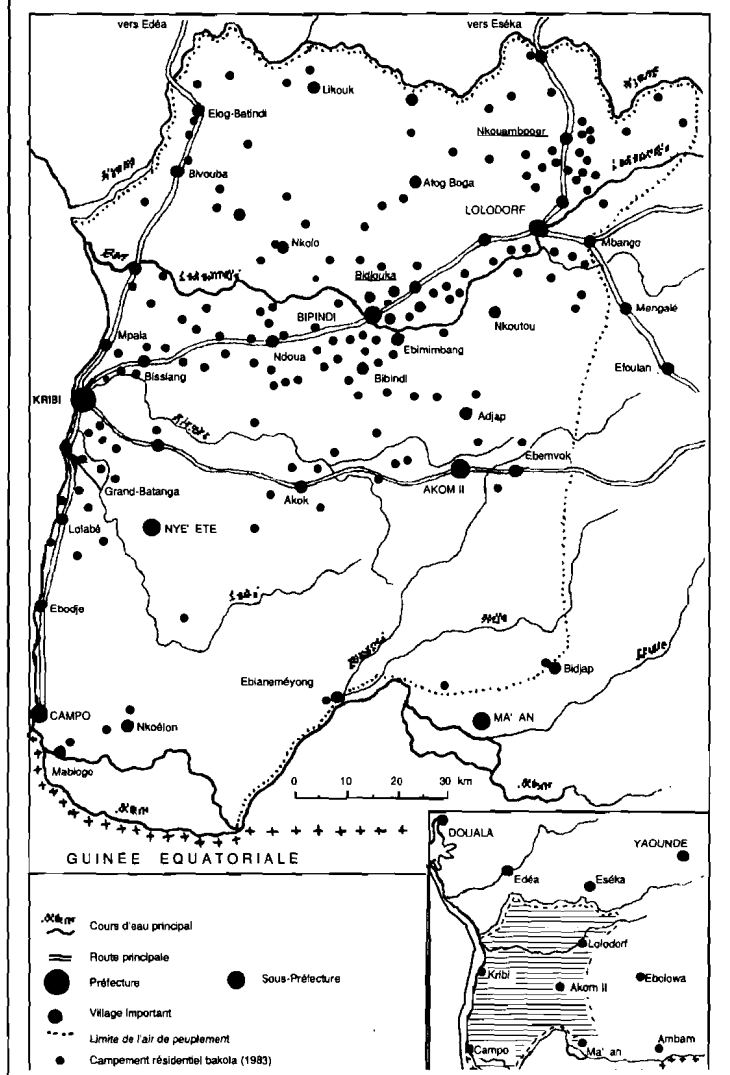
¹⁹ Envi-Rep (2007). Etude pour le suivi de la protection de la zone côtière et de l’environnement marin dans le cadre du projet Capece – Cameroun.

²⁰ Pygmies: by some environmental pressure groups, the name “Pygmies” nowadays is considered a pejorative name for the traditional hunter-gatherers with their very particular lifestyle of which representatives live in more than 10 central African countries, with similar life styles, and without often being aware of each others existence. The current attention of an ecological lifestyle and the resulting interest in their way of life has, besides all the real problems of citizenship, access to land and loss of environment, created a sense of “Pygmy pride” among the more organized fraction of the various Pygmy groups. The capitalization of the name is a recognition of this particular lifestyle.

²¹ PNUD (2000) South Province, page 15.

others on the Kribi-Akom II road, and a few settlements south of the area. The Nyong is the northern limit of their extension, and the first 10 km eastwards from the Lolodorf – Eseka road the eastern limit. Between 1997 and 2002, some 150 settlements have been identified, with an average population of 23 people. For all settlements data about its origin and detailed demographic data were gathered. Most of the more important settlements had existed at the same spot or in the area since over 25 years, while during the same period about 25% of the settlements had moved. Very small settlements tend to move often between forest sites, and

Figure . Bakola in the Ocean Province (results of a 1983 study published by LOUNG, 1996)



individual people can easily move from one settlement to another for very long periods, or find a house or hut near a “Bantu-protector” in a village.

Census was done in the 1980's by Professor Loung, assisted by Dr G. Ngima Mawoung, however except for a general map²² (Map 1), results were not published.

In December 1999, several settlements and individual families were found along the Kribi-Edea road, including the settlement of Bonguén, located directly under the 90 KV powerline. All 150 settlements localized in 1997-2002 are shown on the map in Annex 7.

²² LOUNG, J. F., (1996). – L'insuffisance des féculents sauvages comestibles et ses conséquences chez les Pygmées Bakola du Cameroun. In : Froment A., I. de Garine, Ch. Binam Bikoï et J.F. Loung (eds.), Bien manger et bien vivre. Anthropologie Alimentaire et Développement en Afrique intertropicale, Paris, ORSTOM-L'Harmattan, pp. 173-194.

The exact settlements location along the Kribi-Akom II road and in the Nyabezan Ma'an area is not known.

The status of the Bagyeli-Bakola and the impact of the project have been serious issues during construction of the Chad-Cameroon pipeline. This population group received ample attention from Cotco and local and international NGOs. Detailed baseline data exist on the settlements and their inhabitants' livelihood²³.

An Indigenous Peoples Plan (IPP), based on an initial capital of 600 K\$, has been outlined and is supposed to function during construction. Twenty-three Bagyeli-Bakola Pygmy settlements of the minority Bakola (Bagyeli) ethnic group are located within a zone of 2 km from the pipeline. In these 23 settlements, detailed data on present livelihood (origin, history, agricultural fields) and on perceived development priorities were gathered as a baseline for the IPP. Additionally, there are 20 settlements having the Kribi-Bipindi-Lolodorf-Akongo road as their main access. An estimated 1,000 Bakola Pygmies live in these 43 settlements. All would benefit from this IPP. Table 3-3 lists the considerations that make the Bakola-Bagyeli eligible for the status of "indigenous people" under the World Bank Operational Policy 4.20:

Table 3-3. Analysis of the Bagyeli-Bakola Pygmies as a vulnerable indigenous group in regard to the World Bank's OP 4.20.

World Bank Characteristic	Bagyeli-Bakola Pygmies
A close attachment to ancestral territories and to the natural resources in these areas.	Applicable to Bakola Pygmies.
Self-identification and identification by others as members of a distinct cultural group.	Bakola Pygmies view themselves, and are recognized by others, as a distinct cultural group.
An indigenous language, often different from the national language.	The Bakola language is close to the Kuassio language.
Presence of customary social and political institutions.	Some customary social and political institutions exist.
Primarily subsistence-oriented production.	Primarily a subsistence-oriented lifestyle, with agriculture gaining in importance.

Besides these, the World Bank is considering an additional characteristic²⁴ to identify indigenous peoples – "vulnerability to being disadvantaged as social groups in the development process" – which applies well to the Bakola Pygmies as during the AES-Sonel powerline consultations, four Bagyeli groups²⁵ were localized.

²³ Various reports are available, the most important are :

1. KOPPERT, G.J.A., FROMENT, A., BAHUCHET, S., NGIMA MAWOUNG, G., LOUNG J.F. (1997) — Survey of Pygmy Population, Lolodorf to Kribi area, Republic of Cameroon. 45 p. Carte de localisation des campements pygmées. Rapport pour le Chad Development and Export System project. Groupe d'Etude des Populations Forestières Equatoriales, Paris.
2. KOPPERT G., NKOUNBÉLÉ F., NGIMA MAWOUNG G., LOUNG, J. F., A. FROMENT. (2002a). Report Consultations for the Indigenous Peoples Plan and socioeconomic baseline studies conducted in the Kribi-Lolodorf area June 28 to August 04, 2001 with reference to the pre-construction consultations in 1997, 1998 and 1999 (version 1.01, October 2002)
3. INDIGENOUS PEOPLES PLAN (1999). Indigenous peoples plan for the Bakola pygmies Kribi-Lolodorf area, Cameroon. EMP, Vol 4, part 3, pages 1.1-7.1.

²⁴ World Bank Policy on Indigenous Peoples, Approach Paper for Revision of OP 4.10. (July 14, 1998).

²⁵ These, and other groups, had already been localized in 1999 by the Gepfe team, As the settlements are closely linked to individual Bantu villagers, these settlements are not always very permanent.

Various other small groups:

1. Bamileke, who are mostly engaged in small and larger trade;
2. Nigerians are numerous among the fishermen along the coast. In 1995 there were 25,000 fishermen with 83% of them being foreigners. In the Ocean province 715 fishermen with 20% foreigners, in Sanaga Maritime 639 with 45% foreigners (Envi-report, table 5);
3. Other small minorities in governmental and commercial services.

Migration

In the south province in general, and Kribi in particular, during the last century or so, migration has only taken place to sites where there was specific demand for labor such as Kribi, Edea, Ipono (logging company). Besides, Nigerian fishermen minorities are found along the coast. Even during the pipeline construction, far fewer job seekers came to the southern construction camps than to the northern ones.

This is quite a peculiar situation, the reasons for which are not clear. The villages are composed of people closely related by family ties, and all the land around the villages is owned by individuals and/or their extended families, and the land is not particularly fertile.

It can be expected that there would be huge population increase around existing towns and new industrial plants, but so far there is no tradition of mushrooming villages or rapid growth in other villages. The wider Kribi area is a region where, outside the towns, only indigenous (traditional) people live and villages in the countryside hardly grow.

3.3.3 Administrative and local organisation of the populations

This section describes the administrative structure as empowered by the central government followed by the various traditional structures that exist in and between communities.

Administrative structure

The administrative organisation in Cameroon is structured as follows:

Table 3-4. Political structure in Cameroon: from the president to the village chief.

French denomination	English denomination	Headed by	Observtions
Etat	State	Président	Elected by the population
> Province	Province	Gouverneur	Appointed by the government
> Département	Division	Préfet	Appointed by the government
> Arrondissement	Sub-division	Sous-préfet	Appointed by the government
> District	District	Chef de district	Appointed by the government
>canton/groupement		Chef de canton /groupement	Elected by the local population, indefinite term
>Commune		Maire	Elected by municipal councillors, 5 year term
> village	Village	Chef du village	Elected by the local population, indefinite term

The official organization powered by the central state is structured from provinces down to districts. At all these levels, it is the central government that appoints the persons in charge. The other functionaries are elected by the local population and are in general appointed for their lifetime. Village chiefs are classified into three groups, according to their importance: 1st degree, 2nd degree, and 3rd degree. Mayors are elected for 5 years by the council of directly elected “conseillers municipaux”, and usually serve only one 5-year term²⁶.

Many different ethnic groups live in the project area. However, they can be re-grouped in 4 categories, who speak related languages, and have related cultures. Each of the main ethnic groups has its own, officially recognized, “Chef de groupement”, usually an inherited position²⁷.

Organisation at village level

Available data

Envi-report (2007)²⁸ describes the villages as “stateless societies” without a strong central power structure. Lineages of people live in “quartiers”, and authority is mainly exercised within the extended family. Adult men of such a group tend to eat together in special designated huts, called “Abba”, where they receive food from the various households and discuss communal issues. The spheres of influence concern family-lineage-clan in their execution of diplomacy, defence, management of persons and goods, formulation of laws and regulations, jurisdiction (especially on land disputes which happen to be numerous in the region). The religious sphere polices and censors behaviour in order to guarantee the social order and stability. Members of secret societies have knowledge of and use myths and traditional practices.

Most villages are made up of one ethnic group, and even usually one clan, and not much trade is passing between the different villages. The only binding force is the matrimony system which obliges people to find their spouse in another village, to which they then become indebted through the bonds and obligations of the marital status²⁹, that are especially visible in moments of grief when all people who recognize themselves as kin come together.

Village chiefs are elected, generally from the same family – also female chiefs, though rare, are possible – and decisions are taken by an assembly in which the elders (“anciens” or “notables”) and important people who have left the village (“élites extérieures”) play a role (Envi, 2007).

Analysis and discussion

The absence of well defined leadership in the villages is an important constraint for any project: it does not suffice to consult a chief or a couple of elders of the village, and obtain their agreement to have the same agreement of the population. Chiefs and elders may also retain information as something valuable through which they can have power on their fellow villagers. Villagers know that the chief has first his own relatives, and then

²⁶ <http://www.mairiedekribi.net/chiffre.php> MAIRIE DE KRIBI. (2007) The present maire de Kribi, since September 2007 and until 2012, is Martin Hervé Bell Benaé.

²⁷ Carte des groupements 1/200.000, J. Robert Kameni, INC, Yaoundé, 1998. and E. Dounias (1993), adapté d’anciennes sources.

²⁸ Section 3.4.4 page 47.

²⁹ Adapted from the analysis described by Salem-Murdock, Muneera, Mfoulou J. and Ndonko F.. (1999) Human environment: Socioeconomic and cultural survey in the Project Area.

only the other villagers to take care of. So everybody wants to be informed and consulted individually – in a meeting or privately – about any external developments.

The lack of authority, combined with the lack of trust in the authority, means that people often rather trust the rumours than the words of their leaders. The Cameroonian term for “rumours” is “*kongosa*” which means “a truth vehicled by word of mouth in a community” and it is very difficult, if not impossible to counter this by corrective information³⁰.

Formal and informal organisations

Available data

Envi (2007) describes the most important formal and informal local organisations: churches, traditional societies, GICs, rotating systems, and political parties. Information on the first four groups is presented below.

Churches. - The most important organisations in the area are the churches, which are mostly Christian (catholic and various protestant denominations) and many newer churches like the neo-apostolics, Jehovah witnesses, etc. Envi (2007) notes that despite a very apparent and vibrant religious practice, the mentality of the population remains strongly characterized by sorcery and strong feelings of bonding with the graves of their ancestors. SW (2007a) observes that churches are most often cited as the most important place where people go for leisure activities.

Traditional societies. – Organisations like *ngondo* exist, groups of people born the same year exist with Yassa and Batanga. (see Envi, 2007)

Groupes d'Intérêt Commun (GIC). – Agriculture and artisanal groups unite in a GIC (*groupe d'intérêt commun* = common interest group) which is legalised through simple notification at the prefects office, and may be assisted by several governmental and agricultural services. Envi (2007) cites that especially GICs uniting fishermen have gained importance: 77 GICs are present and affiliated to the FAPA³¹ Artisanal Fishermen Associations. GICs uniting craftsmen were not observed. With respect to hunting, except for domestic use being mostly considered as poaching, whatever organisation may exist is also not formalized. Envi provides no data on the organization of farmers.

Rotating Saving Groups. – Saving is usually practiced through rotating saving groups: *tontines* or *njangi* in pidgin. They have a mixed social and financial function of saving and borrowing money. It is basically a membership-based organization that requires each of its members to pay a certain amount of money on a regular basis (weekly, bi-weekly, or monthly), which enters into a common savings “account.” This total amount is distributed among the members or can be partly borrowed for a maximum period of a few months, in order to profit from interests which may be up to 10% per month³².

³⁰ A few of the more national “kongosa” during the last decades have been the fear that infant vaccination would render girls sterile, the belief that one of Cotco’s subcontractors measured the height of its employees in order to prepare their gaskets because they were sure to die on the job. People don’t come for aids-tests in Yaoundé, because ‘one Cameroonian professor has discovered a cure that will free you from aids within 12 days...

³¹ Recensement Fédération des Associations de la Pêche Artisanale. Cited in Envi, 3.5.3.8 page 87).

³² http://www.entrepreneurnewsonline.com/2006/12/five_million_ca.html. Sika et al. (2006). Five Million Cameroonians Rely on Tontines and Njangi to Fight Poverty. See this article for a detailed description of the financial functioning of various tontines.

Analysis and discussion

In terms of savings and loans, *tontines* essentially serve short-time needs between one month and a year; they are easy to manage for people who have no access to formal credit without collateral. Another, less often cited advantage of borrowing from a *tontine* is that as the borrowed money is to be repaid in a short period, people rarely accumulate debts beyond their carrying capacity, like is often the case with bank generated easy loans.

3.3.4 Land tenure

This section describes the main characteristics of the legal land tenure and the traditional land tenure, and describes the main points of conflict between the two. Land tenure depends on two different and often opposing sets of rules: legal aspects as present in national laws, decrees and arrests, and traditional rights as evolved locally within and between the traditional ethnic groups.

Legal aspects

Available data

Data on land tenure are provided in Cotco³³ (1999) Envi³⁴ (2007) and completed by Njomgang (2006)³⁵ who analyses the recent new decree on land titling. The details are provided in Annex 8.

The Resettlement Action Plan for the Transmission line provides the following summary³⁶:

Ordinance No. 74-1 of 6 July 1974 to establish rules governing land tenure – This law relates to rules governing land tenure. The following categories of land are distinguished:

- Private Property – land that is held by private persons or entities in possession of a certificate of occupancy (the terms and conditions of issue being determined by decree);
- Private Property of the State and other Public Bodies – this includes personal and real property acquired by the State or public body either without consideration or for a value consideration according to the rules of expropriation for public utility and common law;
- National Lands – land that is not classed as public or private property, sub-divided into two categories;
 - land occupied with houses;
 - land free of any effective occupation.

National Lands are administered by the state and allocated to customary communities provided they are of Cameroonian nationality, peacefully occupying or using the land. As such, customary communities can apply for land certificates in line with the provisions of the law.

³³ COTCO (1999) <http://www.esso.com/Chad-English/PA/Files/v03ch3ca.pdf> Compensation plan. Legal Framework for Land Acquisition, occupation and use. Section 3.0 and appendix E.

³⁴ Envi report (2007) section 3.4.3.

³⁵ NJOMGANG H. (2006) Enjeux et perspectives d'une réforme foncière au Cameroun. Land Administration Issues in Africa. In: Promoting Land Administration and Good Governance, 5th FIG Regional Conference, Accra, Ghana, March 8-11, 2006. http://www.fig.net/pub/accra/papers/ts12/ts12_04_niomgang.pdf

³⁶ See Scot Wilson (2007a)

- Public Property - comprises all personal or real property set apart for either direct use by the public or for public services. Public property is subdivided into two categories;
 - natural public property, being coastland (first 50 meters from the coast line);
 - artificial public property, being roads, railways, telecommunications, ports, national monuments, and traditional concessions (chiefdoms).

Public property of the state is inalienable, imprescriptable and non-attachable. Land occupation or land use rights may be granted by the administrators of such lands as temporary or revocable rights.

Traditional land tenure

Based on interviews during previous studies³⁷ the traditional aspects of land ownership rules can be described.

The traditional land tenure system is based on the “right of the hoe”: whoever is the first to clear the land owns the land, even when it returns to fallow. In practice this is not always respected, as all land belongs traditionally to (extended) families, even if it has never been cultivated. Traditional boundaries between families and villages are often only vaguely defined and are source of disputes.

In the southern province, all land is said to belong to someone: a village, an extended family, a person. Villagers say that there is no land that belongs to nobody. This was confirmed during the crop inventory for the pipeline construction where, as could be expected, all cultivated land belonged to individuals, but also non cultivated land and all wild forest resources that were compensated by the project. Only east of Yaoundé, outside the Bédi area, the notion of communal land and communal resources appeared to be present in all villages.

Traditionally, in most of Africa, it is very easy for outsiders to acquire land when they settle in an area, especially if there is sufficient land available. The various migratory movements along the coast that lasted to the beginning of the twentieth century have created a mosaic of ethnic groups. People coming from the inlands were given land on the coast, which they could freely cultivate and which they were believed to own. However, once the land supply becomes short, or land gets a compensation value, the land donors recall that they had provided the land in the past, and reclaim a right on the profits. Between 2 villages in the Kribi area such disputes, involving court rules, have been going on for the last fifty years³⁸ without a real solution.

Tensions between traditional and legal land tenure systems

Cameroonian law recognizes the right of communities having customary rules, and their members, to continue to occupy and use National Land that they had developed before Ordinance 74/1 of July 6, 1974 took effect on August 5, 1974 (Envi, 2007; Cotco, 1999). In general, lands occupied with houses, farmlands, plantations, grazing lands, and paths are recognized.

³⁷ Gepfe(2006) – Baseline and monitoring studies along the pipeline Chad-Cameroun)

³⁸ Koppert G. Loung J.F. (1999) Evaluation of socio-economic impacts ate the Lolodorf, Bipindi and Ngoumou Storage yards, Belabo Pump station and Kribi Pressure Reduction Station. GEPFE 1998.

Occupation of this type of land must be manifested through an effective human presence and visible improvement. For instance, Cocoa plantations, even as they are no more maintained, are considered to denote effective human presence and visible improvement. Lands free of any effective occupation are not recognized (Cotco, 1999).

Analysis and discussion

Only legally titled land is eligible for compensation. For all other land occupied under traditional rules, only the “value adding improvements” (*mises en valeur*) are compensated. Though in this way traditional ownership of cultivated land is recognized, this is not the case for fallow land. However, fallow is part of the agricultural system, and fields are returned to fallow after a relatively short period of 3-4 years. Farmers need to have access fallow land, which after a period of 3-10 years will again be used for agriculture.

In practice, outsiders only happen to have right to land if locals do not need it. Where land shortage exists, or land becomes a financially valuable asset, non locals (Pygmies, widows, foreigners) often are chased away.

Tensions between projects and local populations are created because traditionally ownership is not recognized in compensation schemes. In this aspect, agro-industrial plantations – in whose interest in most of Africa the legal system has been created during the colonial period – are especially unpopular among villagers as they need thousands of hectares that were formerly possessed if not used by local populations.

3.3.5 Public facilities

Transport: roads and railroads

Available data

By the end of 2007, the Edea to Kribi road and the Bounyabel-Eseka-Lolodorf are the only tarred roads in the region: the former is a good quality heavy road, the latter only has a thin tarred surface. Logging companies maintain roads in areas where they have their concessions. Road improvement projects concern:

- Kribi to Yaoundé: via Lolodorf-Mvengue-Ngoumou, of which the first part from Yaoundé is actually under construction³⁹ with some dissatisfaction among the locals about compensation rates and payments.
- The actual road Kribi-Bipindi-Lolodorf is regularly maintained but the pavement is such that the road rapidly degrades during the rainy season; mud pools and a steep hill near Lolodorf make passage often difficult during the rainy season.
- The tarring of the Kribi-Campo road is one of the future projects. Since the improvement of the bridges along this road in the 1990's, traffic has been possible during all seasons.
- The Kribi-Akom II – Ebolowa road has some very difficult sections around Ambam⁴⁰. No information was available about a planned road improvement for this road which would link the main division capitals of the south Province.
- Railroads – new railroads are directly linked to the creation of a deep water port in Kribi. Various projects of railroads are projected, and some contracts have already

³⁹ TAMBA E. (2007) <http://edouardtamba.centerblog.net/rub-Yaounde-Kribi-La-route-passe-la-colere-suit.html> consulted December 20, 2007. In: *Le Messenger du 23-10-2007*.

⁴⁰ PNUD (2000) page 68.

been signed: with Hydromine for the Edea to Kribi railroad⁴¹ for the exportation of aluminium; and for the wide gauge railroad from Mbalam to Kribi for the export of Iron Ore (the most advanced project). No details are available on the Mamelles to Kribi railroad for similar iron ore exportation⁴².

- The deep water port – this is the oldest development project (PNUD 2000) planning to create a 20 meter deep port near Grand Batanga, where this depth is reached closest to the shore. According to the US Department of State (2007), feasibility studies are advanced and a contract with Hydromine has been signed for its development. The Mbalam Iron project has planned its railroad towards the deep sea port.

Access to electricity

Available data

In 2004 the southern province had 585,437 inhabitants in 113,074 households, with 12 inhabitants per km². The province has 2,332 km power lines, 547 distribution post, 16 service stations of which 14 in division capitals. Minimum solar potential is 3,95 kwh/m²/day (Panerp, annexe 2, December 2005)⁴³

Table 3-5. Electricity supply in the southern province. Source (adapted from (Panerp, December 2005)

	Division capital - Département	Sub-division capital - Arrondissement	Sub-division capita - District	Villages	Total
Total number	4	21	1	1209	1235
Access to electricity	4	16	0	411	431
% access	100%	69%	0%	34%	35%

Table 3-6. Electricity supply to public services. Source (adapted from (Panerp, December 2005)

South-Province	Total (2004)	% Electricity
Education	2024	22%
Health facilities	194	40%
Women's activities	7	100%
Social Services	76	93%
Rural Development	283	2%
Environment	0	--

Analysis and discussion

For local populations, the construction of a powerplant and the electrification of their villages are two naturally linked developments: one cannot be accepted without the other. However, the high tension facilities of a powerplant and the low tension needed for electrifying the villages are technically not compatible.

Arguments in favor of linking transmission lines with rural electrification are obvious: the transmission line negatively affects the local population's livelihood, and electrifying the

⁴¹ US department of state (2007) <http://www.state.gov/e/eeb/afd/2007/80687.htm>

⁴² See for instance. IMF (2006, points 168)

⁴³ <http://www.panerp-cm.org/Docs/Documents/1149581749-Annexe2.pdf>. PANERP (2007). – Plan d'Action National Energie pour la Réduction de la Pauvreté, Rapport d'avancement annexe 2.

villages, with subsidized connection of new lines can be part of the community compensation process.

In rural villages the first problem usually is access to the electricity grid. Once that exists, however, a second problem that emerges: the payment of the monthly bills. This explains why in many electrified villages there are so many unhooked electricity meters. To avoid this, prepayment meters – that function similarly to scratch cards used for mobile telephones – could be installed. Though prepayment meters are probably more expensive, costs of recuperating payments will be much less than with a post-payment system.

Access to clean drinking water

Available data

Clean drinking water is a rare commodity in the south province. The PNUD (2000) report indicates that piped water is only available in Kribi and Campo, but supply is irregular or insufficient. Only five public faucets are functioning in Kribi, none in Campo, while only a small minority of houses is directly linked to the grid. Various drinking water projects have failed because their installations require too much attention from the villagers. Of 43 Scanwater motorised water towers in the south province (built in the 1980's), PNUD (2000) reports that only 10 are still working. The ESIA (Scot Wilson, 2006) report indicates that very few villages have clean drinking water through drilled wells, but most people drink surface water.

Analysis and discussion

The small size of most villages as well as their spatial lay-out (linear building along the roads) make drilling of wells uneconomical as it means that drilled wells often serve only a very small number of families.

Surface water is usually available at a short distance from most of these hamlets⁴⁴. It may be drawn from open rivers or “natural sources” which in fact are in most cases unprotected river heads.

The importance of clean drinking water clearly shows from the frequent presence of diarrheal epidemics in the area.

Health facilities

Available data

An updated list of health facilities in the area has not been available for this report. Hospitals are present, among other sites, in Kribi, Campo, Bipindi, and Lolodorf; integrated health centres are available in some of the more important villages. PNUD (2000) indicates that more than the number of health structures, the quantity and quality of health personnel appears often as the limiting factor. Table 3-7 has been deducted from this report and shows the inventory of health facilities in the Ocean division.

⁴⁴ Locations and descriptions of water supplies in some 30 villages of the pipeline between Kribi and the Chadian border were part of the baselines studies (Koppert et al.,2006) and opinions expressed in this section are based on these data.

Table 3-7. Presence of hospitals, integrated health centers and other health facilities in the Ocean division (source: adapted from PNUD, 2000, page 74)

Health facility (private and public)	Number present in 1998-99
Hospitals	8
CSI (Integrated Health Centres)	43
Other health centres	39
Private pharmacies	2

Education

Primary education is well represented in the area (mostly government schools but also private and religious institutions), but qualified teachers and educational supplies are lacking. Over 60% of the schools are built with semi-definitive materials. PNUD (2000) indicates on average 35 pupils per class in the Ocean division. Secondary education had 21,000 pupils in the general sections and 7,400 in the vocational sections that have become more important during the 1990's. There is a teacher's school in Kribi. School fees, according to ECAM2 (2002, p.68) were 13,600 FCFA per child for the poor and 32,600 FCFA for the non-poor population, or respectively 4.5% and 3.5% of the household income. With many households having 4-5 children in school, the financial burden for providing education to one's children is high.

Since 2000, the implementation of the Poverty Reduction Strategy⁴⁵ has modestly improved the situation by means of recruitment and integration of more teachers, improvements in school buildings, and subsidizing a minimum package of free supplies for pupils and schools.

Table 3-8. Educational facilities in the Ocean division (source: adapted from PNUD, 2000, page 77)

Educational facility (private and public)	Number present in 1998-99
Kindergarten	32
Primary school	185
Post-primary education	10
Secondary education (general)	12
Secondary education (vocational)	5
Teachers training schools	1

Analysis and discussion

As the present level of technical skills of the local population is low, projects should make technical and vocational training (both through on-the-job training and promoting new technical schools) an integrated part of their ESHAP. In the long term, improved technical training will allow more recruitment among the locals, which is beneficial to the local economy and economically advantageous to the companies. Also, recruitment of trained locals⁴⁶ will have a positive impact on the attitude towards education among the local population.

⁴⁵ IMF (2006) – The national poverty reduction strategy included since adoption of the strategy the construction and rehabilitation of 3768 classrooms, recruitment of 1700 probationary teachers and absorption into the public service of 987 graduates of the Advanced Teachers' Training School (ENS).

⁴⁶ Between 1960 and 1985, any completed education was almost a guarantee to a job, most often a government position, and parents and children were highly motivated to education. Since then, access to education has

Recreational and cultural facilities

Available data

Facilities like cinemas, libraries, swimming pools and cultural centres are mostly absent (PNUD, 2000), but were often cited as developmental priorities during consultation meetings in villages crossed by the Chad-Cameroon pipeline. The PNUD report indicates for the Ocean division (Kribi): a theatre, a library, an exposition hall, and a youth centre. Kribi is the only site in the division which has access to a commercial bank. Since 2005, Kribi also owns a centre for artisanal fishery.

Analysis and discussion

As the political structure of the local populations is traditionally weak and characterized by poor collaboration and rapid emergence of tensions within and between villages and ethnic groups, recreational and cultural facilities can help to improve coherence among the local populations.

3.3.6 Cultural heritage and archaeology

The Nyong-Ntem region has been important in the Bantu expansion from the grassfields into central Africa. Archaeological research has been especially interested in the Kribi region during the last 10 years, mainly in conjunction with the Campo-Ma'an park and the Chad-Cameroon pipeline, but also via unrelated research programs (see detailed report in Annex 9).

Late Stone Age

This is estimated from around 30,000 to 5,000 years ago and characterized by the presence of stone tools made from a cloudy or translucent quartz, many flakes, notched tools, scrapers, bifacial tools and points.

Neolithic stage (first Bantu expansion)

This stage is known in west-Cameroon since 4,000 BP and in the region Kribi-Campo, around 3,000 BP. Populations created their settlements on hilltops and along crest lines. Stone pebbles were used to hew axe-hoe tools for use in farming. They had good knowledge and mastery in the different techniques of stone polishing and pottery. This period can be estimated between 1,000 and 300 BC.

According to Oslisly (2001) the chronological sequence presented above points to an irrefutable continuous human presence along the coast of Cameroon for about a millennium, being from 2,600 to 1,800 BP. This can be explained by the rich coastal flora and fauna that favoured hunting, and the slash and burn farming together with fishing in the sea. Between 1,800 BP and 600 BP population decreased (Nlend, 2004).

Old Iron Age (Iron Age I, second Bantu expansion)

This era is situated around the second century BC and is characterised by the presence of slag and highly corroded iron tools. During this period, iron ore of very good quality may have been obtained from the Mamelles hills where it was known to occur since a long time.

much improved, but access to employment has strongly diminished, leading to many highly educated unemployed people, and diminishing motivation for schools.

Late Iron Age (Iron Age II)

This mainly concerns the pre-colonial period (between 900 and 400 BP], and is represented from XIIth century by many villages created near beaches at the sea shore.

Conclusion

Archaeological research undertaken in the area, especially since 2000, shows not only the importance of the coastal area, but also an abundance of archaeological findings. The results obtained show that since about 5,000 BP most of the sites were either located on hilltops or on crest lines. Most of the artefacts that were found, are revealed in two ways: firstly, the hewed stones are always found in a stratigraphic level enclosed in lateritic pieces of gravel. Pottery sherds on the other hand are either found in the clayey-sandy formation at the surface of the lateritic horizon for settlement levels or most often in dug structures commonly known as pits which are older.

The high demographic pressure translates into an increased number of archaeological sites but also had considerable impact on the coastal forest. Palynological analysis reveal the presence of specific plant species known from open landscapes as *Pycanthus angolensis* and those highly influenced by man as *Pennisetum* (millet) comparable to species present nowadays (Oslisly *et al.* 2006).

The archaeological potential of the Kribi region, in line with international agreements on cultural heritage, necessitates for the integration of archaeological research in environmental assessments. This process will lead to improved knowledge of the early history of southern-Cameroon in general and that of the coastal band in particular. African history will be better understood through cross studies using different research methods, amongst which archaeology can be a major one.

Recent manifestations of cultural heritage

Living populations have the knowledge and the use of various manifestations of cultural heritage such as well described sites like tombs, sacred sites, churches, and specific knowledge and techniques used. Each of the over 10 ethnic groups in the area, has its own cultural heritage, that is to be taken into account by any development related project.

3.4 Economic activities

3.4.1 Agro-industry

Available data

During the writing of this report only few data were available about local labour in the various companies. In 1998-2000, people from the two villages Talla and Mpangou, informed the consultation teams that no locals were involved among the thousands of people working on the Socapalm and Hévécam plantations. Such data will have to be double checked against administrative data⁴⁷ from the companies.

- Hévécam
Hévécam was established in 1975 and exploited 15,000 hectares of rubber during the oil boom, with support from the World Bank and the French Government

⁴⁷ In general, during consultations about employment one discovers that more people are recruited in projects than villagers admit, especially because workers tend to leave the village, but the total number is in general inferior to what the villages expect.

(Mouafo, 1992)⁴⁸. The company was privatised in 1996 and bought by the Malayan registered GMC. According to the Envi report (2007, p.81) the plantation covers a concession of 42,000 ha., 17,000 of which are in production and 5,000 in extension; in total 5,250 persons are employed by the company. Rough measurements from Google Earth satellite images (dated appr. 2000) show that the disturbed area is already about 45.000 ha, probably because it includes land cleared by the project workers.

- Socapalm
This former state company has been privatised and now belongs to the international Sofinco group. According to the Envi report (2007, pp.81-82)⁴⁹ it covers a total area of 20,000 ha, of which 16,000 are within the Campo-Ma'an UFO. Only 8,000 ha are actually in production and produce an annual 26,000 T of palm oil. The plantations are too old for optimal production. The total number of dependents amounts to appr. 1,500 people, being 375 employees and their families. A village plantation program buys up produced palm bunches from the neighbouring villages. Socapalm also owns a herd of 950 head of trypanosomiasis resistant cattle, that by grazing clear the plantations and assist with the transport of produced bunches. Part of the cattle is butchered every year and sold to the employees. No data on future developments are available, but as the actual occupied area is only a small proportion of the total concession area, real extensions should not be expected.
- Société des Palmeraies de la Ferme Suisse (SPFS)
During the last few years, prices of rubber and palm oil on the world markets have increased, which means that the dire financial situation of the Cameroonian agro-industrial plantations at the turn of the century have improved. Envi (2007) indicates that Hévécam is expanding. News paper reports in December 2007⁵⁰ indicate that since 2007, SPFS has started a bio-fuel project and already has produced its first bio-fuel: 1,700 litres per day to be increased to 2,500 litres per day in the near future. No other data on future extension are available, but with the growing importance of bio fuel, and the technical knowledge of the plantation, extensions could be sound economic policy.
- Fernandez
No data are available about the existence of such an oil palm project at the time of writing of this report.

Analysis and discussion

This section of the report suffers from lack of official data on actual activities and planned extensions of the agro-industrial projects in the area. Currently, high prices are being paid at the world market for rubber and palm oil, while bio-fuel from oil palms also appears to have a bright future, at least as long as oil prices remain as high as they are right now (around 100 USD per barrel).

Discussions in the developed world about bio-fuel and its impact on the environment may have an important impact on the financing of bio-fuel projects in the tropical forest. Initially, there was a general enthusiasm of cultivating bio-fuel in the tropics as a means

⁴⁸ In : <http://www.wrm.org.uy/deforestation/Africa/Cameroon2.html>. Ndoye O., Kaimowitz D. (1998). – Macro-Economics, Markets, and the Humid Forests of Cameroon, 1967-1997.

⁴⁹ Data for Socapalm and Hévécam seem to have been copied from an earlier FAO report : Akogo G. (2002) Etude de cas d'aménagement forestier exemplaire en Afrique centrale : La zone de Campo-Ma'an, Cameroun. Doc FM/10F, FAO, Rome, Italie <ftp://ftp.fao.org/docrep/fao/008/y9382f/y9382f.pdf>

⁵⁰ http://www.kwalai.com/index.php?option=com_content&task=view&id=4846&Itemid=45 KAI WALAI (13-12-2007) – Le bio-carburant est désormais produit et consommé au Cameroun. (accessed 02 January 2008)

to simultaneously diminish climatic change and alleviate tropical poverty⁵¹. Recently, however, awareness has risen⁵² about the negative impact of bio-fuel growing on the destruction of the rain forest as well as the amount of energy necessary to produce chemical inputs, to transform the base product and to transport the produced fuel, and its impact on consumer prices⁵³ for essential foodstuffs.

The total area occupied by the four main agro-industrial plantations in the study area is about as much as the area occupied by village agriculture. The land now occupied by the plantations covers part of the traditional domain of the surrounding villages, and villagers claim some sharing of the profits through employment and development. Developmental actions should include income related projects, as well as participation in local social, health, and educational facilities.

Land is also occupied by employees of the companies, and in general such occupation is not managed (see also Envi (2007), p.79). No specific data has been found, but if each worker uses about 1 hectare of fields, for Hévécam with its 5,000+ workers this would mean that more than 5.000 hectare extra – being 30% of the area occupied by rubber trees – is needed. Such strong impacts are to be taken into account in the projects.

3.4.2 Forestry industry (logging concessions)

Available data

Since 1986, exports of timber and derived products (particularly plywood panels) have played a growing role in Cameroon's economy. This growth was concurrent with the fall in prices of exported raw materials (coffee, cocoa, etc.). The forestry sector, which contributes some 6% to GDP, currently generates around 45,000 jobs, half of which are in the informal economy. The adoption of the forest code in 1994 and the partial halt to exports of logs in 1999 paved the way for the rapid industrialization of the sector. Cameroon has one of the most highly developed processing industry in the West-African region. In 2003, exports of timber and derived products, second only to petroleum products, represented 16% of all exports (around 380 million dollars).

The industrial logging in Cameroon and Kribi region is generally of low intensity, the number of trees being felled for sale being less than 5 per hectare (trees of commercial value). The process is very selective, in which only the very highest value specimens are taken (*écrémage* – literally *creaming off the best specimens*), but often not ecologically sustainable. Damage occurs on remaining trees, the tree biodiversity diminishes, logging removes nutrients and escalates forest fragmentation.

Main logging companies in the area are HFC (Forestière de Campo, belonging to a French international group) located in Campo with a sawmill capacity of 60,000 m³ per year, and Wijma (GWZ)⁵⁴, in Kribi, with a sawmill in Bidou I of a capacity of 75-90,000

⁵¹ EU (2008) http://ec.europa.eu/energy/res/legislation/biofuels_consultation_en.htm The European commissions web site on biofuel.

⁵² BBC (2008) <http://news.bbc.co.uk/1/hi/world/europe/7186380.stm> interview with EU Environment Commissioner Stavros Dimas.

⁵³ Due to competition from bio fuel, the price of palm oil has risen in Cameroon from around 500 FCFA/L to 900 FCFA according to <http://allafrica.com/stories/200712200560.html>

⁵⁴ http://www.wijmadouala.com/bestanden/R%E9sume_de_l'am%E9nagement_et_de_la_d%E9marche_FSC_pour_l'UFA_09-021_et_la_scierie_de_Bidou.pdf: WIJMA (GWZ). (2006). – Résumé de l'aménagement et de la

m3. The latter company has been certified FSC (the Forest Stewardship Council), a sustainable forest management label⁵⁵. According to rumours, Wijma would have recently bought HFC. Other companies in the area are MMG (Mba Mba Georges), CUF, SCIEB, and EFFA, each exclusive users of large logging concessions. Logging companies have been closely monitored and scrutinized by various environmental NGOs, and are in general accused of poor environmental management and illegal logging⁵⁶.

Besides legal payments to the villages (50% of the official fees are to be remained locally, of which 10% to adjacent villages) Wijma proposes a fixed fee of 1,000 FCFA per m3 of logs for social projects like wells, school supplies, school repairs, and health.

Analysis and discussion

Environmental impact studies possibly exist for other major logging companies, especially for HFC, working around Campo, but could not be located for this study.

Contrary to agro-industrial concessions, forestry concessions are obliged by law to share a fixed proportion of their turnover with the local populations. Unfortunately⁵⁷, this money often is used for consumptive projects rather than being invested in development actions.

Logging companies are popular with the local populations because (1) they create roads; (2) they employ some local people; (3) often transport people in their trucks and assist during funerals; and (4) they participate in local development through the forest tax. These short term positive impacts usually overwhelm latent fear among the local population of the long term negative impacts on the environment and especially on hunting.

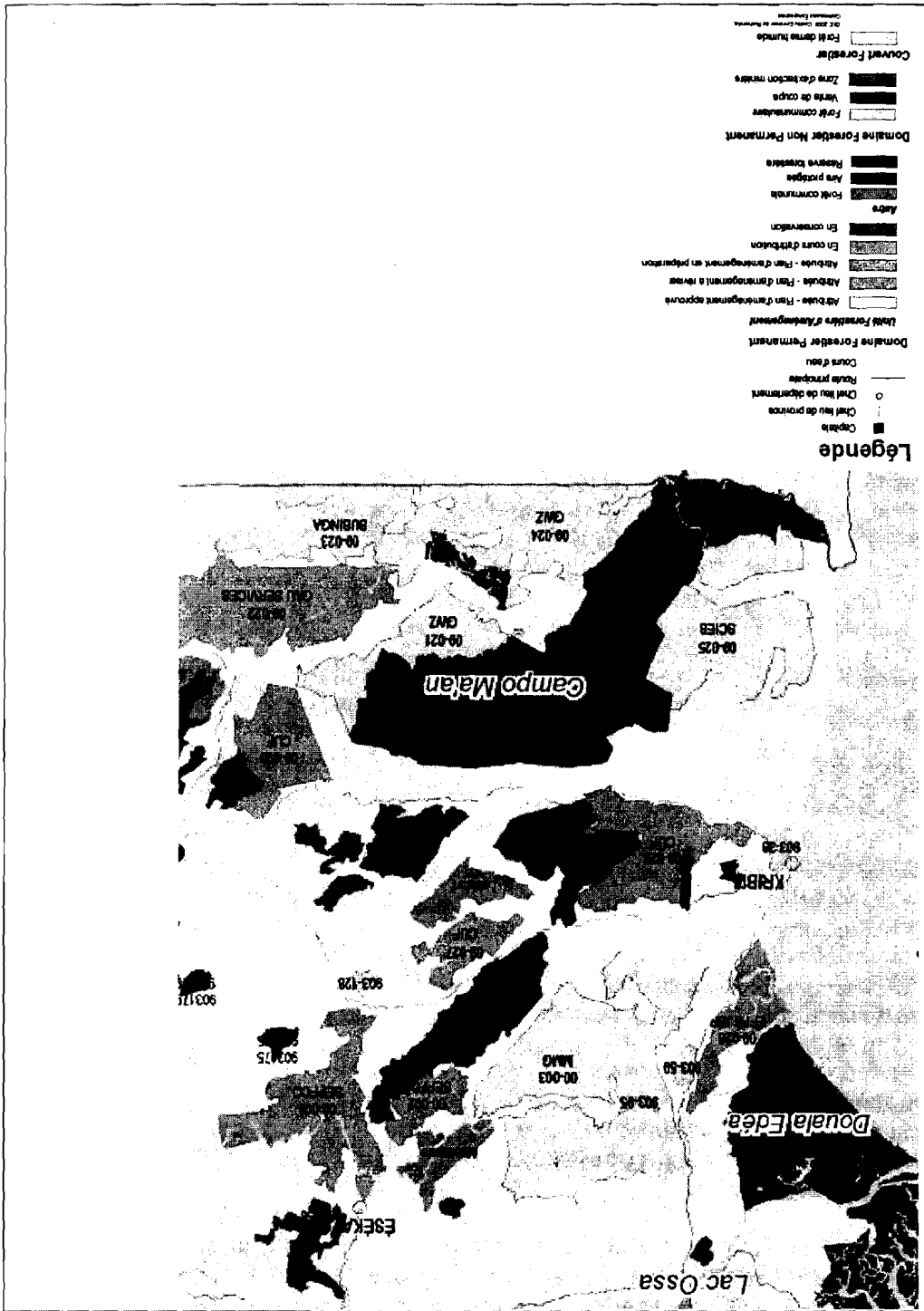
démarche FSC pour l'UFA 09-021 et la scierie de Bidou (EISA published on the official website of the logging company). UFOs are 09-21, 09-024, 11-002 and with CFK, 09-013.

⁵⁵ http://www.fsc-watch.org/archives/2006/11/05/Cameroon_Wijma_still_certified_as_official_observer_finds_new_illegalities_comments The company's actions remain criticised by international forest watch NGOs. According to the company's website, the certification was suspended in May 2007. Chibani-Jacqot P. (25/10/2006) – Polémique autour de l'attribution du label FSC au Cameroun. In French <http://www.novethic.fr/novethic/site/article/index.jsp?id=103567>,

⁵⁶ <http://www.illegal-logging.info/uploads/GreenpeaceWijmaDestroyingCameroon.pdf>: Greenpeace (2002). – Wijma: destroying Cameroon's rain forests. A report of the Dutch chapter of Greenpeace about Wijma and affiliated companies.

⁵⁷ See for instance NZOA G. (2003) – Gestion décentralisée des revenus forestiers et développement local durable: le cas de la commune de Yokadouma est – Cameroun. <http://www.fao.org/DOCREP/ARTICLE/WFC/XII/0163-C2.HTM> XII World Forestry Congress, Quebec

Figure 3-4. Logging concessions in the area: situation by May 31st 2006.
 (The map shown is part of a map by USAID/CARPE/Leticia/Global Forest Watch). Source
http://pdf.wri.org/gfw_cam_atlas_v2_attiche_2006.pdf Global Forest Watch, 1996).



3.4.3 Oil & Gas exploration and exploitation and related development

Pipeline Chad-Cameroon

Available data

The Chad-Cameroon pipeline was completed in 2003. The Kribi part of the project concerns a Pressure Reduction Station (PRS) and a Floating Storage Facility, linked with a 10 km pipeline to the shore, with a 500 m exclusion zone around the underwater pipeline. No direct employment has been created by the pipeline and as the company, Cotco, is registered in Douala, no taxes are being paid locally. The local population states that they do not gain any profits from this billion dollar project.

During the construction phase, the impact of the project on the local communities has been evaluated. Study results⁵⁸ from 29 communities along the pipeline among the male population over 15 years, show that 25% had at any moment been employed by the project for an average duration of 95 days, resulting in a revenue of 400-600,000 FCFA. The positive economic impact on the population was thus well-distributed, but had a short lifespan.

Compensation was paid individually to farmers in-cash and in-kind, and collectively to the affected communities for general loss of use of the pipeline easement, as collectively selected communal assets.

Indirectly, project money is available through FEDEC that is in charge of the Indigenous Peoples Plan (based on an invested grant of 600,000 USD) and the Camp-Ma'an reserve which, through WVC, has a financing through the product of a trust fund containing 3.5 million USD used for the Campo-Ma'an and Mbam-Djerem projects.

Analysis and discussion

The Chad-Cameroon pipeline was the first project in which, besides government and donor organisations, also the civil society was actively involved (via NGOs). Many of their actions have had a considerable impact on the project: re-routes in the environmentally sensitive areas of Deng Deng and the Mbam valley, revision of compensation rates paid to farmers, and the importance of the Bakola/Bagyeli Pygmies.

Before the start of the project, all 240 villages were visited by a social team. The team provided information about the project and about its very limited long-term impact on local employment and economic development. Locals⁵⁹ were invited to indicate their main sources of revenue, their main problems and main priorities. This exercise has helped the project in developing its strategy for community compensation. However, as the reported priorities were so much more expensive than the available community compensation, it also created sentiments of frustrated expectations.

Since the completion of the pipeline, its impact on the local economy has been almost negligible, apart from some maintenance operations (bush clearing) along the easement.

⁵⁸ KOPPERT et al. (2006). – Baseline and monitoring reports Chad-Cameroon Pipeline. Cotco, Gepfe (1998-2006).

⁵⁹ Separate groups of men, women and young were formed, who would each report their main revenues, problems, and priorities., See Gepfe (2000).

Ever since the start of the project, the local authorities have regretted that Kribi would have the pressure reduction station and the off-shore vessel, but no income from the presence of a main Cotco office or the payment of local taxes.

Off-shore oil and gas exploration and exploitation

PERENCO is exploiting oil rigs in the Ebodjé and Kombe-Nsepe blocs. They are managing the Ebome rig and the rigs around Ebodjé. The company mostly uses labour imported from outside the area and as all exploitation is outside the direct 2 miles coastal waters, taxes are being paid in Douala. The local population states that they do not gain many profits from this project.

Central Processing plant and Electricity production facilities around Kribi

The Sanaga South will be carried out by Perenco, who will sell all produced gas to AES-Sonel to be used in its powerplant. The gas project includes two exploitation gas wells off-shore; an about 14 km long pipeline to a Central Processing plant; a Central Processing plant on-shore (planned in the village Eboudawaé), (4a) a 21 km pipeline to transport waste for re-injection at the Ebome-platform; a 14 km pipeline to inject glycol in the exploration holes; a gas pipeline of 10-20 km to the Power Production Plant in Mpolongwe II, 9 km North of Kribi; and a 150KV power transport line between Kribi and the national electricity grid in Edea.

The population is supposed to benefit from this project in the following ways:

- Construction: employment will be mainly in the construction of the on-shore facilities as off-shore facilities require highly qualified personnel;
- Construction of the CPF, 30-50 people will be employed during a period of 6 to 12 months; the ESHIA;
- 150 MW Power Station and 225kV transmission line. All construction activities will need qualified as well as unqualified labour. Construction of each of the plants may take 6-12 months, the construction of the powerline up to 6 months with a continuous presence of about 1 month in a given area. For the construction of both the power plant and the power line the labour needs are estimated at about 900 workers, with an estimated 10% to be recruited in the area. As the line crosses 30 village, this would mean about 3 jobs per village;
- Production: local preferences for qualified as well as unqualified staff. Staff is estimated to be around 30 people during the exploitation phase but no estimates are provided in the ESHIA on the proportion of locally attracted labour. Annual maintenance of the powerline easement will be subcontracted to companies who may hire locals for the clearing.

Analysis and discussion

The two ESHIA of the CPF, powerplant, and transmission line indicate that local employment in the project will probably be very limited. Unfortunately, during the consultation more emphasis has been put on "sharing employment with the local population" than on the very limited amount of employment available. Such consultations may lead to unwarranted expectations among the local population, which will lead to disappointments.

Memve'ele hydroelectric project

Available data

There is an official website for the project exist⁶⁰ on which the first environmental scoping reports (Feasibility study of Coyne and Bellier) are available. The planned dam will have a height of 20 meters, and a maximum width of 395 m. The retention lake will have a surface of 1900 ha, and a capacity of 130 million m³. The installed generators have a capacity of 201 MW, and will be located 56 meters lower than the dam.

For the transmission of the produced electricity three options are considered: 1) via Ebolowa and Mbalmayo to Yaoundé (285 km); 2) via Hévécam to Kribi (problem: will have to cross the Campo Ma'an National Park), or 3) via the interconnected Cameroon-Gabon-Guinea grid towards the south⁶¹. The location of the access road depends on the transmission line, but potential initially access will be through Ebolowa and Nyabizan (see pp. 4-15 and 4-33), and would so improve the road system in the region.

The project proposes to avoid impacting the Campo Ma'an National Park, through roads and transmission lines. It acknowledges its potential negative impacts on the Park. Proposed bush-meat mitigation measures include prohibition of bush meat consumption, creation of markets, shortening of the construction period, increased policing of hunting activities, and limiting induced access to protected areas (p. 4.41-42)

Main social impacts evaluated in 1993 were (Coyne et Bellier, 2006, pp. 4.9-10) the resettlement of a hamlet with 9 households, 116 Ha. of food crops, fruit and palm trees, annual loss of 7.2 Tons of bush-meat but increased annual fishing potential of 60 tons, construction impacts, and migration impacts. A new social impact evaluation is proposed in the report to take into account missing elements like recent legislation concerning ESHIA, Campo Ma'an national Park, impacts on fishing, bushmeat, and compensation.

A new inventory of the exact extension of the retention lake and impacted human settlements is necessary. Road widening, between the Dam and Ebolowa, would destroy according to recent estimations 155 houses, a chapel, a few tombs and 75 other buildings. The resettlement and compensation plan propose necessary mitigation measures. Replacement land usable for agriculture is abundantly present in the region.

The Wijma logging company, with 2 logging concession in the area, has offices in Nyabizan, and created roads linking the area to the Kribi-Ebolowa road. This is an important stakeholder.

Locals have a positive opinion about the project, and also high expectations of its positive impacts on the economy. However, tensions exist between environmental protection measures and the local population especially about hunting restrictions in the National Park.

Fishing – Impacts are both negative (species like shrimps will disappear) and positive (new species will develop and retention lakes in Cameroon tend to be very rich in fish).

⁶⁰ <http://www.projet-memveele.org/>

⁶¹ <http://www.projet-memveele.org/Volume%202.pdf> Coyne et Bellier, (2006). Aménagement hydroélectrique de Memve'ele sur le Ntem. Actualisation des Etudes de faisabilité. Vol II. Les études techniques. pages 3-11 and 3-12.

As fishermen from other regions will probably migrate to the area, this may be reason for social tension.

Tourism – Positive impacts of the project are improved access to the National Park and the potential of the retention lake; negative impact is the disappearance of the Ntem falls.

Influx of people during the three-years construction period (employees, families, other migrants) may be as much as 5,000 people and may so quadruple the actual population of about 1,700 in the area. The report proposes initial ideas about mitigation measures including housing, drinking water, sanitary measures, schools, agricultural areas, recreation, commerce, induced access, and consultation with local representatives. Health impacts are discussed and initial mitigation measures are proposed (ibid, p. 4-44).

Vulnerable indigenous groups are actually absent from the area but the management of their interests should be included in the IPP of FEDEC (p. 4-46).

A socio-economic development plan (PASEM) is part of the report (section 5) and should be based on priorities expressed by the local population. The project is planned to start 2 years before the construction starts, having a duration of about 10 years, and gradually diminishes its impact over the years. Project costs are estimated at 2.5 million USD, for an estimated population of 13,000.

Unofficial information

Unofficial information found on the internet⁶² agrees on the main characteristics of the project. The project, with a cost of 144 billion FCFA (about 300 million US\$), and completed in 2011 will have a production capacity of 200 MW to be shared with Equatorial Guinea, Hévécam, Socapalm, the Wijma logging company, and Alucam in Edea, as well as for rural electrification. Cost of produced electricity is estimated to be only 12 FCFA/kwh, the reason for which already almost 70% of its potential production has been sold.

The project will be built by Sud Energie⁶³. CDC, owned by the British government, owns 100% of Globeleq, which in turn controls Bermuda-based Sud Energie. Globeleq was founded in 2002 by Britain's CDC, a private equity fund investor formerly known as the Commonwealth Development Corporation, to generate safe, reliable power in emerging markets in Africa, the Americas, and Asia.

Analysis and discussion

According to the feasibility study, most of the impacts of the Memve'ele hydroelectric project would be located east of the Campo-Ma'an National Park: both access roads and the transmission line are planned in the direction of Ma'an and Ebolowa, with the transmission line linked to the national grid in Mbalmayo. Although the feasibility study proposes interesting social and environmental mitigation actions, there is no guarantee that these actions will be part of the subsequent detailed ESHIA.

As part of the produced electricity is needed in the Kribi area, it would be interesting to link the existing Ebolowa-Kribi road, the powerline, and the railroad corridor in an

⁶² <http://www.camer.be/index1.php?art=40> Cameroun: le barrage de Memve'ele au detail.

⁶³ <http://www.reuters.com/article/companyNewsAndPR/idUSL0971695720070809?pageNumber=2&virtualBrandChannel=0&sp=true> TANSA MUSA (2007). – UK state firm to build 200 MW Cameroon hydro plant. Published Aug 9 2007, consulted 19-12-2007.

integrated regional sub-project which would cross the already developed Kribi South West area which includes the Hévécam and Socapalm plantations and the Bidou saw mill.

3.4.4 Coastal sand mining

Sand that is being used in construction sector is currently extracted at several points along the coast of the Kribi region. The major points of extraction are:

- the estuary of the Kienké river;
- the Bogandoué south side beach;
- the beach of Nziou North of Kribi city.

In the past, the sand was extracted and traded by transporters while nowadays the Kribi urban municipality controls the exploitation and trade of the sand.

In Bongandoué and Nziou, the sand is extracted from the beaches and sometimes from the water during low tide, thus negatively affecting the beach's landscape. This activity is mainly practiced by young unemployed people or youngsters who have quit their studies, while also some adults have this as their main activity. In total, 25 to 30 people work on the beaches and extract a volume of 5 to 20 trucks per day. Sand extraction, which occurs every year from May till October, contributes to reduction the physical extent of the beaches.⁶⁴

3.4.5 Mining

Available data

Cameroon has several iron deposits⁶⁵, including the 300 million metric ton (Mt) Mamelles deposit near Kribi containing 30 to 35% magnetite and the Mbalam deposit in southeast Cameroon near the border with Congo containing an estimated 220 Mt at 60% iron (or 587 Mt at 30 to 40% iron).

Rumours and projects concerning iron-mining abound in the area. The exploitation of the Mamelles hills near Ebodié have been part of local projects at the same time as the deep sea port in Grand Batanga. For this report no new written information has been found, though the Mamelles project is still under consideration and would include a small railroad to a new deep sea port in Grand Batanga⁶⁶. According to an official IMF progress report on the Poverty reduction strategy paper⁶⁷, "exploration permits were issued to CAMINCO for gold, to HYDROMINE Inc. for bauxite in the Adamawa, to STEEL CAM for iron at Kribi, and to CAM IRON for iron at Mbalam (IMF, 2006, point 168).

⁶⁴ Tchawa, Prof. Paul (2004) Stratégie d'Aménagement et de gestion durable de la bande Côtière Kribi-Campo

⁶⁵ <http://minerals.usgs.gov/minerals/pubs/country/1998/9204098.pdf> Mobs (1998) The Mineral Industry of Cameroon. Who cite the following primary sources that are not active anymore: (Ministère de Mines, d'Eau, et de l'Energie, written commun., undated; Ministère de Mines, d'Eau et de l'Energie, 1998, Ministère de Mines, d'Eau, et de l'Energie—Ressources Minière, accessed May 21, 1999, at URL <http://www.camnet.cm/investir/minmee/resmine.htm> ; Ministère du Développement Industriel et Commercial, 1998, Produits du Cameroun, accessed May 21, 1999, at URL <http://www.camnet.cm/investir/mindic/produits.htm>)

⁶⁶ <http://www.sedfinance.com/perso-25617.htm> provides some information about the project which has to be counter checked.

⁶⁷ IMF (2006) Cameroon: Poverty Reduction Strategy Paper Third Annual Progress Report. IMF Country report no 06/260, July 2006. <http://www.imf.org/external/pubs/ft/scr/2006/cr06260.pdf> and <http://www.imf.org/external/pubs/ft/scr/2008/cr0801.pdf> the latest report issued in 2008.

Official reports are available ^{68, 69} about the Mbalam Mine project by CamIron a subsidiary of Sundance Resources, which would include a 490 km railroad to Kribi. Estimated costs of the project are 2.46 billion USD, including all mining and crushing facilities, the 490 km railroad, and port facilities to handle 250,000 DWT cape size vessels for an estimated production of 35 million tpa. (project flyer⁷⁰, 2007). Production is scheduled to start in 2011. According to national radio CRTV, a memorandum of understanding between the company and the GOC is planned to be signed in March 2008.

The preliminary scoping study (ProMet Engineers, 2006) provides the following technical details: transport options of the ore include: 1) through Gabon, which would mean construction of a 200 km railroad to Belinga where a Chinese Iron Ore mining company will build the remaining 150 km to the Gabonese grid; 2) through a new railroad to Mbalmayo (approx. 350 km); 3) a new wide-gauge railroad to the Kribi-Campo area with a deep water berth capable of accepting cape size vessels. The latter solution is preferred.

The project prefers to create the deep sea port near Lolobe, about 10 km south of the apparently preferred site of the government, because deep water (20 m) is closer to the shore in that area. The preferred railroad corridor (before environmental studies) would lead the railway along the Ntem Valley, probably through the Campo-Ma'an National Park, east of the Mamelles hills and ending between Lolabé or Grand Batanga.

Analysis and discussion

The Mbalam mine project is located outside the wider Kribi area, but will have important impacts through its associated 500 km long railroad, which will cross during its entire length more or less disturbed tropical forest and through the specific terminal needed at the deep sea harbour south of Kribi.

The preliminary scoping report does not yet take into account environmental and social aspects, but indicates the various studies to be completed to comply with environment, sustainable development, and social license. A summary table of expected impacts is provided⁷¹, but may underestimate the environmental (forest) and social consequences of the project. Local, national and foreign employment, minorities, and migration may all become future issues.

3.4.6 Industrial fishery

Available data

Industrial fishing in the area is based on trawlers that have their home harbour in Douala. The most recent data available (cited in Envi 2007, p.73) indicate that in 2005 11 trawlers and 53 shrimp boats were active along the coast. No data are available

⁶⁸ PROMET ENGINEERS, HEYLING E. (2006). Mbalam Iron Ore Project Scoping Study. Sundance Resources Limited. Report C5243-RP-001 Rev 1. (Scanned report, not available on Internet).

⁶⁹ <http://imagesignal.comsec.com.au/asxdata/20070730/pdf/00743560.pdf> Sundance resources, quarterly report for the period ending 30 June 2007.

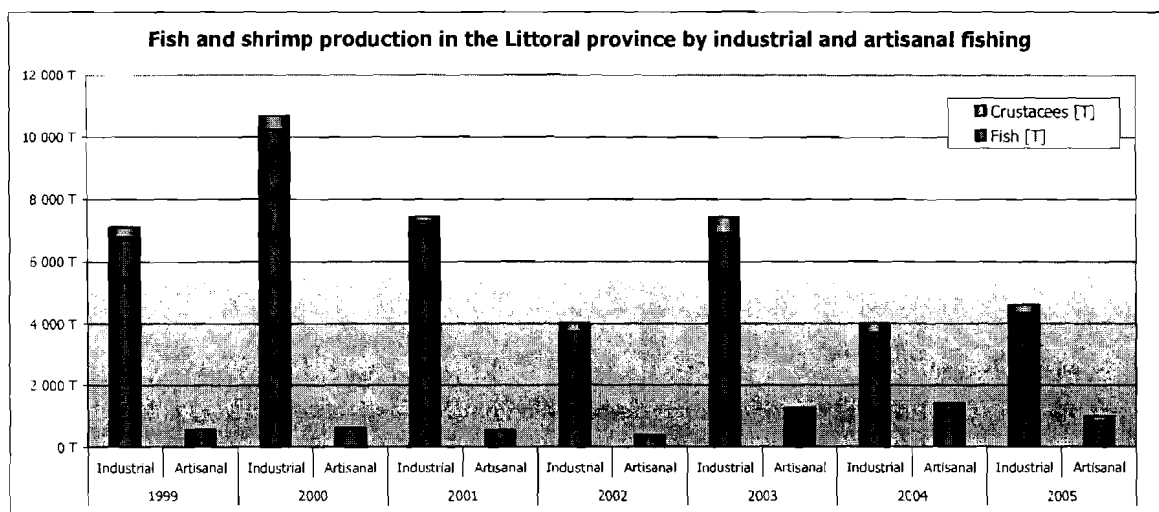
⁷⁰ http://www.sundanceresources.com.au/projects_cameroon.asp (2007) A flyer with a general overview of the Mbalam project.

⁷¹ Promet Engineers (2006). Table 10.1 page 47.

about the presence of boats from other ports or foreign boats along the coast of the littoral and south provinces.

According to the Envi report, the shrimp fishing trawlers with their fine mesh nets are responsible for the sharp decrease in fish and shrimp stocks along the coast, from 20,000 Tonnes/year in 1980 to less than 5,000 Ton in 2005. Figure 3-5 shows data for recent years derived from official data from the littoral province. As trawlers from Douala also fish in the Kribi area, the industrial fish production probably also includes fish caught in the Ocean division.

Figure 3-5. Fish and shrimp production in the littoral province by industrial and artisanal fishing. (Source: drawn from data of MINEPIA littoral, cited by Envi, 2007)



Analysis and discussion

The ministry of fishing, through MINEPIA, is responsible for the gathering and compiling of data on fish production. The large variations observed between the years, as well as the increase in fish production by artisanal fishing, could reflect real changes in production. However, they may also be a result of the difficulties of gathering correct data.

3.4.7 Port traffic

The Kribi port consists of 250 m of quays, a storage area of 10.000 m² for logs⁷² and a specific fishing quay recently transformed into an artisanal fishing centre. (Envi, 2007, p.84). The port is managed by the ONPC⁷³. As the water is shallow, boats have to throw ancre 2-3 km from the coast.

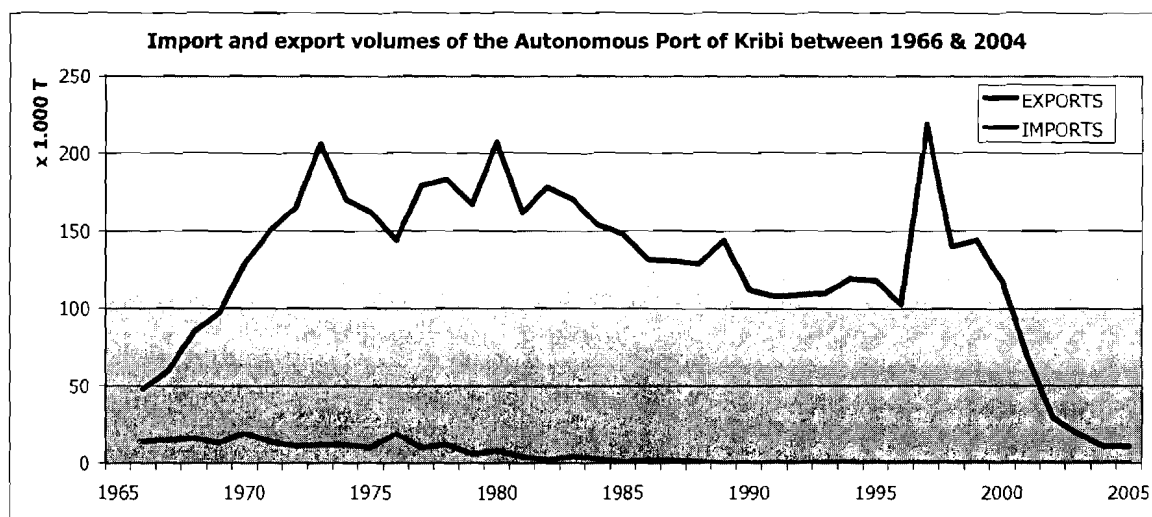
Though Kribi is officially an independent port, in practice it belongs to the autonomous port of Douala. The Envi report indicates that in 2004, 11,000 Tonnes (mostly lumber) were exported, while only 11 Tons were imported by 10 vessels. Traffic has decreased

⁷² Managed by the Société d'Exploitation des Parcs à Bois au Cameroun (SEPBC)

⁷³ Office National des Ports du Cameroun.

from 100-200,000 Tonnes in the 1980's and 1990's to the mere 11 Tonnes observed in 2004 (see Figure 3-6 below and Envi, p.85: table 21)

Figure 3-6. Import and Export volume of the autonomous port of Kribi. (Source: graph derived from data compiled by Envi (2000))



3.4.8 Other industries

Besides the agro-industries based on palm oil and rubber, the logging companies with a sawmill in Bidou and in Campo, and oil companies, there are no further industrial development in the Wider Kribi Area.

3.4.9 Trade

Kribi is the main commercial centre in the area, and the only one with a daily market, shops, supermarket, hardware shops, pharmacy, bank, post office, overland telephone link, and some other facilities that are found in urban areas.

Trade concerns mostly imports of food and consumer goods to Kribi, smuggling of cheap goods from Equatorial Guinea through Campo and Campo beach (cigarettes, liquor, wines), and export of manufactured consumer goods (PNUD, 2000).

The data on the Autonomous Port of Kribi in Figure 3-6 show that both imports and export have diminished strongly and are now almost non existent. The rubber and oilpalm plantations take care of their own transport.

3.4.10 Tourism

Tourism (standard / 'mass' tourism)

Available data

Tourism is a major but underdeveloped asset of the Kribi region. The following sections summarize data on infrastructure, major assets, and major conflicts related to the coastal band in general, and to tourism in particular.

- **Infrastructure and occupancy rate**
The beaches of Kribi with their white sand, heavy waves, and beautiful palm trees are among the main assets of the region, and are a potential axes of development. Tourism in Kribi has significantly developed over the last 20 years, especially through the creation of many new hotels along the coast. However, the impact of tourism remains limited as it mostly concerns weekend and holiday traffic from Douala, Yaoundé and Edea, where people stay only 1-2 nights. Kribi has 4 3-star hotels (139 rooms), 6 2-star hotels (161 rooms), and 6 1-star hotels (199 rooms) + 34 unclassified smaller hotels. In 2003, 927 beds were available⁷⁴. Officially, during the period 1999-2005 there was an average of about 8,000 official tourists, while the estimated occupancy rate was only 17%⁷⁵. During the construction of the Chad-Cameroon pipeline, over 10,000 official tourists were counted (among them many pipeline related visitors and workers), but since then tourism has diminished.
- **Major assets**
Besides the beaches, tourists visit the Pygmy settlements that are located along the Kienké and Lokoundje that can be visited by *pirogues*, and visit the Campo-Ma'an national park. A small hostel with a few rooms has been built by Tropenbos in Nkoelon for the tourists. The village of Ebodjé also provides some simple tourist accommodation and is quite popular with its local presence of beach, sea turtles, and tropical forest. Campo and Ipono do not yet have lodging facilities that are sufficiently sophisticated to accommodate tourists.

Development of tourism remains modest, as is its impact on the local economy. Salaried work in the sector is extremely poorly paid (one report cites 30,000 FCFA (50 USD)/year for a menial job, 100,000 FCFA (200 USD) for a management job.

- **Major conflicts**
Major sources of conflicts in coastal planning are cited to be those related to agro-industries, conflicts between industrial and artisanal fishing, sharing of the tourism benefits through occupation of the sea front, and unmanaged sea front occupation (Tchawa, 2007). Access to land and resources seems to be the major problem in the area.

General issues in the coastal area

- Expansion of agro-industrial estates and related conflicts with communities: the agro-industrial plantations have been created and expanded without taking into account local land rights. Now that land has become a financial asset, the locals feel cheated out of their traditional rights. Communities tend to rely too much on alleviation of their poverty from agro-businesses.
- Campo-Ma'an National Park and local communities face similar problems: locals are not allowed to hunt in the park, and receive no compensation when game destroys their crops. Without a more sensitive approach, local participation, and

⁷⁴ Tchawa P. (2007) Regional course on integrated Coastal management. Environmental Management in Cameroon: Problematic Situations and Success stories. <http://www.ics.trieste.it/Portal/ActivityDocument.aspx?id=5079> consulted 19 Dec. 2007.

<http://www.sommets-tourisme.org/f/prix/2004/18.pdf> Nzeugah Fangue (2004) Projet 18 - Plan d'aménagement de la bande côtière de Kribi-Campo, Cameroun consulted 19 Dec. 2007. The consultation team was composed of Pr. Tchawa Paul, Tsobzé Albert, Schaler Wouter, Fangue Hubert and Kana Collins and visited the area between June 14 and August 26, 2004.

⁷⁵ EIE Sanaga Sud, Haskoning, page 70.

local (socio-economic) compensation, the position of the National Park will be very weak.

- Conflicts to control productive fishing area: mainly industrial trawler that destroy artisanal nets. Lack of control and reinforcement of existing laws are at the basis.
- Pygmy – Bantu land issues: Pygmies are often evicted by Bantus from their land. Tchawa sees as main cause the temporary nature of the Pygmy settlements, and as consequence marginalisation of the Pygmy community and regular conflicts.
- Some conflicts of competency among institutional actors, and difficulties to implement existing development master plans (like for Kribi).

Tourism related issues in the coastal area

- Small tourist operators facing vulnerability in land occupation: local (young) villagers who manage portions of beach for their own profit are menaced by outsiders who buy land at the sea front. The problem is one of lack of rules and their enforcement, but according to Tchawa, may lead to violent confrontation.
- Rapid development of the built-up area at the sea front, with uncontrolled and unplanned development of tourist facilities.

Analysis and discussion

The report by Tchawa et.al. describes a number of the major issues in the area that have the potential to evolve into major conflicts in the future. It clearly indicates the lack of a mutual development goal between locals and projects: fishermen are in conflict with oil-companies and industrial trawlers about fishing rights; villagers are in conflict with agro-industrial industries about land-rights; coastal villagers are in conflict with wealthy people who buy and title land on the coast; the National Park is in conflict with local people about hunting restrictions and police harassment.

In all cited cases, the industrial projects appear to have a negative impact on local development. The coastal area suffers from mis-managed developments: in the Kribi area all coastal land has been bought and/or titled, and hotels are built – against all rules – directly in the sea, while further down towards Campo, beaches are claimed by individual villagers, without any legal basis.

With respect to the mis-management of the National Park and the forest, it's not only the lack of bushmeat that leads to a poorer quality diet for the local population, but also damage to field crops caused by game. Villagers may wonder if animals are more important than people.

The Pygmy culture is a powerful tourist attraction. Still in 2000, informal guides took tourists to settlements where "Pygmies" were still supposed to live their traditional lives – in real, however, the guides instructed them to dance and play for tourists, not to speak French, to pretend not to know money, and to build a traditional style camp in the forest that can be shown to the tourists, while not to show their normal settlements.. The tourists are told to bring soap and salt as gifts, and money for the guides who take them there.

Cotco's Indigenous Peoples Plan recognized the importance of tourism to the Bagyeli/Bakola people as a way of providing income and of valuing the Pygmy culture. However, in the present way the settlements that are being visited hardly benefit from this approach.

3.4.11 Eco-tourism

Eco-tourism opportunities are currently being investigated and implemented at a small scale by WWF, in cooperation with local stakeholders, for the Campo Ma'an National Park. This may include e.g. gorilla watching, turtle watching, dug-out canoe rides, small lodges, guestrooms and bungalows, watchtowers for wildlife viewing and a canopy walk.

3.5 Forestry management and conservation

3.5.1 Forest concessions system

Forest Concessions apply to the Permanent Forest Domain only. The overall goal of granting "Forest Concession" titles are to generate revenues for the state and, to a lesser extent, for the immediate concerned local communities, on a long-term sustainable basis. There are two titles, for long-term and medium term purposes, these are described below.

1. Long-term exploitation is through Forest Management Units. A FMU is a timber extraction concession covering an area of not more than 200,000 ha, granted for a period of up to 30 years. The annual cut may not exceed the Annual Standing Volume which covers an area defined as 1/30th of the approved tree inventory of the entire FMU. Therefore, operations of this type demand extensive technical and administrative planning in order to meet these requirements. For example, ecological and socio-economic impact studies must be carried out, a sound management scheme with complete tree inventories undertaken, and reforestation activities organized. The regulations expect that strict implementation and enforcement of these management stipulations will lead to a significant reduction in fraudulent and illegal extraction activities in the long term.
2. Medium-scale exploitation of Permanent Forests is undertaken via Sales of Standing Volumes. An SSV is a permit granted to extract timber in a 2,500 ha area, in a three year period. This type of title is the most profitable since no expensive planning is required. In 2002, a quota system was imposed by the Cameroonian government whereby a specified number of permits must be allocated to Cameroonian operators.

Logging concessions assigned by Forest Management Units are given out by the MINFOF for 15 years. A management plan has to be prepared during the 3-year provisional agreement. This provisional agreement (PA) period allows the concessionaire limited exploitation over a maximum of three years. If MINFOF accepts the management plan, the concessionaire can sign a 15-year renewable forest concession agreement (convention definitive) with MINFOF. The forest management plan is reviewed every five years, when the boundaries of the FMU and its subdivisions may be adjusted as necessary. In practice several PAs in the Kribi region have already passed the specified 3 years without an approved management plan.

Forestry in the Non Permanent Forest Domain:

3. In the "Non-permanent Forests", communities are entitled to utilize various forest resources in a range of economic activities in Community Forests (CF), including logging activities on a limited basis. Communities do, however, have the "Right of Pre-emption", that is the right to have an area of permanent forest that has been designated Sale of Standing Volume converted to a Community Forest.

In addition, the law provides for four other ways to access limited quantities of timber in the Non Permanent Domain:

4. Exploitation Permits can be granted by the Minister responsible for forestry for the extraction of timber for commercial purposes, special timber products, as well as poles and firewood. The volume must not exceed 500m³, and the exploitation period must not exceed one year.
5. Logging of trees of a volume up to 30m³ for private, non-commercial purposes can be granted by the Provincial Forest Authorities as a Personal Logging Authorization. The certificate's validity must not exceed three months.
6. When wood is found abandoned in a forest, a Sale by Public Auction (SPA) is organized by the forest authorities. After the wood is auctioned, the purchaser is granted the right to evacuate the wood via the issuing of an OSO. Timber removal must be completed within a 30 day period following the public auction.
7. The Timber Recovery Permit (TRP) authorizes the 'salvage logging' of trees in the context of a development project (road construction, establishment of a plantation, etc.), during a period of up to one year, on an area not exceeding 1,000 ha. This permit is also granted to recover timber which, for good reasons, could not be evacuated from a concession in due time, or which was found at road sides or as driftwood.

Because of widespread abuse of authorizations granted to recover this timber, all these four small permits were suspended by Ministerial Decision N°. 0944/D/MINEF/DF, on 30 July 1999. Following this suspension, a number of permits were devised by the forest minister for timber already felled, such as the Timber Recovery Authorization (TRA) and Timber Recovery Special Authorization (TRSA), Coupe de Sauvetage de Bois etc. None of these are specifically addressed by any Cameroonian law or legal document. Furthermore, it is suspected that the beneficiaries of such permits are, in most cases, those responsible for cutting and abandoning the wood – and that this method of extracting timber is pursued in an effort to avoid paying the Annual Forest Licence Fee and felling tax [Global Witness, 2005]

3.5.2 Forestry in Kribi region

In the Figure 3-7 below the current Forest Management Units (FMUs) in the Kribi region and the current zoning plan for timber extraction are shown⁷⁶. The figures indicate that most of the forests in the region have been assigned as Forest Management Units, suitable for logging, including parts of the Campo Ma'an National Park and buffer zone which have in the past been allocated (and have or are still being used) as logging concessions.

The FMU 09-028 between the Douala-Edea reserve and the proposed CPF project, a 'buffer' zone which is expected to contain valuable wildlife and plant species, has not been allocated yet for logging. Illegal logging in this area, near the village of Yawanda has been reported in 2001⁷⁷.

⁷⁶ Interactive Forestry Atlas of Cameroon Version 2.0

⁷⁷ AN OVERVIEW OF LOGGING IN CAMEROON, Linking forests & people, A Global Forest Watch Cameroon Report, 2000

Figure 3-7. FMU Management Plan Status

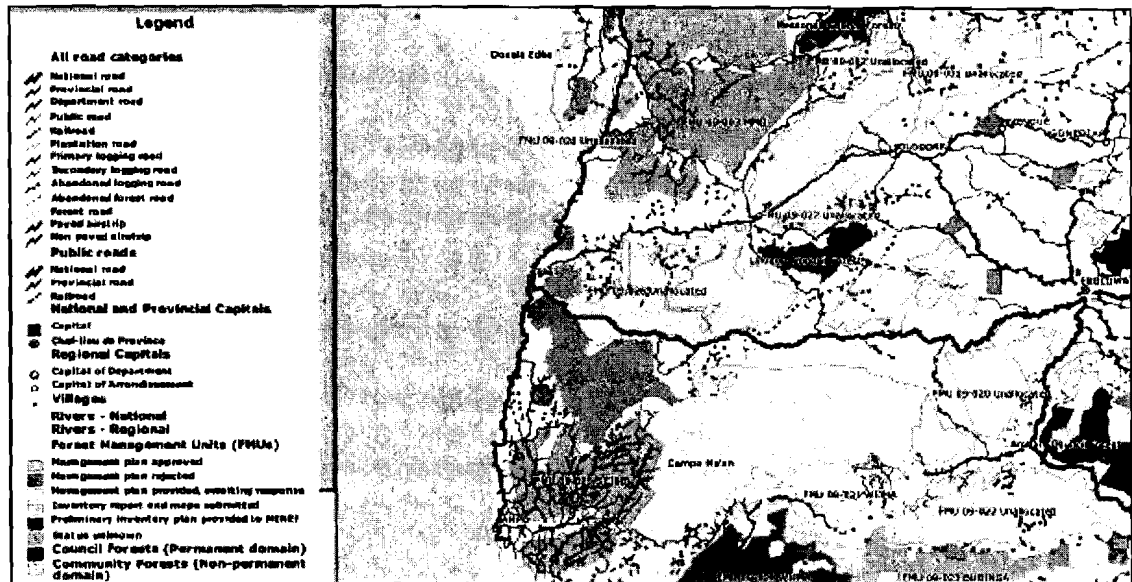
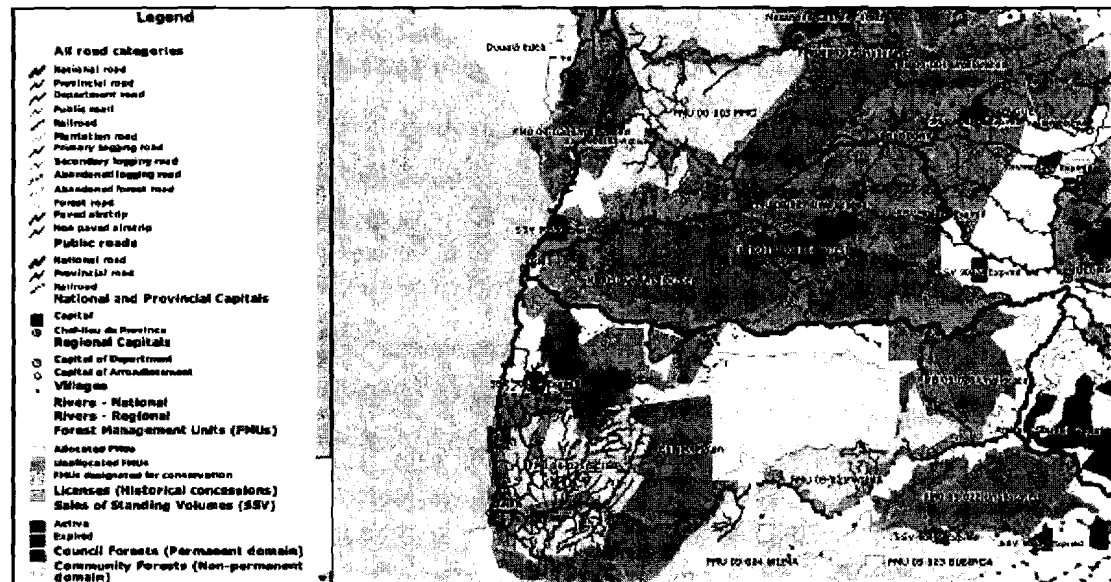


Figure 3-8. Zoning Plan – Timber Extraction



3.5.3 Responsibilities of stakeholders

The competent government services shall draw up a management plan for state forests. In this plan the objectives and the rules for the forest are described, as well the way in which the local population may exercise their logging rights. The government services are to provide technical services free of charge to local communities to promote management of forest resources. Each year, the forestry services shall determine the volume that can be logged from state forests. Wildlife exploitation is subject to a management plan drawn up by the forestry services. Keeping and trafficking in

protected species within Cameroon is subject to a certificate of origin, to be issued by the administration in charge of wildlife.

The local population keeps their rights to traditional activities like harvesting non timber forest products from state forests. Timber and firewood may only be collected for domestic private use, not for sale. Hunting is subject to a permit.

Local administrative authorities set conditions for lighting fires, set up bush fire control centres, and give permits for burning of grazing areas. The Governor can declare ecologically fragile zones, subject to restrictive measures.

Public and private institutions (NGOs, schools etc) are to sensitize the publication in environmental problems. Schools shall introduce environmental education in their curricula. Projects that may have a negative impact on the environment are subject to an EIA [Forestry law (No 94-01) of January 1994].

The government of Cameroon has embarked on several national and international programs to improve forest management in Cameroon. The meeting of heads of state in Yaoundé (1999) and Brazzaville (2005) has resulted in the document « Plan de Convergence pour la Conservation et la Gestion Durable des Ecosystèmes Forestiers d'Afrique Centrale ». The COMIFAC (Conférence des Ministres en charge des Forêts d'Afrique Centrale) was installed as a result of the Yaoundé summit and is an institution aimed at knowledge sharing, consultation and decision making and has prepared a plan for better management and conservation of the forests of the central African region, this institution monitors the implementation of the Yaoundé declaration.

In October 2003, the first AFLEG (African Forest Law Enforcement and Governance) was held. Since 2005, Cameroon is partner in the FLEGT (Forest Law Enforcement, Governance and trade) program supported by the European Union. To date, these programs are still largely active only at the ministerial level, while at local level implementing agencies lack of knowledge of these projects and programs hampers effective implementation.

The CEFDHAC (Conférence sur les Ecosystèmes de Forêts Denses et Humides d'Afrique Centrale) or Processus de Brazzaville is also a framework for dialogue and exchange of various actors (politics, administrations, private sector, NGO and civil society) in the forest sector aimed at equitable and sustainable management of forest ecosystems in the central African region.

The 'Partenariat pour les Forêts du Bassin du Congo' (PFBC) was initiated by the US government with an initial US\$53 million budget from USAID for a 4 year period. This partnership aimed to 'promote economic development, poverty reduction, improve governance, conservation of natural resources through support of a network of protected areas, well managed forest concessions and support to local communities. USAID has a major presence in the region through the Central African Regional Program for the Environment (CARPE), initiated in 1995 for a period of 20 years. CARPE is the major channel for US funding for the PFBC. Other international donors in the PFBC include France (Fonds de Solidarité Prioritaire et de l'Agence Française de Développement, AFD), Germany (GTZ), etc.

At institutional level, international donors have started yet another initiative, the Forest Governance Facility, a basket fund to stimulate collaboration between the civil society and the state in forest management and improve transparency in the sector⁷⁸.

New initiatives for the establishment of protected areas in the coastal zone of Cameroon include the future Mount Cameroon National Park (support from GTZ, KfW, DED and WWF), protection of the mangroves swamps along the Cameroon coast [WTG, 2008], extension of the Douala-Edea reserve to include the lower Sanaga River and estuary (MINFOF in collaboration with CWCS) [CWCS, 2008], and the south Cameroon marine park (MINEP). For all these initiatives, long term sustainable funding is not yet secured, but industrial developments in the region are seen as potential funders through their environmental compensation obligations. However, there is yet no clear legal obligation for economic operators to make long term financial commitments as environmental compensation for new activities.

3.5.4 Management of protected areas

According to Cameroon law, in protected areas the local population is allowed:

- to keep their rights to traditional activities like harvesting non timber forest products from state forests
- to collect timber and firewood for domestic private use, not for sale
- to hunt, but a permit is obligatory.

In protected areas, it is however forbidden to:

- Dump toxic products
- Use the genetic resource of the national heritage for scientific, commercial or cultural purposes without prior authorization from the competent authorities
- Light fires that may damage the forest without authorization
- Clear or exploit forest
- Without special authorization:
 - Pursuit, approach or shoot game from a motor vehicle
 - Hunt at night with lights
 - Hunt with drugs, poisoned bait, tranquilizer guns or explosives
 - Hunt with unconventional devices
 - Trade in hunting lamps
 - Hunt with fixed guns and Dane guns
 - Hunt with a modern net
- Any hunting method, including traditional, which endangers conservation of certain animals may be forbidden or regulated by the service in charge of wildlife.

Sanctions for defaulters range from fines (5.000 to maximum 1.000.000 FCFA, equivalent to 11 to 2247 US\$), or imprisonment (from 1 day to 6 months).

For each protected area, the competent authority employs a conservator to implement the management plan on site. This conservator has at its disposal a budget, staff and office. The Cameroon forestry laws are among the most detailed in the region and Cameroon has a range of legal and institutional measures to provide protection to sensitive areas, including protected areas and internationally recognized protected sites like Ramsar sites.

⁷⁸ Fomete et al, 2006

Practical examples of protected areas management

In practice, in the last 5 years the various stakeholders in management of protected areas often failed to effectively take their responsibilities, leading to degeneration of protected areas and its wildlife. A few examples are given.

The Benoue National Park has been the subject of an extensive international support program in the 1980s and 1990s. Tourist facilities were good, wildlife abundant. Since some 5 years, the state is solely responsible for managing the park. Tourist facilities are seriously degraded, lodging facilities disintegrating, and wildlife levels seriously reduced through poaching.

The Korup national park is one of the older national parks in Cameroon. A management plan was drawn for the park, including resettlement of several villages inside the park, employing ecoguards, ecological monitoring and an extensive ecotourism program. In the 1990s, a large technical and financial support program was launched by the international community to support the government of Cameroon in implementing this management plan. When this aid came to an end, the government of Cameroon was to manage the park in collaboration with local NGOs. The conservator is still in place in Mundemba, but until recently did not have a technical staff and equipment that would allow proper management of the park. There are no means to relocate the villages, and villagers encroach into the park. Poaching is increasing. The NGOs do not get financial support from the government and have a very weak financial basis to perform their ecotourism activities. The government authorities do little or no maintenance on the park infrastructure, leading to disintegration of paths, bridges, trails and huts. Income from tourism through entrance fees is collected at national level and not reinvested into the park. Recently a new international support program was launched (GTZ, KfW, DED) to revive the management of the park.

Until early 2007, the Douala-Edea reserve and the Lake Ossa complex both had a conservator, but they had no means of transport and no staff. Hence, there was little or no monitoring in the reserves and no enforcement of the management plan.

The Campo Ma'an National Park was only relatively recently gazetted a National Park as part of the Chad-Cameroon Pipeline (TCPP) environmental compensation measures. This has led not only to financial and technical support to MINFOF, the competent authority, but also to financial support to an international NGO, WWF, to jointly manage the park. Most likely, Campo Ma'an is now probably one of the best funded parks in the country and is currently experiencing a boom of development initiatives, with several tourist lodges and a park headquarters constructed. A range of ecoguards have been trained and anti poaching raids have increased.

The collaboration between civil society (local NGOs) and the park management (MINFOF & WWF) however is still far from optimal, resulting in slow development of tourism and high poaching pressure on the park. The neighboring Hévécam plantations impose a heavy poaching pressure on the park, which the Hévécam management is not controlling and MINFOF/WWF/the local communities are unable to control. The funding for the park management is not sufficient to implement the complete management plan and is also only temporal, threatening the long term viability of the park.

Since mid 2007, MINFOF has increased the number of staff working in protected area management, resulting in more field staff available for monitoring and control. For example, the conservators for the Lake Ossa and the Douala - Edea wildlife reserve were recently joined by 4 and 8 support staff respectively, greatly increasing their effectiveness.

The International Advisory Group on the Chad-Cameroon Petroleum Development and Pipeline Project in their mission 13 to Chad and Cameroon from November 11 to December 1 2007 however reported a lack of government involvement of MINFOF in the Campo Ma'an National Park. The persistent delay of MINFOF in signing the agreement between FEDEC, MINFOF and WWF is preventing WWF from fully implementing its conservation and sustainable management activities in the Campo Ma'an area. As MINFOF's obligations in the field to help implement the park's management plan have not been formalized yet, they are thus not being fulfilled.

Further MINFOF has been falling short of paying for several years already to provide sufficient funds for paying the salaries of the ecoguards. Salaries have instead been paid by the FEDEC, which is rapidly depleting its funds as a partial result of these unexpected costs. Therefore the future of 19 out of the 37 ecoguards in the Park is now uncertain in 2008, as their salaries can probably not be guaranteed anymore. WWF has signed a three-year agreement, starting 1 January 2007, for the continuation of its activities for the park, but due to the lack of involvement of the MINFOF the proper execution of WWF's activities are currently under threat.

3.5.5 General problems in protected areas management

The Cameroon territory contains a total 7.3 millions hectares of protected area, approximately 15% of the total country surface. However, much of this territory does not receive the proper protection it should have according to their respective management plans. There are several reasons for this Error! Bookmark not defined.

- *Insufficient funds*

The conservator often does not have the means to properly implement the management plan. No vehicle, no budget for transportation, staff, consumables etc, although recently (2007) this has improved. Often the conservator is dependent on external activities (projects, programs) funded through NGOs and other private institutions to go to the field. In protected areas, the traditional authorities (chiefs, Fons) have lost their right to manage user rights in the forest, and management is the sole responsibility of the government services. As the local population does not see nor feel the presence of the government authorities nor the traditional authorities, they go along with their activities irrespective of the management plan.

Conservation is a long term objective that requires long term investments. However, the principal funding agencies currently operate on short term planning cycles, generating the cyclical appearance and disappearance of projects. In Cameroon, only the Campo Ma'an and Mbam Djerem (The CCPL environmental compensation parks) have medium term financing, the rest has short term financing (e.g. Korup National Park) or only state funding (e.g. Benoue National Park). For 2007, the state budget for Ramsar sites was almost negligible. Many newly created protected areas, or protected areas that have been neglected for many years, only exist on paper. Turning them into functional entities

requires a sustained commitment, lasting decades and supported by substantial funding and capacity building.

- *Corruption and the lack of good governance*

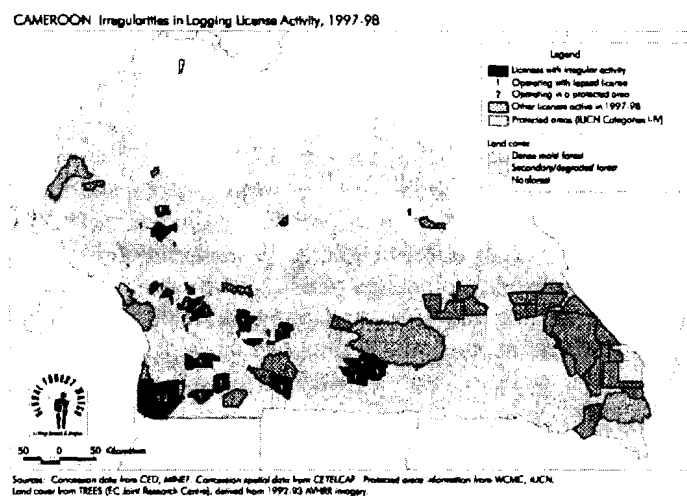
Corruption and bad business practices are causing or maintaining a lack of transparency and good governance in the awarding of forest concessions, often in contravention of the laws and regulations in force. This situation, along with growing tax pressure on companies, is perhaps discouraging long term investments vital to improving the sustainability of the forestry sector. Poor governance also diverts part of the profits from the exploitation of natural resources and reduces equitable distribution among the populations in the region. Even the installation of ecoguards may not improve the situation, as poachers can pay bribes that significantly augment the salaries of these local staff⁷⁹.

- *Lack of institutional capacity*

The limited allocation of government budgets to conservation means that many departments responsible for forests and fauna are understaffed and suffer from poor morale. This leaves these departments extremely weak. Knowledge and technical know-how to monitor the state of biodiversity are lacking and local populations are incapable of effectively safeguarding the natural resources on which they largely depend.

In general, the number of violations of logging concessions in Cameroon, which after reporting, are followed through in the judicial system, has severely decreased, which could indicate a lack of capacity and commitment to enforce the law. See also the figure below for irregularities in logging license activities in the 1997-1998 period^{Error! Bookmark not defined.}

Figure 3-9. Irregularities in logging license activities in the 1997-1998 period



- *Lack of understanding of problems of scale*

The understanding of the fundamentals of conservation must be strengthened in Cameroon at all levels. Many people living in or outside the region think that the forest is

⁷⁹ Medjo, 2008

infinite and its resources inexhaustible. Even if the political commitment in the region is strong, efforts must be made to ensure that the value and vulnerability of these forests are understood by both the general public and government agents, so that the latter can make decisions more soundly based in conservation and the sustainable management of natural resources.

- *Lack of capacity among NGOs and community based organizations*

Community based organizations must be strengthened and given the power to make a real contribution to the sustainable management of natural resources. The traditional decision-making processes at the level of the villages or communities are very complex. In addition, decisions taken at local level often conflict with those taken at the national level. The knowledge, traditional values and know-how of the local populations can contribute to the sustainable management of certain natural resources, but not all of them. For instance, there is no traditional knowledge of logging, an activity introduced by foreigners. In addition, community management runs up against a number of serious socio-cultural problems: traditional management of community forests does not correspond to traditional political practices and community forests risk becoming a political issue.

- *Lack of data, monitoring and evaluation*

Lack of knowledge about the distribution and state of biodiversity is a major obstacle for conservation and sustainable development. Not only are the exact distribution and current size of the populations of most species unknown, but also very few reliable historical data exist. Furthermore, the few existing historical data are often either ignored or called into question. It is therefore virtually impossible to set realistic baselines for monitoring and evaluation. Yet the rapid decline of animal populations in the forests of Central Africa is a process that began a long time ago. Management at the Landscape level, however, is a new concept in Africa and the creation of baseline datasets is only just beginning. Improving tools and capacity is therefore essential so that decision-makers can have permanent access to the information in order to make the best possible decisions⁸⁰.

3.6 Subsistence activities

Traditional economic activities in the area are agriculture for all the groups; sea fishing for the sea faring ethnic groups; hunting and sweet water fishing for most of the Bantu groups; and hunting, fishing, gathering and working on Bantu farms in exchange for food and drinks for the Bagyeli/Bokola.

One of the weaknesses in the area is the lack of a proper market system as there is hardly any direct exchange between local food producers and consumers in the urban areas. In Kribi, all traders in the market were middlemen, and prices were almost 80% higher than the average of prices observed on 10 markets along the pipeline route⁸¹.

⁸⁰ Global Witness, 2005

⁸¹ Gepfe (1997) Market survey, Focus/Gepfe (2000), Market survey.

3.6.1 Agriculture

Available data

The PNUD report for the South province⁸² (2000) describes a very traditional farming system: an average farm size of 2.2 ha, farmed by 4 active people, where only 1.2% use improved seeds, and 98.8 practice mixed cropping. Most farmers do not use any modern equipment: 5% have a chain saw and 33% apply pest control. Bigger farms are usually only created by active and retired civil servants as an investment. Limiting factors for agricultural production and development are the poor use of inputs, by farmers who used to receive them free of charge or paid on the cocoa sale from the now defunct parastatal Sodecao, low impact of PNVA agricultural extension, low reimbursement of micro-credit loans (less than 65%), and credit capacity of local organisations.

The PNUD report for the Littoral Province⁸³ (2000b) indicates that the southern zone (from the Nyong to Edea) is characterized by a mixture of traditional and industrial farming. Traditional subsistence farming sufficiently guarantees long-term food security, in spite of low fertile soils and lack of fertilizers because of the abundant availability of land. The modern sector includes oil palm (Ferme Suisse, south of Edea) and rubber (Safacam à Dizangue) plantations that suffer from lack of investment and renewal of the crops, but improvements have been visible since the late 1990's (ibid., p.29).

The Ecam2 study (2002, p.76) indicates that the average land area per household in the south province is 4.7 ha⁸⁴, with little difference between poor and non-poor households. For all groups who practice agriculture, cassava is the main crop. It does not demand very fertile soils (which are mostly absent from the region) nor repeated intervention during the 6 to 18 months that the crop requires to grow, and lastly, once ripe the crop can remain stored in the soil and so protect people from seasonal hunger. The state of the cassava in the region is not very good as plants suffer from mosaic virus. Cassava yields are rather low⁸⁵: 12 different field tests in the Kribi area averages about 8.2 T/ha, compared to more than 27 T/ha in all 12 sites where yields were measured on the pipeline route between Kribi and Chad.

Secondary staple crops are cocoyam, taro (popular among the Bassa), sweet and plantain bananas, cucumber seeds, small amounts of maize, peanuts and beans, and various leafy vegetables. Land is cleared by men, then grown by women in a succession of crops (of which cassava and bananas may, and slowly returns to fallow. Typical crop rotations in the area are listed in the table below⁸⁶:

⁸² PNUD (2002): Page 35: average farm size 2.2 ha, and 4 workers per household.

⁸³ PNUD (2000b). The socio-economic situation in the Littoral province is overwhelmed by the impact of the major town of Cameroon Douala. Only a small part of the province (zone 4, Edea-Dizangue, 4.500 km²) lies within the zone covered by this report. (page 26). Official production data cited in the report point show such diminishing yields for the main crops (up to 50%) that they cast some doubt on the quality of the data.

⁸⁴ This is more than twice as much as the 2.2 ha reported in the Pnud report, probably because the ECAM2 data are reported by households and estimating areas in the forest is difficult. In the South province evaluating fields in hectares has little importance in local negotiations, contrary to the North, where all cotton fields have to be measured to calculate inputs.

⁸⁵ Field trials carried out in the region of Kribi in 1997 and 2000 yielded on average 12 tonnes/Ha. (Cox et.al., 2000)

⁸⁶ Data obtained during farm visits in 6 sites during the 1997 and 1999 agricultural evaluation of the pipeline area.

Table 3-9. Typical agricultural rotations in the Kribi area.

Year	Fang (Bidou)	Mabea (Bikondo)	Batanga (Bwambe)
Fallow	4-5 years	3-4 years	5 years
1A	cucumber, yam, macabo	Maize + groundnuts + cassava	Cassava + maize + some cocoyam
1B		cassava + bananas + yam + cocoyam	
2	cucumber-cassava-maize	Consumption of cassava	Consumption of cassava
3	Consumption of cassava	Return to fallow	Return to fallow
	Return to fallow		

The main crops in order of importance are: cassava, plantain, maize, cocoyam, groundnuts, and cucumber. Fruit trees belong to the men. These trees are for the most part planted, except the bread tree, the "badamier" (*Terminalia catappa*), raffia palm, and guava tree which may be either planted or natural. In the case of guava especially, the seeds are scattered by birds and later on the trees sprout. The wild mango and nut trees grow naturally. Improved varieties are used only in the case of oil palm because of the nearness of Socapalm. Market gardening crops are non-existent.

Man-power is needed mostly for reclaiming a field from forest or long time fallow: initial clearing and felling of trees, and is exclusively done by men. For the cultivation of food crops the farmers, especially the women, usually come together and work in a group. Otherwise, everybody works on his/her own field.

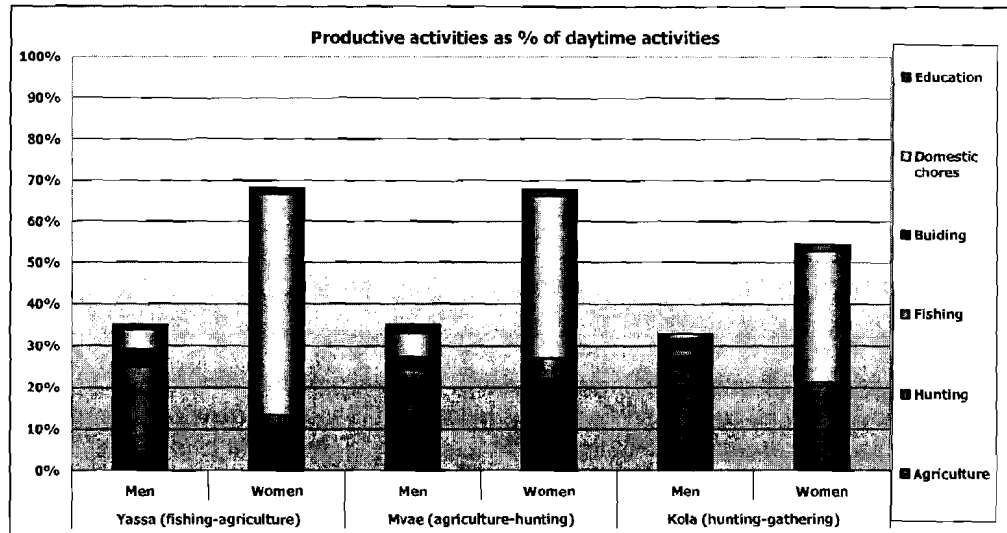
The produce is sold at home for food crops (and at the beach for fishing produce). Retailers and local consumers are the main buyers. Selling at the Kribi market is rare and is carried out by children. Cassava tubers and their derivatives as well as sea products are the most sold and constitute the most important source of income.

In the Kribi region, the staple food is cassava tubers or derivatives which are fermented cassava "bread" and cassava flour. Plantain is also frequently consumed. The palm nut juice sauce or the wild mango almonds' sauce with fish are the most consumed, followed by cassava leaves with groundnuts when fish becomes scarce, as happens during the rainy season.

Main daily activities (adapted from Pasquet & Koppert, 1993)⁸⁷ clearly show that agriculture occupies mostly women while men's agricultural activities are mostly limited to harvesting palm wine. The workload of the women is about 10 hours per day, with that of the men who traditionally work in fishing and hunting is about 4-5 hours daily. Only Pygmy women put in less productive hours than their male counterparts, as they work less on Bantu farms. The following graph is based on 780 time-budget observation days during 1984 and 1985.

⁸⁷ PASQUET, P., KOPPERT, G. et FROMENT, A. (1993). — Activity patterns and energy expenditure in Cameroonian tropical forest populations in: Hladik C.M., Hladik A., Linares O., Pagézy H., Semple A. et Hadley M. Editors, *Tropical Forest, people and food: Biocultural Interactions and applications to development*, Man and the Biosphere Series vol.15, Parthenon-UNESCO, Paris, London. pp 311-320

Figure 3-10. Time budgets of men and women among Yassa fishermen, Mvae agriculturalist and Bakola hunter-gatherers (adapted from Pasquet *et al.* 1996).



Analysis and discussion

The coastal populations mainly grow cassava, with a low productivity. The ethnic groups inland have a more varied and more productive agriculture. The coastal populations have a market but no products to sell, the inland population on the other hand have products to sell but lack a market, as transport costs are very high.

There is very little development in agriculture: cocoa cultivation is in the process of being abandoned (low prices and old plantations, abandoned by young people), mechanization is limited to the use of chain saws for land clearing and two wheel carts, new products are limited to improved oil palms and – more rarely – improved maize varieties and pineapple. All other products are grown on an entirely artisanal basis and mainly by women. PNUD (2000) describes that only improved oil palm seeds have a significant impact on local agriculture: in the Ocean division, two local farmers own 98 ha of palm oil plantations. Improved maize and peanut varieties have little success as they need fertilizer which is not available in the area.

The absence of men in agriculture might be a reason for low production and small fields. Men were traditionally in charge of the palm wine, fishing, hunting, house construction, and the cocoa plantations. With diminishing opportunities, especially in cocoa cultivation and hunting, relative unemployment and dissatisfaction among the male population are increasing.

3.6.2 Fishing

Available data

Batanga and Yassa (Yasa, or Iyasa) are the main fishermen in the area, together with foreigners, mostly Nigerians, who are usually settled in the area since several decades. Most people use simple dugout canoes, and only a minority has access to more sophisticated boats powered by outboard motors. According to Envi (2007) river fishing concerns mostly shrimps, catfish, and various carps and *mâchoirons*. Sea fish catches

are mostly done with gillnets, and suffer from damage by commercial fishing trawlers⁸⁸ that not only destroy fishing nets from artisanal fishermen by trespassing into the 2 nautical miles continental water zone, but also use nets with smaller meshes, thus catching juvenile fish and thereby depleting local fish stocks.

Income of fisheries is according to a regional survey 125,000 F/yearly, or about 2,500 F/week. These low revenues are explained by the seasonal character of the activities, with a peak during the main dry season from December to March, and the consumption by the own family (cited in Envi, 2007). Ngok et al. (2005) estimate the average value sold by maritime artisanal fishing at about 1,000,000 FCFA/fisherman. This variation in available data clearly indicates a lack of reliable base data. The same author also mentions that production has decreased during the last several years (Haskoning, 2007).

Industrial fishing legally only takes place outside the 3-miles' coastal zone, and practically in those areas where the water is deep enough for the trawlers to work. Total and daily yields on industrial fishing have also decreased since 1981, from 4.55 T between 1979 and 1981, and 2.05 T between 1986-90. Reasons are overexploitation, the use of fine prawn nets that also kill juvenile fish, and conflicts with artisanal fishermen. According to Haskoning (2007) industrial coastal fishing is now absent from the area between the river estuaries of the Lokoundje and Ntem.

Fishermen complain about negative impacts on their activity from the pipeline, like diminishing catches and increased prices (Envi., 2007 p.188), lack of adapted techniques, over-fishing by commercial trawlers, direct negative impact of the Chad-Cameroon pipeline, and tar pollution on the beaches.

Shrimp fishing along the local rivers is a local speciality. It is an important activity in the region, especially among women, and allows them to earn a significant income.

- Artisanal fishing
 PNUD⁸⁹ (2000), compiled official data on fishing yields in the southern province. They indicate that women play an important part in the fish trade not only through fishing, but even more through smoking fish and trading the finished product. PNUD regrets the absence of reliable statistics to evaluate the importance of women's fishing trade.

Table 3-10. Maritime, continental and fish-pond fishing in the south province (source: PNUD, 2000)

	Production units (N=)	Number of people	Production (T/year)	Observation
Artisanal sea fishing	507	940	2000	Rather good but diminishing production
Artisanal continental fishing	200	200	200	Marginal activity
Aqua culture (fish ponds)	275	205	100	Productivity too low

⁸⁸ <ftp://ftp.fao.org/docrep/fao/005/ac887e/AC887E03.pdf> DJAMA Th. (1993) Conflicts in coastal fisheries in Cameroon. Idaf Technical report N° 53.

⁸⁹ Pnud (2000) Table 23

- Sea fishing
Artisanal fishing takes place in a 2 mile zone along the coast, in shallow water up to a depth of 10m. PNUD (2000) describes five types of fishing gear used:
 - long dragnets for pelagic fish: these nets are 400-1,200 m long, with a mesh size of 4-5 cm, and another type of 600-2,000 m long with meshes of 6-7 cm;
 - purse seine nets (*watsha*) also for pelagic fish;
 - pot traps for catching *Nemato palaemon* shrimps, known locally as *Njanga*;
 - fishing lines for capturing high value fish like carpes, barracuda, perch, and bars;
 - cast nets for catching surface fish.

The multitude of applied fishing techniques makes evaluation of fish production and potential difficult. Development of new techniques that target species not yet captured and improvement of existing techniques are ways for fishery development.

- Continental waters
The main rivers (Ntem, Lokoundje, Lobe, Ndja, Nyong, Kienke) are used for fishing. In the sea mouths of the rivers, women practice intensive shrimp catching. PNUD (2000) indicates that there are only 200 fishermen with a *pirogue* in the south province.
- Fishing ponds
275 fishing ponds were counted for an annual production of 100 T/fish (Pnud, 2000). More than 80% concern dams in existing water flows, which often lead to local conflicts. Yields are low, and spoilage important due to inappropriate techniques and conflicts.

Analysis and discussion

Data on artisanal fish production are difficult to find, as most fishing takes place outside a market where it can be quantified. Published data are on a very general level, and local variation based on fishing equipment, local productivity, and local practices is not mentioned.

Most authors agree that fishing production has seriously declined during the last twenty years. The locals blame it on the oil companies, whom they believe are capable of paying compensation, while others point to the fishing practices of both industrial and artisanal fishermen as the main reason.

From participatory observation in fishing villages⁹⁰, it appears that income is higher than in the agricultural communities. This mostly shows from the presence of more shops and bars, and less from the more durable indicators like better housing. Contrary to the more stable income derived from hunting and agriculture, fishing provides a more fluctuating income, which makes saving and investment more difficult. This is aggravated by the role that "luck" plays in the amount of fish that is caught, which demands that part of the proceedings of a "lucky day", have to be shared by others in the community.

⁹⁰ Anthropological studies among the Mvae and the Yassa between 1984 and 1992., see for instance Foment et al. (1996) *Bien manger, bien vivre*

3.6.3 Hunting

Available data

The wider Kribi region has an unique environment of Biafran forests, estuaries, and swamps with an associated unique wild life, with more than ten species on the IUCN list of endangered species (Envi, page 79). Hunting pressure has been increasing constantly during the last decades, and techniques like metal snares, firearms, poisoned baits, and night hunting using flashlights evolved in such a way that in many areas game has become rare⁹¹.

Legally Cameroon has classified game in three categories⁹²: those that are completely protected, those that requiring a hunting permit, and those on which controlled hunting is allowed. Traditional subsistence hunting is allowed by law, but only on game of the last mentioned category, and outside the protected areas. The law defines poaching as "hunting without a permit, during periods of hunting-restriction, in protected areas or using prohibited arms" (Koulagna, 2001, p.57). Poachers and illegal networks that transport bushmeat to the urban centres are the main threat to wild life.

Analysis and discussion

Over the last twenty years, local hunting has evolved away from the a valued occupation for adult men in the area that it used to be – providing not only a source of food and income, but also of social status – to an almost criminal activity. Rapidly diminishing production of bush meat, reinforcement of legal limitations, actions of ecological groups, and organisations like Tropenbos have changed the perception of hunting. In villages like Nko'elon (gatekeeper of the Campo-Ma'an game reserve) where people consumed about 250 g of meat per person per day in the 1980's, and where there was a continuous presence of *buyam-sellam* meat traders, meat is now consumed in secret, and hunters are hiding. The positive impact of the game preservation actions by Tropenbos around the Campo-Ma'an National Park is that foreign hunters with guns, who were never popular, currently are being persecuted by the locals. Simple villagers are stopped by game wardens, when they are found in possession of bush-meat. Home consumption is not altogether forbidden, but villagers know that crossing the street in the village in order to give meat to a neighbour is forbidden.

However, bush meat is still readily available in the tourist hotels and restaurants in Kribi. This means that the reinforcement of hunting prohibition affects the villagers more than the people in the towns who can afford to pay the providers and those who regulate the consumption.

⁹¹ NOUDJIEU CHEUMANI C. (2005) estimates the amount of bushmeat captured by populations surrounding the Campo-Ma'an National park in 2000 at 143.9 g per capita, of which 69.1 g is consumed locally and remaining 51% is sold. *Approches de gestion durable de la chasse dans L'unité Technique Operationnelle de Campo-Ma'an (UTOCM) Sud Cameroun*, ULG-Gembloux, <http://www.ivt.ulg.ac.be/memoire/Cheumani.pdf>

⁹² See law 94/01 and subsequent decrees. See: Koulagna Koutou (2001) *Problématique de la viande de brousse au Cameroun. Central African Bushmeat Perspective*. In BCTF Collaborative Action Planning Meeting Proceedings. Edited by: N.D. Bailey, H.E. Eves, A. Stefan, and J.T. Stein. Bushmeat Crisis TaskForce. Silver Spring, MD. 319 pages. Available from <http://www.bushmeat.org> Page 55-59. Mr. Koulagna is in charge of fauna and protected areas for the Ministry of Water and Forests (MINEF)

3.6.4 Arts and crafts

Available data

There is hardly any development of arts and crafts in the region. Traditional black smiths and potters have since long ceased to exist. Elder men and women still are active in weaving baskets for agricultural transports, making pot traps for shrimp fishing, repairing regular fish nets, and in sales of coral plants. According to various economic surveys, income from arts and crafts is very low.

Analysis and discussion

The low occupation rate of the village population as shown in time-budget studies (see Figure 3-10) suggests that investments in arts and crafts are a potential for income improvement, without having a negative impact on other productive activities. Investment in these types of activities may especially be important for women and elderly who cannot easily leave the villages for commercial activities.

3.6.5 Local industry and trade

Small scale local industry and trade are discussed below, based on the limited information that was available.

Analysis and discussion

Small scale cottage industry is sought after by the locals, but difficult to organize. In Mpangou (near Kribi) one farmer bottled fruit juice from his farm which was sold locally in the markets (unpublished data). Most trade is centred around the vices of mankind: sale of cigarettes and of imported and locally produced alcohol.

Palm wine production is a typical male occupation, and mostly a social one. Men who have producing palm trees visit them every morning, harvest the 10-20 l product and return to the village to drink and to sell the product. Local alcohol⁹³ is made of a mixture of cassava, sugar, palm wine, and bakers yeast, distilled in an artisanal way by women. Its production is mostly illegal, but permits women (especially widows) to earn some income. Industrial alcohol is seriously competing with the traditional products. Small sachets of low quality whiskey and gin (locally called 'condoms') are sold for a few hundred francs, while good quality 40° proof gin is sold by the litre or 20 l jug for as little as 10,000 FCFA or less than 1 USD per litre. Cameroonian beer of one of the many breweries is sold in most of the villages.

Drinking is such a common social activity in the area that alcoholism is one of the main health risks of the population and a serious barrier for development. Alcohol induced quarrels and fights regularly cause serious victims. Bakola-Bagyeli are especially prone to binge drinking: too often money is used to buy alcohol which is shared by all members of the family including women, toddlers and children.

Only the bigger villages have small shops. In the smaller villages the only household products that are sold are lamp oil, tomato paste, salt, sugar, tea, soap, magi cubes, and other simple items including dried shrimps and sometimes smoked fish. These small shops are run by either women or young men.

⁹³ Various names used for this drink are Africa gin, arki, ha or Odontol. The last name reflects the smelling of the mouth of those who consumed it.

3.6.6 Periodic markets

Available data

Apart from those in the main town and villages, there are only a few markets in the area: the daily market in Kribi and the weekly markets in Bipindi, Londji, Campo, Ipono, Niété (Hévécam), and Elog Batindi. Other markets officially exist but appear hardly functional. Reasons for this are, according to PNUD (2000), the low population density and the absence of a "market tradition" culture in the area. In other regions of Cameroon, market days are the most important day of the week, and going to the market is both an economic (selling and buying) and a social (meeting people) activity.

In the south province, farmers sell their products directly from their home to passers-by who, in-turn, may take the products to the urban market and benefit from the price difference. Almost all sellers in Kribi are women who buy their goods in the village. Many of the women traders and male shop-keepers come from non-local ethnic groups: Bamileke, Ewondo, Bassa, and Bamoun (PNUD, 2000).

Analysis and discussion

Absence of a market tradition means that village producers do not have the necessary outlets for their products and consequently sell their products for a lower price than they would otherwise get. Due to the multiple intermediaries, the urban population pays a much higher price for rural goods than necessary⁹⁴.

3.6.7 Summary of women's activities and gender issues

Traditionally, women used to marry at a young age, being as soon as the fiancé had his own cocoa plantation and could show that he was capable of raising and supporting a family. Nowadays, it has become more difficult for young men to achieve economic independence, and women tend to marry later, if at all. During an unpublished survey in the Kribi-Campo area in 1985, it was found that 1/3 of the children were born out of wedlock, without an officially recognized father. In such cases, the father of the young mother takes over the social role of being the father of the young child, and the young child is completely adopted in his family.

Young women tend to be relatively free, and easily leave their children to the care of their family in the village, while looking for opportunities elsewhere.

Once married, the tasks between husband and wife are quite clearly structured: women take care of most of the daily needs (growing food crops and potherbs), and men are in charge of the more irregular tasks: fishing, hunting, house construction, and land clearing. Men also are responsible for bringing in the money to send children to school, for medical expenses, and to pay the meat. However, women generally participate in many of these activities, while a minority of men participate in the women's activities.

⁹⁴ The impact of local traditions is strong. In Lolodorf for instance, local Ngumba were mostly absent as traders in the market, while women from other ethnic groups were ready to walk for six hours in order to sell their products in the market. The Lolodorf market, took place very early in the morning with traders present from 5:30 to 8:30.

Agriculture – In the Ocean division, women are in charge of the daily food production, which is centred around the growing and preparation of cassava. Men clear the agricultural fields, but women are responsible for the subsequent stages of food production. Women also buy most of the ingredients necessary for cooking.

Fishing – Shrimp fishing and cupping small barrages in creeks are women's activities. The product is used for feeding their family and for small scale trade.

Alcohol production, and sale of beer – Women prepare local alcohol for sale or buy a few boxes of beer for sale in the village.

Doughnuts – Doughnuts for breakfast are prepared by women in most villages, using imported flour, bakers yeast, and sometimes cooking oil from the village.

CHAPTER 4 PROJECTS PLANNED AND DEVELOPMENT PLANS

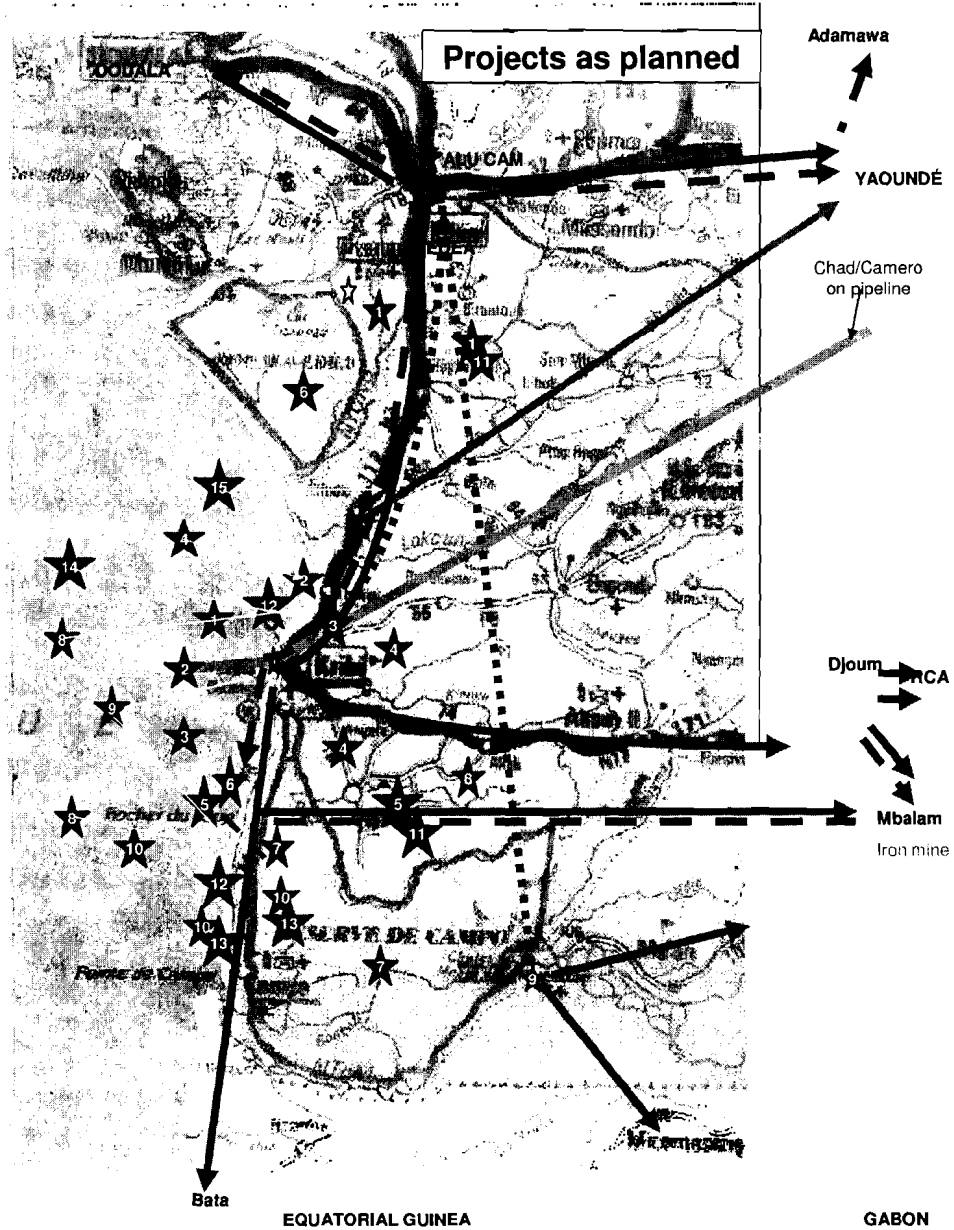
4.1 Projects

During the first mission, it was found out that there are more planned developments in the region than what the ToR mentions. The projects, which could be identified during the first mission and which are part of the scope of the REA study are listed in Table 4-1: This chapter presents a brief description of the projects for which further information could be found since the first mission. The numbering of the projects follows a North to South order within the Kribi region. Those projects (with the same numbering system) can be located on the map in Figure 4-1 below.

Table 4-1. Project activities planned in the Kribi region

	Project activities	Developer	Geographic area
1	Sanaga Sud gas exploitation and CPF	Perenco / SNH	North of Kribi - See map
2	Power station and transmission line	AES Sonel	North of Kribi - See map
3	Pipeline between the CPF and the power station	Perenco / SNH	North of Kribi - See map
4	Industrial estate (on CPF site)	SNH	North of Kribi - See map
5	Deep sea port	Government / Sundance-Cam Iron	South of Kribi - See map
6	Industrial estate (around deep sea harbour)	Gouvernement	South of Kribi -
7	Les Mamelles iron mine exploitation (operator?)	Steel Cam	South of Kribi - See map
8	Precious stones exploration	Sicamine	South of Kribi - South of Krib
9	Memve'ele dam and transmission line	Sud Energy	South of Kribi - See map
10	Marine park	Government	South of Kribi (coastal zone of Grand Batanga) - See map
11	Agro-industry and forestry exploitation expansion	Ferme Suisse & Socapalm, Wijma	South of Kribi - See map
12	Tourism development	Municipalities / Government / diverse operators	Coast line, especially: North and South of Kribi Londji, Rocher du Loup, La Lobé, Coastal area Kribi-Campo
13	Eco-tourism promotion and development	Municipalities / NGOs	North and South of Kribi Londji, Rocher du Loup, La Lobé, Coastal area Kribi-Campo, Campo-Ma'an NP
14	Construction of 5000 social housing over 400 hectares		Londji-North
15	New industry for the production of biofuel		Fifinda I and II
	<u>(Related) emerging infrastructure:</u>		
16	Rail way Edéa-Kribi	Government	See map
Part of 5	Rail way SUNDANCE port – Mbalam	Sundance-Cam Iron	See map
Part of 5	Access road SUNDANCE port – Mbalam	Sundance-Cam Iron	See map
17	Tarred road Kribi-Bata (Equatorial Guinea)	Government	See map

Figure 4-1. Map of the Kribi region with all projects planned in the region



Existing activities

- 1. Ferme Suisse (Agro-ind.)
- 2. FSU platform, COTCO (oil export unit)
- 3. Oil exploitation platform, Perenco
- 4. Socapalm (Agro-ind)
- 5. Hevecam (Agro-ind.)
- 6. Edea-Douala Wildlife reserve
- 7. Campo-Mann National Park
- 8. Sand extraction (most of the coastal area)
- 9. Tourism
- 10. Eco-tourism

Color legend

- Existing
- In construction
- Project (see Table 4-1)

Line legend

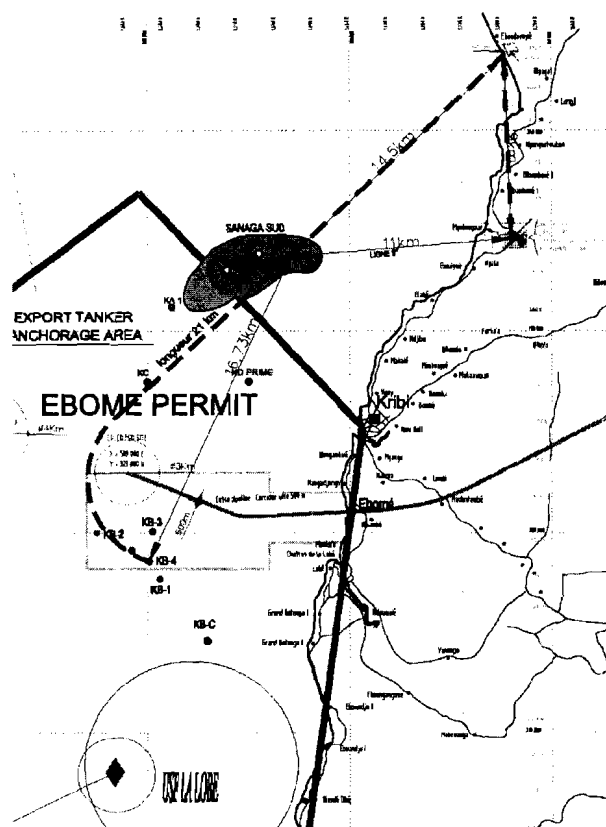
- Road
- Railway
- Transmission line

4.1.1 Sanaga Sud gas exploitation and Central Processing Facility (CPF)

The Sanaga South field is located 10 km offshore, North West from Kribi. For this project, Perenco is in partnership with SNH, which has acquired the Eboudawaé concession, or also named Bipaga I. The gas produced will be directed, for its greater part to a power plant, owned and operated by AES-Sonel. The project location is given in the Figure 4-2 below. The project includes:

- Platform offshore:
 - Drilling 2 exploitation gas wells offshore (from existing and abandoned wells)
 - Gas production units offshore
- A Central Processing Facility (CPF), onshore at Eboudawaé / Bipaga I site.
- Pipelines offshore / onshore:
 - A pipeline between the 2 production wells
 - A pipeline to carry the gas to be treated (from the wells to the CPF, 14km)
 - A pipeline to inject the glycol (from the CPF to the wells, 14 km)
 - A pipeline to transport the by-products (water + condensate) from the CPF to the existing well KB-4 (21km), where it will be connected and to the existing pipeline linking KB-4 to the Ebomé storage platform (USF La Lobé)
 - A pipeline to transport the treated gas from the CPF to the onshore power station, between Ebousawaé et Kribi, in order to produce electricity from the gas provided by Perenco.

Figure 4-2. Sanaga South gas exploitation and CPF site location



The purple dashed line represents the pipelines.

Onshore site description

The site acquired by SNH for the CPF is about 4 Kms North West of Londji, about 12 Kms of Kribi. The Western part of the site is at few meters from the village of fishermen, called Eboudawaé, also spelt Eboudavoyé (about 203 inhabitants) and the beach / sea. The entrance of the site, on its Eastern side is at a site called Bipaga I. The south of the site is reachable at the moment only with a good 4-wheel drive via a laterite track of about 5 Kms which links the Eboudawaé village to the Edéa – Kribi tarred road. In between Bipaga I and Eboudawaé, the site is composed of secondary forest. On its outskirts, near Bipaga I and the road, the forest is quite marked by human agricultural use.

Figure 4-3. Site map of the EIA (Oct. 2006)

The site is split into 2 plots: (1) 3ha plot: close to Eboudawaé and the beach, and (2) 25ha: on the Eastern side. In between, there is a stream and marshy area. According to the legislation, all wetlands are national property and cannot be sold / bought.

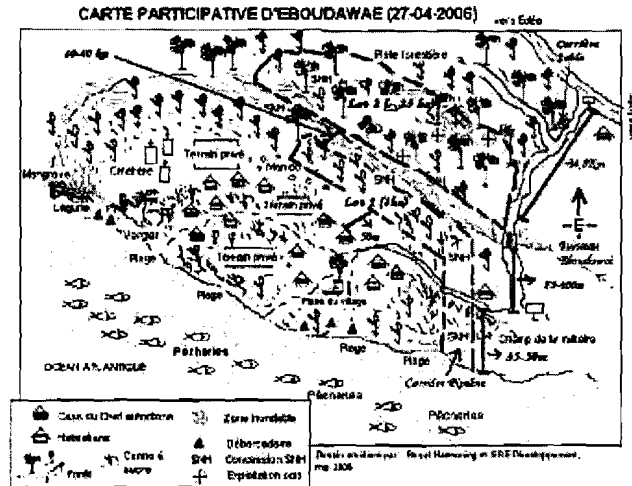
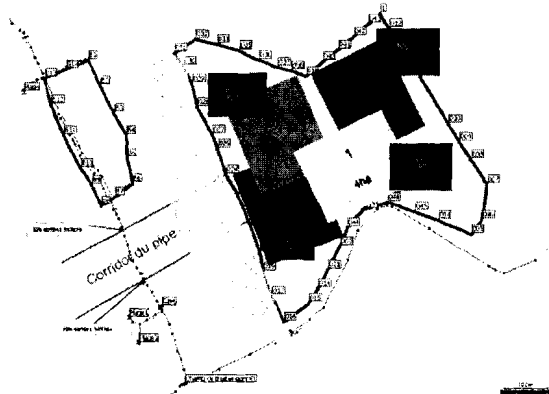


Figure 4-4. Site map of SNH (Dec. 2007)



The space required for the CPF is about 4ha and the space needed for the corridor of the pipeline, i.e. 140m corridor for the length from the beach to the CPF.

The maps presented in the EIA and the map given by SNH during the first mission of this REA study provide complementary information on the location and are presented in Figure 4-3 and Error! Reference source not found..

Major issues of the chosen CPF location

- Pipelines corridor planned to go over marshy area and a stream (blue parts on Figure 4-3). This stream leads to the Nyong estuary where there is presence of mangrove forest.
- Proximity of the Eboudawaé village
- Not known what type of biodiversity there could be in the 25ha plot. Suspiciously, fauna and flora could be identical as the one of the Edéa-Douala Wildlife Reserve (few Kms North).
- Deforestation
- Advised period for construction, considering the rain seasons and the migration period of potential whales, dolphins, manatees and turtles.

4.1.2 Kribi Power Project (power plant and transmission line)

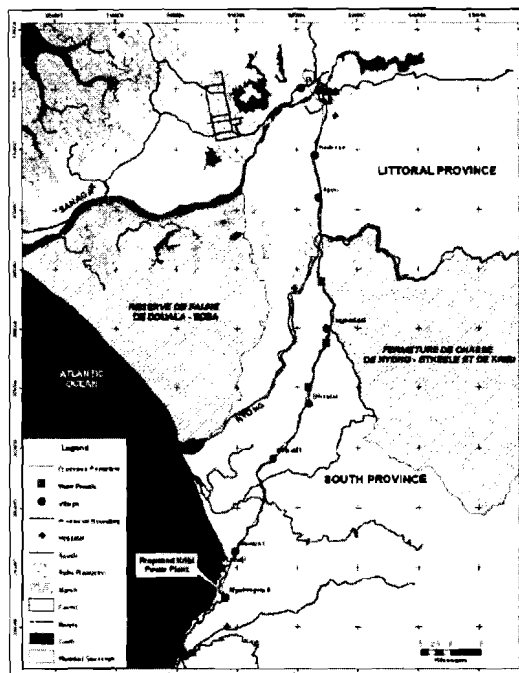
The power plant from AES-Sonel will use the treated gas coming from the CPF and turn it into electricity. This electricity will then be relayed to the distribution centre (distribution to the grid) near Edea at Mangombe through a transmission line.

The Kribi Power Project shall comprise:

- the construction of a 150 MW power plant fuelled with natural gas at the Mpolongwe site; and
- the construction of energy transmission facilities comprising:
 - (i) a step-up substation at the plant site (11 to 225 kV) at Mpolongwe;
 - (ii) a circa 100 km 225 kV double circuit transmission line between the plant and the Mangombe 225/90 kV substation at Edea;
 - (iii) the connection of the transmission line at the Mangombe substation with installation of new 225 kV line bays.

Location

Figure 4-5. Location of the Kribi Power Project (power plant and transmission line)



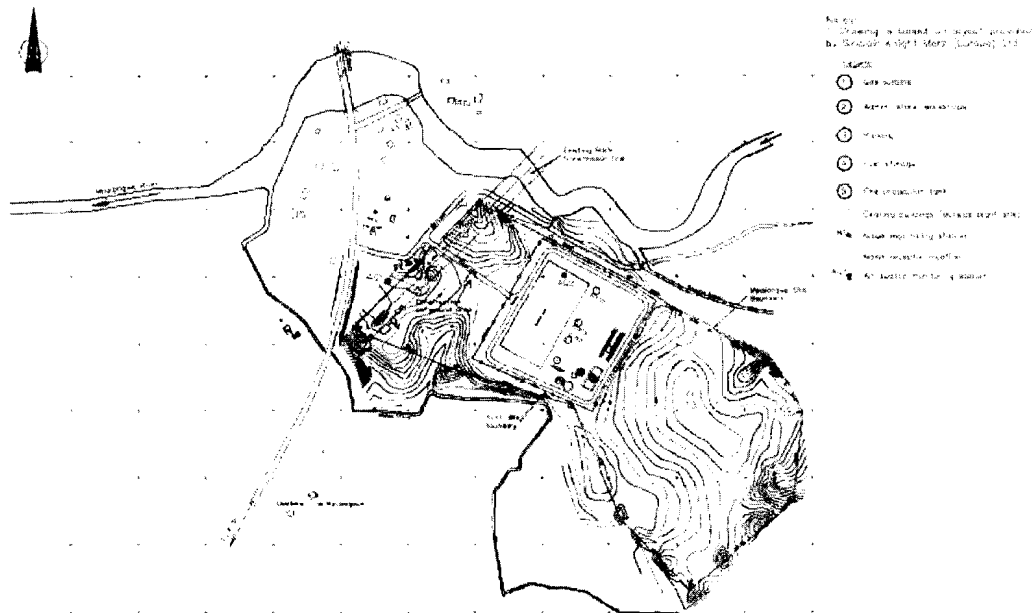
Site description

The chosen location of the power plant lay at Mpolongwé. The overall Mpolongwé site occupies an area of approximately 16 hectares although the power plant site itself will only require approximately 4 ha once constructed. However, the overall larger site is meant to allow for the development of a construction compound as well as the plant itself and also allows the flexibility for the plant site to be located to best reduce the potential impacts.

The land surface is gently undulating with a height varying between approximately 10 m and 20 m above sea level. The site is predominantly forested although there are a number of buildings, constructed of local materials, which are understood to house three families. These primarily occupy the

western edge of the site within the wayleave of the existing 90 kV transmission line. The forest on the site has already been heavily used by the surrounding population. Three watercourses drain this site, the largest is Mpolongwe River the two minor streams being tributaries of this river. The river and tributary streams are understood to flow throughout the year and, where they flow adjacent to the site boundary, are used by local inhabitants as a water supply.

Figure 4-6. Site description



Transmission line route

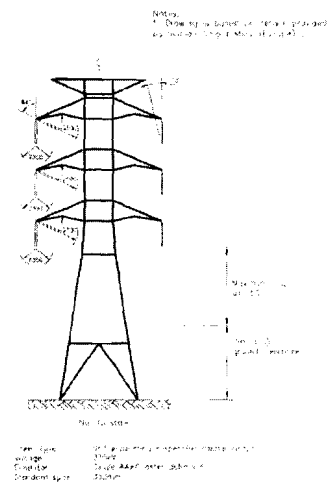
The new transmission line will follow the general route of the existing 90 kV line for approximately 90% of its length and runs directly parallel to it for 40% of the route as illustrated in Figure 4-6. It also follows the route of the Kribi to Edéa main road, which it crosses at 24 locations. This new road was built after the 90 kV line, and followed the former road, thus some crossings might have been avoided. In addition, it crosses minor tracks 21 times.

Major issue concerning this site

- Three families need to be relocated
- Water taken from and rejected to the streams are, according to the the description of the EIA, of very minimal amount (2 to 3 m³ per month). However, this would need to be checked during operation in order to ensure that streams are not disturbed.

Advantages for this site location

- Good access to the Edéa-Kribi road
- No highly valued vegetation and fauna affected



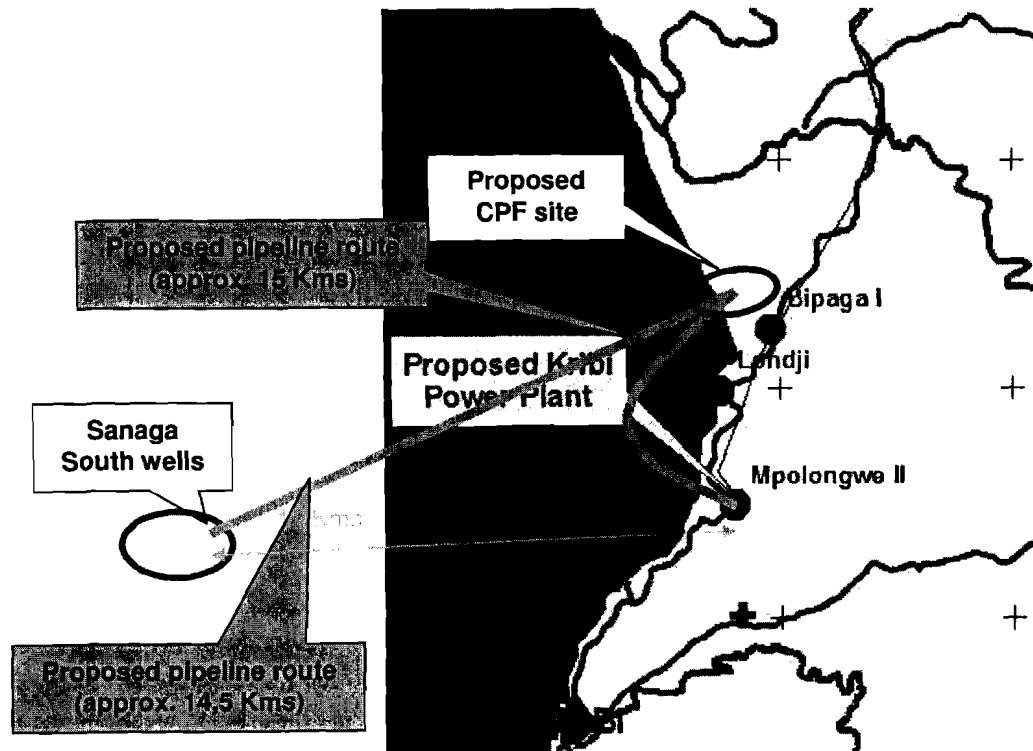
4.1.3 Pipeline between the CPF and the power station

Even though this pipeline is mentioned as part of the project Sanaga South exploitation and CPF in the EIA, it was not covered of the EIA made by Perenco and SNH.

As a result, it was decided that the EIA for this pipeline should be the purpose of a separate and dedicated EIA, under the responsibility of SNH.

Even though there is the EIA under consideration is not made, the chosen route of this pipeline was approximately shown to us and we schematically illustrate it on Figure 4-7.

Figure 4-7. Route of the pipeline between the CPF (Bipanga I) and the power plant (Mpongowé II).



Main issues and questions regarding the route of this pipeline

- The 2 pipelines routes presented in Fig. xx will be have a total length of approx. 30 Kms whereas the Mpongowé location was chosen to be as close as possible to the Sanaga South fields, to which a direct pipeline would be of 11 Kms and would disturb less natural, physical and social environment.
- The pipeline Bipanga I to Mpongowé II will pass close to Londgji. Additional to the pipeline Sanaga South fields – Bipanga I, this further put the coastal population of londji at risks especially in terms of safety.
- The lay out of the pipe, so close to the coast, will highly disturb marine and coastal sea fauna, fishery activities and marine local transportation.
- Due to the vicinity of the coast, we can assume that the pipeline will be buried. Even though it is necessary for safety reasons, this will disturb much more benthic habitat & communities. As a result, this may affect the fish stock in this area: disturb and finding no food, fishes may migrate to another location.

4.1.4 Industrial site at Bipaga I

SNH and Perenco would like to attract industries around the CPF in order to make use of the by products of the gas treatment (condensate) and sale more gas to other potential clients (industries).

The production of gas will possibly be increased at a later stage. To our understanding, AES Sonel would not have a contract of exclusivity; neither does it buy 100% of the production. In this, Perenco / SNH can search for new clients.

The industrial estate is desired on the 25 ha plot of the SNH at Bipaga I, close to the CPF. It is even envisaged to have a jetty at the beach side to ease transport to and from this industrial estate.

4.1.5 Deep sea harbour and related development

Mbalam project (deep sea harbour and railway)

The project of the deep sea harbour has several potential origins and potential developers or initiators. Information being restricted and the few not being always consistent, it is not clear to us at the moment if there are other parallel projects for a deep sea harbour from other parties.

In any case, this section will describe the deep sea harbour project part of the Mbalam iron ore mine project, planned by Cam Iron/SUNDANCE, according to the Mbalam Scoping report, from SUNDANCE, August 2006 and other official reports and information found available on Internet⁹⁵.

The Mbalam project includes:

- Mine
- Crushing and screening facilities
- Mine stockyards and train loading facility
- A railway system from the mine to a port (490 km)
- Port facilities to unload trains, stockpiles and ship iron ore in vessels up to 250.000 DWT
- Infrastructure facilities at both mines and port including workshops, warehouses, laboratories and administration buildings as well as infrastructure, including water and electricity supply, access to roads, airport and permanent facilities.

The Mbalam deposit is in southeast Cameroon near the border with Congo containing an estimated 220 Mt at 60% iron (or 587 Mt at 30 to 40% iron). Project costs are estimated to 2.46 billion USD, for an estimated production of 35 million tpa. (project flyer⁹⁶ 2007). Construction is scheduled to start in 2009, production in 2012 and full capacity should be reached in 2015. According to National radio CRTV, a memorandum of understanding between the company and the GOC is planned to be signed in March 2008.

Cam Iron, is the Cameroons subsidiary of SUNDANCE, Australian mining firm. Sundance will probably operate under the name of Cam Iron in Cameroon.

⁹⁵ <http://imagesignal.comsec.com.au/asxdata/20070730/pdf/00743560.pdf> Sundance resources, quarterly report for the period ending 30 June 2007.

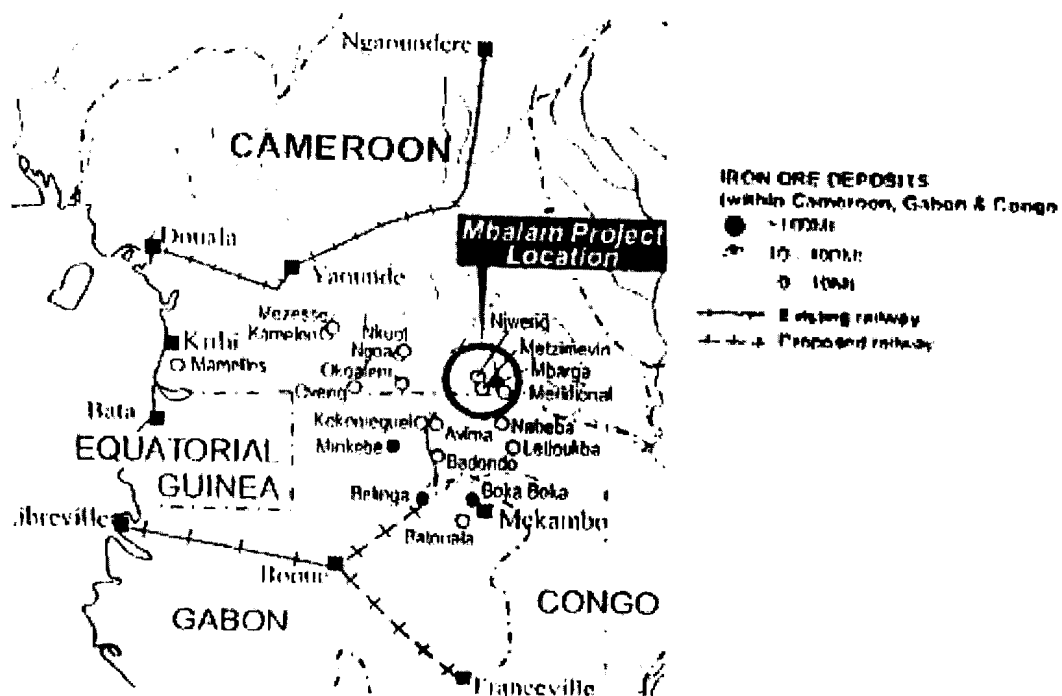
⁹⁶ http://www.sundanceresources.com.au/projects_cameroon.asp (2007) A flyer with a general overview of the Mbalam project.

Export options

Several options were studied by Sundance for the railway system and port: (1) through Gabon, which would mean building a 200 km railroad to Belinga, where a Chinese Iron Ore mining company will build the remaining 150 km to the Gabonese grid, (2) Through a new rail road to Mbalmayo (approx. 350 km), (3) a new wide-gauge railroad to the Kribi-Campo area with a deep water berth capable of accepting cape size vessels. The latter solution is preferred.

What concern the Kribi region is the port with associated facilities and the railway line which goes through the region.

Figure 4-8. Location of Mbalm Iron ore mine



Port

Two locations were considered (1) Grand Batanga (about 10 Kms South of Kribi), and (2) Lolabé (20 Kms further South).

Grand Batanga is a potential multi-user, multi product port. The government has already done a feasibility study for a deep sea harbour port. Preferred location is Grand Batanga. However, the feasibility study did not address the bulk shipping of iron ore and its requirements in regards to rail unloading loops, iron ore stockpiles or Cape size vessels with their associated deeper drafts and larger turning basins.

Lolabé has the advantage that the 20m fathom line is approximately 2 Km closer to the shore which would reduce ship turnaround times as well as reduce dredging costs and wharf related construction costs. Therefore Lolabé would be the preferred port location

as both the rail and port construction costs would be lower at this location than at Grand Batanga.

The plans of Sundance are, according to the Scoping report, to make a port suited for the export of ores only (Mbalam and other ores exports). As alternative, the addition of a more expensive shore backed layout would make this port a multi-user, multi-product port similar to that proposed by the Cameroon Government's feasibility study. This alternative has potential environmental issues associated with it as littoral drift along the coast will be interrupted.

According to some inhabitants of the area, the port would be 5 Km wide and 3 Km long, going into the sea.

Railway

The preferred railroad corridor (before environmental studies) would lead the railway along the Ntem Valley, probably through the Campo-Ma'an national park, east of the Mamelles hills and ending between Lolabé or Grand Batanga.

The rail access road would run the full length of the railway to allow railway maintenance.

Environmental and social considerations

The preliminary scoping does not take into account environmental and social aspects, but indicated the various studies to be completed to comply with environment, sustainable development and social license. A summary table of expected impacts is provided⁹⁷, but may underestimate the environmental (i.e. forest) and social consequences of the project. Minorities, local, national and foreign employment, migration may all become future issues.

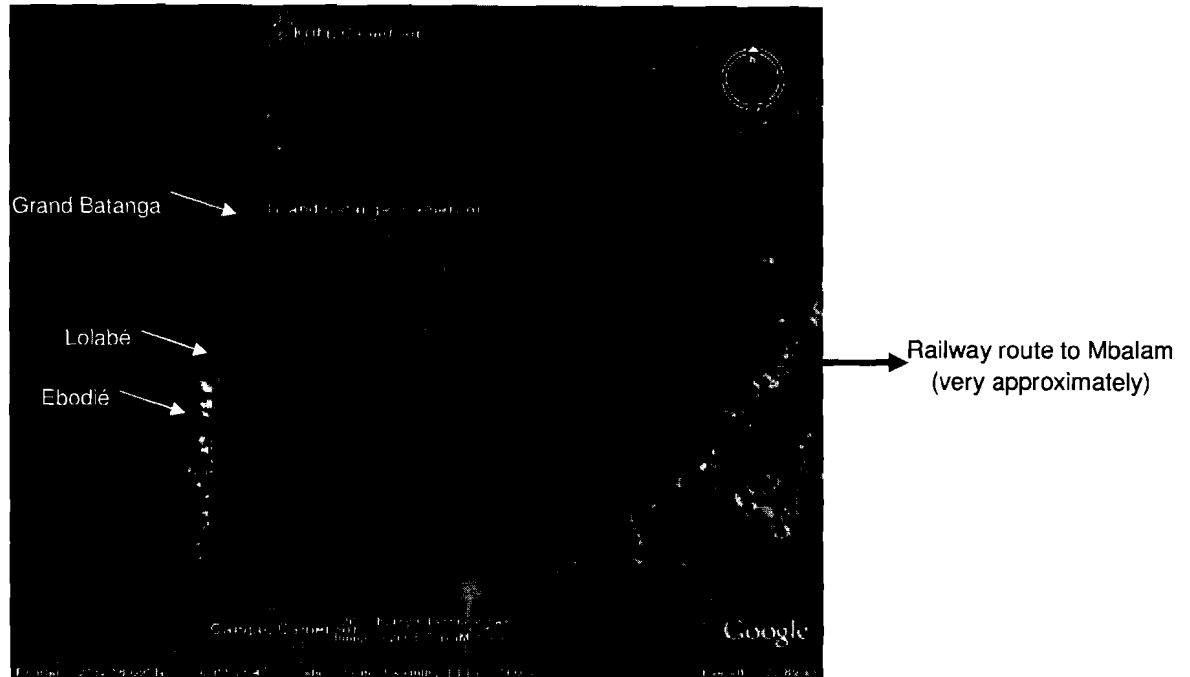
Main issues

- Lolabé is know for the "Rocher du Loup" (translated: "Wolf's rock") which is a big rock on the beach having the shape of a wolf's head. It is a popular touristic attraction in a picturesque natural environment and an important sacred site for the Yassa⁹⁸. The construction of the harbour could therefore mean that this touristic attraction would disappear or gets visually impacted.
- Lolabé is 20 km further to the south of Grand Batanga, which means that an additional 20 km of coast will be damaged by industrial development.
- Closer to the Campo-Ma'an National Park.
- Clearance of the forest for the railway: opening of the forest to poaching and other (illegal) use, disturbance of fauna and flora.
- Coastal disruption: not enough details at that stage to evaluate those disruptions.

⁹⁷ Promet Engineeers (2006). Table 10.1 page 47.

⁹⁸ According to Dr. Ngima, an anthropologist from the Yaoundé University, The Yassa of Ebodié are the only group who uses this rock as their main sacred site. They perform ceremonies and rites to pray to their ancestors and spirits of the sea, to protect the fishermen against the dangers of the sea and pray for abundant fish, as well as for the protection of their village and its people.

Figure 4-9. Possible locations of the deep sea port (Grand Batanga and Lolabé)



4.1.6 Industrial estate (around deep sea harbour)

From interviews, we understood that it was the plan of the Gouvernement to attract industries and develop industrial estate(s) in the vicinity of the deep sea port. No further information could be found so far, qua location, extent, etc.

4.1.7 Les Mamelles iron mine exploitation (operator?)

Project name	Operator	Category of project
Les Mamelles	CAM IRON?	Mining
Location	Status	
40 Km South of Kribi, near Ebodje	On-going	

Information sources

- Interviews in the Kribi region
- Internet sites
- No further official information found

Description

Exploitation of an Iron mine and railway to an harbour for the exportation of the ore extracted.

Cameroon has several iron deposits⁹⁹, including the 300-million-metric-ton (Mt) Mamelles deposit, 40 Kms South of Kribi containing 30% to 35% magnetite and the

⁹⁹ <http://minerals.usgs.gov/minerals/pubs/country/1998/9204098.pdf> Mobs (1998) The Mineral Industry of Cameroon. Who cite the following primary sources that are not active anymore: (Ministère de Mines, d'Eau, et de l'Energie, written commun., undated; Ministère de Mines, d'Eau et de l'Energie, 1998, Ministère de Mines, d'Eau, et de l'Energie—Ressources Minière, accessed May 21, 1999, at URL <http://www.camnet.cm/invistir/minmee/resmine.htm> ; Ministère du Développement Industriel et Commercial, 1998, Produits du Cameroun, accessed May 21, 1999, at URL <http://www.camnet.cm/invistir/mindic/produits.htm>)

Mbalam deposit in southeast Cameroon near the border with Congo (see previous section).

There are rumours regarding projects exploitation of the Mamelles hills near Ebodié. There have been part of local projects at the same time as the deep water port in Grand Batanga. No formal information could be found on Les Mamelles project. According to interviews (sometimes contradictory),:

- Les Mamelles project is still under consideration
- It would include a small railroad to an exportation port. The railway would run along the coast line.
- According to some interviewees, this port would be the new deep water port in Grand Batanga¹⁰⁰, or, according to some other interview, the operator would create its own new port.
- The developer, according to rumors would be Cam Iron, and Les Mamelles project would be included in the Mbalam project. However, the Mbalam Scoping report of Sundance does not mention anything about the exploitation of Les Mamelles deposit.
- According to an official IMF on the Poverty reduction strategic paper, “exploration permits were issued to CAMINCO for gold, to HYDROMINE Inc. for bauxite in the Adamawa, to STEEL CAM for iron at Kribi, and to CAM IRON for iron at Mbalam” (IMF, 2006; point 168¹⁰¹).

As mentioned earlier, quite a few information is to be found on the Mbalam project, while Les Mamelles project remains still quite a mystery. Among the many routes considered for the rail road Mbalam-Kribi linking the coast, some come close to the Mamelles hills and could be used to transport ore from these hills.

4.1.8 Precious stones exploration

Project name	Operator	Category of project
Precious stone exploration	SICAMINE	Mining
Location	Status	
South of Kribi	On-going	
Information sources		
<ul style="list-style-type: none"> • Interviews in the Kribi region 		
Description		
<p>According to interviews, SICAMINE explore the South part of the region in search of precious stones (gold, zircon, etc.). Apparently it concerns a wide area of exploration. Exploration is on-going. This type of exploration is usually of very restricted scale, even though at several places. Little impact is to be expected at this stage. When plans for further exploitation would take place, an EIA should be conducted.</p>		

¹⁰⁰ <http://www.sedfinance.com/perso-25617.htm> provides some information about the project which has to be counter checked.

¹⁰¹ IMF (2006) Cameroon: Poverty Reduction Strategy Paper Third Annual Progress Report. IMF Country report no 06/260, July 2006. <http://www.imf.org/external/pubs/ft/scr/2006/cr06260.pdf>

4.1.9 Memve'ele dam N/A

Project name	Operator	Category of project
Memve'ele dam and related developments	Cameroons Government	Energy (hydraulic power)
Location	Status	
Dam: Nyabizan, Road and transmission line: Nyabizan – Kribi,	Not known	
Information sources		
<ul style="list-style-type: none"> • Interviews in the Kribi region • Feasibility study of Coyne and Bellier • http://www.projet-memveele.org/ • http://www.projet-memveele.org/Volume%202.pdf • http://www.camer.be/index1.php?art=40 Cameroun: le barrage de Memve'ele au detail. 		

Brief description

A dam is planned to be constructed for the production of electricity. This will induce the flooding of an area upstream of the Ntem river and the construction of a road and a transmission line to bring the electricity produced from Nyabizan to Kribi. Only this later is part of the scope of the REA study.

The project

The PASEM (socio-economic support project) would start two years before the construction starts, have a duration of about 10 years, and gradually diminish its impact over the years. Project costs are estimated at 2.5 million USD, for an estimated population of 13.000.

The dam

An official website for the project exist ¹⁰², on which the first environmental scoping reports are available. The planned dam will have a height of 20 meters, and a maximum width of 395 m. The retention lake will have a surface of 1900 ha, and a capacity of 130 million m³. The installed generators have a capacity of 201 MW, and will be located 56 meters lower than the dam.

Transmission line

For the transmission line of the produced electricity three options are considered:

- (1) via Ebolowa and Mbalmayo to Yaoundé (285 km);
- (2) Via Hévécám to Kribi (problem: will have to cross the Campo Maan national park), or
- (3) via the interconnected Cameroon-Gabon-Guinea grid towards the South¹⁰³.

The location of the access road depends on the transmission line, but potential initially access will be through Ebolowa and Nyabizan (page 4-15 and 4-33), and would so improve the road system in the region.

Environmental and socio-economic considerations

The Project proposes to avoid impacting the Campo Maan National Park, through roads and transmission lines. It acknowledges its potential negative impacts on the Park. Proposed bush-meat mitigation measures include prohibition of bush meat consumption,

¹⁰² <http://www.projet-memveele.org/>

¹⁰³ <http://www.projet-memveele.org/Volume%202.pdf> Coyne et Bellier, (2006). Aménagement hydroélectrique de Memve'ele sur le Ntem. Actualisation des Etudes de faisabilité. Vol II. Les études techniques. pages 3-11 and 3-12.

creation of markets, shortening of the construction period, increased policing of hunting activities, limiting induced access to protected areas (page 4.41-42)

Main social impacts evaluated in 1993 were (Coyne et Bellier, 2006, p. 4.9-10):

- the resettlement of a hamlet with 9 households,
- 116 ha of food crops, fruit and palm trees,
- annual loss of 7.2 Tons of bush meat
- but increased annual fishing potential of 60 tons,
- construction impacts,
- migration impacts.

A new social impact evaluation is proposed in the report to take into account missing elements (recent legislation concerning ESHIA, Campo Ma'an park, impacts on fishing, bush meat, compensation).

A new inventory of the exact extension of the retention lake and impacted human settlements is necessary. Road widening, between the Dam and Ebolowa, would destroy according to recent estimations 155 houses, a chapel, a few tombs and 75 other buildings. The resettlement and compensation plan propose necessary mitigation measures. Replacement land usable for agriculture is thought to be abundantly present in the region.

Stakeholders

The Wijma logging company, who has 2 logging concession in the area, has offices in Nyabizan. It will be an important stakeholder, especially in creating roads linking the area to the Kribi-Ebolowa road.

Locals have a favourable opinion about the project, and also high expectations of its positive impacts on the economy. However, tensions exist between environmental protection measures and the local population especially about hunting restrictions in the National Park.

4.1.10 Marine Park

Project name	Operator	Category of project
Marine Park	Cameroons Government	Conservation
Location		Status
Kribi region or Kribi - Campo		Not known
Information sources / available		
• Interviews in the Kribi region		

Brief description

Background

Some commitments of the Cameroons Government would have been made at an International conference regarding the creation of Marine Parks in Cameroon. Plans went further and have defined the Ocean department area for this purpose.

The project

The sought Marine park would include marine waters off the shores (distance not now), the coastal areas, and inland areas up to a certain distance from shore (distance not known) off / in the Kribi region.

Concern of the population

At the moment, it is controversial project. Some people perceive this park as a limitation to economical development in the region. Some other say that economical development and conservation are compatible in the region and that such a project would lead to a sustainable development of the region. The restrictions of this Marine park on economical activities are actually not yet know.

4.1.11 Agro-industry and forestry expansion

Agro-industry

Project name	Operator	Category of project
Hévécam plantation expansion	Hévécam	Agro-industry (rubber)
Location		Status
Sought around the existing Hévécam plantation location, South-East of Kribi		EIA is made

Information sources / available

- Interviews in the Kribi region

Brief description

Extension of 2000 hectares, meaning the deforestation of the existing surrounding forest.

Project name	Operator	Category of project
Biofuel production	Ferme Suisse?	Agro-industry (palm plantation)
Location		Status
Sought around the existing Ferme Suisse plantation location, North-East of Kribi, nearby the Edéa-Kribi road.		?

Information sources / available

- Interviews in the Kribi region
- Article found on internet: <http://fr.allafrica.com/stories/200801100734.html>

Brief description

There are rumours about the plantation of biofuels in the region.

According to the article mentioned above,

- the Ferme Suisse is already producing 60 000 L of biofuels from palm oil.
- The French Agro-Energy Development organization (AED) proposes to the Government of Cameroon to produce biofuels from sunflower and jatropha, plants which are not produced in Cameroon.
- The Government of Cameroon was favorable, but advised on previous research on plants which are cultivated in Cameroon, using the experience of the Ferme Suisse. The Government also stresses that plantain wastes are also valuable sources of biofuel.

Other information is not yet know at that stage.

Forestry extension

There is no information on the extent and location of forestry extension. However, it is thought that this activity will try to extend.

4.1.12 Tourism

It is also the wish of the government and municipalities to promote tourism in the region. Ground along the coast has already been allocated to its majority and it is thought that large tourism facilities will develop along the coast. However, no (detailed) plan or list of planned facilities could be found.

4.1.13 Eco-tourism promotion and development

The Cameroonian government is working with various non-governmental organisations to develop ecotourism in the region. These efforts are largely concentrated on the Campo-Ma'an National Park, which is a base for various gorilla habituation projects. The Netherlands Development Organisation runs another project that takes travelers to the Campo Reserve and then to traditional homes in Ebodjé, a village 25 km north.

4.1.14 Transport infrastructure projects

Transport infrastructure projects which are not included in other projects mentioned above:

- Tarring of the road Yaoundé-Kribi: in process
- Tarring of the road Kribi-Bata
- Railway Edea-Kribi

4.2 Development and land use plans

The main plans which have already been developed so far for the region are described below.

4.2.1 The draft zoning plan of the MEAO

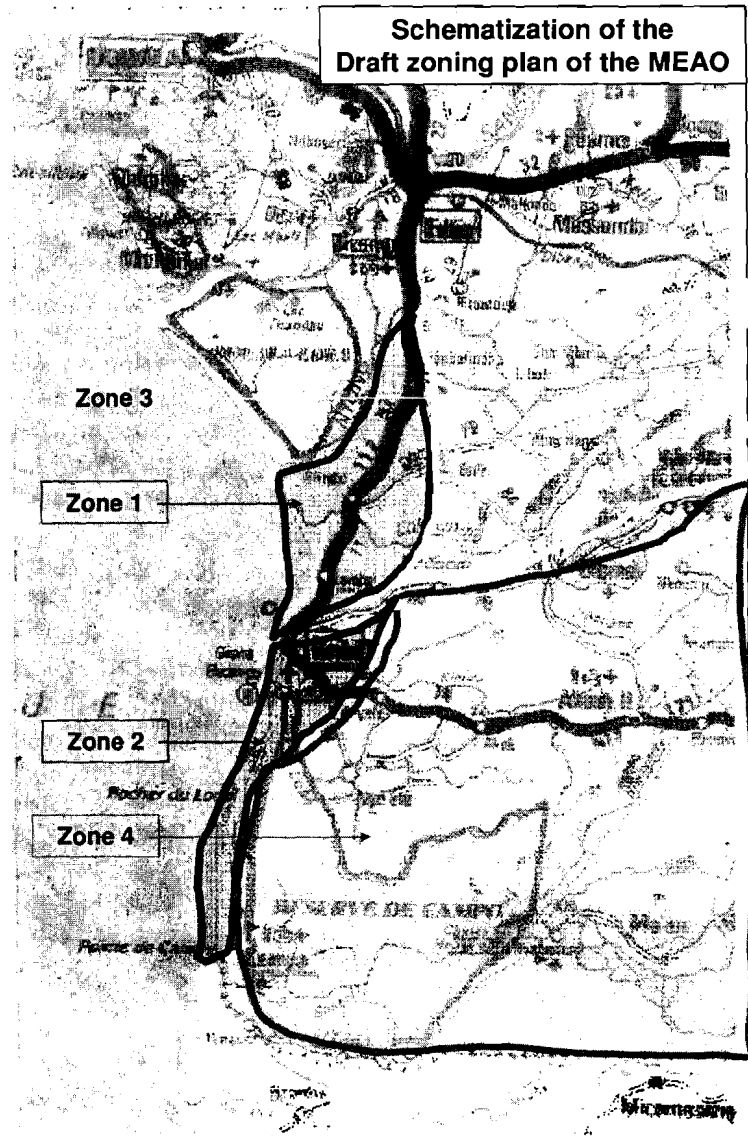
The Group for the Land Use Planning of the Ocean department (in short MEAO, from the French "Mission d'étude pour l'aménagement de l'Océan"): has drafted a land use plan for the Ocean department. The MEAO is officially under the authority of the Ministry of planning and regional development (MINPLATDAT). Its mission is to develop a land use plan for the department of the Ocean. The institution, set up as a temporary entity, has been created by order of the President. This gives this plan a national dimension, which attracts interests of the same scale.

This Draft zoning plan is now drafted for review and/or approval by the Government and is not yet available to the public. The MEAO agreed to receive the Royal Haskoning project team during its first mission. The draft zoning plan was discussed but could not be made available for this project. During this discussion, the main zoning concept was explained and is summarised in Box 4-1 and can be visualized in Figure 4-10.

Box 4-1. Draft zoning plan proposed by the MEOA

- Draft zoning plan proposed by the MEOA**
- Zone 1 North-West (coast line from Kribi town to the Nyong): tourism, fisheries and light industries
 - Zone 2 South –West (coats line, from Kribi town till the border with Equatorial Guinea): port activities, industries, fisheries, tourism
 - Zone 3 North East-East: agriculture & cattle,
 - Zone 4 South Center & East: forest exploitation and agro-industries, respecting the Campo-Ma'an NP
- Important points:
- The Kribi city expansion is proposed (i) between Kribi and the deep sea port (coastal area South of Kribi town) and (ii) along the road axes Kribi-Edéa and Kribi-Yaoundé.
 - Eco-tourism is proposed South in the Campo-Ma'an NP and the Dipikar island

Figure 4-10. Schematization of the Draft zoning plan of the MEOA



4.2.2 Strategy for Sustainable land use planning in the coastal zone Kribi-Campo (2004)

Background

This strategy was prepared in 2004 by Prof. Tchawa on request of three municipalities (Kribi urban, Kribi rural and Campo) with the aim of developing sustainable tourism. This study was supported by SNV (Dutch organization for development).

Summary

This strategy for sustainable land use includes 4 strategic axes:

Axe 1: Institutional capacity enhancement

Axe 2: Space and land use planning and control

Axe 3: Promotion and development of the local economy

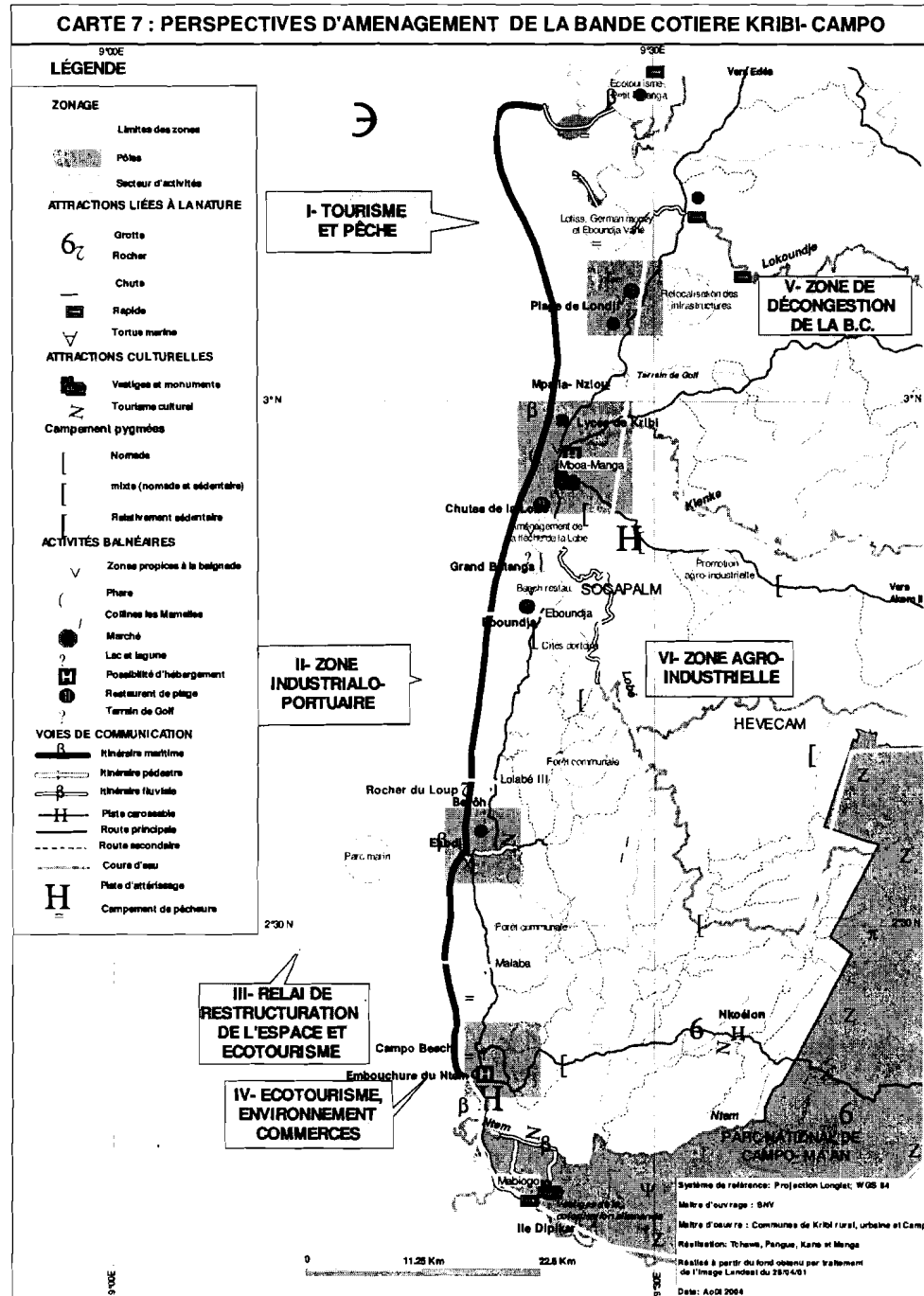
Axe 4: Nature protection and environmental risks management

The zoning proposed as part of this study is summarized by Table 4-2 and can be visualized on Figure 4-11.

Table 4-2. Summary of the coastal zoning plan as part of the Sustainable land use strategy of the Kribi-Campo coastal zone

Zone	Main orientation	Objectives	Strategies
Zone I (Nyong estuary to Grand Batanga)	Business, beach tourism and fishing activities.	Promote specialised tourist activities: beach, business and pleasure; Create coexisting conditions with fishing activities;	- Specialize this sector through a process to relocate activities. A sustained micro zoning and a specific posting plan with priority to business, beach and pleasure tourism are urgent.
Zone II (Grand Batanga to Lolabé)	Industrial and port pole	Create a specialised industrial pole for Grand Batanga's future port in deep water	Attract investors in order to integrate Grd Batanga's potentials (port) Mammals (iron) and Lolabé (gas) in a process to build a port pole
Zone III (Lolabé III to Malaba)	Restructuring space and ecotourism	Provide for the spatial disequilibrium between Kribi and Campo and develop the ecotourism potential of the future relay-pole of Ebodjé.	Instigate, within the framework of the asphaltting project for the Lobé-Campo leg, the establishment of basic facilities at Ebodjé to make of it a re-adjustment pole for the B.C. space
Zone IV (Malaba to Campo-Ma'an NP)	Ecotourism, Environment, Commerce, traditional fishing.	Develop the potential of the Campo park. Promote the development of reception and accommodation facilities at Campo. Develop and organise the commercial potential of Guinea; Fishing and ecotourism capacity building.	Establish a pool of donors, international organisations to attract investors at Campo. Combine the potential of the park, the status of being a frontier town to develop ecotourism and commerce.
Zone V (inland:Lolokoundje river and around Bidou I)	Decongestion of the coastal line	Re-adjust the management and relieve congestion from the sea frontage which is currently saturated	Through a local management policy, delocalize activities that are incompatible with zone 1. There should be prerequisites (constructed roads, land and real state promotion policy, etc...).
Zone VI (Inland: agro-industrial plantations and village agriculture)	Agro-industrial pole	Build a new growth and development pole in the backcountry.	Take advantage of agricultural products by Socapalm and Hévécam to create processing agro-industries. Create new small size plantation areas for smallholders. This production could be disposed of via the port of Grand Batanga.

Figure 4-11. Visualisation of the zoning plan as part of the Sustainable land use strategy of the Kribi-Campo coastal zone



4.2.3 Integrated coastal zone management project

Background

This project is part of the wider Guinea Current Large Marine Ecosystem (GCLME) project, initiated by the United Nations Industrial Development Organization (UNIDO) is currently being undertaken in the Kribi region. The GCLME project is entitled “Combating living resources depletion and coastal land degradation in the GCLME through ecosystem-based regional actions”.

The GCLME project is an ecosystem-based effort to assist countries adjacent to the Guinea Current Ecosystem to achieve environmental and resource sustainability. There are 16 countries concerned by the GCLME projects, among which Cameroon. This would be accomplished by shifting from short-term sector by sector driven management objectives to a longer-term perspective and from managing commodities to sustaining the production potential for ecosystem-wide goods and services.

One of the project goals is to build capacity of Guinea Current countries to work jointly and in concert with other nations, regions, and Global Environment Facility (GEF) projects in West Africa to define and address priority trans-boundary environmental issues within the framework of their existing responsibilities under the Abidjan Convention and its Regional Seas Programme.

One of the sub-projects of the GCLME project is “Integrated Coastal Management Program on Erosion, Environmental Degradation and Conservation of Coastal Biodiversity” and the Kribi region of Cameroon was chosen as pilot project.

Summary

This project is in two phases:

1. Regional diagnosis based on stakeholder consultation. Identification of the current situation by a detailed diagnosis of the condition of region. This includes although the set up of a strategy for Integrated coastal management. This phase is now completed.
2. Implementation of the strategy and its management plan with the set up of a steering committee responsible for it. The tendering of this phase is completed and the implementation should start soon.

Milestones

In the framework of the Integrated coastal management project, a training course was given in November 2007, entitled “Regional training course on Integrated coastal zone management - Environmental Management in Cameroon: Problematic Situations and Success Stories, Prof. Paul Tchawa, Douala, November 2007”.

The summary presentation presents the conclusions which are presented in the box below.

Box 4-2. Milestones from the presentation “Regional training course on Integrated coastal zone management – Environmental Management in Cameroon: Problematic Situations and Success Stories”; Prof. Paul Tchawa, Douala, November 2007

Current situation

The current situation in the Kribi region shows evidence of the lack of integrated coastal area planning¹

- Sectoral environmental management plan
- Various growing conflicts
 - Expansion of agro industries estate and related conflicts with communities
 - Conflicts to control productive fishing area
 - Small tourist operators facing vulnerability in land occupation
 - Some characteristic conflicts among institutional actors
- Rapid development of built up area at the sea front
- Other poor sited facilities of the coastal zone
 - Londji Bay : a typical case of poor sited activity
 - The location of hotels

Attempts

Attempts to elaborate a coastal management plan in the area:

- Previous initiatives (MEAL, GEM GOG, Local councils/SNV attempt)
- Recent and current initiatives (GCLME/UNIDO Kribi Campo ICAM)
- Other institutional pertinent instruments (SDRATT, MEAO, IRAD Kribi...)

Conclusion: the critical issues

- An uncontrolled an unplanned development of tourist facilities;
- Environmental problems (over fishing, destruction of mangrove,
- Coastal erosion, pollution from agro industries and oil companies ...) due to human activities;
- Complex conflicts of access and control of resources;
- An anarchic occupation of sea the front;
- Conflicts of competency among different institutions;
- An inextricable land property context;
- Difficulty to implement the Urban Development Master Plan of Kribi;
- Increasing marginalization of local communities despite the availability of resources in the area.

Opportunities for Integrated coastal area management In the study area

- The fact that the area is a priority development zone
 - Many important development projects are about to be launch in this coastal zone (Deep sea harbour, mineral and gas exploitation...)
 - Some where implemented some years ago (SOCAPALM, HEVECAM, COTCO)
- The existence of unique biodiversity asset with a management plan endorsed and implemented
- The initiative of local municipalities which have tried to develop a common development vision
- The trans boundary physical planning initiative for Central Africa Region
- The current GCLME/ICAM initiative / the pilot demonstration site
- The capacity building strategy with the creation of a Centre for oceanography in Kribi.

4.2.4 Other specific plans for the management of Campo-Ma'an National Park

Other plans in the region concentrate on the Campo-Ma'an area.

Master Management Plan for the development of the UTO of Campo Ma'an

The Tropenbos Cameroon Programme (TCP) ran from 1994 till 2002 in the Campo Ma'am UTO area. The TCP was mainly directed at the sustainable production of timber and other forest products, and included projects on:

- Forest land inventory and evaluation
- Economic, ecological and social aspects
- Improved methods for forestry and indigenous land-use
- Local people's participation in management

Figure 4-12. Master Management Plan for the development of the UTO of Campo Ma'an

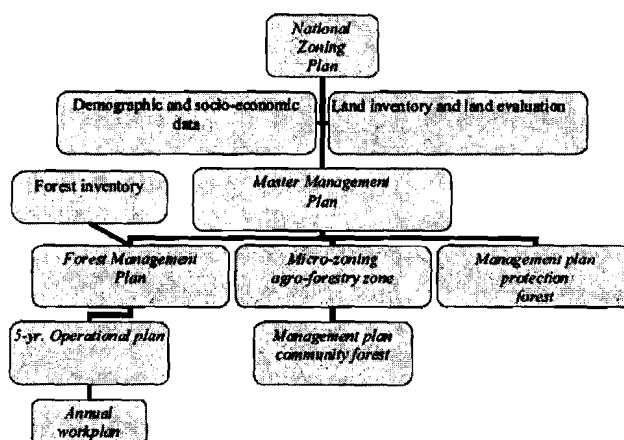


Figure 4-13. Compatibility of Land Utilisation Types

Table 5.1. Compatibility of Land Utilisation Types

LUT	Flora cons.	Fauna cons.	NTFP gathering	NTFP hunting	Timber prod.	Housing	Shifting cult.	Cacao	Oil palm	Rubber	Pineapple
Flora conservation	++	+/-	+	+/-	-	-	-	-	-	-	-
Fauna conservation			+	-	+/-	--	-	-	-	--	-
NTFP. gathering				++	++	--	++	-	-	--	-
NTFP. hunting					+	--	++	++	++	++	++
Timber production in natural forest						--	--	-	-	--	--
Housing							+	-	-	-	--
Shifting cultivation								-	-	--	-
Cacao plantation									-	++	-
Oil palm plantation										--	--
Rubber plantation											--
Pineapple plantation											

- ++ LUTs are fully compatible, although there may be a slight impact of one LUT on the other
- LUTs are compatible, but at least one LUT is modestly affected by the other
- +/- LUTs are partially compatible; one LUT (conservation) is affected by the other (timber or NTFP production)
- LUTs are poorly compatible and should better not be combined on the same tract of land
- LUTs are incompatible and cannot be combined on the same tract of land

After a process of data collection, field research, mapping and stakeholder consultation, six land allocation types were proposed for the Campo Ma'an area, ranging from Protection Forest to Agro-Forestry Zone, each with its own management objectives and legal status according to the Forest Law. For each zone, the possibility and compatibility of certain land uses (see the figure below for an example) as well as corresponding scenarios were identified and assessed (integrated area management). The methodology can also be used for land use planning at the local level.

For more information <http://www.tropenbos.nl/files/Cameroon/camser9.htm>

Development and Management plan of Campo Ma'an national park

A draft Development and Management Plan for the Campo Ma'an National Park was made by Tropenbos and SNV, through a project funded by GEF.

In 2003 WWF took over and completed the Management Plan for the park, especially including more local (indigenous) stakeholder consultation, such as with the Bakola / Bagyeli pygmy minority of traditional forest dwellers. Their rights and obligations regarding using the forest resources in the Park as part of their traditional livelihood system are now officially recognised in the Management Plan of Campo Ma'an National Park. The Management Plan was validated in 2005 and officially approved by the government of Cameroon in December 2006.

In 2005 Campo Ma'an was also recognized by the government as one of Cameroon's two model forests, part of the International Model Forest Network, with the aim to implement sustainable forest management while accounting for community needs and ensuring every actor has a say in the use of the forests.

CHAPTER 5 CUMULATIVE IMPACTS

5.1 General approach

Royal Haskoning will deliver a Regional Environmental Assessment (REA) by using its structured project management approach and following established methodology of impact assessments, cumulative impacts assessments, appropriate local external requirements and international standards, i.e. the World Bank and IFC guidelines and performance standards.

The base reference documents for preparing the REA will be

- The Environmental assessment Sourcebook Nb 15, June 1996 (*Regional Environmental Assessment*)
- *Environmental Assessment Sourcebook 1999*, World Bank
- The *IFC Performance Standards*, and especially the *IFC Performance Standard 1-Social and Environmental Assessment and Management System (April 30, 2006)* which describes the WB/IFC's requirements for the contents and conduct of an ESHIA.
- The *General HSE Guidelines (IFC / WB) (April 30, 2007)*
- The *IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets (May 2007)*

Other performance standards will be adhered to when applicability is established during the REA process.

5.2 Methodology

5.2.1 Regional Environmental Assessment

*'Regional environmental assessment (REA) is a tool to help development planners design investment strategies, programs and projects that are environmentally sustainable for a region as a whole. REAs take into account the opportunities and limitations represented by the environment of a region and assesses on-going and planned activities from a regional perspective.'*¹⁰⁴

The methodology which will be used is based on The World Bank *Environmental assessment Sourcebook Update Nb 15*, June 1996 (*Regional Environmental Assessment*).

The methodology can be summarised by Table 1-1 below. Table 1-1 presents the steps of a REA (first column), the corresponding sub-tasks of the REA for the purpose of this project (second column) and relates those to the Tasks given by the ToR (third column).

¹⁰⁴ World Bank *Environmental assessment Sourcebook Update Nb 15, 1996*.

Table 1-1. Methodology steps of the REA for this project (repeated)

REA step	REA steps description	REA sub-steps	Corresponding Task in the ToR	Chapter in this REA report
Step 1.	Scoping	1.1 Identify spatial and temporal boundaries 1.2 Identify issues of concern and select appropriate Valued Environmental, Socio-economic and Health Components (VESHCs), (see VESHCs definition below).	Task 1	Chapter 1
Step 2.	Policy, legal and administrative framework	2.1 Policy and legal framework 2.2 Institutional framework (incl. Environmental and socio-economic management and monitoring existing capacity) 2.3 Administrative, formal and informal organization	Task 1	Chapter 2
Step 3.	Baseline conditions	3.1 Abiotic environmental conditions 3.2 Biotic environmental conditions and 3.3 Socio-economic baseline 3.4 Health conditions	Task 1 Task 3 Task 4	Chapter 3
Step 4.	Projects planned and development plans	4.1 Projects planned in the region 4.2 Existing plans in the region	Task 1	Chapter 4
Step 5.	Cumulative impact assessment	Scenario in 10-15 years time, if no ESH measure is taken: 5.1 Assess effects of all selected actions on abiotic, biotic, socio-economic and cultural environment and health (especially on selected VESHCs) 5.2 Greenhouse gas cumulative analysis of the planned developments	Task 1 Task 2	Chapter 5
Step 6.	Recommendations towards an optimal regional investment plan	Coherent and comprehensive action plan (mainly through recommendation for the improvement of existing plan) to ensure long-term economic and environmental sustainability.	Task 1 Task 2 Task 4	Chapter 7
Step 7.	Recommendations towards an environmental management strategy.	Based on the findings, the REA will propose a strategy for strengthening environmental management within the region.	Task 3	Chapter 8
Step 8.	Recommendations and alternatives for projects.	In order to apply concretely concepts and strategy dealt with in the last two chapters, recommendations are made to specific projects.	Task 1 Task 2	Chapter 6

5.2.2 Cumulative effects

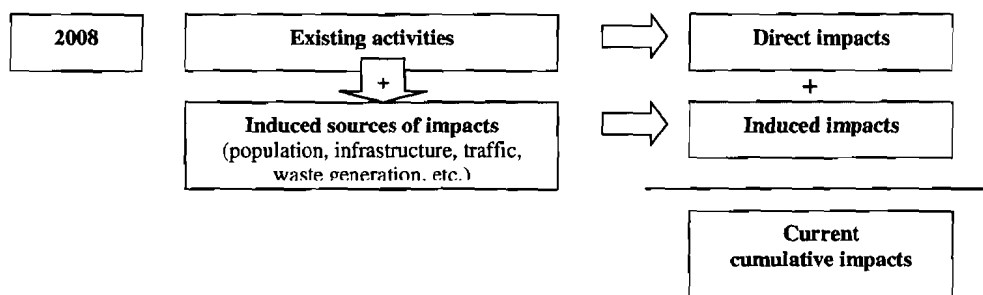
This section gives further explanation on the Step 5 of the above mentioned methodology.

By cumulative effects, this REA study considers the following concepts:

- **Concept 1: Direct and indirect effects:**
cumulative effects of the direct and indirect effects of the planned projects and activities.
- **Concept 2: Future evolution:**
cumulative effect due to the evolution of the situation in 15 years time, considering the evolution of the current activities and the planned projects.
- **Concept 3: Impacted elements:**
cumulative effects of the different activities / projects onto each impacted element

Concept 1: Cumulative effects due to direct and indirect effects

Figure 5-1. Illustration of the cumulative effects of direct and indirect sources of impacts and impacts



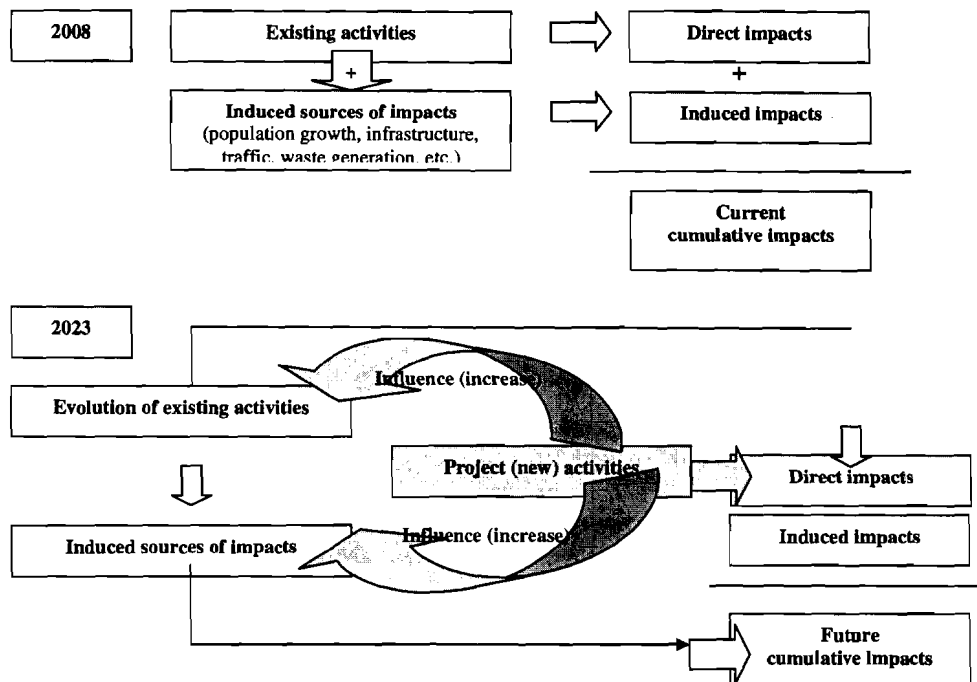
Concept 2: Cumulative effect due to the evolution in time of activities

The **sources** of cumulative impacts in 15 years time are

- the existing activities (considering their evolution in 15 years time)
- induced sources of impacts from existing activities (population, waste generation, built environment, etc.) and
- the projects activities and
- the influence of the project activities onto the existing activities, and thus on induced sources of impacts.

The accumulation of all those activities is the source of cumulative impacts.

Figure 5-2. Illustration of the cumulative effects of direct and indirect sources in the future



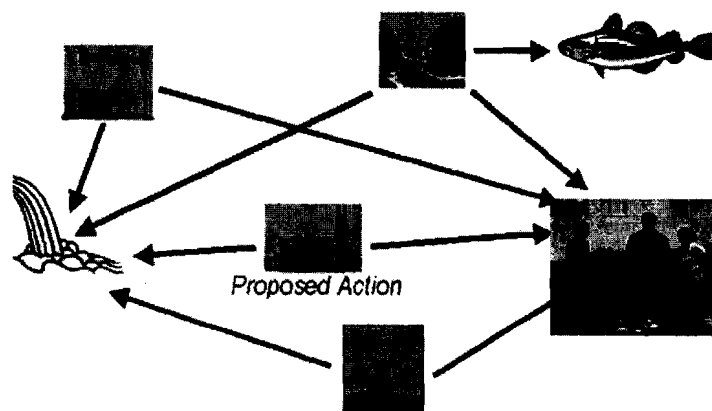
Concept 3: Cumulative effects on impacted elements

Considering Concept 1 and Concept 2, direct and indirect sources of impacts of existing activities and project activities in 15 years time are assessed on potentially impacted 'valued environmental, socio-economic and health components'.

Those valued environmental, socio-economic and health components' (VESHCs) are defined as: "Any part of the environment or society (ESH aspects) that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern".¹⁰⁵

Figure 5-3: Focussing on Effects on VESHCs

The analysis of cumulative effects will focus on assessing effects on the selected VESHCs, from the VESHCs point of view, in which the combined (i.e., cumulative) effects of the various activities on each VESHC. Figure 5-3 illustrates this approach: fish, water quality and human are the VESHCs in this case and arrows indicate an action causing an effect on a VESHC.



¹⁰⁵ Cumulative Effects Assessment Practitioners Guide, http://www.ceaa-acee.gc.ca/013/0001/0004/2_e.htm.

Specific attention will also be paid to:

- Effects that are limited for the individual projects, but due to the cumulative effect are much more important (for example: each of the individual developments doesn't go beyond an air quality standard level, but their cumulative effect would.)
- Other effects that are considerable enlarged through the cumulative effect and/or where common mitigation measures would be more (cost-) effective.

Further background information on the cumulative analysis using VESHCS as basis is given in Annex 3.

5.3 Impact sources

Most sources of impacts are listed below. Activities written in blue are new or existing which are planned to increase / extend.

5.3.1 Industrial activities

1. Agro-industry
(Ferme Suisse, palm plantation – Socapalm, palm plantation, – Hévécam, rubber plantation)
2. Forest exploitation
(Wijma)
3. Oil & Gas exploration and exploitation and related development
(Oil exploitation – Perenco, FSU, COTCO, Chad/Cameroon pipeline – COTCO + Sanaga Sud, CPF, power station)
4. Coastal sand mining
5. Industrial fishery
(Fishing Centre in Kribi)
6. Port traffic
(Kribi port + Deep sea port (s))
7. Other industries
(for the processing of agro-products near Kribi port + new industrial estate on the SNH site and around the deep sea port, new biofuel industry)

5.3.2 Tourism

8. Tourism (see induced sources of impacts)
(expansion of tourism activities, especially the coastal area from Londji to Campo)
9. Eco-tourism
(expansion of tourism activities, especially between Kribi and Campo)

5.3.3 Conservation

10. Conservation
(Edea-Douala Wildlife Reserve, Protected forest of Lolodorf, Campo-Mann National Park)

5.3.4 Subsistence activities

11. (Subsistence) farming (crops and old coffee plantation)
12. Subsistence fishing
13. Hunting

5.3.5 Housing

- 14. Social housing project planned at Londji Norht

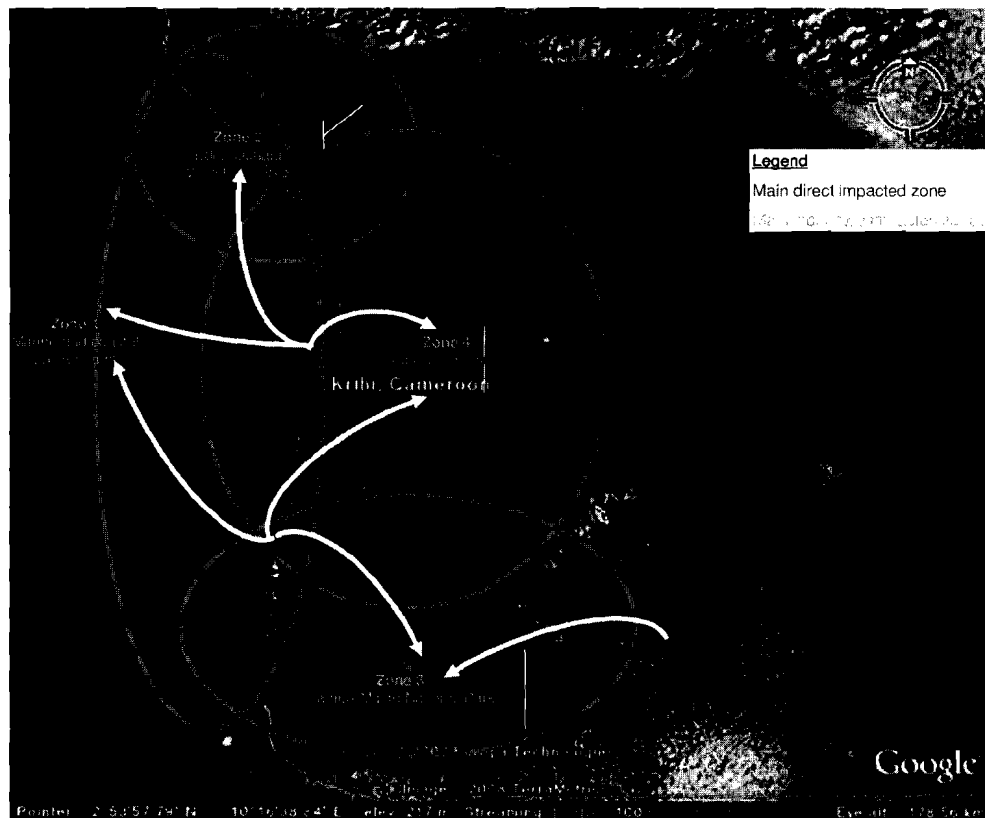
5.3.6 Induced sources of impacts

- 15. Population
- 16. Infrastructure, built environment and land use
- 17. Road traffic
- 18. Marine traffic
- 19. Waste generation

Importance of the induced cumulative impacts

The main cumulative impacts in terms of magnitude will be related to the induced impacts, which are usually looked at project level in an EIA and which would be underestimated without a global approach. The main cumulative impacts of induced activities are described below. Figure 5-4, illustrate the difference in considering only direct impacts (red cycles) opposed to considering induced impacts (orange cycles).

Figure 5-4. Illustration of the importance of induced impacts



Population

There are different interpretations on how many people could live in the Kribi region in 15 years time. Some people expect that the population will be more numerous than in Douala (2 millions inhabitants)¹⁰⁶. The MEAO expects that the population of the Kribi region will quadruple within this period of time. A reasonable assumption¹⁰⁷ would be that in 15 years time, the population in the Kribi city will be 250 000 inhabitants (about 60 000 now¹⁰⁸) and the remaining of the region would not increase significantly.

However, for the purpose of this report, we will say that the population of Kribi town will 'significantly increase' for the following reasons:

- Lack of accurate statistics and demographic data in the region, which does not allow an accurate quantitative estimate;
- The term 'significant' is used considering the number and scale of the projects planned in the region;
- The nature of this REA study is qualitative and therefore the demographic elements will also be described qualitatively.

This significant increase of population and will have equally significant consequences, through:

- the need for more dwellings
- the need for drinking water
- the production of domestic waste and need for treatment and disposal sites
- the need for mobility
- the need for recreational areas
- the need for food

Infrastructure, built environment and land use

Infrastructure which will be induced by the planned projects can be classified in:

- the infrastructure built for the projects: e.g industry buildings, administrative buildings, roads, rail way, etc.
- urban infrastructure related to the increase of population: e.g. dwellings, roads, additional commercial activities to serve the population (goods and services), drinking water treatment, waste water treatment plant, additional energy / electricity facilities, etc.

The significant increase of population will be reflected in a significant increase in infrastructure, resulting in a significant increase of land used for this purpose. The region being largely forested, the additional land used for infrastructures can only be realized through deforestation.

Road and marine traffic

In relation to more industrial and tourist activities and increase of population, the need for goods and people transport will increase highly. This mobility will be facilitated by the current infrastructural projects, i.e. roads and railway planned.

The impact due to goods and people transport should not be underestimated. The population will increase significantly, and so will economical activities. In this, both goods and people mobility will also increase significantly:

¹⁰⁶ Heard during interviews of the first project mission

¹⁰⁷ According to the socio-economist of our team, having large experience in the region.

¹⁰⁸ According to the socio economic report of the UNDP on the South province of Cameroon

Waste generation

The waste production will also increase significantly. However, the following should be considered:

- New type of waste will arise (from the mine exploitation and related activities at port location)
- The amount of waste during construction will bring additional wastes.
- Usually, economic growth is accompanied by waste increase which a much larger factor. In this, further studies should be done in order to get a more accurate estimate of waste production in 15 years time.
- Waste production and issues related to those wastes are often underestimated. They are however the source of a lot of environmental and health risks. This can lead, for instance to waste dumping at sea, increase of diseases, increase of land use conflicts, etc. When facilities are planned after that problems occur, they are mostly much more costly and also means that damage has already occurred. Prevention by ensuring an adequate waste management is the best option.

5.4 Impacted elements

The VESHCs are the elements impacted. As explained in the section on Methodology (5.2), the selection of VESHCs considers:

- Issues of great concern;
- Addresses regulatory requirements;
- Addresses issues raised by the public and other stakeholders;
- Integrates cumulative effects.

The VESHCs are further defined in section 5.2.2. This section identifies the VESHCs, which are grouped in categories:

- 5.4.1 Abiotic environment (abiotic VECs);
- 5.4.2 Biotic environment (biotic VECs);
- 5.4.3 Climate change (climate change VECs);
- 5.4.4 Socio-economy and culture (VSCs);
- 5.4.5 Health (VHCs).

5.4.1 Abiotic environment

The selected abiotic valued environment components (VECs) are:

1. Air quality;
2. Noise level (on site, in neighboring communities, and marine noise level);
3. Surface water quality and quantity;
4. Groundwater quality and quantity (especially as source of drinking water);
5. Terrestrial erosion / sedimentation;
6. Marine water quality;
7. Coastal erosion / sedimentation;
8. Landscape (visual impact).

5.4.2 Biotic environment

The selected biotic valued environment components (VECs) are:

Vegetation

9. Moist evergreen forest;
10. Mangrove forest;
11. Swamp forest / wetlands.

Terrestrial fauna

12. Terrestrial rare or endemic mammals:
- Great Apes (gorillas, chimpanzees);
 - Other Large Mammals (e.g. forest elephants);
 - Monkeys and other small mammals.
 - (Migratory) Birds

Marine and coastal fauna

13. Cetaceans (whales & dolphins);
 14. Marine turtles;
 15. Manatees;
 16. Fish (sea and estuaries);
 17. Fish (inland rivers, lakes).

Habitat

18. Protected areas;
 19. High biodiversity areas.

5.4.3 Climate change

The selected climate change valued environmental components (VECs) are:

20. Production and use of electricity;
 21. Consumption of fossil fuels by industry and transport and residential applications;
 22. Changes in carbon stocks.

5.4.4 Socio-economic environment

The selected valued socio-economic components (VSCs) are:

Economic

23. Local employment;
 24. Economic development of the region;
 25. Community services and infrastructure;
 26. Mobility capacity.

Social

27. General welfare and well-being;
 28. Land and resources used by aboriginal communities;
 29. Land and social conflict.

Cultural and archeology

30. Cultural heritage (burial sites, etc.);
 31. Archaeological heritage.

5.4.5 Health

The selected valued health components (VHCs) are:

32. HIV affected people;
 33. Public health & safety.

5.5 Cumulative impacts on the abiotic environment

Cumulative impacts are described in this section, per VESHCS, i.e. components potentially impacted.

5.5.1 Air quality

Background

Pollutant considered

Main air pollutants we will focus on are based on the criteria pollutants defined by WHO, the EC and USA, and additional pollutant have been integrated as important in the context. The pollutants considered are: CO, NO₂, O₃, SO₂, PM-10, and Lead

- Carbon monoxide (CO);
- Nitrogen dioxide (NO₂), Nitrogen oxides (NO_x) will also be used;
- Sulphur dioxide (SO₂), Sulphur oxides (SO_x) will also be used;
- VOCs (mainly HC, with CH₄ – gas- and in minor quantities: ethylene oxides, formaldehyde, phenol, phosgene, benzene);
- Particles (dust and PM₁₀);
- Ozone (O₃);
- Metals (mainly Lead (Pb), but also Arsenic (As), Cadmium (Cd), Nickel (Ni)).

CO₂ is also an important air pollutant, but will be dealt with in the climate change aspects as not being directly polluting to human health but one the major contributors to climate change.

Impact of air pollution

Human health:

- Respiratory
 - Impacts on respiratory system shown through: chronic bronchitis, asthma crisis, emphysema, irritant effects, extra sensibility to bacterial and viral disease, allergies, fibrosis (from asbestos), cancer (from poly-aromatics and particles);
 - Sources of these impacts: from: SO₂, NO_x, Oxydants, Particles, O₃;
- Intoxication
 - Sources of this impact from heavy metals, fluoric acid;
- Blood problem
 - Sources of this impact (NO_x, Lead);
- irritation of eye and the mucous membrane
 - Sources of this impact: (VOCs, O₃).

Vegetation

- Direct effect (leaves necrosis)
 - Sources of this impact SO₂, NO_x, Particles, HF, HCl;
- inhibit plant growth / damage to vegetation
 - Sources of this impact (VOCs, O₃);
- Indirect effect
 - Sources of this impact O₃ and photo-oxydants, acid rains: effects through leaves and/or roots.

Material

Impacts on material occurs in form of:

- Blackening;
- Chemical attack;
- Cracks.

Air pollution considerations and cumulative aspects

- Local and global effect
 Considering that the wind currents in the region are not very strong, the local air pollution will be a problem, as well as global air pollution. The wind current changes its direction in the course of the day which means that wind currents will not much affect the recipient of air pollution. Thus, recipients of the air pollution will probably be the population, flora and fauna directly surrounding the sources, while air pollution will dilute and spread as the day goes along. The cumulation of air pollutants from different sources can lead to secondary pollutants through reaction of the pollutants with each other. It is difficult to evaluate this secondary reaction without exact data on which industries are to come in the industrial estates.
- At construction time
 Construction periods generally are responsible for significant air emissions due to the intensity of equipments used and the traffic generated by the activities. General air quality and also dust measures need to be taken in order not to disturb the physical, natural, and social environment.
- Operations
 Similarly, existing activities and new projects will be responsible for a general degradation of the air quality as well as dust production. Due to the number and intensity of activities planned, this can lead to serious health problems in the region, and a large contribution to global air pollution. Measures should be taken to lower these impacts.
- **Cumulative sources and their impacts on air quality**
 The cumulative sources of air pollution are presented in Table 5-1:

Table 5-1. Impacts on air quality

Production of pollutant	Sources	Pollutant	Location	Development and relative importance of impact
Pesticides and other chemical products used, and the evapo-transpiration of the plants.	Agro-industrial activities Forest exploitation	volatile chemical compounds such as VOCs and metals	Ferme Suisse, Socopalm, Hévécam, industrial forestry	Compared to now, slightly more.
Combustion processes such as diesel engines and gas turbines	All industrial activities through the equipment used Road and marine transport Energy production (power plant)	CO, NOx, SO2, PM10	Especially around populated areas, industrial areas and ports, but also widespread through the road system.	Huge increase, same for the impact.
Flaring, venting and purging gases (O&G)	Oil and gas activities (offshore platform & CPF) Some waste landfills	Gas or CH4	Offshore operations, some industrial estates.	Medium increase, medium impacts compared to now.
Fugitives gases from loading operations and tankage and losses from process	Most industrial activities using the port facilities. Road and marine	VOCs and metals	Especially around industrial areas and ports	Huge increase, major impacts.

Production of pollutant	Sources	Pollutant	Location	Development and relative importance of impact
equipment (O&G, port operations)	transport			
Air born particulates from soil disturbance during construction and from vehicle traffic	all construction activities traffic especially on non-tarred road and in the dry season mining activities	Dusts, PM10	Especially around all new development during the construction period, in the Mamelles mine.	Great concern especially during construction period.
Particulate matter from other burning sources such as testing.	Most industrial activities		Especially around industrial areas and ports.	
Deforestation through more land use	Agri-industrial activities extension Forestry extensions Extension of the built environment for the construction of industrial estates, dwellings, industrial and public infrastructure.	No pollutant emitted but reduction of the buffer effect of the vegetation on pollution	Widespread	This is expected to be very important, especially through dwellings and associated infrastructure. Great concern.
Production of volatile metal compounds	Mining activities	Metals	Deep sea harbour in the loading of ores, Mammelles	Great impact. This impact did not exist, potentially great amount of metals, great impacts on health.

Main impacts expected / main concerns

The greater expected impacts of cumulative aspects are:

- General poor air quality leading to poor health condition of the population (medium to long term);
- Dust issues, especially during construction time;
- The creation of secondary pollutants through the mixture between primary pollutants emitted by different industrial activities;
- Air pollution on site, especially at ports, around industrial activities and at Mamelles mines: air pollutions on site are much more concentrated. Due to the high risk of the products used in those activities (agro-industry, mines, etc.) workers are at risks.

5.5.2 Noise

The main impacts expected are:

Construction period

- Noise impact during construction: This would affect people in the surroundings of the construction works, but also through induced traffic
- Noise impact on marine mammals and cetaceans during construction period, mainly due to the laying of the pipes (Perenco projects) and the deep sea port.

Operational period

- Traffic noise on main traffic axes and in urban areas;
- Marine noise level of the deep sea port activities;
- Noise level at site, for all projects, concern for the workers;
- Ambient noise level at Les Mamelles mine and in the surroundings area.

5.5.3 Surface water quality and erosion / sedimentation

Background

Water quality

At present, most of the population (estimated to 65%¹⁰⁹) use surface water (without previous treatment) for drinking as well as for bathing/washing/cooking. .

The use of surface water for drinking supplies has resulted in the most significant cause of illness among the local inhabitants, particularly children. This is a sign that surface streams are polluted (¹⁰⁹), since no other monitoring data could be found.

The quality of surface water is critical to the health of the population.

It is not known at this stage what source of water will be used for drinking water of the workers and additional population. AES Sonel mentions surface water; Perenco, if groundwater is insufficient, river water would be collected and treated. This would need specific attention in order not to disturb river courses.

Main impacts expected

Water quality

- Aggravation of the poor quality problem of surface water in the region through:
 - Continuous practice of DTT fishing where the water current is low or nil (lagoons);
 - Increasing discharge or run-off of pollutants (chemicals, pesticides, etc.) in river catchments by the agro-industry and forestry sector;
 - (Accidental) leakages and discharge of existing and new activities;
 - New sources of water pollution through the two new industrial estates (industrial estates, power plant, Les Mamelles mine: see dedicated section);
 - Increasing amount of sewage and solid waste from industrial and domestic origin. The treatment and discharge of such amount of waste with different streams is not yet known;
 - Additional pollution due to sewage and solid waste. If waste is not tackled properly, operators and governmental bodies may dump waste on free/public grounds or in their backyards. If waste is not stored properly, leakages may reach surface waters.
- Difference of water temperature resulting from discharges of warm water after process in river courses (power plant, CPF, agro-industry, mine);
- Risk of population and workers contamination by drinking surface water if not appropriately treated.

Erosion, sedimentation, watercourse disruption

- Disruption of water courses and flow due to:
 - water intake and water rejection in rivers for processes (power plant, CPF, agro-industry, mine) and for drinking water (construction camps, population increase) and .
 - through effects on catchments' run off, especially during construction activities (de-vegetation, water flow obstruction, soil subsidence)
 - silt discharge in river / sedimentation

Main concern

¹⁰⁹ Kribi power project, AES Sonel EIA.

Water quality

- High increase of pollution expected. Critical question on drinking water source.

Erosion, sedimentation, disruption of water courses

- The streams and marshy areas on SNH site and its related water catchments may be highly disturbed by the planned activities. This water catchment leads to the Noyng estuary which hosts mangrove forest. In this, mangroves may also be indirectly disturbed.;
- The EIA of AES Sonel states that surface water will be used as primary water source during operations. There is no further indication on volume, method, or location. The streams on site are very little and could potentially be highly affected by intakes;
- Mbalam projects roads and rail routes will cross a large number of water courses. Not enough is known yet to determine the existence and extent of potential impacts in water course;
- The deep sea port location is located at a river estuary. This issue is not yet tackled by Sundance;
- The Mamelles mine operations with pollution specific to the mining industry:
 - Huge amount of waste produced;
 - Sedimentation;
 - Acid drainage;
 - Metal deposition.
 See Annex 4 for further information on mine-specific issues;
- All construction activities represent a high risk of erosion and/or sedimentation depending on the practices for storage, temporary roads, driving, etc. This should be very carefully checked by the authority.

5.5.4 Groundwater

Background

There is little data available on groundwater in the region. Both Kribi power project and Sanaga South project EIA assume that shallow groundwater (at about 8m on the power plant) is present due to other physical data known. It is assumed that there is also groundwater in the Southern part of the region. This may be slightly deeper than in the Northern part of the region due to the Cameroonian plateau, which is higher level the sea level up to the sea level. The plateau formation has originated the Lobé waterfall, which is at the end of the water course and which water stream directly into the ocean. This is a usual pattern for a river.

There is no information on groundwater for the Northern part of the region,

The groundwater is very sensitive to any surface water / soil pollution due to

- The shallow aspects of the groundwater;
- the low flow due to its low slope rate;
- the porosity of the above soil;
- the high volume of water during the rain seasons.

In this any pollution from the surface would reach quickly the groundwater and would have difficulty to be diluted or transported elsewhere.

Main impacts expected

- Pollution of the surface water (see all sources mentioned in the surface water section) would be reflected in the groundwater.

Main concern

The main concern is drinking water. There does not seem to be a clean source of water available for drinking purposes. This means that water needs further treatment or that drinking water needs to be imported. In both cases, there are additional environmental impacts related to this (more traffic, more land required for the treatment of water). But, the most important is to be able to guarantee safe water to the people who will work and leave in the region. This is actually not the case and the projects planned in the region could contribute to an upgrade of the situation (see recommendations).

5.5.5 Marine water quality

Background

The marine waters off the coast of the Kribi region not free of pollution. Marine quality is important for:

- Quality of life and use of sea water as recreational waters
- Tourism
- At important factor to maintain economical marine resources (i.e. fish stock). Both industrial and subsistence fishing depend on those high fish stocks.
- Scientifically, marine water quality is also important to maintain marine biodiversity, and especially maintain sensitive species.

There is an issue on the scarcity of marine resources. The fishermen see their resources diminishing drastically. According to scientific sources, petroleum activities would not be the only nor the main cause for this scarcity (opposed to what the local fishermen think). The sought sources of marine resources scarcity are :

- The local fishermen themselves (main contribution):
 - fisheries practices have changed to ones which do not guarantee the reproduction of the fish stock
 - fishing with DTT is still practised
- The industrial fisheries (main contribution):
 - the practices of fisheries have changes for ones which do not guarantee the reproduction of the fish stock
- The pollution caused by agriculture and forest exploitation, draining down to rivers and further moving to the coast (main contribution)
- The pollution due to marine transportation and supposed de-fuelling of oil tankers (main contribution)
- The pollution due to oil exploitation (contribution thought to be negligible)
- Urban pollution / pollution coming from dwellings (sewage, solid waste, etc.) (contribution at the moment limited)

Main impacts expected

It is assumed that all the above sources of pollution will also be present in 15 years time. Additionally, other main sources are|:

- Additional pollution from the additional port activities, especially the mining-port activities.
- The new type of (very toxic) pollution from mining activities in the port and around Les Mamelles which may be drained to the sea. (see surface water).

- All surface water pollution identified previously may be drained to the sea.
- Addition marine pollution due to additional marine traffic.
- Additional pollution due to sewage and solid waste. If waste is not tackled properly, operators and governmental bodies may dump some waste in the sea, facing an huge increase of waste and not having neither the treatment, nor the space for adequate storage.
- If waste is stored or treated, leachates may reach sea by drainage.
- Sedimentation and disturbance of the coastal drift due to the deep sea port

Main concerns

The level of marine pollution is already quite high. Current industry practices are thought not to be. Even though no monitoring data is available, the fact that there is a decrease in the fish stock is a demonstrated this. Additional marine pollution (see above) would probably have drastic effect on marine biodiversity and would disturb the whole marine ecosystem. This also mean that fish stock would be further affected which would make very difficult to continue fishing activities. An end to fishery activities would have drastic economic and social consequences.

All efforts should be made to reduce pollution from existing activities and make sure that no additional one from new activities would arise.

Industrial activities in a marshy areas (SNH site), the deep sea port and mining activities (around the deep sea port and by Les Mamelles) are the zones where most concern lay, considering the types of pollution (mine and port) and the consequences that those pollutions would have in these zones and those whole region.

5.5.6 Coastal erosion / sedimentation

Background

The beaches of the Kribi region have already suffered from erosion due to the extraction of sand near the coast. As a result, the beaches have reduced significantly, according to the inhabitants of the region. This already weakens the beaches (subject to further erosion) and reduces tourist attraction. The large picturesque white sand beaches are still present in the Southern part of the region.

Main impacts expected

- The intention of SNH to use marshy areas (which at the moment are public domain) for the pipeline corridor and maybe later use the beach for a jetty port may highly increase the risk of beach erosion in the area of Eboudawaé.
- The deep sea port would bring a completely different current pattern to the coast South of Kribi. As a result, there is high risk of sedimentation and erosion on the coast North and South of the port.
- For the deep sea port, the scoping report mentions that an extension to a multi-purpose port would influence substantially the coastal drift. Environmental studies are for the moment not available. Specific attention should be made to coastal erosion / sedimentation aspects when the planned environmental studies will be made.
- The pipelines going from Eboudawaé / Bipaga I to Mpolonwé I goes along the coast.
 - Construction work will weaken even further an already fragile coast at this location.
 - High safety risks, considering the sand extraction which take place also at this location.

5.5.7 Landscape

Background

The environmental aspects of landscape lay in the visual environment in which people live, work and visit. The impact is therefore visual or aesthetical. Even though it can look a quite superficial theme, it is fundamental in the quality of life and the well being of people. The way the land is used determines the landscape of an area.

At the moment, the region of Kribi is widely covered by vegetation, which can be visually grouped in:

- Dense forest,
- Secondary forest (used and open)
- Plantation
- Coastal vegetation and beaches

This variety of vegetation makes currently also the variety of landscape in the region.

The built environment is anything which is built. It can be houses, industries, roads, schools, etc. The built environment is at the moment quite limited and widespread, living the visitor is a green image of the region with picturesque white sandy beaches.

Main impacts expected

All the projects will impact largely the landscape of the Kribi region.

- Terrestrially, the SNH site will deforest 25 ha of a currently densely and open (on the edge) forest. It is not known if the CPF and possibly other industries will be visible from the surrounding villages, the road Edea-Kribi and the sea. It is expected that the visual impact from land sites (villages, road) will be however limited due to the fact that this site is surrounded by forest. However, the visual impact from the sea, the beaches and from Londji is not known. Indeed, the longer distance which would make this more visible from those places. Landscape impact is not tackled in the Sanaga EIA.
- The power plant will probably be visible from the road, but apparently not from another location (villages, beach, sea, etc.). The impact is therefore not expected to be important.
- Les Mamelles will probably have a very local visual impact. Even though expected to be a large site, the area is not much populated and widely covered with vegetation. The site being inland, in the middle of the vegetation should not be highly visible. However, Les Mamelles being a hill, attention should be made to place the mine in such a way that it uses the hill in order not to be seen (in opposition of being on top of it).
- The deep sea port may have a potentially high visual impact. It will be surely visible from the sea and from the coast. However, depending the layout of the port (which is not yet known) the port will be more or less visible and to a longer or lesser distance from the port (North and South of the port). From land, it is also not possible to evaluate the visual impact at this stage (not knowing the layout of the port and surrounding facilities). The area chosen is close to Ebodje and is very picturesque and has high potential for (eco-) tourism. From the beach of Ebodje, due to its location, the port will probably be visible. All effort should be made in order to minimize coastal visual impact and to make in such a way that it is not visible from land in order to preserve the other potentials (eco-tourism) of this area.

5.5.8 Conclusion

Summary of impacts and their relative importance

Table 5-2 below presents an overview of the cumulative impacts of the abiotic environment and their magnitude which are assumed by the consulting team (based on available information). It also locates where the major impact will be in the region.

Table 5-2. Overview of cumulative potential impacts of the abiotic environment, their magnitude, major sources and locations

Abiotic VESHCS	Impact magnitude	Main sources of impacts (projects) and locations mostly impacted	Main potential impacts
Air		<ul style="list-style-type: none"> Locally around industrial sites, ports, urban areas, busy road traffic points, at ago-industry and industrial forestry sites Regionally an globally: from all projects 	<ul style="list-style-type: none"> poorer health of the population, subject to more diseases, allergies, irritation, intoxication and higher mortality damage to flora and fauna
Noise		Same as air. Main source expected: <ul style="list-style-type: none"> traffic 	<ul style="list-style-type: none"> depending on intensity and frequency: discomfort to psychological disturbance
Surface water		<ul style="list-style-type: none"> Physic-chemical pollution expected especially around ago-industry and industrial forestry sites. Physic-chemical pollution, physical pollution and disruption of water course risks during construction activities of all projects. 	<ul style="list-style-type: none"> decrease of fish stock decrease or extinction of shrimps drainage of nutrient and loss of soil fertility pollution of soil, groundwater and sea water contamination / intoxication of human and animal population damage to vegetation <p><u>NB:</u> In case of extreme or long-lasting pollution, there is risk of extinction of some fish species.</p> <p><u>Comment:</u></p> <ul style="list-style-type: none"> The region having an extensive water catchment system with a lot of little streams drained to bigger water course, any pollution is quickly widespread down the catchment flow. The water quality is already poor.
Groundwater		Same as surface water	
Marine water		<ul style="list-style-type: none"> Surface water pollution drained to sea (see surface water) Deep sea port Industrial activities at SNH site and around port 	<ul style="list-style-type: none"> decrease of fish stock decrease or extinction of shrimps contamination / intoxication of human and animal population damage to coastal vegetation (incl. mangrove forests) coastal pollution <p><u>NB:</u> In case of extreme or long-lasting pollution, there is risk of extinction of some fish species.</p>
Coastal erosion / sedimentation		<ul style="list-style-type: none"> Jetty at SNH site Deep sea port 	<ul style="list-style-type: none"> destruction of beaches instability of the coastal areas and risk

Abiotic VESHCS	Impact magnitude	Main sources of impacts (projects) and locations mostly impacted	Main potential impacts
		NB. Those projects will have a high influence. However, the sand extraction, which is a current activity, is the major contributor to coastal erosion and danger for the coastal landscape.	<ul style="list-style-type: none"> for coastal infrastructure built • risk of flooding
Landscape		<ul style="list-style-type: none"> • Coastal areas <ul style="list-style-type: none"> ○ From Londji to Kribi and Kribi to Campo (due to increase of tourism) ○ From industrial development (Jetty at SNH site and Deep sea port) 	<ul style="list-style-type: none"> • Unattractive coast line, decrease of tourism <p><u>Comments:</u> NB. In this case, the major landscape impacts are caused by the coastal erosion. 'coastal erosion' and landscape' could be treated as one. See N.B. in Coastal erosion section.</p>

Legend of Table 5-2

Impact magnitude

- Red: Major negative
- Orange: Moderate negative
- Yellow: Minor negative
- Green: Positive impact

Conclusion abiotic impacts

At present, there is no effective environmental monitoring of the physical environment; there are no means to determine water, air and coastal quality.

The only visible signs or impacts serve as indicators to alert the population and the authorities that something does not function properly. Some complaints by the population are registered in study reports¹¹⁰ which are testimony of those visible signs or impacts, i.e. stock fish decreasing, beach breadth decreasing, dead fishes floating in rivers.

Those visible impacts are sometimes signals of real environmental disasters, like dead floating fishes over a long stretch of the Lobé river, that are accompanied by cases of human intoxication¹¹¹. Such catastrophes occur at a point of extreme pollution and are observed when damage has already occurred and restoring to the level of the original situation is either impossible or very costly.

It is of crucial importance that monitoring of the abiotic environment is established in the Kribi region in order to timely identify pollution and be able to prevent drastic damage. Instruments are needed to switch from a reactive or passive attitude to a proactive attitude in environmental management; monitoring of the abiotic environment (air, water, noise, coastal erosion / sedimentation) is a key instrument to achieve this.

The cumulative impacts of all the projects will basically only aggravate the current level of pollution of the region which may have drastic consequences on the economy in the long term.

¹¹⁰ (1) Etude pour le suivi de la protection de la zone côtière et de l'environnement marin, Envi-Rep, Nov. 2007. and (2) Stratégie d'aménagement et de gestion durable de la bande côtière Kribi-Campo, Tchawa, 2004.

¹¹¹ 2) Stratégie d'aménagement et de gestion durable de la bande côtière Kribi-Campo, Tchawa, 2004., page 53.

Risk to economical activities

- If pollution of the surface water and marine water quality is degraded further, fisheries (commercial and subsistence) are at risk of extinction.
- If soil is not utilized in a sustainable way, this can decrease the fertility (nutrient-load) of the soil to a point that it cannot be exploited anymore for agricultural purposes.
- If coastal erosion continues, this will threaten:
 - tourism activities, by making the coastal area unattractive;
 - port activities, by the weakening of the coast which may bring instability to the port infrastructures in place which in turn will have maintenance and safety consequences.

Health and safety risks

- The increase of air and water pollution will be translated in poorer health of the population, subject to more diseases, allergies, irritation, intoxication and higher mortality.
- If coastal erosion continues, this could threaten the population by an increased risk of flooding.
- The main source of drinking water, presently being surface water, exposes the population to a high risk of contamination. Any surface water pollution has direct consequences to the population and especially to the young and elderly.

5.6 Cumulative impacts on the biotic environment

5.6.1 Vegetation

For the aspect of vegetation the following Valued Components have been defined:

- Moist evergreen forest
- Mangrove forest
- Swamp forest / wetlands

The main impacts that will be considered relate to:

- Changes in deforestation (forest cover)
- Changes in extent of degraded forest
- Changes in deterioration of quality and diversity as result of pollution

Population and socio-economic activities

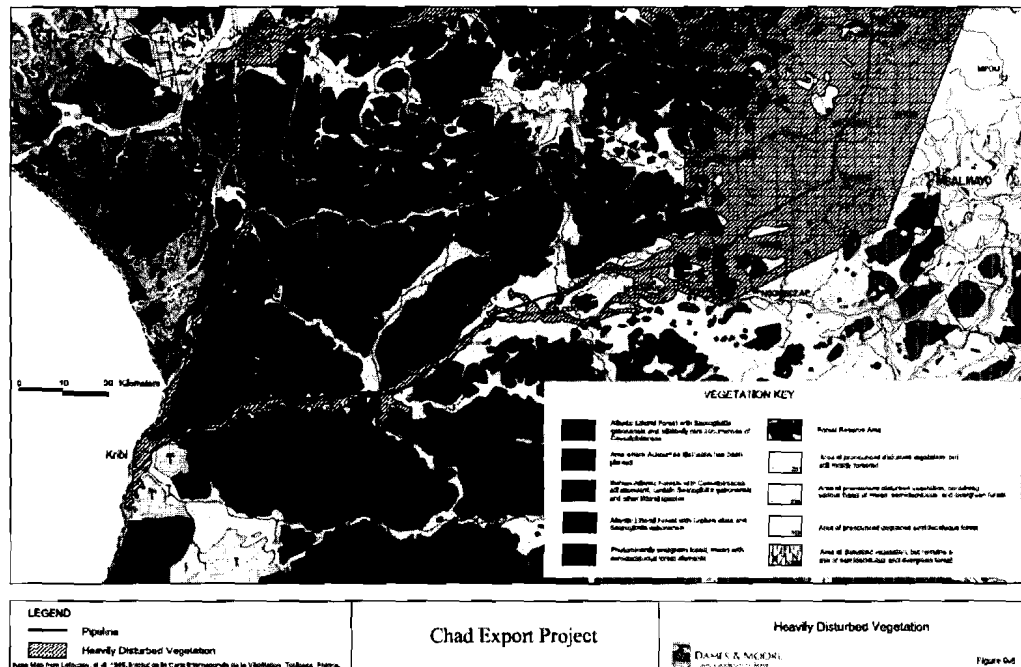
Background

Satellite data from Google earth indicate the current impact of the population and their activities on the deforestation and degradation of the forests in the Kribi region:

- Small areas of degraded forest are present near the main axis: Kribi-Edea, Kribi-Bipindi-Lolodorf, Bipindi-Bela-Elog Batindi, Bipindi-Eseka, Elog-Batindi Eseka, Kribi-Campo, Campo-Nko'elon. Land use extends in general less than 1 km inlands from the roads.
- The rubber plantations of Hévécam, and the oil palm plantations of Socapalm and Ferme Suisse have been sketched along the area.
- More extensive impact on the environment comes from the various logging roads, which penetrate the forest and allow easy access not only for logging companies, but also for other activities such as illegal logging and poaching.
- The Bakola/Bagyeli hunter gathers often (about 50% of the settlements) live between 30 minutes and 2 hours from the main road. Between 1997 and 2000, more than 150 settlements were located in the area. Logging roads allow for more easy travel than undisturbed thick forests.

The following Figure 5-5 from the Chad-Cameroon pipeline, shows current heavily disturbed vegetation near Kribi along the location of the main road to Edea, along the pipeline, and along the Kribi-Bipindi-Lolodorf main road¹¹².

Figure 5-5. Heavily disturbed vegetation in part of the Kribi region



Impact assessment

The proposed projects in the Kribi region and the resulting influx of population will result in a larger demand for land for roads, agriculture, housing, tourism and other purposes. Examples from other countries, such as Brazil (Amazon) show that with the construction of main roads, secondary (legal or illegal) roads, spiraling off the main road, are likely to occur. The announcement by a government of road construction can as well result in major speculative developments, including a run on land along the proposed routes, with people (illegally) occupying land and destroying the vegetation on their chosen site to create the impression that the land is theirs. The example from Brazil showed that 80% of deforestation has taken place within 50 km of a road (area of influence)¹¹³.

The increase in population in the Kribi region will as well fuel an increased demand for e.g. construction and fuel wood (derived from informal logging) and food (which can be e.g. derived from small-scale slash-and-burn agriculture and bush meat). The small scale subsistence agriculture can become a problem when the fallow period becomes shorter and shorter and more and more 'primary' forests are cleared. This generally occurs along main roads and on the outskirts of urban centers. Also a form of virtually

¹¹² Chad export project, SUPPORTING DOCUMENTS VOLUME 2 PROJECT ALTERNATIVES ANALYSIS MAY 1999

¹¹³ Article from National Geographic Magazine, January 2007 "Logging in the Amazon, The Wild West of Brazil", Scott Wallace

permanent agriculture is currently developing in densely populated areas in Western Cameroon with very short (1-2 years) or even non-existent fallow periods, combined with local stock farming (particularly cattle). Abandoned agricultural fields are turned into pasture and any secondary reforestation is prevented.

As a result, the cumulative impacts from increase in population and socio-economic activities pose a high risk of increased deforestation and degradation of forest areas in the region¹¹⁴. This will likely have the most effect on the moist evergreen forests, which are the dominant vegetation type in the interior areas and provide more easily accessible and less hostile areas for urban settlement and economic activities than the mangroves and wetlands.

Gas-to-power project (CPF and Kribi power project)

For the CPF by SNH and the power plant (Kribi power project) by AES Sonel in particular, their construction and operation as well as that of other envisioned industrial activities near the CPF site, will attract workers from local or other areas, depending on the recruitment policy and number of skilled and unskilled workers available in the region. Non-local workers will be housed in the nearby city of Kribi, thus not putting additional pressure on the vegetation near or on site by means of worker camps. However, with every population increase in the Kribi region the demand for land for housing, and the demand for food from agriculture and livestock or hunting and items such as construction and fire wood will increase as well, attributing to the human pressure on its valuable natural resources.

The 2 projects as well as the foreseen industrial activities to take place on the adjacent 25 ha CPF plot plus the construction of a pipeline between the 2 sites will result in the deforestation of the remaining forests at these locations under the footprint of the developments. Where as the CPF, Kribi power project and industrial activities will mainly impact on moist evergreen forests (mainly degraded secondary moist evergreen forests, with some primary moist evergreen forests as well at the CPF site) at the locations of buildings, roads and other facilities, the construction of the pipeline is likely to mainly impact on valuable coastal mangrove forests, as present at part of the CPF site.

Despite major disturbance of most of the (remaining patches) littoral moist evergreen forest areas in the past by activities such as logging and agriculture, surveys by AES Sonel at their site showed that about a 100 different tree species are still present in degraded areas, some with an intermediate to high conservation value. The area of moist evergreen forest loss as a result of the SNH and AES Sonel projects might in absolute terms be relatively small, the major disturbance of forests in the region by innumerable small and many large developments results in a cumulative loss and degradation of its forests that is very significant.

Main concerns

The main concerns for further deforestation and degradation of the forests from human and economic pressures are with the roads and railways and transmission lines, the urban expansion of Kribi city including residential as well as industrial areas, and the expansion of the agricultural plantations (Socapalm, Hévécam). They can have a

¹¹⁴ Interactive Forestry Atlas of Cameroon (version 1.0) An Overview; Global Forest Watch, MINEF, World Resources Institute; 2005

negative impact of major significance on deforestation and degradation in the region, especially on moist evergreen forests and mangroves.

Logging

Background on industrial logging

The industrial logging in Cameroon and Kribi region is generally of low intensity, the number of trees being felled for sale being less than 5 per hectare (trees of commercial value). The process is very selective, in which only the very highest value specimens are taken (*écrémage* – literally creaming off the best specimens), but often not ecologically sustainable. Damage occurs on remaining trees, the tree biodiversity diminishes, logging removes nutrients and escalates forest fragmentation.

Most of the forests in the region have been assigned as Forest Management Units, suitable for logging, including parts of the Campo Ma'an National Park and buffer zone which have in the past been allocated (and have or are still being used) as logging concessions.

The FMU 09-028 between the Douala-Edea reserve and the proposed CPF project, a 'buffer' zone has not been allocated yet for logging, but illegal logging has occurred in this area.

Logging concessions (assigned by Forest Management Units) are given out by the MINOF for 15 years. A management plan has to be prepared during the 3-year provisional agreement. This provisional agreement (PA) period allows the concessionaire limited exploitation over a maximum of three years. If MINOF accepts the management plan, the concessionaire can sign a 15-year renewable forest concession agreement (convention definitive) with MINOF. The forest management plan is reviewed every five years, when the boundaries of the FMU and its subdivisions may be adjusted as necessary.

In practice several PAs in the region have already passed the specified 3 years without an approved management plan. In 2006 2 concessions in Cameroon were FSC certified. The WWF also mentions the absence of an approved forest management plan for several of the logging concessions in the buffer zone of the Campo Ma'an national park.

The current main logging companies in the Kribi region are HFC (Forestière de Campo, belonging to a French International group) located in Campo and in Kribi the company Wijma (GWZ)¹¹⁵. The latter company has been certified FSC (the Forest Stewardship Council (FSC), a sustainable forest management label¹¹⁶ and e.g. manages an important concession (09-21) south-east of the Campo-Ma'an reserve. The actions of Wijma however remain criticised by international forest watch NGOs. According to the company's website, the FSC certification was suspended in May 2007.

Other companies in the area are MMG, CUF, SCIEB and EFFA, which are each concessionaires of large logging concessions. Logging companies in the region have been closely monitored and scrutinized by various environmental NGOs, and are in

¹¹⁵ http://www.wijmadouala.com/bestanden/R%E9sume_de_l'am%E9nagement_et_de_la_d%E9marche_FSC_pour_l'UFA_09-021_et_la_sci%C3%A9rie_de_Bidou.pdf: UFOs are 09-21, 09-024, 11-002 and with CFK, 09-013.

¹¹⁶ www.fsc-watch.org/archives/2006/11/05/Cameroon_Wijma_still_certified_as_official_observers_finds_new_illegalities_comments

general accused of poor environmental management and illegal logging¹¹⁷. According to the World Resources Institute illegal logging in Cameroon accounts for 50% of all timber harvesting. In addition the increased access to areas by means of logging roads provides an opportunity for poachers.

Background on informal logging

Outside the industrial sector there are informal, or artisanal forms of logging, which supply local markets with construction timber and firewood from moist evergreen forests, as well as from mangrove forests. There are already indications of over-exploitation of the mangrove vegetation in the Doula-Edea reserve, by local fishermen who use the fuel wood for smoking fish. Surveys carried out in Cameroon suggest that these forms of logging involve larger volumes of timber than those from industrial logging and they are not subject any kind of regulation. They have been little studied and statistics are scarce.

Impact assessment

In light of the foreseen increase in forest exploitation in the region (e.g Wijma), and the questionable track records of the recent past of the main logging companies active in the region as well as the improved access to (allocated or unallocated) forests areas as a result of the proposed new or to be upgraded roads (and to a lesser extent, railways) the impact of (legal or illegal) logging on the degradation of the forests in the Kribi region is expected to continue and likely increase. This will likely impact most on the moist evergreen forests, which are the dominant forest type in the interior region and provide the highest number of commercially attractive species. As mangrove forests are being used in informal logging for use as e.g. fire wood, they are under increased threat too.

Main concerns

The Kribi region is heavily logged by companies with questionable performance, some of which might want to expand their activities. In addition the increase in population in the Kribi region will also fuel a demand for wood for construction, fire and other purposes. Especially the core Kribi region as well as areas near (new or upgraded) roads will be impacted most by logging activities. This will mostly effect on moist evergreen forests.

Mining

Background

Cameroon has several iron deposits¹¹⁸, including the 300-million-metric-ton (Mt) Mamelles deposit near Kribi containing 30% to 35% magnetite. The exploitation of the Mamelles hills near the coast is still under consideration and would include a small railroad to a new deep water port in Grand Batanga¹¹⁹.

Impact assessment

¹¹⁷ <http://www.illegal-logging.info/uploads/GreenpeaceWijmaDestroyingCameroon.pdf>: A report of the Dutch chapter of Greenpeace about Wijma and affiliated companies.

¹¹⁸ <http://minerals.usgs.gov/minerals/pubs/country/1998/9204098.pdf> Mobs (1998) The Mineral Industry of Cameroon. Who cite the following primary sources that are not active anymore: (Ministère de Mines, d'Eau, et de l'Energie, written commun., undated; Ministère de Mines, d'Eau et de l'Energie, 1998, Ministère de Mines, d'Eau, et de l'Energie—Ressources Minière, accessed May 21, 1999, at URL <http://www.camnet.cm/invistir/minmee/resmine.htm> ; Ministère du Développement Industriel et Commercial, 1998, Produits du Cameroun, accessed May 21, 1999, at URL <http://www.camnet.cm/invistir/mindic/produits.htm>)

¹¹⁹ <http://www.sedfinance.com/perso-25617.htm> provides some information about the project which has to be counter checked.

These developments could impact on nearby valuable wetlands or mangroves on the coast through direct habitat elimination, by pollution from heavy metals and spills, or by altering upstream watersheds and increased sedimentation. In addition the Mamelles hills have been identified as a high biodiversity spot for plant species.

Main concerns

Main concerns are with pollution and habitat alteration from the proposed Mamelles mines and its impact on and location in a floral biodiversity hot spot.

Tourism

Background

The mostly sandy, largely forested, and unspoiled shoreline between Kribi and Campo is unique in Cameroon. According to WWF, rich businessmen from Douala and Yaounde are becoming aware of this and have started buying plots which they plan to develop in the future. They are speculating on the further development of tourism and service infrastructure in the area.

Impact assessment

With the plans to pave the gravel coastal road to Campo and Equatorial Guinea, there is a risk that the valuable coastal forests along this road will be converted into luxurious beach resorts. Without proper land use planning and zoning, these valuable areas can easily be bought for use in future (unsustainable) tourism developments.

Main concerns

Main concerns are with the road from to Campo and Equatorial Guinea and nearby moist evergreen forests along the coastal strip between Kribi and Campo.

5.6.2 Terrestrial ecology

For the aspect of terrestrial ecology the following Valued Components have been defined:

- Rare or endemic mammals
 - Great Apes (gorillas, chimpanzees)
 - Other Large Mammals (e.g. forest elephants)
 - Monkeys and other small mammals
- (Migratory) Birds

The main impacts that will be considered relate to:

- urban and human pressure, including human-wildlife conflicts
- hunting and poaching
- loss of corridor function
- deterioration of food or breeding conditions

Main causes of biodiversity loss

Background

The loss of resources and biodiversity in the forests of Central and Western Africa can mainly be attributed to three processes, which are not necessarily linked but whose effects often accumulate¹²⁰:

¹²⁰ THE FORESTS OF THE CONGO BASIN, State of the Forest 2006 ; Congo Basin Forest Partnership

- (1) A major reduction in the area of the forest, or deforestation, which can lead to the disappearance of certain species based on the concept that the total number of species in an ecosystem or region is proportional to the area of that ecosystem or region.
- (2) Fragmentation of the forests can also cause a loss of species due to the fact that populations may be divided into unviable subpopulations.
- (3) Degradation of the remaining forest formations.

Impact assessment

All three aspects (deforestation, fragmentation and degradation of forest areas) are occurring in the Kribi region, and might be worsened by the many projects that have been planned.

With regard to Campo Ma'an National park ten mammal species in the park have an estimated population size beneath the as critical defined minimum number of 5000 animals¹²¹. The park is considered a relatively isolated area, which coupled with the small population sizes and the limitation on animal migration as a result of human developments can have as a major consequence the extinction of species from the park. This calls for the integrated management of forest reserves in the Kribi region.

Main concerns

Main concerns are with the cumulative negative impact on rare mammal species in the (protected) forests of the Kribi region as a result of roads, railways and transmissions lines, the urban expansion of Kribi city including residential as well as industrial areas, and the expansion of the agricultural plantations (Socapalm, Hévécam).

Infrastructure construction

Background

By the end of 2007, the Edea to Kribi road and the Bounyabel-Eseka-Lolodorf were the only tarred roads in the region, the former being a good quality heavy road, the latter only having a thin tarred surface. Logging companies maintain roads in areas where they have their concessions. Many future road improvement, and road and railway construction projects are being considered, such as:

- Kribi to Yaoundé: via Lolodorf-Mvengue-Ngoumou, of which the first part from Yaoundé is actually under construction.
- Probable improvement of the road Kribi-Bipindi-Lolodorf, which pavement rapidly degrades during the rainy season.
- Tarring of the Kribi-Campo road. Since the improvement of the bridges along this road, traffic has been possible during all seasons.
- Probable improvement of the Kribi-Akom II – Ebolowa road, which would link the main division capitals of the South province.
- New railroads, linked to the creation of a deep water harbour in Kribi, from Edea to Kribi for the exportation of aluminium, from Mbalam to Kribi for the export of Iron Ore (the most advanced project), and from the Mamelles area to Kribi for similar iron ore exportation.

Impact assessment

¹²¹ Pooling local expert opinions for estimating mammal densities in tropical rainforests, Christiaan A. van der Hoeven, June 2004

Roads are essential for development, but they fragment the forests, favor the influx of people (new or expanded settlements) and advance of agriculture and facilitate hunting and trade in bushmeat. They often result in increased deforestation of an area, stemming from better access to forest reserves, easier (more profitable) transportation of logs to market, and the influx of settlers.

The damage that roads cause to biodiversity is usually the result of a lack of planning and non-compliance with the laws in force. In certain cases, roads have positive effects and attract populations away from the forests, sometimes even out of protected areas, and allow these populations to develop activities other than hunting and gathering¹²².

The Chad-Cameroon pipeline for example is showing indications of an increased rate of logging and trade in bush meat, especially of protected species as a result of enhanced forest access provided by the creation of new roads and the cleared pipeline corridor.

In addition to habitat loss and poaching, roads are also causing fragmentation of forests and the blockage of traditional migration routes, which can result in isolation of species, reducing their range, total available food quantity and the reproductive gene pool, leading to an increased vulnerability of these populations.

The increased presence of human being near wildlife populations can further contribute to the spread of disease (e.g. ebola) among vulnerable species, such as gorillas and chimpanzees and cause an increased number of conflicts between humans and wildlife, be it from traffic accidents to the raiding of crops of local farmers by chimpanzees.

Regarding railways can be noted that examples from near Yaoundé show that railways can be used as an effective means for illegally transporting large quantities of bushmeat as they provide reliable all year round transport and local institutional enforcement capacity is often insufficient or corrupt¹²³.

Without proper land use planning and a strong institutional enforcement capacity the infrastructure developments in the Kribi region, mainly roads, railways and transmission lines are expected to contribute to the loss of biodiversity in the region, especially with regard to rare mammals such as forest elephants, gorillas and chimpanzees.

CPF and Kribi power project

The construction of the CPF and the Kribi power project, including access roads, pipelines, transmission line and foreseen related industrial activities at CPF will result in major disturbance of the wildlife present in these areas. Due to prior disturbance from other sources, mainly small mammals including several species of monkeys, 'duikers' (a small deer) and pangolins, reptiles and birds remain here. Although the CPF and power pkant areas do not contain high conservation values (anymore), the ongoing disturbance and dissemination of wildlife populations in the Kribi region has a significant cumulative impact on the sustained survival of this rich array of terrestrial species.

¹²² Indirect Impacts of Road-Building in Developing Countries, Carrie Brunger, Road-RIPorter Issue: Winter Solstice 2003, Volume 8

¹²³ CHAD EXPORT PROJECT, SUPPORTING DOCUMENTS, VOLUME 5: CAMEROON BIOLOGICAL STUDIES, MAY 1999

Main concerns

The possibility that the powerline crosses through or near the Campo-Ma'an reserve; the increasing fragmentation of forests by means of a road and railway to Djoum and the Mbalam mine; and the increased human presence and pressure as a result of the upgrading of the road to Campo (near the Campo Ma'an UTO) and a road, railway, and transmission line from Kribi to Edea (near Douala – Edea wildlife reserve and buffer zone) are of main concern regarding their negative impact on terrestrial fauna species in the region.

Hunting and poaching

Background

The hunting decree (Decree Nr. 95/446/PM) of Cameroon authorizes traditional hunting everywhere except in private domains and in protected areas. Legally hunted bushmeat is solely for individual consumption and therefore the commercial trade in bushmeat is strictly prohibited (Article 24). Hunting in the national domain can be prohibited during certain periods. Moreover, the use of certain techniques (Article 80) and some arms (Article 106 - 108) is forbidden for any hunting activity in Cameroon.

The hunting of wildlife in forests however is a common practice associated with timber extraction, mining, agricultural development and deforestation. Especially roads created for e.g. logging become points of entry into otherwise isolated areas. And till recently many villagers could not believe that bush-meat stocks were finite.

Over the last twenty years, local hunting has also evolved from a valued occupation for adult men in the area to an almost criminal activity (see also section 3.6.3). Therefore poaching in the Kribi region, by locals as well as non-local employees working at e.g. the agricultural companies and pipeline construction, even in protected areas, has become a widespread practice, which has been poorly enforced. Although the enforcement of the non-allowance of poaching by villagers in the Kribi region is gradually stepped up, many of the tourist hotels and restaurants in Kribi still openly serve the same forbidden bushmeat without being bothered.

In addition tourism in the protected areas is very poorly developed (or non-existent) at present and for many local populations the reasons for protection of animal species are poorly understood. Upon the take-over of the Campo Ma'an park management by WWF in late 2003, large amounts of bushmeat, snares and guns were confiscated. For example, non-local workers of the Socapalm and Hévécam agricultural plantations, which are located within the integrated management area (UTO) of the larger Campo Ma'an area, have been known to frequently supply their diet with bushmeat hunted in the Campo Ma'an buffer zone and National Park¹²⁴.

For the Douala-Edea reserve there are indications that hunting for bushmeat is still widespread, as the park is very ill-equipped and –staffed, and with a large number of villages (more than 60) with a population of over 10,000 situated within and on the periphery of the reserve. An impact analysis of poaching activities in Douala- Edea carried out between August and December 2000 (4 months), showed that more than 896 animals were killed or captured distributed as follows: 198 primates (22.1%), 196 crocodiles (21.9%), 148 porcupine (16.5%), 95 alligators (10.6%), the rest constituting antelopes (38), manatees (16), pythons (18), hares (26), turtles (26), bush pigs (32),

¹²⁴ Plan de aménagement et de gestion du parc national de Campo Ma'an, Tropenbos International / SNV, 2003

parrots (10), etc. The animals were killed or captured through: guns (27.7%), traps (27.3%), dogs (20.2%), hooks (18.9%), and others (5.9%)¹²⁵.

Great apes, such as chimpanzees and gorillas, have a slow reproductive rate and tend to be distributed patchily within their geographic ranges, which makes them very vulnerable to poaching. They are fully protected by law, but regularly killed and eaten as bushmeat, and their body parts are also used in traditional medicine. Gorillas are also hunted for trophies, and there is demand for great ape infants for an illicit trade for pets, private zoos, and collections.

The status of forest elephants in relation to poaching remains poorly known, because of methodological problems and severe logistical constraints, which have inhibited reliable population surveys and estimates of illegal killing. Forest elephants are distinctive on morphological, ecological, behavioral and genetic criteria, constituting at least a subspecies and possibly a distinct species of African elephant. As the illegal trade in ivory is more easily enforced on the open savannahs of southern and eastern Africa, the forest elephants are suspected to now be the source of much of the world's illicitly traded ivory¹²⁶.

Besides their 'scientific' value, gorillas and chimpanzees like other non-human primates, as well as forest elephants play an important role within the forest ecosystem as major seed dispersers, and many plant species are even dependent on passing through an elephant's digestive tract before they can germinate. They also contribute a significant proportion of the mammalian biomass.

The absence of a documentation centre, a monitoring system, and a geographical information system in the Kribi region and its protected areas make it hard to assess the status of animal populations and how the whole ecosystem is reacting to external pressure from human activities, as well as to assess the results of anti-poaching measures.

Impact assessment

Without increased institutional capacity and commitment for law enforcement the extent of poaching is likely to increase as a result of the proposed projects, especially as a result of the construction of roads, railways and transmission lines, the increase in urban settlements and in agricultural plantations (Socapalm, Hévécam) and probably also the increase in tourism, as tourism hotels and restaurants openly sell bush meat and thus create a demand.

Not only during the operational phase (causing an influx of people to the region), but also during construction camps of construction workers for f.e. roads provide a major threat to the wildlife in the area. Highly targeted and vulnerable are species such as gorilla, chimpanzee, forest elephant and manatees, next to a number of more common mammals such as a range of monkeys and bush pigs which supply the population with food.

¹²⁵ Reproductive and Management Aspects of Endangered Chimpanzee (*Pan troglodytes*) Population at Douala-Edea Wildlife Reserve Cameroon, BRANDENBURGISCHE TECHNISCHE UNIVERSITÄT COTTBUS GERMANY

¹²⁶ Monitoring of the Illegal Killing of Elephants (MIKE) programme, 2003-2005

CPF and Kribi power project

As its workers will not be housed on or near the sites, this will reduce the impact through poaching on nearby areas. The creation of access roads and transmission lines might however provide improved access to hunters which are looking for an easy entrance into nearby areas. To the north of the CPF site and to the west of the transmission line, valuable wildlife species might be present as this area (FMU 09-028) is expected to act as a buffer zone to the Doula – Edea wildlife reserve. Further to the north-east of the Kribi power project site, in the Lakoundje area, small populations of large mammals, such as gorillas, might remain, as was reported by the 1999 biodiversity studies undertaken for the Chad-Cameroon pipeline.

Main concerns

The agricultural plantations (Socapalm, Hévécam) can be found close to the Campo Ma'an National Park and its (non-local) workers are known to actively poach animals. Surveys indicated that farmers in the Campo Ma'an UTO currently obtain more than 75% of their animal proteins from bushmeat. Inquiries indicated that wildlife abundance within the plantations and the coastal zones was negligible, and most hunting took place outside these areas¹²¹. An increase in these plantations, and thereby number of workers, can increase pressure on the remaining wildlife in the wider area.

The construction and operation of roads near the protected areas, such as the road from Kribi to Campo (near Campo Ma'an UTO), the road / railway / transmission line from Kribi to Edea (near Douala – Edea and buffer zone), and the transmission line from Memvelé dam to Edea (near or through Campo Ma'an National Park), can pose serious threats to rare mammal species.

Mining

Impact assessment

Mining may result in additional indirect impacts that emanate far from the mine site. The most obvious impact to biodiversity from mining is the removal of vegetation, which in turn alters the availability of food and shelter for wildlife.

Most mining operations use metals, reagents, or other compounds to process valuable minerals. Large quantities of metal deposition can be toxic. Few terrestrial species are known to be naturally tolerant of heavy metals.

Main concerns

Main concerns are with pollution and habitat alteration from the proposed Mamelles mines, located near the north-western part of the Campo Ma'an UTO, and its impact on terrestrial fauna species.

Tourism

Background

Development of ecotourism in the region, especially in the Campo-Ma'an area is currently being investigated and developed by the WWF in cooperation with local communities. The inland rainforests provide a high biodiversity including appealing large mammal species. The coast is also very attractive with mangroves and scenic beaches, where turtles come to nest. Inland, rivers are suitable for dugout canoe excursions, the Memve'ele and Lobe offer scenic waterfalls, archaeological sites, and a large cultural diversity with coastal communities, forest dwellers, hunters and gatherers provide a strong tourism potential.

The area's high tourist value currently remains almost unexploited and does not contribute much to the local economy or improvement of residents' livelihoods. Outside Kribi, tourist infrastructures are almost inexistent, and potential tourist sites are not advertised or difficult to access. The park's conservation office does not have a tourist information centre, and most of the local communities have no idea of how to manage ecotourism. Ecotourism though can generate additional or alternative income for locals (instead of poaching, logging and agriculture), as well as high revenues for the government from e.g. visits of western tourists to gorilla groups.

Impact assessment

Tourism in the region, especially ecotourism, will however have to be carefully developed to avoid negative impacts on biodiversity. Habituation of a group of gorillas for example is stressful for the animals and regular visits by people disrupt normal gorilla behavior in various ways. Studies in Uganda indicated that during visits the animals dedicated less time to feeding, and signs of stress or emotional arousal were often noted. The presence of tourists increased the travel distances of the gorilla groups. There is also a high risk of disease transmission to gorillas and vice versa, and of injuries to tourists and ranger guides if minimum distances are not well adhered to. At the study site the rules for the visits and their justifications were not well explained to the tourists by the ranger guides, and were frequently broken by as well the visitors as the guides themselves¹²⁷.

Tours by motorboats (on rivers and through mangroves areas) or jeep can impact on nearby wildlife, as the noise from motor boats and vehicles can disturb (nesting) birds and monkeys as well as other animals, present in trees or on the ground along the route.

The development of nature-based tourism in the Kribi region therefore should be carefully introduced and managed, and be compliant to strict rules in order to avoid negative impacts on wildlife.

Main concerns

Main concerns are with the development of eco-tourism in the protected area Campo Ma'an. If too many tourists are allowed in, rules are not properly explained or enforced or equipment is used in an unsustainable way (e.g. noise from motorboats and jeeps, clearing of forests by guides to allow better tourist access) tourism can impact negatively on wildlife in the area, especially highly popular but vulnerable species such as gorillas.

5.6.3 Marine ecology

For the aspect of marine ecology the following Valued Components have been defined:

- Cetaceans (whales & dolphins)
- Turtles
- Manatees
- Salt and Sweet water fish and other marine species

The main impacts that will be considered relate to:

- urban and human pressure

¹²⁷ The Impact of Tourism on the Behaviour of Mountain Gorillas, Gorilla Journal 30, June 2005

- hunting and poaching
- over-harvesting
- emissions
- deterioration of food or breeding conditions

Industrial / urban development

Impact assessment

Without proper consideration of the impacts of industrial development in the region (including its emissions to air and water) and of the construction of infrastructure (and resulting population influx), combined with a thorough land use plan, major impacts on marine ecology could occur. This could include e.g.:

- The destruction or over-harvesting of mangroves by residents, such as in and near Douala – Edea wildlife reserve, which provide important habitat for manatees.
- The destruction of reefs from pipeline construction and dredging for the deep-sea harbor, providing a natural fish habitat and breeding area.
- In the coastal strip from Kribi to Campo could occur the disturbance of turtles coming on-shore to lay their eggs, as well as young turtles hatching from these eggs, as a result of tourism occupations and light hindrance from industries and hotels along the coast. Beach tourism disturbs adult turtles and could compact the sand of beaches, which is disadvantageous for the development of turtle eggs. Light disturbs turtles searching for their native beach to come on-shore, and disturbs young turtles after hatching to find their way to sea.
- The poaching of animals such as manatees and turtles, and the collection of turtle eggs for sale or consumption as a means of income provision for residents.
- The injuring or killing of manatees as a result of increases in motorized vessel traffic for tourism or fishing purposes near mangroves and in estuaries. Manatees forage near the water surface and do not respond fast enough to avoid approaching motor boats.
- Population decrease of cetaceans such as the Cameroon dolphin as a result of excessive fishing of prey species along the coast and in estuaries, reducing food availability as well as increasing the risk of incidental catch; pollution resulting in habitat destruction, as a result of agricultural and industrial development on the coast and offshore oil and gas exploration; and the possible fracturing of the habitat range, resulting in reproductively isolated groups.
- The disturbance of turtles and cetaceans by underwater noise from vessels, construction activities (for f.e. pipelines) and dredging (f.e. for a deep sea harbor). Harassment of humpback whales¹²⁸ from underwater noise has been indicated from a level of 140 dB noise emissions at source. Turtles are hearing insensitive but do display avoidance reactions at high levels of sound. For instance green and loggerhead turtles¹²⁸ displayed avoidance behavior at 175 decibels (dB). This was extrapolated to mean that behavioural changes would occur at two kilometres and avoidance at one kilometre in depths of 100-120m.
- The further depletion of commercial fish resources as a result of unsustainable fishing techniques and the over-harvesting of fish species, of which there are already strongly indications in the region. Currently artisanal as well as industrial fishing takes place in the area.
- The by-catch of turtles and small cetaceans from unsustainable fishing practices.

¹²⁸ McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, MN, Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K. (2000). Marine Seismic surveys – A study of environmental implications. APPEA Journal 2000: 692-708.

The Chad-Cameroon pipeline for example caused the destruction of a natural reef in front of Eboumé village during the construction of the pipeline terminal, which provided a breeding area for fish as well had certain tourist potential. There are indications that the destruction of this reef has contributed to the disappearance of several fish species. After several years of accusation regarding the problem, an artificial reef was put in place in July 2006. There are no clear indications yet of how effective the artificial reef is in restoring local fisheries.

The risk of water contamination due to oil leaks or spills from this pipeline will also remain a danger, as the pipeline's exit point at Kribi could threaten a fragile marine ecosystem. In January 2007, an oil spill occurred on the Cameroonian coast. While little information was provided on the extent of the spill, a public statement was issued by the World Bank regarding the government's delay in informing about the spill and about the continued lack of a National Oil Spills Response Plan¹²⁹.

CPF and Kribi power plant

Part of the CPF site is located on the coast, with at least the presence of crocodiles being recorded in its EIA and the likely presence of manatees nearby by means of the 1999 biodiversity studies for the Chad-Cameroon pipeline. The general disturbance from construction and operational activities, on land and in water, and especially the construction of pipelines (on- and) off-shore may cause a significant impact on marine species in its presence. Manatees in particular are vulnerable to disturbances, but also fish and other marine species near pipelines will experience disturbance and direct loss of habitat under the footprint of the development. Finally underwater noise from construction activities may impact on turtles and cetaceans present within a few kilometers from the construction site.

Main concerns

Main concerns are with the development of beach tourism, settlements and industries on or near turtle beaches in the area between Kribi and Campo; contamination and destruction of fish habitats (which in turn can impact on other animals, such as cetaceans) as a result of oil and gas exploration, including pipeline construction, and the construction of the deep sea harbour; disturbance, habitat loss and possibly poaching of manatees as a result of the construction of pipelines, other coastal structures near mangrove areas and an increasing coastal human population; and an increase in the (over)harvesting of fish resources (which may also impact on other animals, like cetaceans); and the threats from an increased population on manatees.

Mining

Impact assessment

Mining may impact biodiversity by changing species composition and structure. For example, acid drainage and high metal concentrations in rivers generally result in an impoverished aquatic environment.

Acid drainage occurs when sulfide-bearing minerals, such as pyrite or pyrrhotite, are exposed to oxygen or water, producing sulfuric acid. The presence of acid-ingesting bacteria often speeds the process. Acidic water may subsequently leach other metals in the rock, resulting in the contamination of surface and groundwater. Waste rock piles,

¹²⁹ The Chad-Cameroon Oil & Pipeline Project A project non-completion report, April 2007, Center for Environment and Development, Chadian Association for the Promotion and Defense of Human Rights

other exposed waste, mine openings, and pit walls are often the source of acidic effluents from a mine site. The process may occur rapidly and will continue until there are no remaining sulfides, and impacts on aquatic life when acidic waters are discharged into nearby streams and surface waters.

Most mining operations use metals, reagents, or other compounds to process valuable minerals. Large quantities of metal deposition can be toxic. Few aquatic species are known to be naturally tolerant of heavy metals. Especially juvenile fish are more sensitive than adult fish, and the presence of heavy metals may affect critical reproductive and growth stages of fish.

Erosion from waste rock piles or runoff after heavy rainfall often increases the sediment load as a result of mining of nearby water bodies. The increased sediment loads can smother benthic organisms in streams or oceans¹³⁰.

Main concerns

Main concerns are with pollution of and increased sedimentation in nearby or downstream watercourses as a result of the proposed Mamelles mines.

Tourism

Background

The region has potential for nature-based marine tourism, such as dugout canoe rides on river or on sea, and visits to the turtle species that come to lay their eggs on the nearby beaches. WWF is currently investigating these possibilities at and near Campo Ma'an National Park.

Impact assessment

Nature-based tourism, preferably ecotourism, in the region can provide alternative sources of income to the local population, other than fishing, hunting etc.

In addition there are plans to create a marine reserve, which if well managed could provide major tourism potential. A marine reserve would also allow for the revitalization of fish and other marine species, which have been over-harvested by fishing activities, and thereby contribute to the continued and sustainable presence of a fishing industry on the coast of Cameroon (as the continued unsustainable exploitation of the marine resources would eventually result in the abandonment of fishing activities in the region, and thus loss of economic activity and jobs).

However tours by motorboats or motorized canoes for example through mangroves areas and estuaries can severely impact on manatees in a negative manner, as the animals are often slow to avoid the motor blades and experiences from abroad show that a high number of manatees can get injured in this way.

The development of nature-based marine tourism however should be carefully introduced and managed, and be compliant to strict rules in order to avoid negative impacts on wildlife in order to avoid negative impacts, such as the disturbance of turtles and cetaceans as a result of too close and frequent encounters.

¹³⁰ Appendix 2: Environmental and Social Impacts of Mining, World Resources Institute

Main concerns

One main concern is the sustainable establishment of a marine reserve in the Kribi region, in such a way that also the impacts on local fishermen are carefully assessed and that their participation is encouraged and valued. Another concern is the impact of tourism by motorized vessels on slow-reacting species, such as manatees.

5.6.4 Habitats

For the aspect of habitats the following Valued Components have been defined:

- Protected areas
- High biodiversity areas

The main impacts that will be considered relate to:

- Decrease of habitat size
- Segregation / fragmentation of habitats
- Alterations in the presence of keystone species

Infrastructure and human presence

Impact assessment

The highest level of negative impacts on habitats is usually experienced in the vicinity of roads or human settlements, extending up to a distance of 50 km. The highest levels of indirect impact often occur within a 10 km zone. In this regard can be noticed that the Campo Ma'an National Park for example shows an increasing viability of the habitat and its species from west to east as human pressure and presence are gradually reduced.

Especially in light of the proposed (infrastructure) projects in the Kribi region, only very few areas to none will be located at a sufficient distance from human developments to remain without possible negative impacts on its habitats. In addition infrastructure and its related developments and increased human pressure can considerably contribute to the fragmentation of habitats and the reduction of migratory patterns.

CPF and Kribi power project

The development of the CPF and the Kribi power project will result in direct habitat loss (of mainly degraded forests), but will also decrease the distance between human activities and presence and its hinterlands, which are expected to still contain valuable habitats such as near the Doula – Edea wildlife reserve and in the Lokoundje area. In general can be said that with a reduction of the distance between a vital habitat and heavily disturbed areas, such as near settlements, industrial sites and roads, the risk and level of disturbance of these vital habitats increases.

Main concerns

Major concerns are with the cumulative negative impacts on the habitats of the Campo Ma'an National Park and buffer zone (UTO) and the increase in human pressure from the upgrading of the road to Campo, the construction of the transmission line from the Memvelé dam to Edea, the expansion of agricultural plantations (Socapalm, Hévécam) and the development of tourism in the coastal zone between Kribi and Campo.

Major concerns are also with the cumulative negative impacts on the habitats of the Douala – Edea wildlife reserve and buffer zone (especially FMU 09-028) and the nearby proposed road, railway and transmission line from Kribi to Edea, the growth of

settlements in the vicinities of the reserve and industrial projects near the buffer zone, such as the CPF and power station plant.

With regard to non-protected high biodiversity areas, rock exploitation on Mont d'Eléphant and the possible exploration of iron ore deposits of the Massif des Mamelles, both biodiversity hotspots, and the related service infrastructure could have major negative impacts on the biodiversity of these important areas.

Selective logging

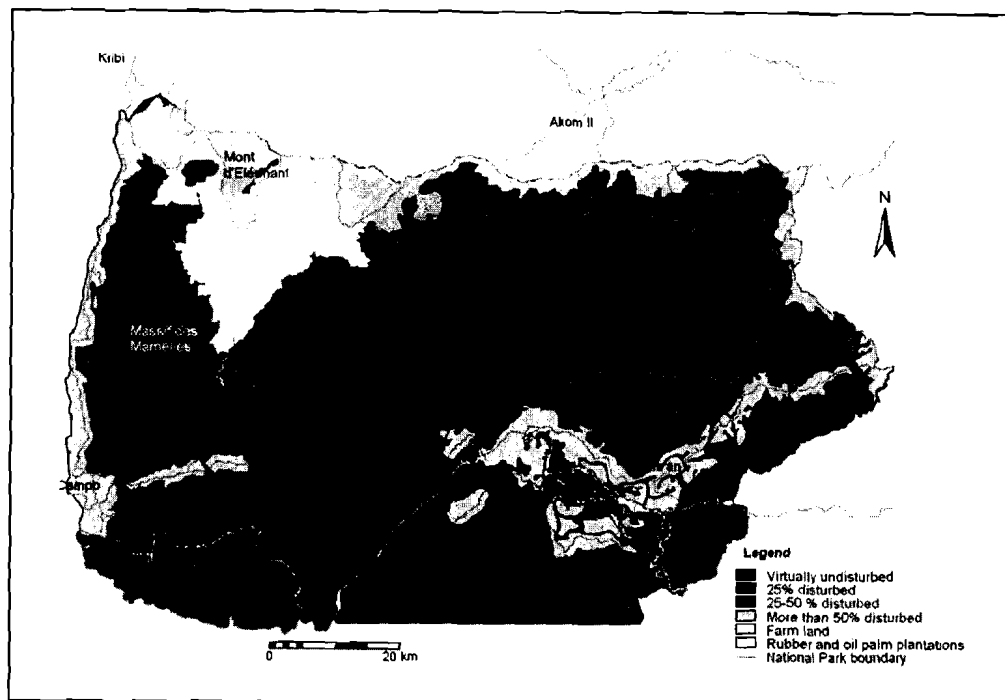
Impact assessment

Logging may either reduce or enhance species and intra-specific diversity, depending on its intensity and pressure on logged species, and the effectiveness of protection measures and management of the subsequent regeneration. In moist tropical conditions, such as in the Kribi region, logging generally favors fast growing species, with low to medium density timber, and may reduce the abundance of those species of very high value. The damage to the vegetation can cause changes in microclimate and availability of food plants, reduction of genetic improvement potential of logged species and natural regeneration potentials. This can in return lead to certain wildlife species to move away or even become extinct, especially those (endemic and specialized) species particularly vulnerable to physical disruption of their habitats. Selective logging can thereby severely impact on and alter critical habitat conditions.

There are indications of illegal and informal logging taking place in the Douala – Edea wildlife reserve, and with the expected increase in human pressure near the park, the practice is likely to continue or even increase.

Regarding the Campo Ma'an National Park, part of the Park has in fact been logged through industrial logging several years prior to its creation, sometimes even twice or three times. The map below (Figure 5-6) shows the disturbance of areas in Campo Ma'an and surroundings¹³.

Figure 5-6. Map showing the disturbance of areas in Campo Ma'an and surroundings



Main concerns

Main concerns are with the expansion of (legal or illegal) logging in or in the vicinity of the Campo Ma'an National Park and the Douala – Edea wildlife reserve as a result of increased human presence and increases in local demand, and the impacts this could have on the ecosystems of the various habitats present in the area.

The same could possibly happen with the high floral biodiversity areas of Mamelles hills and Mont d'Elephant. The fragmented forest patches of Mont d'Eléphant and Massif des Mamelles are likely even more exposed to forest degradation and habitat loss as they are surrounded by already disturbed and degraded forests. The Mamelles hills are located close to the road to Campo (improved access and increase in human presence) and the agricultural plantations of Socapalm and Hévécam (increase in human presence), and Mont d'Elephant located close to these plantations as well as relatively close to the expanding city of Kribi and the road to Mbalam mine / Djoum.

Poaching and keystone species

Impact assessment

The diminishing number or even extinction of certain keystone species in a habitat through poaching can lead to the degradation of the entire habitat. For example large mammals such as gorillas, chimpanzees and forest elephants as well as many small mammals and birds, such as the hornbill, play an important role as major seed dispersers and for pollination. The large mammals also contribute a significant proportion of the mammalian biomass. According to WWF it has been calculated that at least a third of tree species in West African forests even rely on animals such as elephants to pass through their stomach in order to germinate. The reduction in species,

that favor seed dispersion or germination, can therefore in the long-term impact on the vitality and diversity of the entire habitat.

The reduction in keystone predators in a habitat, such as leopard, can cause significant changes in the environmental balance, especially with regard to the population of their prey species. This can result in changes to e.g. browsing patterns and intensity, thereby impacting on vitality and dominance of certain plant species, possibly even leading to major changes in plant compositions, thereby altering the habitat.

Elephants browsing on vegetation also affect the structure of habitats and influence bush fire patterns. For example, under natural conditions, elephants make gaps through the rainforest, enabling the sunlight to enter which allows the growth of a various plant species. This in turn facilitates a more abundant and more diverse fauna of smaller animals.

Large primates, forest elephants, and predators high in the food chain, such as leopards can therefore be concerned as keystone species to the long-term survival and viability of the moist evergreen forests in the Kribi region. The same accounts for keystone species vital to mangroves and swamp forests. Mitigating the negative impacts of the proposed projects on these species can thereby significantly contribute to the conservation of valuable habitats in the region.

Main concerns

Main concerns are with the continuation or even expansion of poaching of keystone species in or in the vicinity of the Campo Ma'an National Park and the Douala – Edea wildlife reserve, as a result of increased human pressure and demand for food, and the high value that ivory tusks and baby-gorillas and –chimpanzees present.

5.6.5 Conclusion

Table 5-3. Overview of potential cumulative impacts of the biotic environment, their magnitude, major sources and locations

Biotic VECs	Impact magnitude	Main sources of impacts (projects) and locations mostly impacted	Main potential impacts
Moist evergreen forest		<ul style="list-style-type: none"> • Around human settlements • Near and at the location of roads, railways, transmission lines and mine • At location of expansion of agricultural plantations (Socapalm. Hévécam) 	<ul style="list-style-type: none"> • Deforestation • Degradation
Mangrove forests		<ul style="list-style-type: none"> • Near human settlements and possibly industrial sites on the coast 	<ul style="list-style-type: none"> • Deforestation • Degradation
Swamp forests/wetlands		<ul style="list-style-type: none"> • Near human settlements and possibly industrial sites on the coast 	<ul style="list-style-type: none"> • Deforestation • Degradation
Terrestrial rare or endemic mammals		<ul style="list-style-type: none"> • Around human settlements • Near roads, railways and transmission lines • Near agricultural plantations • In and near protected or high biodiversity areas 	<ul style="list-style-type: none"> • Decrease or extinction of populations through e.g. poaching • Decrease of habitat size / Loss of migratory routes (incl. reduction in food supply, genetic variety for breeding pool) • Reduction in availability of food and nesting places

Biotic VECs	Impact magnitude	Main sources of Impacts (projects) and locations mostly impacted	Main potential impacts
			<ul style="list-style-type: none"> • Increase in human-wildlife conflicts, incl. injured animals • Increase of stress, leading to e.g. changes in breeding and food collection behaviour
(Migratory) Birds		<ul style="list-style-type: none"> • Around human settlements • Near roads, railways and transmission lines • In and near protected or high biodiversity areas 	<ul style="list-style-type: none"> • Decrease or extinction of populations through e.g. poaching • Decrease of habitat size (incl. genetic variety for breeding pool) • Reduction in availability of food and nesting places • Increase of stress, leading to e.g. changes in breeding and food collection behaviour
Cetaceans (whales & dolphins)		<ul style="list-style-type: none"> • Near deep sea harbor • Near (construction sites of) off-shore pipelines and oil/gas exploration structures • In coastal areas with high pressure of fishing industry 	<ul style="list-style-type: none"> • Decrease or extinction of populations through e.g. poaching or by-catch • Decrease of suitable habitat size • Reduction in availability of food and resting / nursing places • Increase of stress, leading to changes in behaviour
Marine turtles		<ul style="list-style-type: none"> • Near construction sites of off-shore pipelines and oil/gas exploration structures • At turtle beaches along coastal strip developed for tourism • At turtle beaches with high light disturbance from industry or other structures • In coastal areas with high pressure of fishing industry 	<ul style="list-style-type: none"> • Decrease or extinction of populations through e.g. poaching or by-catch • Decrease of or disturbance at turtle nesting beaches • Disturbance of turtle eggs or hatchlings • Reduction in availability of food • Increase of stress, leading to changes in behaviour
Manatees		<ul style="list-style-type: none"> • Near human settlements on the coast • In mangrove areas and estuaries with motorized marine tourism 	<ul style="list-style-type: none"> • Decrease or extinction of populations through e.g. poaching and accidents • Decrease of habitat size (incl. genetic variety for breeding pool) • Reduction in availability of food • Increase of stress, leading to changes in behaviour
Fish (sea and estuaries)		<ul style="list-style-type: none"> • In coastal areas with high pressure of fishing industry • In coastal areas with (harbor / pipeline) construction and dredging activities 	<ul style="list-style-type: none"> • Decrease or extinction of populations through over-harvesting and by-catch • Destruction of suitable habitat size, incl. nurseries • Reduction in availability of food
Fish (inland rivers, lakes)		<ul style="list-style-type: none"> • Near human settlements • In areas downstream of polluting sources, such as mining industry, agricultural plantations 	<ul style="list-style-type: none"> • Decrease or extinction of populations through over-harvesting and by-catch • Destruction of suitable habitat size, incl. nurseries

Biotic VECs	Impact magnitude	Main sources of impacts (projects) and locations mostly impacted	Main potential impacts
			<ul style="list-style-type: none"> Reduction in availability of food
Protected areas		<ul style="list-style-type: none"> Near human settlements Near roads, railways and transmission lines Near expansion of agricultural plantations (Socapalm. Hévécam) 	<ul style="list-style-type: none"> Habitat loss Habitat fragmentation Habitat degradation or alteration, due to loss of or changes in vital / keystone species
High biodiversity areas		<ul style="list-style-type: none"> Near human settlements Near roads, railways and mine Near agricultural plantations (Socapalm. Hévécam) 	<ul style="list-style-type: none"> Habitat loss Habitat fragmentation Habitat degradation or alteration, due to loss of or changes in vital / keystone species

Legend of Table 5-3

Impact magnitude

- Red: Major negative
- Orange: Moderate negative
- Yellow: Minor negative
- Green: Positive impact

Conclusions biotic impacts

The various impacts leading to destruction, degradation and fragmentation of natural areas and to the diminishing of terrestrial and marine wildlife species- can have serious impacts on the vitality and survival of flora and fauna as well as their related habitats. This can eventually result in species falling below the minimum threshold required for a viable population.

If all projects would be executed as proposed without further mitigation prior to or during construction and operation, their cumulative and induced negative impacts are expected to pose such threats to the survival of many of its endangered species, that many of them may become extinct in the region. In addition the sustained survival of entire and very valuable habitats within the Kribi region is at risk, including the recognized (and protected) high biodiversity areas, as well as other possible areas in the region of which the biodiversity value is currently still unknown.

5.7 Climate change and greenhouse gas analysis

The economic development of the Kribi region will cause greenhouse gas emissions. These emissions can be related to three main sources. These are:

1. The production and use of electricity.
2. The consumption of fossil fuels by industry and transport and residential applications.
3. Changes in carbon stocks.

Each of these sources is analyzed below, in line with methodology and data from the International Panel on Climate Change (IPCC).

5.7.1 The production and use of electric energy

Background

In 2001 about 98% of the electricity in Cameroon is produced with hydroelectric plants¹³¹.

For residential purposes mostly solid biomass (fuelwood) is used. 79% of the total energy consumption is met by this biomass¹, only 4% with electric power and 17% with fossil fuels.

According to (1999 Earth trends, country profiles) industry consumes about 17% of the energy, transport about 11%, residential applications 70% and 2% is consumed by agriculture, commercial and public services and others.

Impacts expected

The production of hydroelectric power has a negligible greenhouse gas emission. For meeting the demand of electricity necessary for the economic development a power plant at Mpolongwe is planned. The power plant will be a gas fired plant with a capacity of 150 MWe. The production of this plant will be 1050 – 1200 GWh/year. This causes a CO₂-emission of 360 – 420 ktonnes of CO₂ per year. This energy will not only be used in the Kribi region but also in other parts of Cameroon. It is forecasted that the population in the Kribi region will be about 3% of the population in Cameroon in 2020. 3% of the CO₂-emission from the gasfired plant is ascribed to Kribi, i.e 11 – 13 ktonnes CO₂.

Besides this thermopower plant, a new hydroelectric plant will be built on the Ntem in Memve'ele south of Kribi.

5.7.2 Fossil fuels

Background and assumptions

Almost all fossil fuels in Cameroon are used for industry and transport.

According to the Cameroon Energy Profile of the EIA (Energy Information Administration) the total CO₂-emission of Cameroon related to the consumption of fossil fuels was 6.8 Mtonnes CO₂ per year (in 2005).

In 2005 only 1.1% of the population of Cameroon lived in the Kribi region. When the population is used as an indicator for economic activity, 1.1% of the CO₂-emission is

¹³¹ World bank, Environment department: Environment at a glance 2004 Cameroon, November 2004

attributed to the Kribi region in 2005. Thus, the CO₂-emission in 2005 that can be attributed to the Kribi region was 75 ktonnes CO₂/year.

Between 1995 and 2001 the consumption of energy per capita rose with approximately 1% per year¹.

Impact assessment

When this rise continues and with the forecasted rise of the population in the Kribi region with a factor 4, the CO₂-emission from fossil fuel consumption in the Kribi region will be approximately 366 ktonnes in 2023.

Due to the economic development of the Kribi region, the CO₂-emission of the region will rise with approximately 290 ktonnes CO₂/year.

5.7.3 Changes in carbon stock

Background / assumptions

The major part of the Kribi region is covered with rain forest. For the economic activities some forest has to be removed. Especially the planned transport corridors will effect deforestation.

The tropical forest is a carbon stock. Due to deforestation this carbon will be released. With the "Good Practice Guidance for Land Use and Land-use Change and Forestry of the IPCC" the release of carbon due to deforestation can be estimated.

According to this Good Practice Guide the biomass stock in tropical forests in Africa is 310 tonnes dry solids per ha for wet forests (range 131-513) and 260 tonnes dry solids per ha for wet forests with a short dry season (range 159-433). According to Tropenbos-Cameroon¹³² there are two periods in the Kribi region with less rainfall. So the forest in the Kribi region is seen as a wet forest with a short dry season.

Per kg dry solids approximately 1.5 kg CO₂ is emitted. This results in an emission of approximately 400 tonnes of CO₂ per ha (range 240 – 650 tonnes CO₂/ha).

Impact assessment

It is difficult to forecast the area of deforested ha in a timeframe of 10-15 years. A research project in Brazil showed that a new road affected the forest till a distance of 20 of even 50 kilometers from the road. The effect differs from total removal of the forest for agricultural purposes to removal of only the valuable trees. It is expected that the effect in Cameroon will be less. For the roads the corridor is estimated to have a width of 50 meters, for railways 30 meters, and for the transmission power line also 30 meters. This last figure is concluded from the AES Sonel Survey Map of the power line.

In the table an estimation is made of the deforested surface per project in the Kribi region. It is assumed that the present land cover of all the land that will be used for the several projects is rainforest. This means that the estimation will be a worst case.

¹³² Nounama L. and Yemefack M. :Shifting Cultivation in the evergreen forest of southern Cameroon; farming systems and soil degradation; Tropenbos-Cameroon Report 002; Kribi, November 2000

	wide km	length km	surface present ha land use	final land use
1 gas treatment station at Bipaga			10 forest	
2 power plant at Mpolongwe II			20 forest	
transmission line Mpolongwe- Edea	0,03	100	300 forest	
3 pipeline for gas (in sea)			0	
4 rubber tree plantation			2000 forest	plantation
5 biomass plantation			2000 mainly forest	plantation
6 deep see harbour (5 km wide) (15 km south of Kribi)	1	5	500 forest	
7 Iron mine exploitation (40 km North of Kribi)			500 forest	
8 harbour for iron mine (see 6)				
9 rail way iron mine to harbour (along coast)	0,03	55	165 forest	
10 exploration of precious stones			neglecible effect	
11 road Menvélé- Kribi	0,05	100	500 forest/ existing road	
12 road Yaoundé-Kribi	0,05	150	750 forest/ existing road	
13 railway Kribi-Edea	0,03	80	240 forest/ existing road	
14 road / railway Kribi-Djourn	0,05	450	2250 forest/ existing road	
15 railway Djourn-Liminaré-Bangui and Djourn -CONGO			out of scope forest	
			9235 forest	4000 plantation
				5235 no vegetation

This calculation results in a deforested area of 9235 ha, estimated range 8000 – 10000 ha (about 0.4% of the total forested surface – 23.8 million ha (IPCC) - of Cameroon. About 40% - 50% of the deforested area is used as plantation. According to the IPCC report the biomass increment in a plantation is 5-8 tonnes d.s. per ha/year. This results in an annual carbon storage of $(5 \times 1,5 \times 4000 = 30 \text{ ktonnes CO}_2)$ of 30 to 48 ktonnes CO₂.

The total CO₂-emission due to deforestation is 3.5 (range 2 – 6) Mtonnes CO₂. In plantations 30 - 48 ktonnes of CO₂ per year is stored as average.

Resulting Greenhouse gas emissions

5.7.4 Conclusion

The resulting greenhouse gas emissions related to the projects in the Kribi region are:

	Average	range	unit
Electric power	12	11 – 13	ktonnes CO ₂ /year
Fossil fuels	290	200 - 400	ktonnes CO ₂ /year
Plantations	-/-40	-/- 30 – -/-50	ktonnes CO ₂ /year
Deforestation	3500	2000 – 6000	ktonnes CO ₂ in 10 yrs time
Sum	260	180 – 380	ktonnes CO ₂ /year
	3500	2000 – 6000	ktonnes CO ₂ permanent loss.

The projects planned in the Kribi region will

- rise the total CO₂-emission of Cameroon (6.8 Mtonne/year) with 4%.
- diminish the carbon stock of the rainforest of Cameroon with about 0.4%.

5.8 Cumulative impacts on socio-economic aspects

5.8.1 Introduction

The industrial, transport, and tourism developments beyond their individual and specific impacts, interact among each other and have a cumulative effect. Many of the impacts discussed in the previous sections (health, employment, land tenure issues, local participation, local development, local benefits, etc.) are for a great part quite similar for all projects. In the following sections the general and cumulative impacts are analysed.

Table 5-4. – Summary of present knowledge of projects related study area.

Project	Initiator	Category project	Location	Status	Comments
North of Kribi city					
Gas exploitation offshore (Sanaga Sud field) with gas treatment onshore at Bipaga	Perenco / SNH	Energy / O&G	Bipaga, about 15 Kms North of Kribi city	ESHIA available	The gas is to be linked to the AES Sonel power station for production of electricity
Power plant for production of electricity and transmission line	AES Sonel	Energy	Power plant at Mpolongwe II, about 9 km North of Kribi, Transmission line to distribution centre near Edea.	ESHIA available	construction should start in 2009
Pipeline conducting the gas from Ventral Purification facility to power plant	SNH	Energy / O&G	Between the two. Plans are now made so that the pipeline will go first in the sea and back into the shore up to the power plant.	ESHIA to be made	After a long dispute to know who will have the responsibility of this pipeline (Perenco/SNH or AES Sonel), SNH took the responsibility in order to speed up the process. It was the surprise to the WB to realise that the pipeline was part of none of the two EIAs.
Plantation for bio fuel from palm oil	Ferme Suisse / Fernandez	Agri	North of the Nyong river, South of the Edea-Douala reserve	No official information available	Such a plantation would mean the deforestation of a part of the forest in the region. However, there is little information on what is planned, where and to what extent.
South of Kribi city					
Extension of rubber plantation	Hévécam	Agri	Around the current Hévécam plantation. Exact location unknown	ESHIA completed but not available	Extension of 2.000 hectares, meaning the deforestation of the existing forest.
Deep sea harbour	Government	Infra / transport	South of Grand Batanga, about 15 km South of Kribi	Pre-feasibility study completed/ in progress No official information available	During interviews, people had mixed ideas about this project. It has been about 20 years that people talk about this project. For this, people are sceptical in the actual realisation of this project. Some other people said that the project has now become concrete and will be implemented in the coming 3 years. The project consists apparently of a harbour which would be 5 km wide (along the coast) and 3 km long (going into the sea) This information need to be checked and documents seen
Iron mine exploitation	SteelCam & Sed finances	Mine	about 40 Km South of Kribi, at 'les Mamelles'.	No official information available	Article found on Internet about it, but its validity has to be confirmed. http://sedfinance.com/perso-25617.htm
Rail way linking Mamelles to deep sea harbour	CAM IRON	Infra / transport	Along the coast	No official information available	impact of the railway potentially great and depends on its routing. Scanned scoping study report available

Project	Initiator	Category project	Location	Status	Comments
Iron mine exploitation	CamIron & Sundance Australia	Mine	Mbalam, 500 km inland but linked with a wide gauche railroad to Kribi	Pre-feasibility scoping study available	Impact of the mine is outside the area. Scanned scoping study report available
Harbour for the export of iron	CamIron & Sundance Australia	Infra / transport	Grand Batanga and Lolobe potential sites	No official information available	Cameroon prefers Grand Batanga, Mbalam Iron project, for technical reasons, Lolabé. Scanned scoping study report Mbalam mine available
Road & rail way Kribi-Mbalam	CamIron & Sundance Australia	Infra / transport	Mbalam Iron ore mine	Company information available	http://imagesignal.comsec.com.au/asxdata/20070730/pdf/00743560.pdf Scanned scoping study report Mbalam mine available
Exploration of precious stones (gold, zircon, etc.)	Sicamine	Mine	Apparently wide area of exploration, South of Kribi city	On-going No information available	Little exploration, little impact be expected
Memve'élé dam	AES Sonel / government / WB	Energy	Close to Nyabizan, East the Campo-Maan national park.	Updated pre-feasibility present	Huge impacts of the flooding caused by the dam (outside scope of this report). http://www.proiet-memveele.org
Road Memve'élé – Kribi or Memve'élé – Campo		Infra / transport		No official information available	Huge impact to be expected if a road would be open to link the dam to Kribi or Campo. (to be considered in the study); Preliminary studies indicate that roads and power transmission lines will be directed eastwards and not cross the Campo Ma'an National Park.
<u>Marine park (conservation area)</u>	Government	Conservation	Off the Ocean division coast. It is not clear if it would be all the coast or only from Kribi to the Equatorial Guinea border.	No official information available	This is a very controversial project because it is seen by many as a break to economical development in the region. Not treated in the socio-economic aspects as insufficient data are available.
Large infrastructure projects (essentially related to the deep sea harbour)					
Road Yaoundé-Kribi	Government	Infra / transport	Yaoundé-Kribi	In progress, No official information available	Not related to the deep sea harbour, Will link Kribi to Yaoundé via Lolodorf, Mvengue, Ngoumou, the old German road.
Rail way Kribi-Edea		Infra / transport		No official information available	This would be the end of the Adamawa – Kribi rail way route, linking the Bauxite mine in Adamawa to the deep sea harbour for exportation of minerals. The rail way is to be done in 3 sections: Adamawa-Yaoundé: existing, to be upgraded Yaoundé-Edea: existing, to be upgraded Edea-Kribi: to be constructed. Adamawa could be linked further North to Tchad at a later stage.
Rail way: Djoum-Limariné-Bangui (RCA), and Djoum-CONGO (junction at Djoum)	Sundance / CamIron	Infra / transport	Mostly in the forest zone of the South Province, and ending south of Kribi in a approx. 10 km long loop.		New rail ways are to connect to the deep sea harbour in Kribi the following projects: A mine of Nickel and cobalt in Nkamouna (Geovic) RCA (which does not have access to sea) The CamIron mine in Mbalam, Possibly a Chinese Iron project in the republic of Congo. For further investigation: Only the known impact of the Mbalam-Kribi railroad is included in the report.

As proposed by the World Bank¹³³ (1996), multiple impacts have to be taken into account in the Regional Environment Assessment.

5.8.2 Zoning of the coastal area

Available data

Though based on a simple presentation, the coastal band report (Fangue, 2004, *op. cit.*; Tchawa, 2007) gives very detailed information on the issues of tourist development. Among the cited aspects in the report the following appear important. The report was drafted on the basis of a contract with the Dutch Development Organisation SNV, and validated by the governmental steering committee of the project "Management of the coastal band Kribi-Campo in the perspective of sustainable tourism".

- Zone 1- Nyong estuary to Grand Batanga: to be reserved for recreational and business tourism, and artisanal fishing with as major poles Londji and Kribi town, including Pygmy minorities, resettlement of some fishing settlements, development of tourism
- Zone 2- Grand Batanga to Lolabé: port and industrial zone related to Oil and Gas industry and Iron Ore mining. Such development would include a deep water port and an industrial zone, new residential areas (around Lende Dibe), tarring of the Kribi-Campo road, several community forests, and creation of an environmental authority.
- Zone 3- From Lolabé III to Malaba, including a development pole in Ebodje. Restructuration site for the middle Kribi-Campo area for the promotion of eco-tourism, fishing and artisanal activities: development of a marine and terrestrial ecological centre in Ebodjé, training of guides, open tourist access to the surrounding forest area, financial assistance to local fishermen and tourism GICs.
- Zone 4- Malaba to the south, including the Campo Ma'an reserve. Development of eco-tourism, artisanal fishing, environment and trade: tarring of the Kribi-Campo road, education in environmental awareness of the young and the general population, development of artisanal shrimp fishing, tourists development (Nkoelon, Dipika island, historical sites, Ntem mangroves, hotel facilities, international collaboration with neighbouring Equatorial Guinea...
- Zone 5- Inland zone from the Lokoundje and around Bidou I: urban development (with MAETUR), market garden and small cattle raising development, green belt providing food production for the urban area of Kribi
- Zone 6- Agro-industrial plantations and development of local village agriculture : studies, projects for local transformation of oil (to soap) and rubber (to tyres), as well as environmental monitoring of the area, in order to increase the local involvement in the project and promote local employment.

Analysis and discussion

It's not clear how much of this project of zoning is a proposal of the authors of a report and how much is based on administrative plans. It's implications for the development of projects are major: the Gas-to-power facility planned on two sites near the coast and north of Kribi, are not compatible with this plan, the development of a deep sea harbour should not include any zones south of Lolabé isn't either. Present a new urban development area is being developed in Bwambe, which is located in zone 1, the tourist

¹³³ Regional Environment Assessment Sourcebook update (1996), 15-11. Environmental Department, The World Bank.

zone, indicating that it will probably be difficult to avoid that residential areas will trespass on tourist zones.

Zone-2, the industrial zone with the deep sea harbour would be entirely devoted to industrialisation and urban development. As this zone is quite far from Kribi, Niede Dibe may evolve into a separate satellite town. The area lies adjacent to the Hévécam plantation, 5-10 km from the coast. The size of this zone, about 20 km, means that the new rail road with its wide loop (see Mbalam Iron mine project) can easily be installed. Any development should stay clear form the sacred rocks of the Rocher du loup" (wolves rock) located some 500 m out in the sea.

Recommendations

Major recommendations from the coastal band zone studies as described above are summarized in the following points.

- The coastal zone should contain multiple zones for varied activities: residential, industrial, ports, agricultural
- The first priority to be implemented is the organisation of land tenure and the land titling process
- All stakeholders should be consulted in order to adopt sustainable development options
- Minorities should be specifically protected (land rights for the Pygmies,
- Development of traditional activities and protection of the young population: shrimp fishing for women, improved fishing techniques, reforestation (palms) of the coast, development of sporting facilities, protection of young girls from sex tourism...
- Create permanent consultation bodies (CLD: Comités de Développement Local) and (OITBC: Office Intercommunale de Tourisme de la Bande Côtière.) including all users of the coastal zone.
- Training of CLDs: tourist guides, planning of priority tourist areas, discussions between participating communities, organisation of the many governmental services that are involved in Tourism,
- International financing is necessary for financing an integrated development project in the region.

5.8.3 Cumulative impact of parallel projects

The task is to integrate the various projects in such a way that negative impact is limited and positive impact increased, taking into account the individual constraints of the projects: unmovable projects, linked projects.

Unmovable projects

Unmovable projects are those projects that are in a fixed location and can only be exploited in that location. This also includes existing projects.

- Sanaga gas-fields, off-shore oil-fields, the Memve'ele hydroelectric dam, the Camlron mines in the Mamelles hills and the Mbalam mine, potential sites for the deep water harbour;
- Existing agro-industrial plantations, existing residential areas, the paved road Kribi-Lolodorf-Mvengue-Ngoumou-Yaoundé, which has to use the existing roads;
- The beauty and tourist potential of the 150 km coastal zone is such that it has to preserved as much as possible for the future. If possible, industrial developments should be built a few km inland, if that's not possible, in less favourable coastal sites.

Moveable Linked projects

The analysis of the ESHIA of existing projects allows to group most of them in related clusters of projects, whose negative impacts may be reduced by linking some of their characteristics.

- the gas-purification plant and the power-plant should be built at a unique site to minimize environmental impact and pipeline transport of dangerous and polluting substances. The present plan to build these sites apart is economically expensive and environmentally dangerous;
- the Kribi-Edea tarred road, the existing 90KV powerline, the projected 150KV powerline, the projected rail-link between Edea and Kribi are linked among each other but also with the location of the Kribi deepwater harbour, an effort should be made to limited the footprint by using a common corridor;
- The Kribi to Yaoundé via Lolodorf-Mvengue-Ngoumou. Local populations always counted on the former road as an accompanying benefit to the pipeline construction that would link an area that feels forgotten to the national economy;
- The road and the transmission line linking Memve'ele with its clients (Equatorial Guinea, Hévécam, Socapalm, GWZ-Wijma, Kribi, Edea, but also the Ma'an-Ebolowa region) should be using as far as possible the same corridor, and could favourably be linked with the Mbalam-Kribi railroad;
- It may be expected that most options for a corridor cross many relatively undisturbed areas, and have an ecological impact far beyond projects like the Chad-Cameroon Pipeline;
- Using and upgrading existing road axes, like the Ebolowa-Akom II-Kribi road and other secondary roads, may limit environmental damage and increase benefits to the local population. One report (Coyne et Bellier, 2006) indicates that the logging company already WIJMA already opened a road between Nyabizan and the Kribi-Ebolowa road.

5.8.4 Population

The area is inhabited by about 10 different ethnic groups, but most villages are mono-ethnic. Recent demographic data are not available. Key data about villages is not accessible in a comprehensive way.

- Lack of recent detailed data on population size in the region: latest census data are from 1987, results from 2005 are not yet available
- Extrapolating data from a national census that took place more than 20 years ago is not a valid way to estimate growth in population size or discuss its impact on local developments.
- New data from the 2005 national census are urgently needed. If these data cannot be acquired, a simple technique consists of numbering (and GPS) all households of every village and do a 5-10% survey on the household composition¹³⁴.

5.8.5 Land use and patterns of land ownership and tenure

The population density in the area is low, but as all population lives near the coast and the 4-5 roads inland, locally population density may be high. This is especially the case along the coast and particularly around Kribi. Land has become a valuable assets in

¹³⁴ Village surveys in the pipeline area show the following population changes between 1987 and 2002: Tala +98%, Mpangou +136%, Bidou +12.6%, Ndtoua -7%, Bidjouka +0.9%, and only indicate the population growth in the more urban villages of Talla and Mpangou, and the absence of growth in the rural areas.

these zones and land conflicts are emerging between villages, ethnic groups, locals and migrants.

Specific groups, [Bakola/Bagyeli Pygmies, women (especially widows who do not live in their native village) and foreigners, not belonging to the main clans in the village] are among the most vulnerable groups concerning land access. Various observations and discussions in the villages indicate that their rights to the land they use remain respected by the local community as long as local powerful people don't need the land, but as soon as they need it, everything will be done to push them off the land. This situation is very well described for the Bakola/Bagyeli, but they are not the only ones who suffer from land insecurity.

- Tension between legal land tenure and local systems. The traditional system is based on the "right of the hoe": whoever is the first to cleared land owns the land, even when it returns to fallow. This is in practice not always respected, as all land belongs traditionally to (extended) families, even if it has never been cultivated.
- Traditional boundaries between families and villages are only vaguely defined and source of disputes.
- Uncontrolled titling of land near the coast and around potential industrial areas; tensions between rich people who have the means to title land and local land users
- As more than 90% of the land users do not have a land title, access to replacement land for agriculture has to be monitored by all projects.
- Land is used for about 2-3 years and then lays fallow for 4-5 years, which means that a farmer needs 2-3 times more land than he actually cultivates in order to keep farming. The Cameroonian law only recognises actually used land. In order to protect the farmer's future livelihood, replacement land should be acquired at the rate of 2 ha of new land for every ha actually cultivated.
- Resettled land-users without a land title risk to have greatly diminished land rights on their new land. Titling of the land where their new house will be built is recommended, and new traditional land rights should be guaranteed officially by the village community (chief, elders) and local authorities.
- In order to avoid land conflicts, land under power transmission lines should be allowed to be used for annual crops.
- Traditionally ownership is not recognized in compensation schemes, especially by the agro-industrial plantations who need thousands of hectares;
- Outsiders only seem to have right to land if locals do not need that land. Where land shortage exists, or land becomes a financially valuable asset, non locals (Pygmies, widows, foreigner) are often chased away.

5.8.6 Economic activities

The main economic activities for the local population are the traditional ones of agriculture, fishing and hunting. Modern developments in agriculture area are rare. Since the cocoa crisis which started around 1990, cocoa cultivation in the inland areas has lost its importance, and is only partly replaced by more oil palm cultivation.

Agriculture and animal husbandry

Local agriculture remains mostly traditional and is characterized by too small farms that lack mechanisation, use of improved seeds, fertilizer and pest control, and financial investments, and that are based on women's work. Development should be achieved

through two interlinked ways: higher and more diversified production, and improvement of market access.

- Develop agriculture and market garden crops together with developing local markets:
 - improved seeds, access to fertilizer and pest control products;
 - create more markets in centrally located medium-sized villages;
 - improve extension work by government services, and promote better coordination between government services and NGOs involved in agricultural development.
- Organisation of farmers in producer groups, promotion of micro-credits (education on its principle and distribution of loans).
- Involve local farmers in agro-industrial projects. High world market prices for rubber, palm oil, bio-fuel, and cocoa products are favourable conditions for the development of cash-crops through regeneration of cocoa plantations. Rubber and oil palms can be produced by villagers in collaboration with agro-industrial plantations.
- Development of local meat production especially with chicken and pigs but also goat and sheep, including extension work, risk assessment, preventive and curative veterinary care and financing.

Fishing

Development axes include training, (micro-) credits, conflict resolution, fish stock management, preservation techniques, increased law enforcement, development of fish ponds, management of the Memve'ele retention lake fish resources,

- Training in new and improved fishing techniques, Micro credits for investment in fishing gear and local trade and Improved management of money earned through fishing
- Training in better conservation of fish, improved safe and ecological smoking techniques and development of cold fishing storage in the main production centres
- Sanitary control of fish: pollutants, local preservation methods. Measurement and source identification of pollution in the sea and on the beaches
- Organisation of the fishing community (fishing, preservation, trade) in order to be both more competitive and to add more local value to fish. PNUD insists that such organisations must be set up by the concerned people, not by the authorities
- Regular consultation between oil and gas operators in the coastal area and local fishermen on fishing issues. Enforcement of the 3-miles exclusion zone for industrial fishing
- Studies on the possibility of increasing fish production along the coast through artificial reefs especially around oil and gas facilities
- Improved organisation (financing, choice of site, conflict control) of fish ponds by individuals and organized village groups. Creation of fish multiplication centres for the sale of fry
- Early management of the potential fishing resources of the Memve'ele retention lake.

Hunting

- Develop ways of protecting wild life while at the same time protecting the food security of the local population, who need to protect their fields against animals, and who need bush meat for their food.
- Reinforce control on poaching
- Reinforce control of the presence of bush meat in restaurants in urban areas.

5.8.7 Health and nutrition related impacts

The assessment of negative impacts and sanitary costs of major regional industrial projects related to the diversity of the infrastructures concerned, and limitations of upcoming projects can only be preparatory. It requires additional studies based on the effects of health determinants of the resettled people and of the people who will be living nearby the future complex.

All existing and planned industrial and transport development projects are impacted by health aspects, and on their turn have an impact on health aspects. Both sides (projects and communities) share in the same environment and project people may be contaminated by the local environment and people, and local communities may be contaminated by project activities and people.

- All projects considered will involve concentration of relatively rich often single project workers who will have contacts with the local population, and so increase the risk of IST and HIV/AIDs
- All projects considered will involve opening of hitherto protected areas increasing the risk of spread of malaria, and other transmissible diseases. The area is already known for drug resistant malaria.
- All projects will be faced with the lack of potable water in the local communities and difficulties in creating a reliable and sustainable provision of drinking water in the villages
- All projects will be faced with lack of functioning health centres, lack of qualified personal, lack of medicines and lack of purchasing power of the local population.
- Opening-up of the forest may trigger rapid spread of formerly locally contained diseases
- Disturbance of the sea and exclusion of land for agriculture, may have negative consequences on the food supply. Disturbance of the forest zone will diminish the availability of bush meat for human consumption.
- Road development opens the region positively for trade and tourism, negatively for the spread of transmissible diseases (IST, HIV/Aids)
- Risks of HIV/AIDS and STIs will increase if single men are recruited, but decrease if the project encourages the settling of workers and their families.
- The quality of urban planning (supplying of drinkable water or latrines for the workers camps), will be in direct relation to the incidence of infant mortality (often generated by diarrhoeal diseases) or typhoid.

The main health issues regarding the various development projects to be developed in the Kribi area refer mainly to three kinds of impacts:

- the increase of population : increases pressure on food resources, water availability and quality (risk of diarrhoeal diseases and undernutrition)
- the increase of revenues: may attract prostitution (Aids and other sexually transmitted infections) and develops alcoholism
- the increase on environmental impacts: effects on fishing (pollution hazards in sea and in rivers), on deforestation (creates opportunities for malaria)

Further analysis on health impacts is presented in Annex 5.

5.8.8 Relations between industries and the local population

Already the presence of the projects and resulting industries on itself has an impact on the life of local and regional communities. This is in concrete terms as a result of the physical presence (as for instance a temporal increase in population because of an influx of workers), as well as in expectations and prejudices.

- The project needs to ensure a decent quality of life to workers' families by providing education, agricultural land (including training and ensuring availability of seeds, fertilizer, and pest control products), recreational services, health care, and train workers in preventing accidents and health risks during and after work.
- Avoid concentrations of bachelors in the project area by providing housing and education facilities for project workers and their families
- Create access to affordable medical care to the local population. Create potable water supply and organize waste-management (latrines, kitchen waste) in the project villages
- Organise the provision of the markets with fish (fresh and frozen) and meat at competitive prices in order to provide alternatives to bush meat consumption.

Employment

- More local employment should be created by carrying out more of the activities as labour intensive work. Employment lists for unqualified jobs, to be used in a lottery system for recruitment, should be created during public meetings of candidates in front of all villagers, to avoid that non-locals get jobs allotted to the locals. Each village should have at least a few workers recruited.
- Creation of a transparent system (at village and regional level) of fair sharing of recruitment possibilities between the various stake holders and the projects
- Creation of project and village consultation committees including high-level company representatives who meet at regular (e.g. quarterly or half-yearly) intervals to discuss points of interest between companies and population, and set priorities on potential development programs.
- Choice of the coastal industrial area and deep sea harbour. Integration of the deep sea harbour and railroad route in the general development scheme of the coastal area.
- Limit as much as possible negative impacts of mining, Memve'ele hydroelectric project, planned powerline and railroads on the ecology of the protected areas of the UFO and the Campo-Ma'an park. Electricity transported from the Memve'ele hydroelectric powerplant to the main southern grid through a common corridor with the Mbalam railroad may significantly diminish negative environmental impacts.

Compensation

- A review is necessary of the methodology and application of compensation rates. Compensation paid by the different successive projects should be based on the same or inflation adjusted higher rates than previous projects, based on solid data about yields and seasonal price variations.
- The impact of each project on the livelihood depends on the amount of land affected for each of the households. The report does not indicate which are the households that are so much affected that their economic livelihood will become uncertain. Such a categorisation would need more understanding of the agricultural system in the area, individual identification of the affected people, as well as the provision of specific measures to ensure their livelihood after the passage of the project.

- The important issue of land rights and access to replacement land is especially important for those people who lose more than a negligible amount of land. Pending the availability of better criteria, the cut-off point may be provisionally set at either 25% of the total land or a total loss of more than 0.5 ha.
- Estimates from the report that 20% of the 300 ha of the transmission ROW is agricultural land means that the 600 impacted farmers lose on average about 0.1 ha of fields and 0.25 ha of fallow land. As the average loss is rather low, it is all the more important to identify farmers that are relatively heavily impacted from those that are impacted less.

5.8.9 Planned development activities

The industrial development projects discussed in this REA do not automatically enhance the livelihood of the local populations. Some of the negative impacts – especially pollution and diminished hunting and fishing activities – may even reduce their livelihood. Specific programs should thus be associated to the REA that promote development of that part of the population that does not directly benefit (via employment) from the industrial projects. So far, only the Memve'ele dam has a clearly defined and budgeted development plan, the PASEM, but the wider Kribi Area needs development project to progress in a sustainable way from the level of poverty that is currently experienced.

- The coastal zone should contain multiple zones for varied activities: residential, industrial, ports, agricultural zones and zones reserved for tourism.
- Planning of the various developments should take place at a very early stage, based on promoting realistic expectations from all stakeholders¹³⁵. Honest and realistic information during village consultation meetings about employment possibilities in the project
- Creation of project and village consultation committees including high-level company representatives who meet at regular (e.g. quarterly) intervals to discuss points of interest between companies and population, and set priorities on potential development programs. All stakeholders should be consulted in order to adopt sustainable development options and minorities should be specifically protected (land rights for the Pygmies, and vulnerable villagers)
- Creation of permanent consultation bodies (CLD: Comités de Développement Local) and (OITBC: Office Intercommunale de Tourisme de la Bande Côtière.) including all users of the coastal zone.
- Inclusion of vulnerable groups (hunter-gatherers, widows, non local villagers) in the allocation of project benefits.
- Development of traditional fishing activities: shrimp fishing for women, and for the young: improved fishing techniques, reforestation (palms) of the coast, development of sporting facilities, protection of young girls from sex tourism...
- Training of CLDs: tourist guides, planning of priority tourist areas, discussions between participating communities, organisation of the many governmental services that are involved in Tourism,
- External financing by international projects is necessary for the financing an integrated development project in the region.

¹³⁵ PNUD (2000) describes how the deep water harbour will be used by the Chad-Cameroon pipeline, while this Project was entirely based since its beginnings on the presence of a floating offshore facility.

5.8.10 Community structure

- Communities are mostly mono-ethnic entities, headed by a chief who is in most villages not very powerful, and elders. Most villages are patri-local which means that individual heads of households are close kin: brothers and cousins. Collective actions in such villages are often difficult, and internal disputes are frequent.
- Need of organisation of villagers and development of confliction resolution techniques
- Include and promote the participation of the local population in health care, educational services, agricultural extension

5.8.11 Public facilities

Markets

- The regional market system, is a weakness in the area: there is hardly any direct exchange between local food producers and consumers in the urban areas: In Kribi, all traders in the market were middle (wo)men, and prices were almost 80% higher than the average of prices observed on 10 markets along the pipeline route.
- The coastal populations have a market but no products to sell, the inland populations products to sell but no market, as transport costs are very high.

Transport

- The planned new transport projects will have both positive and negative impacts as they open-up hitherto more or less isolated areas, encroach on sensitive forest areas, affect the habitat of wild life, attract migrant labour, and induce the creation of potential new residential areas.

5.8.12 Cultural Heritage and archaeology

- Extend the definition of "cultural heritage" as used in the ESHIA of the CPF, powerplant, and transmission line to include not only recent cultural heritage (churches, graves) but also archaeological evidence.

5.8.13 Indigenous people

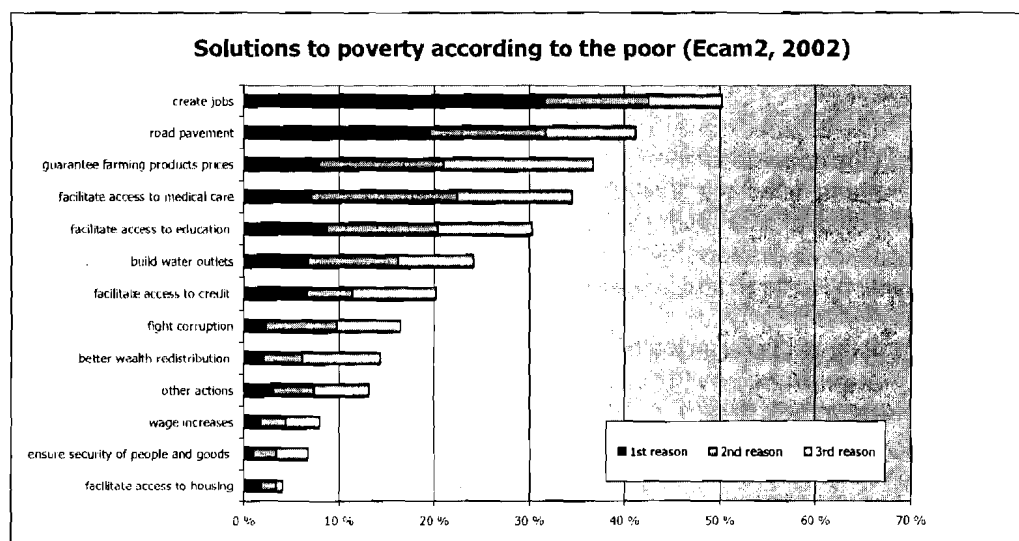
- Study ways of integrating FEDECs Indigenous Peoples Plan, the Community Development plan of the Gas-to-power project, the Memve'ele dam, the Mbalam railroad, and other industrial projects in the area
- Do not limit the CDP to the 4 settlements located directly under the powerline, but to all communities in the adjacent area and integrate with all Bakola-Bagyeli groups in the Ocean Province
- Consult with Indigenous people and Bantu villages separately and together, and let both groups express themselves in a complete independent way
- Study land tenure issues in a global way so that all vulnerable groups (Pygmies, women, foreigners, poor in the village) obtain land security through traditionally respected land rights
- Mix specific targeted actions to the hunter-gatherer community with global actions for all communities in order to gain social license for the global project, and avoiding reverse favouritism.

- Focus developmental actions among the Bakola-Bagyeli groups towards long-term aims of more economic and political independence from the neighbouring Bantu groups.

5.8.14 Customs aspirations and attitudes

In the national ECAM2 study (2002, p.86) statements of people indicate as main causes of poverty, lack of a job, lack of income and lack of road. Subsequent causes are corruption and bad management, and own low education level, laziness and witchcraft. The responsibility of the government is thus engaged through providing jobs, building roads and better governance. The same people see as ways of improvement of their situation (1) creating jobs, (2) improve the road system, (3) improve access to health care and education, and (4) pay fair prices for agricultural products, (5) distribute wealth better. Surprisingly, improving agricultural production was not cited as an action to improve living conditions.

Figure 5-7.– Main living conditions improvement actions ac cited by the households classified as “poor”. (source: Ecam2, 2002, table 7.3)



5.8.15 Conclusions

Individual and cumulative impacts

Important economic developments will take place in the Kribi region in the coming years. Each project has its individual positive and negative impacts, but considered together cumulative impacts may be stronger or weaker and even change the direction of the individual impact from positive to negative or *vice versa*.

The Gas-to-power project is a good example of such cumulative effect. As different parts of the project depend on different promoters (i.e. (i) the gas producing facility, (ii) power plant and transmission line, and (iii) gas transportation through pipelines) individual interest of each developer was more important in the selection of the project facilities locations. The result is that the selected locations are such that they increase costs and negative environmental and social impacts.

Zoning of the Kribi region would allow to an optimal environmental and social management and growth of economic activities such as industry, tourism, agriculture, fishing by reducing negative impacts and optimizing positive impacts. The zoning proposed by the study 'Sustainable land use planning for tourism purposes' (Tchawa *et al.* 2004) is considered a good basis for a Sustainable land use strategy and zoning. The study defines five zones, only one of which will be reserved for industrial development (refer to land use plan in previous section).

Sensitive environmental areas protection is essential for the future conservation of biodiversity, cultural diversity and the economic development in the region.

Industrial developments should be located in sites a few km inland from the coast as far as possible, and grouped in a single zone if they are directly on the coast.

General negative impacts from the projects are expected to result from the opening of the region and the influx of migrants working for the project, and the tensions that this may rise in the local populations.

- Opening up of the area as a result of construction and upgrading (tarring) of roads will lead to an increase in accidents, nuisance, smuggling in border areas, and transport of meat illegally poached in the forest.
- The power line from Memve'ele, and especially the new railroad from Mbalam to Kribi will have negative environmental impacts on hitherto hardly exploited forest areas, increase bush meat trade as effective control will be difficult, and have a negative impact on wild life because of the accompanying noise nuisance.
- New concentrations of project workers will increase the demand on bush meat and fish. Bushmeat consumption control can only be effective if enough imported meat and fish is available at a price that is competitive with the price of local bush meat and fish.
- In order to be able to feed the growing number of people in the region, and thus to make an income, the agricultural sector needs improvement to increase its productivity.
- As bush meat and fish will be traded commercially to the workers, its availability for the local population decreases. This may lead to a lack of animal protein, which negatively affects their health. Thus, alternative sources of animal protein are needed to mitigate this.
- Landscape changes due to industry and off-shore oil exploitation can be expected to negatively affect tourism.
- There is a considerable health risk in the spreading of HIV/Aids, both for the individual projects as cumulative. Another potential negative impact on health is associated with the general deterioration of the forest resulting from the on-going developments.
- Pressure on the land by land use claims of industry, agro-industry, and transportation not only leads to increasing land prices, but also to increasing land scarcity. This could increase tension between ethnic groups while in case of resettlement people may lose their traditional access to farm land. Social tensions might also increase when profits from the industrial developments do not benefit the local population, or in case of perceived or real injustice in the recruitment of project workers.

- Ethnic minorities and other vulnerable groups experience fewer benefits from the projects. They are also at risk of losing their traditional access to farm land, especially in case of resettlements.
- Local population might increasingly lean upon what they receive from or via the projects, making them more dependent and taking away their self-supporting capacity.

Development potential of the Kribi region

From a socio-economical perspective, the main question is how much the local population benefits from the planned projects in the wider Kribi area. The local population is in need of employment, increased agricultural production with products sold at fair prices, improved roads, and improved educational and health facilities. So far, only the improvement of the road system seems to be guaranteed, as this is an essential prerequisite for the success of the projects.

Developing and implementing projects should be carried out in participatory consultation with the local population and should be based on commonly shared analysis of problems, potentials and actions required. The best projects contribute to sustainable development of the region and focus on strengthening the potential of the population to increase their income in a self-reliant and sustainable way. In this report, several of these actions have been identified:

- Community development, including training in community actions and conflict management techniques, which may improve the relation between the project and the local population thus becoming profitable for both parties.
- Agricultural development, including investment through micro loans, as a way to increase productivity in order to feed the new projects, and at the same time to increase local income.
- Fisheries development through better techniques, more investments, creating artificial reefs and fish sanctuaries, reinforcing the legal separation between industrial and artisanal fishing, developing the popular fishpond aquaculture, and managing the exploitation of the potentially rich fish resources of the Memve'ele retention lake at an early stage.
- Investment in education, especially technical schools and vocational training, will help the population to be more competitive when applying for jobs, and to better perform in their daily activities.

CHAPTER 6 RECOMMENDATIONS TOWARDS AN OPTIMAL REGIONAL INVESTMENT PLAN

As outlined in the Regional Assessment sourcebook update nb 15 of June 1996 of the World Bank, this section should focus on the optimization and integration of environmental management strategy into existing plans.

“Recommendations towards an optimal regional investment plan [..] “the mandate for the REA will only allow it to give recommendations for improving an existing plan. At any rate, REA provides unique opportunities to internalize environmental factors into regional development planning to minimize future environmental costs and ensure long-term economic and environmental sustainability.

Source: Assessment sourcebook update nb 15 of June 1996 of the World Bank, p.10

The official development and land use plan of the region as well as other relevant ongoing project document were unfortunately not available for this REA study. These documents were identified from brief interviews only, but were not accessible for viewing or analysis. This was the case of the two plans / strategies which are currently under preparation:

- The zoning plan of the MEAO
- Integrated coastal zone management project (GLCME, UNDP, ongoing)

The inaccessibility of these documents makes it difficult to make robust recommendations. Therefore, based on the information available, at present, we can only recommend that investments are directed to:

- Sustainable land use management planning,.
- Integrated environmental, social and health management,
- Recommendations and alternatives to projects, and
- Further process to investment planning

Some guidance and principles on Sustainable development and Sustainable land use relevant for a regional planning are also presented in this section.

6.1 Sustainable land use planning

Sustainable land use planning for the Kribi region should include a zoning plan, a strategy, and institutional enhancement for the implementation of such strategy. Few plans have been made. These plans should be taken as basis and optimized further.

6.1.1 The draft zoning plan of the MEAO

This plan was made with the collaboration of a lot of stakeholders in the region. In this, it is a good step forward towards the clarification of land tenure and land occupation issues in the region. However, some recommendations can be made (once more it is emphasized that the complete plan could not be seen):

- Extension of the Kribi city:
Alternative and rational for such alternative to the planned extension of the Kribi city is presented in Recommendations and alternatives (Alternative 6).

- **Grey areas**
 There were a lot of areas for which no specific land use was allocated. Those areas were named "all purpose", which is named here 'grey areas'. The purpose of a zoning plan is to
 - To direct the development of a region towards desired socio-economic functions of this region, reflecting an ambition. For instance: 'Kribi region should be a center of mining transit in Cameroon' or 'Kribi region should be the beach of Cameroon (tourism ambition)', etc.
 - To combine land functions in such a way that infrastructure, environmental, social and health management is easier and that land use conflicts are avoided..

By leaving grey areas, where everything is possible, the developments which will occur on these areas can lead to:

- conflict with the vision of the desired socio-economic function of the region
- land use conflicts
- environmental, health or social nuisances due to un-compatible used
- more difficult infrastructure and HSE management due to an 'anarchic' development.

Therefore, it is important that all projects occurring in these grey areas should go through the MEAO or MINPLATDAT in order them to assess if the project is in line with the main direction of the zoning plan for the region. This step should be formalized by a necessary approval of this authority in order to obtain a permit to operate.

- **Zoning plan, not land use management plan**
 From what could be understood, the draft MEAO plan is a zoning plan. This should be further worked out and detailed in order to develop a land use management plan and a strategy for the implementation of such plan. The two land use plans described hereafter should be taken as basis to do so.
- **The importance of having a land use planning before the development of projects in the Kribi region**
 Mostly, local development tends to occur around a project, with no planning, leading to short-term benefits and sometimes long-term damage to the ESH aspects. Developers should fit in an existing plan of the region in order to ensure that these developments fit in the vision of the region and guarantee an optimum long-term benefit for the region.

It is crucial that the Kribi region have a land use plan to guarantee a sustainable development of the region and avoid anarchic developments. In this, the land use plan of the Kribi region should be ready before that the projects are developed in the region. The developers should also go through the planning authorities (MINPLATDAT/MEAO) in order to ensure that project do fit the land use plan of the region.

- **Urbanisation plan for Kribi town**
 Considering that the population in the Kribi region will substantially increase and that it is expected that the population will concentrate in urban areas, it is necessary to establish a urbanisation plan for Kribi town in order to control the population growth, provide the best quality of life to the inhabitants and minimize the impacts of such growth.

6.1.2 Strategy for sustainable land planning in the coastal zone Kribi-Campo (Tchawa, 2004)

This strategy is of good quality. It provides a comprehensive overview of problems, solutions and opportunities, and covers the most important environmental and social issues of the region. It is recommended that authorities take this strategy, together with its related zoning plan, as basis and adapt it further through:

- Including more industrial, economical and subsistence activities (the strategy was focused on sustainable tourism)
- Greater considerations of environmental, social and health aspects through the drafting of detailed plans addressing those aspects.

6.1.3 Integrated coastal zone management project (GLCME, UNDP, ongoing)

This strategy seems to provide a good basis for the region. The exact content of this strategy was not accessible and thus not known when this REA report was drafted, however, it seems that UNDP made use of the results from the previously discussed study. Therefore, one can expect the basic concepts to be similar. Recommendations for this project are as follows:

- Integrate this project into the administrative system of Cameroon and Kribi.
- It is not known what is / will be the official status of such study and how much will it be implemented by authorities since it is not made by or on order of MINPLATDAT. In parallel, the official plan for the region is the one of the MEAO, which had a direct mandate from MINPLATDAT. In order to optimize its use for the country, such study should link to the existing plans and administration of the Kribi region.
- Raise the project's profile (strategy and recommendations) with stakeholders and in particular with project developers and financial institutions (WB, IFC, etc.) in order for them to include the principles of the strategy in their requirements to lenders.

6.1.4 Strategic Environmental Assessment (SEA)

An SEA serves for planning purposes. It is a great tool to integrate all existing government orientations, directions and policies as well as requirements of existing and applicable national and international regulations in a concrete land use planning and/or environmental strategy.

The REA is a sort of SEA for a region. This type of strategic study is the first of its kind in Cameroon.

Such strategic study, i.e. REA / SEA / cumulative impacts assessment studies could be carried out in other region or zones where several developments are planned in order to identify the real impact (i.e. cumulative) on this zone and determine the planning for the region and mitigation or compensation measures.

6.1.5 Follow up of the REA

The REA was very praised by stakeholders during the presentation of the Draft REA report to stakeholders in the form of a workshop. The benefits of the SEA (as mentioned in the previous paragraph) could be recognized by the stakeholders which created expectation and motivation for follow up and implementation of the REA.

Follow up actions on this REA study should be made. An implementation strategy should be established by (or supported by) the concerned authorities. Local stakeholders should be fully involved in the process of establishing and implementing such strategy.

6.2 Integrated environmental, social and health management

This section provides important aspects of attention which should be integrated into the Sustainable land use management plan of the Kribi region.

It is highly recommended to prepare an integrated and optimized regional investment plan based on environmental social and health management of the Kribi region. As discussed previously, cumulative and induced negative impacts of the several planned projects go far beyond project location boundaries and affect (considered all together) the Kribi region as a whole. In this, it is important to consider all activities in the region and to also consider and implement common integrated solutions rather than project-based solutions only.

The benefits of integrated regional environmental management are many:

- Better environmental results: by an integrated vision, interactions with other activities are considered, whereas in project-based approach, those aspects would not be considered. In this, measures deduced are better suited for the context, and therefore more efficient. E.g. an industry could have good environmental practices resulting in low water discharge. However, if another industry upstream discharges a significant amount of pollutant, the river is still polluted.
- Better economical result: environmental mitigation measures of one industry could actually become a negative impact to another economical activity. Moreover, integrated environmental management tends to focus on long term achievement. By ensuring natural environmental resources in the long term, which are also economical resources, the region ensure its long-term economical activities.
- Better efficiency (leading to cost saving): double measures can be avoided. As a result, conflicts can also be avoided and time can be spared.
- Cost saving: in common measures can be cheaper than several single measures.

The cumulative and induced impacts should receive particular attention to realize an integrated approach, for the following reasons:

- Their magnitude (please refer to cumulative impact section)
- They do not have only one single source, but their significance is due to the accumulation of impacts from several activities and projects.
- There is not one party responsible. Cooperation and partnership is needed between the responsible parties (i.e. sources of pollution/nuisance), the authorities and other stakeholders involved in order to solve problems and set up prevention and mitigation schemes.

Main cumulative and induced impacts to focus on in an integrated way are:

- Population increase / urban extension
- Infrastructures, built environment and land use (in relation with land use planning)
- Waste management
- Road traffic
- Marine traffic

The main aspects of the integrated environmental, social and health management of the Kribi region are briefly described below.

6.2.1 Preparation of appropriate environmental infrastructure

(drinking water, waste water, solid waste treatment, storage and disposal facilities)

The increase of population and of economic activity will be accompanied by a considerable increase in (i) demand of drinking water and (ii) the production of wastes (sewage and solid wastes). Appropriate environmental infrastructures are required to deal with these demands in relation to available capacity and mitigate or avoid the impacts from waste production.

- **Drinking water system:**
Development of central or local drinking water system should be set up and made available to the various projects' activities workers and to the (new) residents.
- **Waste management in the region should consist of the following requirements:**
 - Inventory of types and quantities of waste produced
 - Plan for safe and adequate transport and treatment of these wastes
 - Construction, upgrading or expansion of waste collection and treatment/disposal facilities
 - Identification of an institution to be responsible for waste management in the region
 - Establish and promote HSE awareness in order to ensure safe practices
 - Build local capacity where necessary

6.2.2 Natural conservation

The Kribi region should develop a strategy and plan for sustainable integrated management of natural areas for the region as a whole Components could be e.g.:

- Identification and mapping of protected areas, integrated management areas, forest management units, community forests, hunting reserves etc.
- Clear definition of purpose and the allowed functions for each area
- Consideration of aspects such as reducing fragmentation of habitats, improving corridor functions for wildlife between important areas, defining sustainable levels of traditional or other natural-resource based activities, identifying most suitable areas for natural resource harvesting and ecotourism
- Developing / implementing e.g. Codes of Conduct for Forestry and Tourism, Reduced Impact Logging methods, sustainable Community Forest management methods
- Developing and implementing zero tolerance policy for poaching of protected species and illegal logging, and setting quota for hunting of non-protected species based on maintaining sustainable wildlife levels
- Linking nature conservation and poverty in policy making and implementation, for example with assistance of and through best practices of the *Nature and Poverty program* by WWF, IUCN and Friends of the Earth in cooperation with local NGOs. For the Kribi region, the program currently runs in Campo Ma'an and in Doula – Edea wildlife reserve¹³⁶.
- Developing and implementing a stakeholder consultation and participation strategy, including and drawing from the extensive natural resource-knowledge of indigenous peoples

¹³⁶ <http://www.natureandpoverty.org/index.php?id=105>

The Alternative 7 presents additional information and recommendations.

6.2.3 Transport infrastructure management

- Refer to Recommendations and alternatives for projects (Alternative 1 and 2) on sustainable transport and transport corridors;
- Freight and passenger railway network infrastructure;
- Intergation and overall reduction of the number of transport corridors;
- Long-term management plan (including maintenance) of roads which include the funding (see study above) for maintenance; and
- Road traffic control (speed control and state of vehicles)

6.2.4 Environmental control of marine traffic and practices at sea

Enforcement of MARPOL, fisheries agreements and other sea regulations to combat marine pollution is urgently needed off the coast of Cameroon. This subject would require international cooperation. Cooperation with International organizations which work on such problems should be sought for common efforts.

6.2.5 Ensuring short-term and long-term benefits for the local populations

- Development of region wide eco-tourism management plan
So far, eco-tourism promotion has mainly been focused on Campo-Ma'an NP and vicinity. Eco-tourism of the whole Kribi area should be further investigated.
- Promotion of sustainable products;
- Access to electricity for settlements; and
- Efficiency of fuel consumption, e.g. biomass as a fuel in settlements and industrial processes.

6.3 Recommendations and alternatives for projects

Recommendations and alternatives for the projects planned are proposed in Chaoter 8. The proposed alternatives are based on changing a project-based management to a regional and integrated management of environmental, socio-economic and health aspects. These alternatives will require regional cooperation and investment. Please refer to Chapter 8 for the description of the recommendations and alternatives and the previous section for a description of the concept of regional and integrated environmental, social and health management.

6.4 Further process to investment planning

When more details regarding the plan and strategy are known, a more detailed study should be carried out in order to determine:

- Further master planning;
- Detailed planning;
- Feasibility studies;
- Detailed environmental, social and health assessments for the main investments / projects; and
- Financing and funding studies

6.5 Sustainable development guidance and principles

6.5.1 Sustainability and environmental principle applicable

General principle

- **Prevention**
Prevention is advised as opposed to 'no action' or reactive action (fine when the damage is already done). Prevention pays always back, mainly in environmental quality, but also often significantly in the economics of the measures to combat pollution.

- **Precaution**
When the risks of an activity or a substance are not proven, one can
(1) believe that there is no risk in the absence of proof and address potential problem when it would arise,
(2) in doubt, act as there would be a risk and make necessary arrangement accordingly. The second attitude is called precaution.
A good example of the application of the precautionary principle is 'climate change' and genetically modified organism (GMO). For long, climate change was controversial and lots of countries and industries had an ostrich attitude. Now the whole world pays the price of it in seeing the climate changing every year and the industries and government have to invest a large amount of money in order to tend to mitigate damages.
In non-OECD countries, such as Cameroon, governments should be very careful in letting Western industry test what they do not do in the West/ North, like the cultivation of plant species for biofuels. Some of those plant species are not grown in the host country. Induced and long-term effects on the host country of the land used and practices of cultivation are most of the time not well investigated. Those impacts can lead to increase of poverty, negative impacts on the economy and loss of biodiversity for the host country.

- **Shared responsibility principle**

- **Polluter pays principle**
Industries or other activities which are found to pollute or not complying to environmental legislation should pay the price for it. That can be in form of a fine, e.g. when non compliance is found through an inspection or monitoring. This principle has two benefits:
 - It discourage operators to pollute (the fine price much be such that it is realistic to for the industry to pay, but discourage it to do it again)
 - To build up fund for environmental inspection and monitoring
 - Publish the names of polluters (this practice is implemented in Indonesia and has given good results).

- **Sustainable development principles**
Endorse sustainability principles at authority and business level (see Table 6-1 below).

Specific integrated environmental management principle

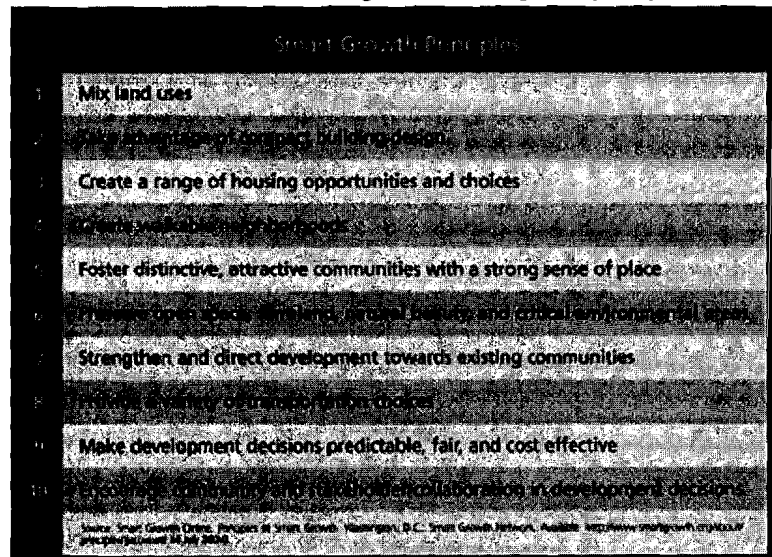
- Fighting pollution at source
The sources of pollutions are well known in the region. In this, all efforts should be made to avoid or mitigate pollution by good practices at site.
- Catchment based approach for water quality management system
Good draining data of the region in order to prevent / track back identified pollution
- Ecosystem approach (biodiversity)
Environmental management of the living environment should be based on the ecosystem. An ecosystem thereby means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It takes into account all the (complex) relationships between organisms (of all sizes) and physical processes (such as climate). And it recognizes that humans, with their cultural diversity, are an integral component of ecosystems¹³⁷.
- Waste management hierarchy
(1) avoidance, (2) reduction, (3) re-use, (4) recycling, (5) recovery, and (6) residue disposal.

Sustainability principles specific to planning

Much more guidance is available on sustainable land use and to understand each specific aspect and concept listed below. This could in fact be the subject of a dedicated study.





- Sustainable spatial planning (regional level)
- Sustainability settlement principles (city level)
 - Mixed land use
 - Housing balance
 - Access to facilities
 - The open space network: (i) provides room for human recreation, wide life habitats, water and energy management, (ii) this concept is too often treated separately or ignored in human planning
- Avoid sprawling and apply the 10 Smart Growth principles (city level), see Figure 6-1

Figure 6-1. Smart growth principles



¹³⁷ Convention on Biological Diversity

Table 6-1: Basic principles of Sustainability for businesses

Basic Sustainability principles	PPP aspects
<ul style="list-style-type: none"> • Respect Internationally proclaimed human rights; (GC1, EU/ SD) • Respect labour rights (ILO); • Eliminate all forms of forced labour (GC4, ILO) • Eliminate child labour (GC5, ILO); • Respect consumer rights; • Contribute to an optimum health and welfare of personnel and society • Do not complicit in human rights abuse (GC2) • Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining (GC3) • Elimination of discrimination for employment and occupation (for sex, race, handicap) (GC6) • Respect culture and Indigenous population • Solidarity within and between generations (EU/SD) • Open and democratic society (EU/SD) 	<p>People</p> <p>Social </p> <p>Societal </p>
<p>Apply the principles of</p> <ul style="list-style-type: none"> • Precaution (GC7) • Prevention • Combating pollution at source (EU) • Polluter payer (EU, OSPAR) • Promote the development, use and diffusion of clean or environmentally friendly technology (GC9) • Best available techniques and best environmental practice (OSPAR) • Integrated ecosystem approach (OSPAR) • Waste management hierarchy (EU, OSPAR) • Undertake initiatives to promote greater environmental responsibility (GC8) • Use of hazardous chemicals in a proper manner • Protect Biodiversity • Respect the Kyoto Protocol and fight against Climate change 	<p>Planet</p> <p>Natural & Physical Environment</p> 
<ul style="list-style-type: none"> • Ensure quality of services/products/researches • Fight against all forms of corruption, including bribery (GC10, OECD) • Ensure business continuity • Ensure responsible governance (EU/SD) • Be financially transparent and apply the EITI principles • Involvement of citizens (EU/SD) • Involvement of business and social partners (EU/SD) • Policy integration (EU/SD) 	<p>Profit</p> <p>Business continuity and profit</p> 

Reference institutions and legend		
Institution of reference	Reference document	Ref. in table 1
<ul style="list-style-type: none"> • UN • OCDE • ILO • EU • OSPAR Convention • MVO (Platform) Nederland 	<ul style="list-style-type: none"> • Global Compact principles • Anti-corruption guidelines • ILO Conventions • Sustainable Development Strategy principle • OSPAR Convention, general principles • MVO Referentiekader 	<ul style="list-style-type: none"> • GC1 to 10 • OCDE • ILO • EU/SD • OSPAR • MVO

Sustainability or PPP aspects
 Societal (People)  Social (People)  Environmental (Planet)  Business continuity (Profit)

Terms of the figure above:

- MVO Platform Nederland is a Dutch institution providing guidance on Corporate Social Responsibility (CSR). It has published the CSR reference framework (NL: MVO Referentiekader).
- OSPAR means Oslo/Paris Convention for the Protection of the Marine Environment of the North East Atlantic. OSPAR is often taken as example by the Abidjan Convention, the equivalent of the OSPAR Convention for African waters.

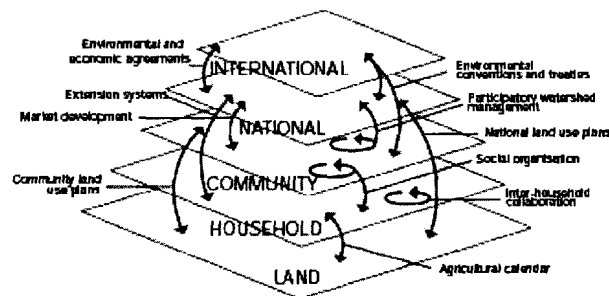
6.5.2 Instruments

Some instruments available are mentioned in this section.

- Local Agenda 21 (for cities)
Local authorities to engage in Local Agenda 21 processes
- Millennium development goals for the provinces of Cameroon
- Global compact (UN Sustainability principles for business)
Kribi / Cameroon could ask business to commit to Global Compact and check against those commitments
- Multi-level stakeholder approach to sustainable development¹³⁸
This approach has been chosen by the management team as being the most appropriate approach of land use management for the Kribi region.

This concept is defined as a “multi-level stakeholder approach to sustainable land management” has been developed for finding feasible, acceptable, viable and ecologically sound solutions at local scales

Figure 6-2. Intervention levels and activities in a multi-level stakeholder approach to sustainable land management (source: [4])¹³⁹



¹³⁸ Concepts of sustainable land management, Hans Hurni, ITC Journal 1997-3/4

¹³⁹ Hurni, H. 1998 (in press). A multi-level stakeholder approach to sustainable land management. Proc of 9th ISCO conf, intro keynote, Bonn.

CHAPTER 7 RECOMMENDATIONS TOWARDS AN ENVIRONMENTAL MANAGEMENT STRATEGY

This chapter presents recommendations in order to establish an environmental strategy in the Kribi region. The main recommendations are presented in the core text section below. Other recommendations are presented in Table 7-1.

The recommendations aim to provide three dimensions to the environmental strategy of the Kribi region:

- Integrated environmental, social and health (ESH) management
This concept has been extensively explained in the previous section
- Switching from passive and reactive to proactive attitude in ESHI management
- Increasing the carrying capacity of the Kribi region

The following elements are part of the environmental management strategy and are described in this section:

- Mitigation measures
- Monitoring
- Inspection and enforcement
- Environmental awareness
- Capacity enhancement and institutional strengthening

7.1 Mitigation measures

Some project-specific mitigation measures have been selected as being particularly relevant to this REA study as they can be applied to any projects planned. These measures are presented in this section.

7.1.1 Main relevant mitigation measures for a sustainable development of the Kribi region

Nature conservation strengthening as compensation for forest degradation and deforestation (example of the Gas-to-power project)

Most of the projects will involve deforestation and loss of biodiversity. Secondary forest should be preferred and primary forest should be as much as possible avoided. In any case, this requires compensation through payments to the protected areas in the vicinity: Douala-Edea wildlife reserve or the Campo-Ma'an National Park, which is in line with the World Bank Operational Safeguard policies OP4.01 on Environmental Assessment and OP4.04 on Natural Habitats, which require environmental offsets or payment to the establishment and/or maintenance of an ecologically similar protected area.

In the case of the gas-to-power project, SNH and AES Sonel site set up involve loss of mostly secondary forests, which is in places still good secondary forest and some primary forest plots on the SNH/Perenco site. As Douala-Edea wildlife reserve is the closest to the both sites and it is thought its conservation management does not function in an optimum way and that the area is under heavy human pressure. In this, it would be advised that compensations would be directed to Douala Edea wildlife reserve first.

In this case, it is not known how the Douala-Edea wildlife reserve is currently managed, neither which institution is responsible of it. The proper management and financing system would first need to be established. Cooperation with the NIFOF delegates will be first required to establish what are the existing management resources of this area, the

problems experienced, the needs and how compensation scheme can be best be set up.

In the case of the deep sea port, compensation could be directed to the strengthening of the Campo-Ma'an NP, and especially, the areas which may be affected by the projects, i.e. due to the corridor of the railway Mbalam-port. Another area of compensation should be the coastal area. North (if applicable) and South of the port, with a particular attention to turtle conservation and promotion of eco-tourism.

Drinking water, sanitary and waste treatment infrastructures as compensation for construction period nuisance

Each project has drinking water, sanitary infrastructure and waste treatment requirements, especially during its construction period. Often, temporary or mobile infrastructures are built and used temporarily and abandoned after the construction time. One compensation measures for nuisances and disturbance caused during the construction period of a project should be that drinking water and sanitary infrastructures are built for permanent use if construction takes place near a local settlement which lacks appropriate service infrastructure. After the construction period, the ownership of these infrastructures can then be handed over to the the local population. These facilities should preferably also be built by the local population, as this will provide them with some employment and on the job training, plus with knowledge for its operation and maintenance.

Health and educational facilities

Similarly to sanitary facilities, promoters should ensure that the increase of population induced by their activities is followed by an appropriate increase of the number of health facilities in the region. When required, promoters could also help improving the quality of health treatment in the existing and/or future health facilities. Promoters could also help in the establishment and improvement of schools in the region. For both educational and health facilities, promoters should first consult the responsible authority for these aspects and support government planning.

Business and project developers' participation in employment and education in the Kribi region

- Participatory development projects which include the local populations in the beneficiaries of the various projects
- Transparent employee recruitment processes which favor the local population
- Actions among local communities and project workers to prevent the spread of HIV/AIDS, malaria and other communicable diseases: access to cheap health care, condoms, bed-nets, and design of projects facilities that minimize spread of diseases
- Improve education, in schools and in the workplace, so that in the future more qualified workers can be hired.

Land compensation

- Ensure of land access to all people whose land has been negatively impacted by the projects

Pygmees

Promoters should not try to make a specific plan for the protection of pygmies (when required, for instance for a road project crossing pygmies camps). Instead, promoters should first consult and when applicable refer to the PPPA (plan pour la preservation des populations autochtones) which apply to most of the Kribi region and deals with pygmies preservation. The FEDEC is coordinating the compensation scheme related to this PPPA and could be used to coordinate additional compensation scheme.

7.1.2 Other relevant mitigation measures

Some project-specific mitigation measures may be:

- Improve market conditions in order to have cheap meat on the market and fish available that can compete economically with bush meat
- Develop cattle farming and training for the population in order to learn cattle farming.
- Road safety: use speed bumps at the entry and exit of villages, use toll gates to check the cruise speed of vehicles.
- Use less land and minimize deforestation on plots to be used for industrial or residential functions (restriction of plot attributed, efficient land use on attributed plot, integration of various functions on plot, use of already cleared or marginalized lands rather than clearing new lands, replanting of trees, re-vegetation of areas cleared during construction)
- Concentrate urban growth around Kribi city and avoid extensive ribbon developments along roads to reduce environmental degradation and to ease proper management of the urban areas.
- Compensation of deforestation, forest degradation or other major impacts on the natural terrestrial or marine environment and caused by major projects. Compensation should be paid for by the project owners e.g. the companies in order to internalize the economic costs for Cameroon of environmental degradation ('polluter pays' principle). Example of such (financial) compensation is presented below for the Gas-to-power project (SNH and AES Sonel).
- Group projects to minimize the number of sites and number of corridors, thereby reducing the impact on the biotic environment, such as iron-ore port and deep sea harbor in 1 location, CPF and power plant on 1 site, roads / railways / transmission lines along the same corridor.
- Have an approved land use and zoning plan in place before commencement of construction of main roads, railways and transmission lines to avoid (speculative and chaotic) un-coordinated and/or unwanted developments with possibly major environmental impacts to take place along the foreseen routes.
- Promote environmentally sound (small-scale) tourism developments, which draw on the rich natural values of the region and 1) which stimulate high local involvement in order to provide financial benefits from (eco)tourism to local communities rather than to large (tourism) companies/investors from the capital city or from abroad; and 2) which don't result in mass tourism in order to avoid major stress on habitats and species.
- (Re-)Plant trees in new industrial estates and in urban areas
- Re-vegetation of areas cleared during construction
- Choose the dry season for construction work to avoid subsidence
- Use fuels and lubricants of good quality and good environmental performance

7.1.3 Other guidance on possible mitigation measures

Other mitigation measures can be found in

- Table 7-1
- The existing ESHIAs already made for projects in the region.
- Guidelines of the World Bank:
 - Operational Policy/Bank Procedures - OP/BP 4.01 Environmental Assessment
 - Environmental Assessment Sourcebook and Updates
- Specific measures per project should be determined by a specific ESHIA

7.2 Environmental monitoring

The Kribi region already has frequent and accidental pollution incidents and has records of some environmental catastrophes, especially regarding water pollution. These incidents are accompanied by drastic effects on the natural and social environment and on the economy (e.g. decrease of fish stock, mangrove disruption and human intoxication).

Therefore, it is crucially important that monitoring of the abiotic environment is established in the Kribi region in order to timely identify pollution and be able to prevent drastic damage. A strategy and instruments are required to switch from a reactive or passive attitude to a pro-active attitude in environmental management; monitoring of the abiotic environment (air, water, noise, coastal erosion / sedimentation) is a key instrument to achieve this.

Considering the situation and history of the Kribi region, the priority is on (surface and sea) water monitoring.

Indicators can be used in such a monitoring system in order to establish the baseline, check on compliance and assess the efficiency of some ESH measures taken. ESH indicators can be:

Abiotic environment (also for health) (in order of priority):

- Water physico-chemical quality (surface , ground and marine water)
- Width of the coast (at several set points along the coast)
- Air physico-chemical quality
- Noise level

Biotic environment

- Forest cover per type of forest
 - Moist evergreen forest;
 - Mangrove forest;
 - Swamp forest / wetlands.
- The number of terrestrial rare or endemic mammals (Specific species to be chosen as indicator must be determined):
 - Great Apes (gorillas, chimpanzees);
 - Other Large Mammals (e.g. forest elephants);
 - Monkeys and other small mammals.
 - (Migratory) Birds

- The number of marine and coastal fauna (Specific species to be chosen as indicator must be determined):
 - Cetaceans (whales & dolphins);
 - Marine turtles;
 - Manatees;
 - Fish (sea and estuaries);
 - Fish (inland rivers, lakes).

Climate change

- CO2 emissions
- Forest cover

Socio-economic

- % of population employed (ans details of qualification of employees)
- Growth % of the economic development of the region;
- Number and specifications of community services and infrastructure;
- Number (or length or road/railway) and specifications of transport infrstructure
- average income opf the population;
- Surface of land and resources available to aboriginal communities;
- Number of land and social conflicts (registered).
- Presence and state of cultural heritage (burial sites, etc.);
- Presence and state of archaeological heritage.

Health

- Nutritional status (height and weight of children),
- Vaccine coverage,
- Demographic estimate of natality and mortality,
- Causes of consultation in dispensaries and hospitals ,etc.
- Number of HIV affected people;
- Number of malaria affected people
- Number of aggression recorded.

7.3 Inspection and enforcement

Regional monitoring should be accompanied by an inspection and enforcement system in order to ensure environmental compliance. In the absence of national regulation and norms, international standards should be enforced.

Particular attention for inspection and enforcement should be on:

- agricultural and forestry practices (mainly plantations, but also subsistence agriculture)
- construction sites of new projects
- industrial sites:
 - ESHIA and EMP incluto be included in the permit for industries,
 - environmental permitting system for industries, with appropriate inspection and enforcement of permit regulation (installations classes)
- marine traffic and practices at sea (tankers, marine transport)
- coastal sand extraction in order to prevent coastal degradation
- respect of protected areas and nature preservation
- illegal poaching and logging

7.4 Environmental awareness

Improving environmental awareness is required at the following levels:

- Authorities (not only MINEP should be concerned, but other ministry delegates should be aware of the consequences of bad environmental management and should co-operate with MINEP Delegates)
- Industries (in order to ensure environmentally-friendly practices)
- Population:
 - subsistence practices are often unsustainable. Awareness should be raised among the population in order them to make the relation between their actions and the environmental consequences (eg. Decerase of fish stock due mainly to over fishing and fishing practices not respecting the reproduction cyle of fishes)
 - Awreness should be raised to teach the population the importance of motifying the authorities (MINEP delegates) when pollution is observed. This would allow MINEP to act accordingly.

7.5 Capacity enhancement and Institutional strengthening

Most of the capacity enhancement and institutional measures are presented in this section. Further recommendations ar presented in Table 7-1.

7.5.1 Consideration of the local context

For successful implementation of institutional measures in Cameroon, it is important to consider, respect and integrate the two existing systems which both equally rule the society of Cameroon.

- The administrative system of Cameroon
For the Kribi region, solutions can be implemented at departmental level and lower administrative level (arrondissement, district, canton, municipality and village).
- The informal system of Cameroon
The informal system is as important as the formal system in Cameroon. Traditions and customs need to be respected and considered when trying to establish a new system in the Kribi region. This demands extensive stakeholder engagement, considering that there are numerous ethnic groups in the Kribi region, having each their culture and traditions.

7.5.2 General

The institutional setting with respect to environment and social issues in the Kribi region is partly known in broad lines. However, there is no information available on details as number of environmental staff available, capabilities of those staff, interaction intensity with external parties, etc. Therefore, the recommendations in the field of institutional setting of environmental responsibilities and capabilities are formulated in general and require further formulation.

In addition, further development of the Kribi region requires solid planning mechanisms to enable a solid optimization process also for environmental matters. In fact, most environmental benefit can be gained during the overall planning discussions in the

sense of alternative evaluation, scenario development and simultaneously discussions on the various interests.

7.5.3 Main recommendations

Internationally funded project

For the large future developments planned, an internationally funded project is recommended to strengthen environmental management in the Kribi region. This project should aim at developing a balanced and sustainable institutional framework to protect the environment in an integrated way. The main components may be:

- detailed institutional assessment
- developing objectives and plans for key organizations
- institutional change or set up
- training and capacity building
- quality system and key performance parameters
- financing in GdC

Balanced development means that attention will be given to government, industry as well as NGO's/public. Environmental awareness and participation are key words in this sense.

Synergy of the Ministry delegates at local level

The Ministry delegate should improve cooperation between the ministries at local level in order to join, coordinate and split tasks and resources, especially to carry out the inspections and ensure environmental enforcement.

It is recommended to consider establishing a departmental authority for Kribi region in which all main environmental responsibilities are combined. This environmental authority may be equivalent to the French DRIRE and the Dutch DCMR. The latter is specifically set up for the strongly industrialized area of the Port of Rotterdam.

Focus on key institutions

At first, capacity enhancement should focus on key institutions at local level. These key institutions would then take a role of advisor in ESH aspects to the other delegates.

When needed, and probably at a latter stage, the key institutions could train other institutions on ESS aspects. The key institutions which have been identified are listed below.

- **MINEP at Department level**
This main environmental organization at department level should be strengthened in order to become capable to protect the environment in this highly developing region. Strengthening of the following aspects are crucial to achieve this:
 - policy development and planning
 - establishment of basic framework of norms / legislation?
 - review of environmental impact assessment
 - permitting
 - environmental monitoring
 - inspection and enforcement
 - promotion of environmental education
 - participation in emergency/contingency planning

- increased cooperation between and advisory role to other ministries
- MINFOF at Department level
Most of the recommendations for MINEP are also applicable to MINFOF in terms of forestry and fauna management.
- MINPLAPDAT / MEAO at Department level
This main planning organization can have a crucial position in the spatial planning in Kribi region. Spatial planning and evaluation of planning alternatives and scenario's require expertise from many angles. Environmental expertise is required within MINPLATDAT as well as sufficient involvement with eg. MINEP. Therefore, the MEAO should also be strengthened to become capable for these tasks.

Financing environmental planning and enforcement:

- Develop and implement a system of regional (environmental) taxes for developments / projects in the region and which is paid directly to the regional bodies.
- Develop public-private partnerships:
Partnerships with the private sector and developers should be (further) established and made operational. This will be useful in general, but also considering the limited governmental/private capacity and also considering remote areas. For this purpose Memoranda of Understanding / Co-operation (MOU, MoC) with stakeholders should be prepared, reviewed or updated.

7.5.4 Specific recommendations

Local governmental bodies

Various local organizations may have environmental responsibilities to enhance environmental management in the Kribi region. Institutional capacity should be available for:

- Drinking water production
- Collection, treatment and disposal of solid waste
- Collection, treatment and disposal of waste water
- Monitoring environmental quality
- Inspection of environmental performance

Local industries

Local industries, especially those of a certain threshold size, high pollution profile or high safety profile, require and in-house environmental capacity. These capacities should be in the form of environmental or HSE units or departments. For larger industries such as in power generation, oil and gas, mining and the chemical sectors responsibilities lie in the field of:

- Implementation of HSE policy
- environmental monitoring
- possibly development of an environmental management system
- good housekeeping and maintenance of equipment and vehicles
- environmental reporting, possibly sustainability reporting
- positive interaction with the Government

Local NGOs / public

NGO's and the public have a vital responsibility in the development of a region, certainly if there is a high rate of that development turnover. These organizations and the public have specific local knowledge that can contribute to a development in a more sustainable way.

MINEP and the proposed international project should promote environmental awareness in the Kribi region. The public should be motivated and urged to contribute to the project development, e.g. via public consultation. The end result will be a development that is carried through by the local population and in which they will participate.

- Training and further awareness raising for and with local NGO's is recommended. Possibilities are eg.:
- Dissemination of environmental reports;
- Development of a strategic plan for systematically enhancing and linking the education and awareness efforts of NGOs, the private sector and other organizations in the region.
- Dissemination of information on the impacts of existing development operations on the environment and natural resources on a regular basis;
- Education and awareness strategies relating to environmental management and biodiversity will be updated and be in place;
- Student awareness and youth environmental participation initiatives to be developed.

Forests and protected areas management

The protected areas in the Kribi region require additional management and maintenance measures, capacity and funding in order to sustain and strengthen their qualities and protect them against the substantial external influences.

See our earlier recommendations in Chapter Chapter 6 and Chapter 8 for the sustainable and integrated management of natural areas, including:

- the completion of biodiversity studies (for which a cost-effective method developed in Campo Ma'an is proposed)
- the assignment and mapping / zoning of protected and integrated management areas including improving corridor functions between areas
- developing and implementing zero tolerance policies for poaching and illegal logging; improving stakeholder consultation and participation processes
- respecting traditional lifestyles of indigenous peoples as well as with setting quota for hunting of non-protected species
- exploring sustainable natural resources uses, such as through sustainable forestry and eco-tourism, and
- linking nature conservation with poverty, such as through the Nature and Poverty program which currently runs in Campo Ma'an and in Douala – Edea wildlife reserve.
- Develop a specific approach to ensure the integration of marginalized groups in all initiatives aiming to boost local development and sustainable management of natural resources
- Promotion of sustainable products: request for 'sustainable' wood is increasing, and logging companies are trying to obtain the FSC or similar certification for their products. The government of Cameroon could stimulate this development by providing benefits to companies who operate as such
- Promote sustainable and transparent commercial logging in Cameroon, e.g. the FLEGT process. Detailed recommendations are available to improve the commercial

logging sector in Cameroon, e.g. Global Witness (www.illegal-logging.info), Fomete et al, 2007.

7.6 Additional studies recommended

In order ensure the success of the proposed mitigation, monitoring and institutional measures, it is recommended to previously carry out the following main studies:

- Surface water and ground water study: Establish good baseline data on groundwater depth and quality in the region in view of determining if suitable for human consumption
- Additional biodiversity study: Expand biodiversity baseline (terrestrial species plus coastal or fresh water species, such as manatees and crocodiles) beyond Campo Maán National Park to include other important biodiversity hotspot areas in the Kiribi region, including an improved qualitative and quantitative baseline of Douala – Edea woldlife reserve. For a relatively quick and cost-effective inventory method is referred to the recent (October 2007) Phd-study "*The missing link : bridging the gap between science and conservation*"¹⁴⁰ (Christiaan van der Hoeven / WUR), which was conducted in Campo Ma'an and explores and explains a new method of wildlife density estimation, which is less time and money consuming but yields comparable results with classical methods.
- Study the cumulative effects of the light emission of the planned developments at the coast on turtles behavior, such as from light emissions, beach tourism, egg raiding, fisheries by-catch, underwater noise, coastal erosion, destruction of beaches by sand harvesting
- A Kribi region-wide feasibility study on other eco-tourism opportunities, in addition to the research conducted by WWF for Campo Ma'an National Park
- Studies should be made in order to identify which on/off-shore locations are most suitable for sand extraction in order to preserve the coastal physical environment
- Integrated ESHIA for Gas-to-power project (Sanaga – CPF – power station)
- Specific good quality ESHIA for each project planned (if not already done)

¹⁴⁰ <http://library.wur.nl/WebQuery/catalog/abstract?dissertatie/nummer=4288>

Table 7-1. Recommendation table

Measures	VESHCS	Application to	Comments
Additional studies	VESHCS	Application to	Comments
Air quality baseline: measurements to establish air quality baseline in the Kribi region	Air Q	As part of further detailed cumulative assessment or as a specific baseline study. <ul style="list-style-type: none"> • Air quality of industrial projects near Kribi (usually point sources from stacks) near urban settlements (=nearby sensitive receptors) • In case of major traffic flows: ambient air quality near roads (with settlements) 	
Noise level baseline: measurements to establish noise level baseline in the Kribi region	Noise, Marine Ecology: Turtles and cetaceans	<ul style="list-style-type: none"> • Ambient noise in the surrounding for the Mamelles mine • Underwater noise for construction of the deep sea port and off-shore pipelines / platforms, incl. dredging (impact on marine ecology) • Noise emissions from industrial sites near Kribi (impact on nearby sensitive receptors -> humans and terrestrial wildlife) 	
Surface water and ground water study : Establish good baseline data on groundwater depth and quality in the region in view of determining if suitable for human consumption	Surface water Groundwater	<ul style="list-style-type: none"> • Region wide, especially in project sites and (newly) populated areas, and especially: • Downstream of certain project sites, such as Mamelles mines • Near industrial sites • Near agricultural plantations 	
Sea water quality baseline	Sea water Q Marine ecology	<ul style="list-style-type: none"> • (End of) Chad-Cameroon pipeline • Near industrial sites 	
Water modeling (current and sedimentation modeling)	Coastal erosion / sedimentation	<ul style="list-style-type: none"> • Deep sea port (mainly) • Jetty at the NSH site • 	
Study the cumulative effects of the light emission of the planned development on the coast on turtle behavior	Marine ecology: turtles	Any development on the coast, eg. <ul style="list-style-type: none"> • Offshore platforms • industrial sites 	Minimize turtle hindrance during breeding seasons (lights confuse them in finding their nesting beaches)

Measures	VESHCS	Application to	Comments
		<ul style="list-style-type: none"> • deep sea port • hotels, • etc. 	
Additional biodiversity inventories and assessments	Vegetation, Terrestrial and marine ecology	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • High biodiversity hotspots (which are not part of protected areas) 	Except Campo Ma'an National Park there are very limited data available on the remaining population sizes of endemic, endangered and protected species in the region, neither on the number of animals poached.
Kribi region wide feasibility study on other eco-tourism opportunities	Vegetation, Terrestrial and marine ecology, Habitats	<p>Kribi region wide and especially:</p> <ul style="list-style-type: none"> • Douala-Edea wildlife reserve • Campo Ma'an UTO • High biodiversity hotspots • Coastal strip between Kribi and Campo • Marine zone 	<p>Efforts so far are concentrated on the Campo-Ma'an area. Other areas within the Kribi region can still be explored.</p> <p>Alternative income generation for local population and government, however sustainability level will have to be clearly assessed</p>
Financial study on the costs for management of protected areas, and identification of funding sources (to be the input of the integrated natural management plan for the Kribi region, see further down)	Habitats	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • Campo Ma'an UTO • High biodiversity hotspots • Coastal strip between Kribi and Campo • Proposed marine 'reserve' 	To gain better insight in management costs and ensure sufficient funding
Study to identify long-term management (including maintenance) cost and identify contract forms, funding sources etc.		Proposed or to be upgraded roads	
Full and detailed ESHIA	All	All major projects, which still do not have one	Supervision and check of those EIA should be meticulous
Integrated ESHIA	All	Gas-to-power project (Sanaga – CPF – power station)	
Studies should be made in order to	Coastal erosion	Compensation of the deep sea port activities	Avoidance of negative impacts from sand

Measures	VESHCS	Application to	Comments
identify which on/off-shore locations are most suitable for sand extraction in order to preserve the coastal physical environment			extraction, such as erosion and degradation of beaches, intrusion of salt water, weakening of coastal defense against flooding
Update demographic data in all villages of the Wider Kribi Area, include for each villages the available facilities: education, health, water, electricity	Local population		Demographic data should take into account the presence of vulnerable minorities (Bagyeli-Bakola hunter-gatherers), and of non-local minorities.
Inventory of Bakola-Bagyeli settlements, especially along the Kribi Akom II road, where no recent data are available.	Bakola-Bagyeli groups		
Assess present chemical pollution level of sea and river fish	Sea and river fish		
Inventory of agricultural land used by employees from projects: saw mills and agro-industries	Local population; Agriculture		
In case the most recent census data cannot be acquired, a simple technique for a socio-economic baseline study is to be carried out in all local villages among a 5-10% sample of their population.			The survey should provide data on at least: village or hamlet-name, GPS coordinates, Arrondissement, Groupement, primary ethnic group, secondary ethnic groups, number of households, average household size, total population, % of permanent material roofs, primary school presence or distance, health post presence or distance, supply of water and electricity, market presence or distance, recreational facilities, road type, presence of churches and sacred sites, and economic activities.
Carry out a health and epidemiological baseline study (including but not limited	Health situation of the local population		

Measures	VESHCS	Application to	Comments
to children under five and women in their reproductive ages) to obtain a better understanding of the health risks			
Evaluation and identification of present pollution sources			
Good identification of the pollution source in the sea and on beaches (rigs, ships, pipelines) can assist in improving mitigation measures			
(Project related) mitigation measures	VESHCS	Application to	Comments
Use fuels and lubricants of good quality and good environmental performance	Air Q	All industrial activities All transport activities	
Use Best Available Technologies	Air Q	All industrial activities	
Use low- or reduced-impact construction methods	Vegetation, Terrestrial and marine ecology, Habitats	All construction activities	•
Use less land and minimize deforestation (restriction of plot attributed, efficient land use on attributed plot, integration of various functions on plot, use of already cleared or marginalized lands rather than clearing new lands)	Air Q Landscape Vegetation Carbon stock Terrestrial ecology	All industrial activities	<ul style="list-style-type: none"> • To minimize impact on valuable habitats and its species • To impact less on people in the surrounding • To have maximum buffer effect of vegetation for e.g. air / noise emissions
(Re-)Plant trees in new industrial estates and in urban areas	Air Q, Vegetation, Terrestrial ecology Carbon stock	Industrial projects, Urban settlements	<ul style="list-style-type: none"> • Improvement of air quality • Compensation of CO2 emissions (through land clearance and industrial / urban activities) • Creation or restoration of wildlife corridors

Measures	VESHCS	Application to	Comments
Prevent dust through: <ul style="list-style-type: none"> Limiting the speed of vehicles, especially when crossing villages and Upgrading of dirt tracks to gravel or laterite roads in areas of high heavy vehicle intensity Spraying of water in sensitive areas. 	Air Q	Especially around all new development during the construction period, and the Mamelles mine, all transport on laterite tracks.	
Minimum distance between industrial sites and dwellings or public buildings. Plant trees in this zone whenever possible.	Noise, air Q, Landscape, Safety	Project having safety risk and / or nuisances	
Appropriate personal protection	Noise, Safety	Risk project location	
Re-vegetation of areas cleared during construction	Air Q, Climate change, Water courses, Noise, Vegetation, Terrestrial ecology Carbon stock	All construction sites	
Best practice in laying (temporary) road, bridge and other infrastructure in construction period	Water (erosion / sedimentation)		
Choose the dry season for construction work to avoid subsidence (this will induce dust. See dust measures)	Water (erosion / sedimentation)	All construction work	
Communicate in a realistic and honest way about compensation throughout the entire project (but especially at the initial stages). Creating expectations that cannot be fulfilled at a later stage will have a much worse impact on the long term viability of the project than replying	Local population	Entire project period, especially during the initial stages	

Measures	VESHCS	Application to	Comments
negatively to questions during initial meetings.			
Annual reservation of a clearly defined proportion of the turn-over or the benefits of each project for social benefits and economic development of the surrounding communities on whose traditional domain the activities take place.	Local population	Entire project period	
Integrated (mitigation) measures	VESHCS	Application to	Comments
A central or local drinking water system should be put in place and made available to Projects activities workers and to the (new) population	Surface and ground water		Realistic evaluation of capacity should be made for now and the future in order to respond to an increasing drinking water demand. The system should evolve or go from one to three treating center, for instance. It should be evaluated what sources is better : surface or groundwater (both apparently polluted at present).
Development of Codes of Conduct for e.g. Tourism, Forestry, Agriculture	Vegetation, Terrestrial and marine ecology, Habitats	National and Kribi region	In cooperation with stakeholders
Development of eco-tourism management plan	Vegetation, Terrestrial and marine ecology, Habitats	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • Campo Ma'an UTO • High biodiversity hotspots • Coastal strip 	
Develop financial compensation scheme for population affected by wildlife (e.g. crop raiding)	Terrestrial and marine ecology	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • Campo Ma'an UTO • High biodiversity hotspots 	To maintain commitment of population to protect rather than kill wildlife

Measures	VESHCS	Application to	Comments
		<ul style="list-style-type: none"> Coastal zone 	
Improve incidence and crime reporting, publication and prosecution	All	Kribi region	To prevent and reduce e.g. deliberate forest fires, poaching, illegal logging, littering and spills from ill-maintenance
Plan for drinking water provision and related processing plant(s)	Health	Additional population	Make in such a way that the plan(s) is either flexible to grow, or that other sites are reserved for (an)other plant(s)
<p>Waste management in the region</p> <ul style="list-style-type: none"> Inventory of types and quantities of waste produced Plan for safe and adequate transport and treatment of these wastes Construction, upgrading or expansion of waste collection and treatment/disposal facilities Institution identified responsible for waste management in the region Bring HSE awareness in order to ensure safe practices Build local capacity where necessary 	<p>Air Q (including pollution and odor)</p> <p>Surface water</p> <p>Groundwater</p> <p>Marine mater</p>	<ul style="list-style-type: none"> Authorities to steer and manage this Participation and implementation by all projects and existing activities Population (awareness) Attract a waste processing facility (such as Tredy for industrial and specialized waste and another one for domestic waste) 	Waste production and issues related to those wastes are often underestimated. They are however the source of a lot of environmental and health risks. This can lead, for instance to waste dumping at sea, increase of diseases, increase of land use conflicts, etc. When facilities are planned after that problems occur, they are mostly much more costly and also means that damage has already occurred. Prevention by ensuring an adequate waste management is the best option.
Promotion of sustainable products.	Flora & Fauna	Forests	Traditionally the major buyers of Cameroon timber are European companies and governments. In Europe, the request for 'sustainable' wood is increasing, and logging companies are trying to obtain the FSC or similar certification for their products. The government of Cameroon could stimulate this development by providing benefits to companies who operate under these internationally recognized labels.
Logging industry.	Flora & Fauna	Forests	Several programs are ongoing to promote sustainable and transparent commercial

Measures	VESHCS	Application to	Comments
			logging in Cameroon, e.g. the FLEGT process. Various reports from projects and programs in this domain have made detailed recommendations to improve the commercial logging sector in Cameroon, e.g. Global Witness (www.illegal-logging.info), Fomete et al, 2007.
Kribi region wide strategy and plan on sustainable integrated management of natural areas (e.g. Reduced Impact Logging, co-existence of humans and wildlife, Community Forests)	Vegetation, Terrestrial and marine ecology, Habitats	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • High biodiversity hotspots • Forest Management Units • Campo Ma'an UTO (in specific the areas outside but near National Park) 	
Long-term management plan (including maintenance) of roads which include the funding (see study above) for maintenance	Air, noise, safety, health, terrestrial ecology	Proposed or to be upgraded roads	
Implement and enforce anti-speeding measures on roads	Terrestrial ecology	Proposed and to be upgraded roads	To increase road safety and prevent accidental kills of wildlife and humans
Clear physical demarcation of protected areas	Habitats	<ul style="list-style-type: none"> • Douala-Edea wildlife reserve • Campo Ma'an UTO and National Park 	
Controlling logging and settlements along roads	CO2, biodiversity	Forested area's	Prevention of deforesting on both sides of new and existing roads
The best locations for plantations	CO2, biodiversity	Forested area's	Prevention of deforesting (loss of carbon stock) Try to use abandoned or marginalized sites. Deforestation in favor of a plantation has a negative CO2-balance. With respect to the greenhouse gas emissions the setup of a plantation in regions without forest (for example the Sahel zone in the Northern part of Cameroon) is recommendable.

Measures	VESHCs	Application to	Comments
Access to electricity of settlements	CO2	Settlements and infrastructure	Most electric power is generated with hydropower. Use of hydroelectricity saves fossil energy Electrification of the Kribi region can diminish the use of fossil fuels by industry. When the electric power remains to be generated with hydropower plants this will diminish the CO2-emission.
Railway network infrastructure for freight and people	CO2, all	infrastructure	A good railway infrastructure can save transport fuel for trucks
Efficiency of fuel consumption. Biomass as fuel consumption in settlements and industrial processes.	CO2, other emissions	Settlements, industry	Higher efficiency of the processes can diminish the consumption of energy
Concentration of activities and reduction of transport corridors			The wide of the corridors through the forests has a huge impact on the deforested area. For roads this wide is estimated to be 50 m. Prevention of the logging, settlements and other economic activities all along the roads can diminish the average wide. Concentration of the activities can be advised.
Improve local (and also more regional) market conditions in order to make cheap meat and fish available that can compete economically with bush meat	Fauna	Region	
Drinking water (see remarks in table about drilled deep wells, trucking of potable water for construction sites, etc.)	Water	Region	
Ensure participatory development projects in order to include the local population as beneficiary of the various projects	Local population; Indigenous groups	Region; All projects	

Measures	VESHCS	Application to	Comments
Guarantees of land access or compensation to all people whose land has been negatively impacted by the projects	Local population	Region; All projects	
Transparent employee recruitment processes that are in favor of the local population	Local population	All projects	
Actions involving local communities and project workers in order to prevent the spread of HIV/Aids, childhood diseases, malaria, and other transmittable diseases: acces to affordable health care (both prevention and curation), condoms, mosquito nets, and design of project facilities and infrastructure that minimize spread of diseases	Health, HIV/Aids and other diseases; Local population	Region; All projects	
Access to clean drinking water is often cited among developmental priorities of villages. Water supply programs should opt for a cooperative approach with the local population so that knowledge capacity and money are available for maintenance and repair.			
Improve education, in schools and at the workplace, so that people can get training and in the future more qualified workers can be hired locally	Local population	Region; All projects	
Road safety: regulate speeding by the use of speed bumps at the entry and exit	Loal population	Region; Implementation at village level	

Measures	VESHCS	Application to	Comments
of villages, use toll gates to check the cruise speed of vehicles			
Keep populations regularly informed about the different ongoing and foreseen projects		Region; Implementation at village level All projects	
Monitoring	VESHCS	Application to	Comments
Air monitoring stations	Air Q	around project sites and in the region	
Noise monitoring stations	Noise level, Marine ecology: Turtles and cetaceans	Especially close to project locations, at work site and at inhabited surrounding Also around project sites, in urban areas and at some busy traffic points (and temporarily during marine construction in sensitive ecological seasons)	
Water monitoring system held by the government or independently monitored (not the firms)	Water	All sensitive points in the region (i.e. up and downstream of each industrial activity).	
Light emissions monitoring on the coast and monitoring of turtle behaviour	Marine ecology: turtles	Any development on the coast, eg. <ul style="list-style-type: none"> • Offshore platforms • industrial sites • deep sea port • hotels, • etc. 	Minimize turtle hindrance during breeding seasons (lights confuse them in finding their nesting beaches)
Capacity building / Institutional enhancement	VESHCS	Application to	Comments

Measures	VESHCS	Application to	Comments
One institution should be appointed to look after ground- and surface water (quality) as for the moment there is none ¹⁴¹	Groundwater	general	
Institutional strengthening in mining environmental enforcement	Water	Les Mammelles	Institutions should be strengthened and cooperation should happen between MINEP, MINEE and Min-Mines in order to legislate inspect and ensure that the Mammelles mining operation does not impact the region significantly.
Institutional strengthening in biodiversity management and law enforcement (especially poaching)	Terrestrial and marine ecology, habitats	Especially at local level (enforcement)	MINOF
Institutional strengthening in land use planning	Vegetation, Terrestrial and marine ecology, Habitats	Kribi region	Regional Land Use Plan, reduce fragmentation of natural areas, regulate human settlement and economic activities
Institutional strengthening in forest management and law enforcement	Vegetation, Terrestrial and marine ecology	<ul style="list-style-type: none"> • At national level (policy making, review of forest management plans) • At local level (monitoring and enforcement) 	MINOF
Increased cooperation and collaboration between governmental bodies in natural resource management	Vegetation, Terrestrial and marine ecology, Habitats	Especially at local level	Multidisciplinary approach, integrated management
Increased cooperation and collaboration between government and other stakeholders in natural resource management	Vegetation, Terrestrial and marine ecology, Habitats	Especially at local level	Multidisciplinary approach, integrated management, full stakeholder inclusion (incl. indigenous groups)

¹⁴¹ Sanaga South EIA, p. 45.

Measures	VESHCS	Application to	Comments
Environmental awareness and education programs	Vegetation, Terrestrial and marine ecology, Habitats	Kribi region (local population, project employees and government officials)	
Environmental training for local population who is active in sand extraction	Coastal erosion / sedimentation	Compensation for the deep sea port activities	
Long term funding.	Flora & Fauna	Forests	Protected areas should receive long term funding to ensure proper implementation of the management plans and sustainability of the implemented activities and investments (e.g. tourism). Funding should come partly from the state budget, but should also include funds raised in the parks themselves, e.g. entrance fees. Park authorities should be allowed to raise money for conservation activities. The government of Cameroon should insist on environmental compensation for economic activities that have a negative environmental impact, as determined in the legally required EIA. These funds should be channelled to protected areas for implementing protected area management according to the management plans, as was e.g. the case for the TCPP.
Better collaboration between government services and civil society.	Flora & Fauna	Forests	The government can increase their collaboration with civil society to manage protected areas in Cameroon. The Mbam Djerem and Campo-Ma'an National Parks are jointly managed with CWS and WWF respectively, and these initiatives can be implemented in other areas with these and other partners. The conservator should be stimulated to

Measures	VESHCS	Application to	Comments
			start joint management activities with local NGOs and communities, within the framework of the management plan.
Governmental 'Regional Land Use Plan' See also specific section in Chapter 6	All	Kribi region	Ministries <ul style="list-style-type: none"> • Proper zoning of the region • Clarity for population and companies • Easier enforcement in case of un-allowed developments and activities • Prevention of chaotic / ribbon development of settlements along roads • Prevention of illegal roads and settlements • Limiting fragmentation of natural areas
Capacity building at ministry level	Flora & Fauna	Forests	At the level of the ministries, capacity building is needed in monitoring, data collection, and integration of activities between various ministries working in this field. At local level (delegations of MINFOF, MINEP, councils, communities, NGOs), capacity building is needed to reinforce monitoring and control of management plans and illegal activities.
Institutional strengthening strategy <ul style="list-style-type: none"> • For each institutions involved • Set of an action plan • Commitment of ministries and other parties involved 	All	All major projects in region	
The involvement of health staff in controlling the quality of fish products, or even an implementation of surveillance program of fish products consumed could complete the control program of oil pollution.			
Risk of water pollution and contamination			

Measures	VESHCS	Application to	Comments
of fish with carcinogenic substances to be mitigated by and independent committee of medical and fishery authorities (like the recent "Centre communautaire de pêche artisanale" de Kribi (CECOPAK) built with Japanese development assistance) financed by the Oil and Gas Industry			
Regulation / inspection	VESHCS	Application to	Comments
Strict regulation and enforcement on water intake from and discharge into water courses	Water	Region	
Inspection of practices during construction	Water	All construction sites	
Regulation for coastal sand extraction in order to prevent coastal degradation			

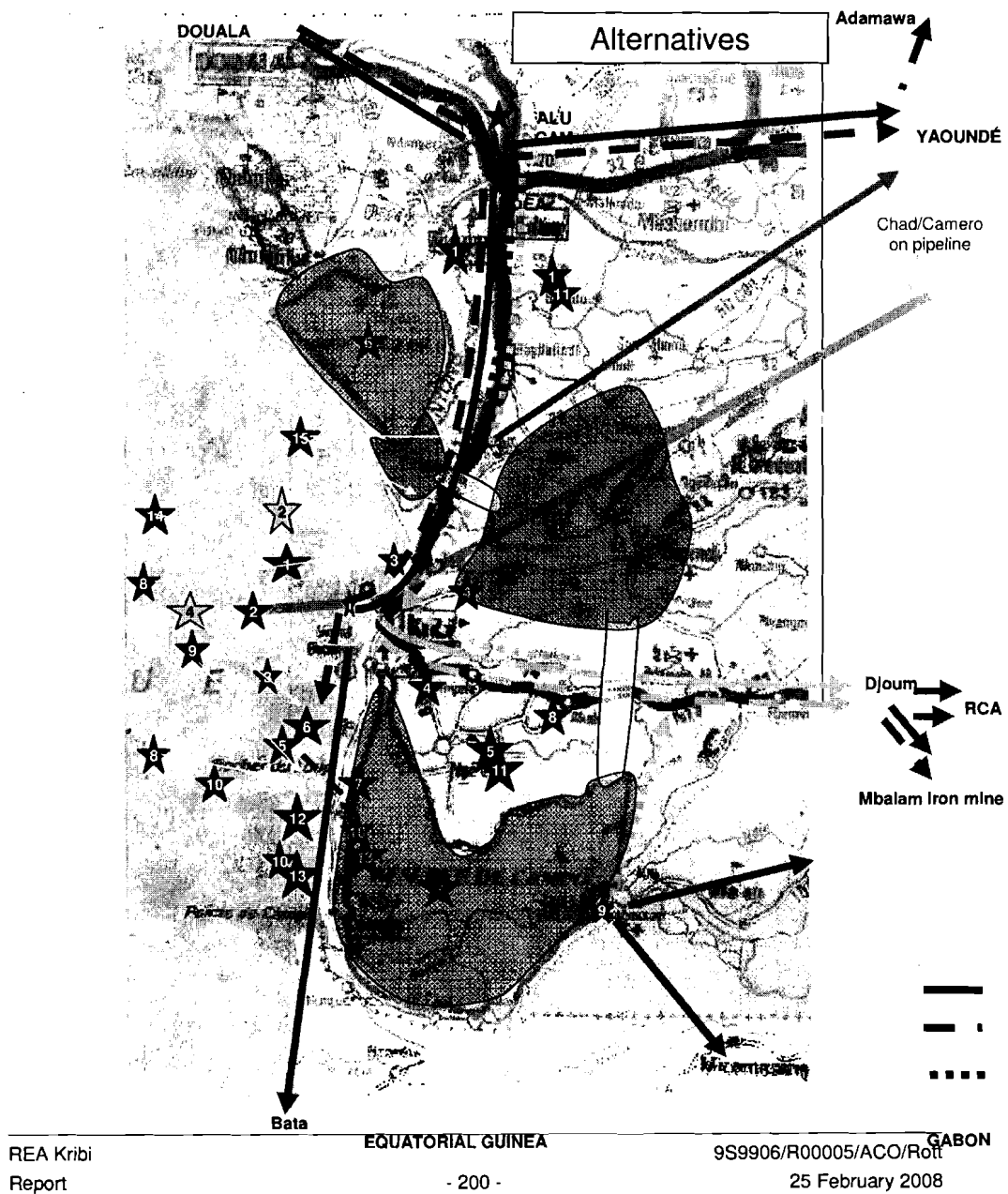
CHAPTER 8 RECOMMENDATIONS AND ALTERNATIVES FOR PROJECTS

Considering the findings of this study, several alternatives are proposed to the current proposed projects. These alternatives would need to be discussed with the different stakeholders involved. These alternatives are accompanied with additional recommendations for the implementation of those alternatives.

Chapter 6, 7 and 8 represent all three the recommendations of this REA study.

8.1 Recommended alternatives overview

Figure 8-1. Overview of all existing activities (blue), projects planned (red) and recommended alternative (orange)







Legend of Figure 8-1

Projects.

1. Sanaga Sud wells
2. CPF site
3. Power station
5. Deep sea port
7. Les Mamelles Iron Mine
8. Precious stones exploration
9. Memvélé dam
10. Marine park (whole coastal area)
11. Agro-industry and forestry extension
12. Tourism extension
13. Eco-tourism extension
14. Construction of 5000 social housing (over 400 hectares)
15. Biofuel industry

Existing activities

1. Ferme Suisse (Agro-ind.)
2. FSU platform, COTCO (oil export unit)
3. Oil exploitation platform, Perenco
4. Socapalm (Agro-ind)
5. Heve CAM (Agro-ind.)
6. Edea-Douala Wildlife reserve
7. Campo-Mann National Park
8. Sand extraction (most of the coastal area)
9. Tourism
10. Eco-tourism

<p>Conservation zone legend</p>  <p>Existing protecting areas Integrated forest management zone Green ecological corridors</p>	<p>Font color legend</p> <p>Existing In construction Project (see Table 2)</p>	<p>Line legend</p> <p>Road </p> <p>Railway </p> <p>Transmission line </p>
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8.2 Transport corridors

Planned project:

There are currently numerous transport routes planned to be developed or upgraded. In the current plan, each road, railway and transmission line is investigated individually with creation its own transport corridor.

Recommended alternative

Road, railways and transmission line should be considered at regional level as forming the regional transport network system and not as several individual projects. The number of corridors should be minimized, which would therefore call for grouping these roads, railways and transmission lines into two major transport corridors in the region:

- North-South, i.e. Edea-Kribi-Campo corridor, and
- West-East, i.e. Kribi-Lolodorf corridor

Figure 4-1 shows the current planned routes and Figure 8-1 illustrates proposed grouping of transport corridor into two main ones

Such an approach minimizes the land used and forest impacted. This greatly reduces the impacts on fauna and flora that would have otherwise been the case due to numerous (unnecessary) transport corridors. Roads are a major driver of environmental and ecological degradation in many tropical countries. At the same time, it creates a transport system in the region which eases transport movements and is easier to manage. Indeed, maintenance can be carried out in a more cost-effective way. Also, the area of control of the negative effects of roads (e.g. poaching) is restricted and therefore more manageable.

Rational

Impacts of the multitude of corridors

A major cause of (tropical) forest loss in Africa as well as other regions, such as the Amazon in Brazil, is the opening of roads with insufficient consideration of the social,

cultural and ecological impacts of new roads. Roads open previously isolated areas for rapid and unregulated development and it is critical to ensure that effective management systems are implemented to avoid negative consequences, such as illegal natural resource harvesting, increases in HIV and malaria infection rates, and cultural degradation within local communities.

An integrated regional development concept therefore includes the combining of physical infrastructure, social services, rural development, and environmental protection.

- **Fragmentation of the forest**
The currently foreseen locations of proposed roads, railways and a transmission line in the Kribi region will contribute to further fragmentation of the forests (blocking migration routes of wildlife, important for their food collection and for exchange of the gene pool through breeding, as well as for seed dispersion; and reducing habitat size).
- **Forest accessibility to illegal activities**
In addition they will provide multiple entrance routes to the forests for the execution of illegal activities such as illegal logging, poaching and other unregulated harvesting of forest resources.
- **Enforcement of legislation**
For enforcement of the law, which prohibits such activities, a multitude of routes makes it more costly and complicated to effectively control and fight deforestation, poaching and illegal logging, and will require a higher number of guards to be employed, equipment such as patrolling vehicles to be available, and guard stations to be set up along the routes. The same accounts for law enforcement on traffic rules, such as the prevention of speeding. Considering the limited institutional capacity in Cameroon and the Kribi region this could easily lead to an uncontrollable situation.
- **Further deforestation**
A multitude of routes provides as well a range of opportunities for people to settle down along these routes, leading to ribbon developments, associated deforestation (through e.g. land clearing for agriculture) and increased human pressure on these areas. All these routes will also have to be regularly maintained, involving high costs as a result of the tropical moist climate.

Advantages of the two main transport corridors

The reduction of the number of routes and grouping them into a few, main corridors increases the ease and (cost)efficiency of law enforcement on illegal activities and on traffic rules, limits fragmentation, controls the spread of human settlements along roads and their associated impacts, and benefits regular maintenance. It also provides better opportunities for increasing public awareness along the corridors, such as through road signs indicating the activities that are not allowed.

Roads through or near the most sensitive areas can even be gated, with a gate and a police / ranger station on either side, allowing for easy patrolling of vehicles leaving the road, as well as allowing for the closure of the road at night, thereby preventing illegal activities such as poaching to take place under the cover of darkness. This concept is

successfully being applied in various countries, such as in Guyana (Linden-Lethem road).

8.3 Sustainable transport in the region

Planned project

At present, passenger transport is planned by the creation or upgrade of roads. In parallel, railways are planned for freight transport exclusively.

Recommended alternative

- Upgrade railways planned for freight only to passenger transportation and plan for related infrastructure (stations)

Additional recommendations are:

- Establish a train network for passenger transport along main commuter routes to Kribi, i.e. Douala-Kribi (railway planned) and Yaoundé–Kribi (not yet planned). This requires only the creation of one new railway line.
- Creation of a tourist train along the planned Kribi – Campo route in order to:
 - Restrict vehicle access to this zone
 - Decrease disturbance and pollution of the zone
 - Increase attractiveness for tourists
- Creation of a train / tram system in the Kribi urban community (to be connected to the railway network (Yaoundé, Douala, and tourist train)
- Promote train travel instead of bus or car.

Rational

There are very few people in Cameroon who own a vehicle; however, the population of Cameroon has high mobility requirements. Currently, transits between main cities are operated by bus (official ones and poor quality ones such as packed and badly maintained mini-buses). There is a great opportunity for developing the public transport to Kribi, which could benefit tourism activities in the region as well. In this, it is advised to firstly promote more sustainable ways of public transport, by promoting the train instead of the use of roads by bus. Environmental and social impacts of railways are often much less than road traffic. Moreover, the comfort is much higher.

Funding for implementation of railway system construction (and maintenance should be sought at several international donors. Nevertheless, as railways can also be used as an effective means for illegally transporting large quantities of bush meat if local institutional enforcement capacity is lacking or corrupt, funding should be therefore sought at several international donors not only for the implementation of public transport such as railways but also for improving local enforcement capacity of natural resource management.

8.4 Coastal zone: Kribi-Lolabé

Planned project

This zone is currently planned by the MEAO for city growth.

Alternative proposed

Recommendations:

- In line with the zoning proposed in the Sustainable land use strategy (Tchawa, 2004), the coastal area Kribi-Lolabé should be used for port and industrial activities.

- A recreational area could be developed at the sea front, accessible from Kribi city. The industrial activities could be located between Kribi and Lolabé (deep sea port) just a bit further off the coast.

Rational

Avoiding the extension of Kribi city to the South, leaves this land for industrial extension. Industrial activities can then extend between Kribi city and the deep sea port. This will avoid that industrial activities would extend further South and East, which would represent a threat to the Campo Ma'an NP.

8.5 Kribi city growth

Planned project

The MEAO plan suggests city growth in three zones:

- Between Kribi and the deep sea port
- On road axe: Kribi-Edea and
- On road axe: Yaoundé – Kribi (tarred road in construction)

Recommended alternative

- In line with the zoning proposed in the Sustainable land use strategy (Tchawa, 2004), extension of the city should preferably be to the North-Eastern side of the current Kribi city, between Kribi and Londji (North) and to the East side.
- Circular extensions from current centre to the North –East. concentrating urban growth in and around the current city and avoiding extensive ribbon development along roads.
- Development of the coastal area Kribi-Londji for tourism, with a promenade, café, restaurants, etc. but taking into account important turtle nesting beaches as beach tourism can have negative impacts on turtles and turtle eggs.

Rational

- Extensive ribbon developments along road axes as proposed should therefore be limited, as they are likely to have major environmental implications on forest deforestation/degradation and on wildlife populations.
- In addition concentrated urban growth allows for easier and more effective urban management than extensive ribbon developments, strung out along access roads.
- Easier transport system
- Minor biodiversity in those zones
- Leaving more space to industrial development in one zone (easier to control)
- Linking Kribi to Londji, in this promoting Londji development

8.6 Integrated nature conservation zoning

Current situation and plans

At present, the Kribi region has two protected areas: Edea-Doula wildlife reserve and Campo-Ma'an national park. Campo Ma'an has attracted the attention of few international NGOs, which has led to several studies and management plans attempts in this zone. However, it seems that the Edea-Doula wildlife reserve and the remaining of the region does not attract much attention and is for some unknown reason somehow neglected. As a result, natural protection and conservation management plans for the region focuses only on Campo Ma'an.

Recommended alternative

- Analysis

Douala-Edea wildlife reserve and Campo Ma'an NP are currently quite far from each other and do not allow exchange of flora and fauna population. Moreover, the area around Bipidi seems to be another zone of high biodiversity values¹⁴² and containing rare and endemic species (e.g. gorillas). This zone has not received attention so far.

- Main recommendations:

A regional approach should be taken in natural management and conservation to come to a network of protected areas. Protected areas should be accompanied by implementation of buffer zones (like Campo Ma'an NP) and corridors between them. Figure 8-1 presents the natural protected areas network which could be implemented in the Kribi region.

Other recommendations are:

- Execution of *additional biodiversity surveys* to identify populations of wildlife species of high conservation value in the area just south of Douala – Edea wildlife reserve (north of CPF site by SNH)
- Expansion of the Douala – Edea wildlife reserve with this section in the south (see map) to act as an additional buffer zone from the industrial and infrastructure developments. Expansion of the reserve south of the Sanaga river is in fact a current proposal by the government as well.
- Expansion to be paid with *compensation payments* for its establishment, research and maintenance (including law enforcement)
- Establishment of an integrated forest management zone in the heartland of the Kribi region (see map, indicative location which will have to be further investigated), as biodiversity studies for the Chad – Cameroon pipeline have recorded the presence of small groups of large mammals such as gorillas, chimpanzees and forests elephants here, which have (very) high conservation values. Similar to Campo Ma'an UTO and Model Forest a more sustainable management of forest resources should take place in this region, with respect to wildlife populations, indigenous lifestyles and existing population and with cooperatively improving the sustainability of existing economic activities. Extensive increases in urban settlements, infrastructure and economic activities in this area should be avoided.
- Creation of 2 relatively safe green ecological corridors (see map, indicative locations which will have to be further investigated) with limited human disturbance between the 2 protected areas and the integrated forest management zone to allow for the migration of animal populations, which reduces fragmentation of habitats and allows for more variety in the gene pools of vulnerable wildlife species as well as allowing wildlife species to forage in a larger natural area, reducing pressure from crop raiding on agricultural areas near the protected areas.

See Figure 8-1 for visualization of the proposed nature conservation network.

¹⁴² According to the Chad / Cameroon ESHIA

8.7 Deep sea port

Planned project:

The government has made a feasibility study for a (multi-purpose) deep sea port at Grand Batanga.

Sundance has made a feasibility study for an ore export deep sea port, with preferred location at Lolabé, and possible alternative with extension to a multi-purpose port.

Recommended alternative

Economically and environmentally, it would be better for the region that region has one multi-purpose port as opposed to a single use port for ores export only and a separate deep sea port. This option should therefore be further investigated. Some recommendations:

- Further collaboration between the government and Sundance (CamIron) in the concept of the deep sea port³ and at a single location
- Association of the feasibility study of the government with the one of Sundance to a common project.
- Master plan for the port and related activities (industrial sites, required transport facilities, etc.)
- Environmental, health and social aspects integrated in the decision making process, including the best port location on the coast from an environmental and social point of view.
- Environmental, health and social detailed studies on the project impacts.

8.8 Gas-to-power project

8.8.1 The situation

Presentation of the project

The Gas-to-power project is composed of:

1. the Sanaga Sud gas field (offshore) and Central Processing Facility (CPF) at Eboudawaé / Bipaga I site
2. the Kribi power project (power plant and transmission line) with the power plant located at Mpolongwé II,
3. the gas pipeline between the CPF (Bipaga I) and the power plant (Mpolongwé II)
4. the industrial site at Bipaga I site.

Planned project

- CPF site at Eboudawaé / Bipaga I
- Power plant at Mpolongwé II
- Gas pipeline system: from Sanaga South field to Eboudawaé (approx. 15 km) and from Eboudawaé to Mpolongwé II (approximately 15 km), both passing by Londji.
Total length: approximately 30 km.

Operators involved

The operators are Perenco/SNH for sub-project 1, AES Sonel for sub-project 2, and SNH for sub-project 3 and 4.

Further information

These projects are numbered 1, 2, 3 and 4 in Table 4-1, Figure 4-1 and Figure 8-1. They can also be located on Figure 4-7.

Chapter 4 provides for further project description. In Chapter 4, those projects are described separately. In this Chapter, it is consciously chosen to group those as sub-projects under one single so-called Gas-to-power. This choice will be further explained later in this section.

Specific situation

This gas-to-power project will be treated differently than the other projects, for which alternatives and recommendations were presented in this Chapter. Indeed, according to the information orally¹⁴³ received:

- Decisions are made about this project (and sub-projects) and cannot be changed as commitments have been made by the different promoters involved.
- Two ESHIAs for some elements of the projects and have been made and have been accepted by the Ministry of Environment (MINEP).
- The project is at a quite advanced stage and construction should begin promptly.

In this, considering the above and last developments around this projects, this section will focus on

1. recommendations, which can still be applied at that stage, and
2. lessons learned: we will also look back in order to extract lessons learned and will give recommendations for how it could have been done in order that a similar project can learn from this experience

8.8.2 Recommendations which can still be applied considering the stage of advancement of the project

Brief analysis of the situation

Two ESHIAs have been made for some sub-projects of the gas-to-power project:

- ESHIA 'Sanaga South' ordered by Perenco.
It covers sub-project nb 1 (Sanaga South fields exploitation, CPF and pipelines in between).
- ESHIA 'Kribi power' ordered by AES Sonel.
This ESHIA covers sub-project nb 2.

Also, it must be noted that both existing ESHIAs:

- did not use the same assumptions (especially for alternatives) and the ESHIA Sanaga do not propose alternative location;
- do not reflect the actual situation, as decisions and situation has changed since they were made; and
- environmental analysis were made on basis of existing literature (which is quite limited for the area) and no actual investigations have been made in the project zone and surroundings (i.e. such as biodiversity study through actual field visit and inventory of fauna; and
- socio-economic analysis were not always adequately made (see Annex 6 for more detail).

¹⁴³ Information was given by both SNH and AES Sonel, for their respective elements of the gas-to-power project.

Recommendations

Recommendation 1: one project

The gas-to-power project should be considered as one single integrated project and not as three or even four separate projects, even though several sub-parts will be operated by different developers.

Recommendation 2: new ESHIAs

Some sub-projects of the gas-to-power project still do not have an ESHIA and this should be done as soon as possible. Additional ESHIAs should be made for:

- Sub-project nb 3: the gas pipeline between the CPF (Bipaga I) and the power plant (Mpolongwé II) (operator: SNH)
- Sub-project nb 4: the set up of the industrial site at Bipaga I site (operator: SNH). Special attention should be given to the village of Eboudawaé. The Sanaga South ESHIA concluded that the resettlement of this village was not necessary. In the ESHIA for the set up of the Bipaga site as industrial site this aspects should be well considered: the distance of future industries to the village and the nuisances related to both the set up of the site, the industries in operations and the use of the access road to the village.

The above recommendations are also mandatory requirements by law (EIA legislation of Cameroon and International standards).

Recommendation 3: existing ESHIAs

Regarding the recommendations below, this would not be mandatory according to Cameroons law, as the existing ESHIAs have been already approved by MINEP. However, these recommendations are made based on best practices and International standards.

The update of the existing ESHIA(s) is recommended on the following aspects:

- Actual situation: ESHIA should reflect actual decisions made and situation and provide justification for these decisions. ESHIAs assumptions and studies should reflect those decisions.
- Socio-economic data: Consider recommendations and comments on the social aspects of the existing ESHIAs in Annex 6.
- Biodiversity and abiotic environment:
 - Recent studies should be integrated (i.e. Biodiversity study ordered by the WB and carried out on the Bipaga site, and physical/topographic data of the Bipaga/Eboudawaé site collected by SNH)
 - Additional field surveys for biodiversity and the abiotic environment should be carried out when required.
 - Other elements of impacts (i.e. direct and indirect impacts) should be better considered.

Recommendation 4: cumulative ESHIAs

This recommendation would replace and is a combination of Recommendation 2 and 3. A cumulative ESHIA of the gas-to-power project could be carried out, considering existing ESHIAs, decisions made, later studies and data available (Recommendation 2) and completing the missing aspects (i.e. the two ESHIAs recommended in Recommendation 3).

This recommendation may not be mandatory according to Cameroonian law. However, it is based on best practices and International standards, and would allow the best and more realistic ESH analysis, as all aspects of the project would be considered, as well as cumulative impacts.

Recommendation 5

The promoters of the several sub-projects (Pernco, SNH and EAS Sonel) should discuss the implementation of their respective Environmental Management Plan (EMP) in order to minimize financial costs and those related to ESH measures. Some common measures should be envisaged, such as Biodiversity compensation to the Douala-Edéa wildlife reserve.

Considerations

Some considerations are made below which should be considered in any the application of any recommendations above mentioned.

Environmental consideration

- The tourism potential of the coastal area in the surrounding should be as much as possible preserved.
- Special attention should be made to minimizing/avoiding coastal erosion, water pollution and water flow disruption.
- High ESH risks due to the high sensitivity of environmental site of the Eboudawaé/Bipaga (see WB Biodiversity study for the site) and potential social and environmental sensitivity of the pipeline CPF-power station.
- The Eboudawaé/Biapaga site presents some swampy spots. This is quite common in the area, but this requires special attention in the set up of the site. According to late information, the site would be subject to flooding. The ESHIA recommended in Recommendation 2 or 4 should investigate this further and recommend for mitigation measures. It must be noted that the water catchment of the Eboudawaé/Biapaga site lead to a mangrove forest.

Health and Safety considerations

- The swampy spots and/or flooded area represent a high safety risks. Care should be taken to mitigate negative impacts adequately.
- Stress related to resettlement of villages (Mpolongwé site)
- Risks due to the additions traffic induced by the different sub-projects.

Socio-economic considerations

- Adequate compensation scheme should be calculated based on the Chad/Cameroon pipeline experience (see Annex 6).
- Good inventory of villages and pygmies camps should be carried out (see Annex 6).
- Regarding the pipeline CPF-power plant: the overland part of the pipeline could have negative impact on local agriculture.

Economical and business (in relation to environmental aspects) considerations

The swampy areas and areas subject to flooding are not only of environmental concerns but also safety and economic one. These areas provide an unstable environment which can lead to unsafe situation, especially with dangerous substances like gas. As a result, costs for setting up the site and maintenance of it will be higher. Some industry may not want to be on such grounds for those reasons. It is important that these issues are addressed seriously and that mitigations measures are presented as part of the set up of the site.

Concerning the industrial site at Bipaga, the type and number of industries and their requirements (facilities, transportation, safety, environmental conditions and other requirements) are still at a conceptual stage. On an economical, business and environmental point of view, it would be much more advised to first inventory the requirements of the industries and carry out an ESHIA in order to best set up the Bipaga site, considering the ESH aspects.

Operational considerations (potential problems)

According to our understanding of the draft zoning plan proposed by the MEAO, this zone will be restricted to tourism and light industries (which would not conflict with tourism development). Once the draft MEAO plan will be approved, SNH may:

- Have difficulty to extend the site if an important number of industries would be interested to come to such location
- Restricted in the type of industries (light, not heavy) which can be located on the site.
- Be faced to stricter conditions of operation in view of not disturbing adjacent tourism activities (stricter environmental, social and health measures)

8.8.3 Lessons learned

The gas-to-power project should have been considered as one single integrated project and not as three or even four separate projects from the conceptual stage of the project, i.e. at a very early stage, even though several sub-parts will be operated by different developers.

In this, a single cumulative ESHIA (such as recommended in Recommendation 4) should have been carried out, with better consideration of International standards (especially for biodiversity, coastal erosion and socio-economic compensation).

This would have ensured that all sub-projects are included in the ESHIA and have avoided a situation where, at a very late stage in the advancement of the project, some sub-projects still do not have an ESHIA. Still can cause delay in the implementation of the project as a whole.

In this, a cumulative ESHIA would have ensured that an adequate environmental, socio-economic and health impact assessment was carried out for all elements and direct and indirect impacts of the project, and thus help in respecting the strict time delays which is this project is subject to.

Moreover, is by considering the project as one, realistic alternatives could have been analysed. An example of alternative analysis for the gas-to-power project which could have been carried out is the comparison of the following scenarios:

- Planned project: described above and in Chapter 4.
- Alternative 1:
 - CPF on power plant site (i.e. at Mpolongwé II)
 - Industrial estate moved either by extension of the Mpolongwé site (on the Eastern or Southern site) or near the deep sea port location
 - Gas pipeline system: from Sanaga South field to Mpolongwé II (approx. 11 km), not passing off the Londji shore.

- Alternative 2:
 - The power plant on CPF site site (i.e. at Bipaga I)
 - Industrial estate remains at the Bipaga I site
 - Gas pipeline system: from Sanaga South field to Eboudawaé / Bipaga I (approx. 15 km), passing off the Londji shore.

The example of alternatives analysis for the gas-to-power project is further outlined in Annex 11.

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CHAPTER 10 GLOSSARY

- impacts/effect/risk

Effect:

Any change, whether positive or negative, that an undertaking may cause in the environment, including any effect on socio-economic conditions, on environmental health, physical and cultural heritage or on any structure, site or thing.

Impact:

A change in effect on an environmental resource or value resulting from human activities, including project development.

Risk:

Environmental risk is the chance that human health or the environment will suffer harm as the result of the presence of environmental hazards.

- Direct/indirect effect

Direct:

A direct impact or primary impact is caused by the action and occurs at the same time and place

Indirect:

An indirect impact or secondary impact is caused by the action and occurs later in time or farther removed in distance, but is still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

- Cumulative impacts

The impact on the environment which results from the incremental impact of actions when added together with other past, present, and reasonably foreseeable future actions regardless of what company, government or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

- Regional Environmental Assessment

A detailed study of the reasonably foreseeable significant impacts on the environment, positive as well as negative, of certain public and private projects and developments in a defined region.

- Land occupation issues

The use (occupation) and conversion (transformation) of land area by activities such as agriculture, roads, housing, mining etc. Land occupation issues deal with the impacts of the land use and land transformation, the amount of area involved, the extent of changes in land properties, the duration of its occupation and the area affected.

- (Environmental) nuisance

An environmental problem that annoys or disturbs people and is a source of discomfort and/or a concern for health

- Positive/negative impacts

Positive:

An impact that is beneficial to its environment, including the abiotic, biotic and socio-economic environment

Negative:

An impact that is adverse to its environment, including the abiotic, biotic and socio-economic environment

- Carrying (or absorption) capacity

The maximum number of people, animals or (socio-economic) activities, that a particular environment can sustain without environmental damage.

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Annex 1

Planning of the project execution

CAMEROON KRIBI GAS PROJECT TOR FOR REGIONAL ENVIRONMENTAL ASSESSMENT, AUGUST 24, 2007

General:

AES Sonel and SNH / PERENCO have prepared two good project based Environmental Assessment Reports (EAs). These EAs analyze the direct impacts of the respective projects, but do not analyze the indirect, induced and cumulative environmental and social impacts on a wider regional scale taking into account economic activities which are already existing, which are under construction and which are being planned in a 10 to 15 year time frame. The present TOR request the preparation of a Regional Environmental Assessment (REA) which takes into account these indirect, induced and cumulative environmental and social impacts and the larger development issues in the Kribi region. The REA will take as a basis the two EA reports prepared by AES Sonel and SNH / PERENCO, the EA prepared by Exxon for the Chad – Cameroon Oil Pipeline, EAs prepared for other projects in the Kribi region and the MEAO (Mission d'Etude pour l'Aménagement de l'Océan à Kribi) documents which deals with the planning of the zonation and sustainable development in the Kribi region.

Objective of the consultancy services and tasks:

The main objective of the Regional Environmental Assessment is to look beyond the base case for the amount of gas presently identified and beyond the project and specifically analyze the indirect, induced and cumulative environmental and social impacts in the Kribi region from existing projects, projects under construction and planned within a 10 to 15 year time frame. The REA should also evaluate how the region would look like in 15 years from now if no adequate action is taken. Based on this analysis an Action Plan needs to be developed to keep the economic development of the Kribi region on a sustainable development path. The REA should include all the work that relates to Regional Planning produced by MEAO in Kribi. All the proposed activities should be budgeted.

Task 1: The consultant should find out what the plans are for the development of the Kribi North area, both onshore as well as offshore. Preparation of a Regional Environmental Assessment (REA) Report which will analyze in great lines the indirect, induced and cumulative environmental and social (e.g. SIDA and other health impacts) impacts on terrestrial and marine ecosystems, impacts on people and pollution and safety aspects of existing projects, projects under construction and planned projects or economic development activities in a 10 to 15 year time frame. Special attention should be paid to the impacts on endangered and threatened marine and terrestrial species and other biodiversity such as the Atlantic Littoral Forest and mangrove forests.

Projects and development activities to be considered should include: tourism development, mining development, port development, industrial projects, hydropower development, gas and oil projects (seismic, exploration and exploitation), forestry exploitation, agro-industries, agricultural development, population increase, workers influx, etc. Only existing data should be used for the REA.

The consultants should in great lines estimate the impacts of these developments on the marine pollution levels, for instance from oils spills and condensate leakage, etc., water quality in the rivers and streams, impacts on marine and terrestrial ecosystems and on human beings (the human environment).

Task 2: Greenhouse gas analysis for the entire project should be part of the REA. Climate change issues should also be addressed in the REA.

Task 3: Also environmental and social management and monitoring capacity building needs with regard to change in the Kribi region should be addressed. The needs for environmental and social management capacity building within SNH and other responsible institutions in the oil and gas sector should also be analyzed. These environmental and social management capacity building efforts are essential to mitigate, manage and monitor the impacts of present and future of oil and gas developments.

Task 4: Outline of a Social Development Plan, a Community Liaison Program and a Complaint Register needs to be included in the REA.

AES Sonel and SNH/PERENCO should make it very clear what they consider their responsibility and what is the responsibility of the Cameroonian government.

Public Consultation:

The REA needs to be discussed during a public consultation meeting with local stakeholders, affected people, national NGOs and other interested parties.

Reports:

REA report in English or French, but both with an English and French Executive Summary. Draft REA report after 2 months: 10 hardcopies and a CD with the REA in Microsoft Word. Final REA report after 3 months after inclusion of the comments of the Government of Cameroon and of the World Bank: 20 hardcopies and a CD with the REA in Microsoft Word.

Publication:

The REA report will be published in the project area, in Douala and Yaounde, in the Infoshop and on the internet site of the World Bank in Washington.

Support by the Government, AES Sonel and SNH/PERENCO:

The government, AES Sonel and SNH/PERENCO provide access by the consultant to all project sites, to all relevant agencies, such as MEAO, to all data and documents relevant for the REA study. These partners should also provide counterparts to the consultants to facilitate and speed up the work.

Experience of the consultant and duration of contract:

The consultant needs to have an international experience in preparing Regional EAs and an in-depth international knowledge of environmental and social issues. The REA needs to be prepared in 3 months.

Annex 2

Planning of the project execution

PLANNING OF THE PROJECT EXECUTION - REA KRIBI -

01 Dec. 2007	Start of the REA Kribi study
01 Dec. – 06 Dec. 2007	<p>Mission 1</p> <p><u>Objective of the mission:</u></p> <ul style="list-style-type: none"> • Collection of documents, data and information available • Site recognition • Scoping of the study
07 Dec. – 20 Jan. 07	<p>Analysis of the collected information, Possible other mission to be carried out, Drafting of the report</p>
21 Jan. 2008	<p>Draft REA report</p> <p>RH sends the report to SNH and WB (per email and per post / hard copy delivery)</p> <p><u>Note:</u> The Draft REA report will include in an Annex the list of proposed participants for the workshop</p> <p>SNH has 2 days to read the Draft.</p>
23 Jan. 2008	<p>Presentation of Draft to SNH by RH</p> <p>In this way, any questions or things which are unclear, misunderstand, can be discussed straight away. This should accelerate the process.</p>
25 Jan. 2008	Comments of SNH and WB sent (per email) to RH
25 Jan. 2008	Invitations are sent by SNH to the stakeholders listed in the Draft REA report for the workshop
28 Jan. 2008	<p>Draft REA publication</p> <p>The new version of the Draft will consider the comments of both SNH and WB.</p>
13 Feb. 2008	Pre-presentation of the workshop to SNH by RH
15 Feb. 2008	Presentation of the Draft REA study to stakeholders in form of a workshop, in Kribi
18 Feb. 2008:	<p>Debriefing meeting RH team – SNH</p> <p>In order to agree on the integration of stakeholders' comments into the Final REA report</p>
19 Feb. – 22 Feb.	Consideration of the stakeholders comments (received in the workshop) by RH team, drafting of the final REA version
20 Feb. 2008	Deadline for delivery of comments which can be integrated in the Final report
25 Feb. 2008	<p>Final REA report sent to SNH (cc WB) (per email)</p> <p>Possible comments by SNH within 2 to 3 days (per email)</p>
03 Mar. 2008 3 days.	Final REA , Validation of the REA Kribi report by SNH within 3 days.

Annex 3 **Cumulative effect assessment using VESH's**

APPROACH FOR THE ASSESSMENT OF CUMULATIVE EFFECTS

The Regional Environmental Assessment includes the assessment of indirect, induced and cumulative impacts.

The assessment approach which will be used in this project to determine cumulative effects is based on the model described in the *Cumulative Effects Assessment Practitioners Guide*, from the Canadian Government. The approach will consider the WB/IFC guidelines mentioned in 4.1, the Cameroonian legislation and stakeholder consultation and is further adapted to this project, according to the information and requirements in the ITT, the stated timeframe and experience of the consultants.

The Canadian model was selected because it is an Internationally recognised and used model and that Canada has more experience in the assessment of cumulative effects. The assessments methodology provided is applicable to all project activities and experience is recorded in the Oil and Gas sector (the Canadian Association of Petroleum Producers recommend such approach).

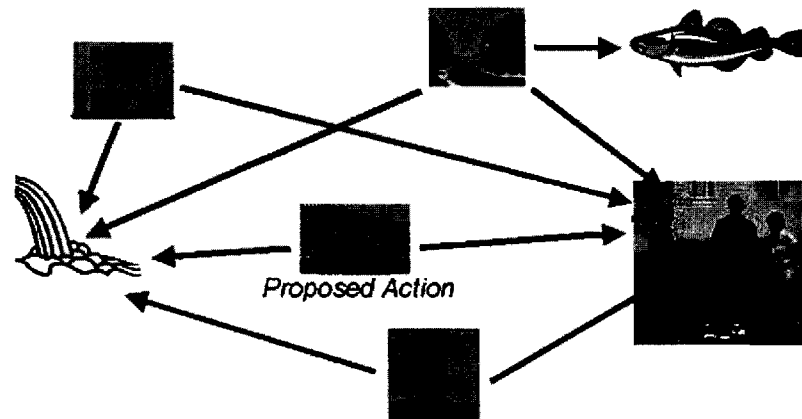
The analysis of cumulative effects will focus on assessing effects on selected Valued Environmental, Social and/or Health Components (VESHCs) (Figure). The REA will be looked at "from the VESHCs point of view", in which the combined (i.e., cumulative) effects of the various activities on each VESHC (i.e., on Figure, fish, water quality and human) are assessed (arrows indicate an action causing an effect on a VESHC).

The **definition of Valued (ESH) Component (VC)** is:

Any part of the environment, social or health that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern.¹⁴⁴

¹⁴⁴ Cumulative Effects Assessment Practitioners Guide, http://www.ceaa-acee.gc.ca/013/0001/0004/2_e.htm.

Figure 1: Focussing on Effects on VESHCS



The methodology stresses the importance of focusing the assessment on environmental components of greatest concern (i.e. VESHCS). In general, the methodology is designed to produce an environmental assessment document that:

- is focused on issues of greatest concern;
- addresses regulatory requirements;
- addresses issues raised by the public and other stakeholders;
- integrates engineering design and mitigative and monitoring programs into a comprehensive environmental management planning process; and
- integrates cumulative effects assessment into the overall assessment of residual environmental effects.

The environmental assessment screening methodology for this Project includes an evaluation of the potential effects, including cumulative effects, of each Project as well as malfunctions and accidents, with regard to Valued Environmental, Social and Health Components (VESHCS).

Project related effects are assessed within the context of temporal and spatial boundaries established for the assessment. The evaluation of potential cumulative effects with regard to other projects and activities will generally include past, present and future activities that will be carried out and will interact temporally or spatially with the proposed developments in the Northern Kribi region.

Specific attention will also be paid to:

- Effects that are limited for the individual projects, but due to the cumulative effect are much more important (for example: each of the individual developments doesn't go beyond an air quality standard level, but their cumulative effect would.)
- Other effects that are considerable enlarged through the cumulative effect and/or where common mitigation measures would be more (cost-) effective.

The VESHCS for this project could be:

- endangered and threatened marine and terrestrial species,
- the Atlantic Littoral Forest
- mangrove forests.
- Indirect impact on human health

Annex 4 Environmental and Social Impacts of Mining

ENVIRONMENTAL AND SOCIAL IMPACTS OF MINING

This annex is meant to provide a brief review of the literature with regard to environmental and social impacts from mining, as well as key regulatory issues. Key Environmental and Social Impacts

Environmental and social impacts of mining have been well-documented and an ample literature exists on this topic. The following discussion summarizes those environmental and social issues that formed the basis for the Mining and Critical Ecosystems framework. Environmental and social impacts are divided into waste management issues, impacts to biodiversity and habitat, indirect impacts, and poverty alleviation and wealth distribution. Those seeking additional details may wish to consult the many resources available on this topic.

Waste Management

By nature, mining involves the production of large quantities of waste, in some cases contributing significantly to a nation's total waste output. For example, a large proportion of the materials flows inputs and outputs in the United States can be attributed to fossil fuels, coal, and metal mining (Matthews et al., 2000:107). The amount of waste produced depends on the type of mineral extracted, as well as the size of the mine. Gold and silver are among the most wasteful metals, with more than 99 percent of ore extracted ending up as waste. By contrast, iron mining is less wasteful, with approximately 60 percent of the ore extracted processed as waste (Da Rosa, 1997; Sampat, 2003).

Disposing of such large quantities of waste poses tremendous challenges for the mining industry and may significantly impact the environment. The impacts are often more pronounced for open-pit mines than for underground mines, which tend to produce less waste. Degradation of aquatic ecosystems and receiving water bodies, often involving substantial reductions in water quality, can be among the most severe potential impacts of metals extraction. Pollution of water bodies results from three primary factors: sedimentation, acid drainage, and metals deposition.

Sedimentation

Minimizing the disturbed organic material that ends up in nearby streams or other aquatic ecosystems represents a key challenge at many mines. Erosion from waste rock piles or runoff after heavy rainfall often increases the sediment load of nearby water bodies. In addition, mining may modify stream morphology by disrupting a channel, diverting stream flows, and changing the slope or bank stability of a stream channel. These disturbances can significantly change the characteristics of stream sediments, reducing water quality (Johnson, 1997a:149).

Higher sediment concentrations increase the turbidity of natural waters, reducing the light available to aquatic plants for photosynthesis (Ripley, 1996). In addition, increased sediment loads can smother benthic organisms in streams and oceans, eliminating important food sources for predators and decreasing available habitat for fish to migrate and spawn (Johnson, 1997b). Higher sediment loads can also decrease the depth of streams, resulting in greater risk of flooding during times of high stream flow (Mason, 1997).

Acid drainage

Acid drainage is one of the most serious environmental impacts associated with mining. It occurs when sulfide-bearing minerals, such as pyrite or pyrrhotite, are exposed to oxygen or water, producing sulfuric acid. The presence of acid-ingesting bacteria often speeds the process. Acidic water may subsequently leach other metals in the rock, resulting in the contamination of surface and groundwater. Waste rock piles, other exposed waste, mine openings, and pit walls are often the source of acidic effluents from a mine site. The process may occur rapidly and will continue until there are no remaining sulfides. This can take centuries, given the large quantities of exposed rock at some mine sites. Although the process is chemically complex and poorly understood, certain conditions can reduce likelihood of its occurrence. For example, if neutralizing minerals are present (e.g., carbonates), the prevailing pH environment is basic, or if preventative measures are taken, then acid drainage is less likely to occur (Schmiermund and Drozd, 1997:599).

Acid drainage impacts aquatic life when acidic waters are discharged into nearby streams and surface waters. Many fish are highly sensitive to even mildly acidic waters and cannot breed at pH levels below 5. Some may die if the pH level is less than 6 (Ripley, 1996).² Predicting the potential for acid drainage can help determine where problems may occur. Methods vary from simple calculations involving the balance of acidgenerating minerals (e.g., pyrite) against the existence of neutralizing minerals (e.g., calcium carbonate) to complex laboratory tests (i.e., kinetic testing). However, even laboratory-based tests cannot be relied upon to accurately predict the amount of metals that will be leached if acid drainage occurs, because of the differences in scale and composition that occur when samples are analyzed ex situ (Da Rosa, 1997).

Metals Deposition

Most mining operations use metals, reagents, or other compounds to process valuable minerals. Certain reagents or heavy metals, such as cyanide and mercury, are particularly valued for their conductive properties and thus are frequently used. The release of metals into the environment can also be triggered by acid drainage or through accidental releases from mine tailings impoundments.

While small amounts of heavy metals are considered essential for the survival of many organisms, large quantities are toxic. Few terrestrial and aquatic species are known to be naturally tolerant of heavy metals, although some have adapted over time. In general, the number of plant and animal species decreases as the aqueous concentration of heavy metals increases. Some taxa are known to be more sensitive to the presence of heavy metals. For example, salmon species are particularly sensitive to increased concentrations of copper (Kelly, 1998). Furthermore, juvenile fish are more sensitive than adult fish, and the presence of heavy metals may affect critical reproductive and growth stages of fish.

Annex 5

Health impacts of industrial development projects

HEALTH IMPACTS OF INDUSTRIAL DEVELOPMENT PROJECTS

The assessment of negative impacts and sanitary costs of major regional industrial projects related to the diversity of the infrastructures concerned, and limitations of upcoming projects¹⁴⁵ can only be preparatory. It requires additional studies based on the effects of health determinants of the resettled people and of the people who will be living nearby the future complex.

This section will be taken into account in the comments of each project.

The Gas-to-power project

Available data

Potential impacts of the Gas-to-power project are mainly related to workers, the relocated people, the fishing activity. Negative impacts may affect directly (disease) or indirectly (poverty) the nearby population's health. They concern transmissible diseases (ISTs), malaria, diminished and polluted sea resources, destruction of medicinal plants.

Transmissible diseases. – STIs and HIV/Aids will increase though population growth through (single male) project workers

Water-borne diseases. – The region has very few clean water sources, and surface water is readily polluted by project activities.

Malaria. – Clearing of land and creation of stagnant water sites will increase the risk of malaria in a region where cheap malaria prophylaxis (chloroquine) is not effective anymore

Food production and food pollution. – The oil and gas exploitation of the sea has potential impacts of fish production (less income and more poverty for the riparian populations and contamination of fish with carcinogenic oil derivatives.

Analysis and discussion

Recent data suggest that the south province has a relative poor health situation in terms of STI/HIV prevalence¹⁴⁶, malaria prophylaxis¹⁴⁷, infant diseases and infant mortality¹⁴⁸ through respiratory disease, measles and diarrhoeas and the province suffers from a poor global access to affordable health care¹⁴⁹.

The expectations raised by the impact of the planned industrial projects on the development of the region and the strengthening of basic infrastructure (health centres, schools, electricity, drinking water, employment, development...) in the area are important. However, for most projects (except the mining projects) project employment will be very limited, and project impact limited to land loss and accompanying compensation payments and resettlement. Positive local impacts will thus be short-termed and limited, which will probably create frustration among the local population.

¹⁴⁵The programming, even sprawl, of compensations for the worksite period/post-worksite period is not always clear or no information is provided on the mechanisms employed (CAM-IRON, deep-water port, roads and railways).

¹⁴⁶ Most recent health data of the South Province, suggest that STIs (sexually transmitted infections) and HIV/AIDS are a major public health problem. The prevalence of HIV, was slightly higher than the national average (6.5% vs. 5.5% nationally cf. DHS 2004: 303).

¹⁴⁷ The number of households equipped with a bed net recorded in the South province is lower than the average at the national level (16% vs. 20% cf. DHS 2004: 168).

¹⁴⁸ Available data on the scale of the South Province, showed an infant mortality rate higher than the national average (87/00 to 74/00 throughout the country (See DHS 2004: 216) and an incidence of diarrhoea slightly lower (15.5% for the less than 5 years compared with 16% on average nationwide cf. DHS 2004: 160). These figures do not take into account existing disparities between rural and urban areas, nor between coastal areas and the hinterland.

¹⁴⁹ Rural areas recorded the lowest rate of access to health care, use of bed nets and effective treatments (prevalence of drug resistance to malaria where only too expensive are effective medicines).

Mitigation measures should consider not only the health of project employees but also the health of their families and of the local population. Special attention should be paid to the socially more vulnerable (minorities, women, widows, elderly, non locals) who are affected by the negative aspects of the projects and should therefore be specifically included in public health interventions, access to clean drinking water and sanitation. Safety measures at the plant sites and protective safety measures for the civilian populations should be among the first priorities of all the projects, as all accidents should be avoided.

Recommendations

Risk of water pollution and contamination of fish with carcinogenic substances to be mitigated by an independent committee of medical and fishery authorities¹⁵⁰, financed by the Oil and Gas Industry.

Quality control of fish products by the health authorities, a surveillance program of fish products consumed.

Impact of land clearing on transmissible diseases like malaria and water borne infections

Impact of concentrations of project workers on the spread of IST, including HIV/Aids

Identification of the pollution source (rigs, ships, pipelines) can assist in improving mitigation measures.

Preparation of an emergency plan in case of oil pollution, explosions, and other industrial accidents

The Hydro-electric Memve'ele project

Available data

The building of a dam and creating of an artificial lake by the river may have serious negative health consequences, most of these impacts have been recognised in the actualised feasibility study (Coyne et Belleir, 2007, page 4-44)¹⁵¹:

Waterborne diseases. – they are associated with the appearance of stagnant pools of water : malaria, yellow fever and Bancroft's filariasis, and bilharzias.

Transmissible diseases. – STIs and HIV/Aids¹⁵² will increase though population growth through (single male) project workers

Malaria. – Clearing of land and creation of stagnant water sites will increase the risk of malaria in a region where cheap malaria prophylaxis (chloroquine) is not effective anymore

Water-borne diseases. – Risks due to increased population and the absence of clean drinking water

¹⁵⁰ Like the recent "Centre communautaire de pêche artisanale" de Kribi (CECOPAK) built with Japanese development assistance.

¹⁵¹ Coyne et Belleir, (2006). – Aménagement hydroélectrique de Memve'ele sur le Ntem. Actualisation des Etudes de faisabilité. Vol II. Les études techniques. <http://www.projet-memveele.org/Volume%202.pdf>

See also for instance Same Eboko A, Pradel Y. (2004) Etude environnementale du barrage de Lom Pangar, Impact sur la santé. ARSEL, ISL/Oreade Brèche Sogreah. 111 p. and

¹⁵² Most recent health data of the South Province, suggest that STIs (sexually transmitted infections) and HIV/AIDS are a major public health problem. The prevalence of HIV, was slightly higher than the national average (6.5% vs. 5.5% nationally cf. DHS 2004: 303).

Analysis and discussion

The construction of a hydroelectric dam requires at least three years of work by qualified staff who will be settled in and hitherto almost empty environment. Most workers will probably come without their families, and the risk of sexually transmitted infections is very high. The influx of workers and job seekers create risks of over-exploitation of bush meat and thus less available proteins for the local population. Density of wild animals will be disturbed temporarily by the construction activities. Project employees and project workers are at risk of water contamination and forest-borne diseases.

Recommendations

Carry out an epidemiological baseline study, including but not limited to children under five, and women in procreative age to obtain a better understanding of the health risks to the project of the forest environment.

Develop community health programs: vaccination, nutrition, clean drinking water supply, distribution of bed-nets, STI/HIV prevention programs

The supplying of the electric generators by underground pipes should reduce the flow of running water, and diminish blackfly reproduction, the vector of onchocerciasis.

Create access to affordable medical care to the local population

Avoid concentrations of bachelors in the project area by providing housing and education facilities for project workers and their families

Creating workers' camps and construction sites respecting all international standards of safety (clean water, malaria treatment, latrines and waste management)

Promote potable water supply and waste-management in the adjacent villages.

Organise the provision of the markets with fish (fresh and frozen) and meat at competitive prices in order to provide alternatives to bush meat consumption.

Develop from the start a program of sustainable fishing in the retention lake¹⁵³.

Mbalam and Mamelles Iron projects

Available data

Preliminary feasibility studies lack detailed information about the medical impacts of the projects.

Analysis and discussion

The iron mining projects require major infrastructure upgrades at the plant sites and for transportation and imply many more workers for a much longer time than the power plants of Kribi and Memve'ele and the oil and gas exploitation. As such, they more closely resemble the agro-industrial projects.

However, as more qualified labour is demanded, and probably higher salaries are paid there is a much higher monetary impact on the neighbouring villages, including prostitution, over-exploitation of bush-meat. Density of wild animals will be disturbed temporarily by the construction activities of the railroad. Project employees and project workers are at risk of water contamination and forest-borne diseases.

Previous studies on the health consequences of a sugar agro-industrial complex¹⁵⁴, allow a preview of health impacts of a project in a previously almost uninhabited site.

¹⁵³ Retention lakes tend to be very rich in fish. See for instance Magnet C. and POUJOMONGNE V. (2004) – Etude environnementale du barrage de Lom Pangar, Etude de la pêche. ARSEL, ISL/Oreade Brèche Sogreah. 88 p.

¹⁵⁴ See projects undertaken by ORSTOM (now IRD) OCEAC, and the Pasteur Institute in the city of Mbandjock: Cot *et al.* 1991, 1995; Sajo *et al.* 1996.

Depending to where the workers villages will be located near rivers and fields, exposure from *Simulia* (blackflies) bites (see Cot et al . 1991), the incidence of river blindness, malaria and schistosomiasis, can vary substantially.

Recommendations

Carry out an epidemiological baseline study, including but not limited to children under five, and women in procreative age to obtain a better understanding of the health risks to the project of the forest environment.

The quality of urban planning (supplying of drinkable water or latrines for the workers camps), will be in direct relation to the incidence of infant mortality (often generated by diarrhoeal diseases) or typhoid.

Risks of HIV/AIDS and STIs, will be increased if single men are recruited, but decrease if the project encourages the settling of workers and their families.

The project needs to insure a decent quality of life to workers' families by providing education, agricultural land (including training and ensuring availability of seeds, fertilizer and pest control products), recreational services, health care, and train workers in preventing accidents and health risks during and after work.

Include and promote the participation of the local population in health care, educational services, agricultural extension

Organise the provision of the markets with fish (fresh and frozen) and meat at competitive prices in order to provide alternatives to bush meat consumption.

Annex 6 **Socio-economic analysis of the Gas to power project**

SOCIO-ECONOMIC ANALYSIS OF THE GAS-TO-POWER PROJECT

This section analyses the ESHIAs made for this project and provides recommendations for improvement.

Main elements from the Gas-to-power ESHIA, RAP and CDP

Separate studies were made by different consulting companies for the pipeline with the Central Processing Facility (CPF) (HasKoning, 2006), and the power plant and transmission line to the national grid in Edea (Scott Wilson 2006, 2007a, 2007b). These studies partly overlap while at the same time suffering from not discussing major impacts. This section describes the choice of sites for the two facilities as well as notable results of the ESHIA studies. Only the Scott Wilson study includes a Compensation and Resettlement Action Plan, and a Community Development Plan, while the Haskoning study is limited to the Environmental Impact Assessment.

Choice of location of the Central Processing and electricity producing facilities

Available data

The Sanaga gas fields are located some 10 km offshore east of Kribi. No cumulative environmental considerations are considered in the ESHIAs of the CPF and the power plant / transmission line.

Perenco will use an area of 25 ha acquired previously by the national oil company SNH in the village of Eboudawaé, 10 km North of Kribi. The Gas plant CPF will use only part of the 25 available hectares, though exact dimensions are not part of the EIA report (Haskoning, 2006).

Alternative sites of the powerplant compared in the ESHIA, only take into consideration the distance to the gas fields. However, this analysis is flawed: as the clean gas comes directly from the Central Processing Facility, the relative locations of the CPF and power plant are more important data. According to the ESIAs, though the two plants are located 9 km apart, they will be linked through an offshore pipeline of 25.5 km! As both plants are on-shore, and a sufficiently vast area is available on the SNH site, it's advisable to consider building both plants side by side on the same plot. This is especially so because the foot print of the final powerplant will be about 4 ha only (Scott Wilson, 2006, pages 3-10)

Tourism is an important source of livelihood for the local population, and the building site of both the CPF and the Powerplant should be chosen in such a way that as little as possible of the coastal environment (including skyline) is disturbed. According to the Haskoning (2006) study, all land along the coast is now titled land, and value of land directly on the coast is about 10 times the value of land inland. It's thus advisable to leave the ocean front liberated from all direct industrial impact, and build all facilities inland, a few km away from the coast.

A fishermen's hamlet, Ebodawae, with an estimated population of 29 households and 203 people, is located close to the CPF, and should be relocated if the negative impact from the CPF and powerplant becomes too important. Its population is mostly of foreign, Nigerian origin (Haskoning, 2006).

Costs evaluation of alternative sites

The box below shows the alternatives from the ESIA report, and indicates that

Mpolongwe 1 is the cheapest alternative. Initial analysis of different site alternatives [apparently] considered only options where the two plants would be built in a single location.

The below table show an evaluation of costs variations related to selected criteria for each site. Mpolongwe 1 is considered as base case.

	MPOLONGWE 1	MPOLONGWE 2	BIPAGA 2	EBOME	G. BATANGA
Transmission line	0 km	(+ 0.7 km)	(- 10 km)	(+ 5 km)	(+ 10 km)
		+140,000 \$	- 2,000,000 \$	+ 1,000,000 \$	+ 2,000,000 \$
Pipeline	0 km	(+ 0.7 km)	(+ 8 km)	(- 2 km)	(+ 4 km)
		+ 280,000 \$	+ 3,200,000 \$	- 800,000 \$	+ 1,600,000 \$
Earth works & Foundations	0	0	+ 1,000,000 \$	+ 500,000 \$	+ 200,000 \$
Access road	(0.1 km)	(+ 0.7 km)	(+ 5 km)	(+ 4 km)	(+ 9 km)
	+ 50,000 \$	+ 350,000 \$	+ 2,500,000 \$	+ 2,000,000 \$	+ 4,500,000 \$
Relocation	(10 huts)	(0 hut)	(0 hut)	(7 huts)	(4 huts)
	+ 300,000 \$			+ 200,000 \$	+ 100,000 \$
Land cost	+ 720,000 \$	+ 720,000 \$	+ 1,200,000 \$	+ 1,200,000 \$	+ 720,000 \$
Total	+ 1,070,000 \$	+ 1,410,000 \$	+ 5,900,000 \$	+ 4,100,000 \$	+ 9,120,000 \$

Costs assumptions:

- Transmission line	:	200 k\$/km
- Pipeline	:	400 k\$/km
- Access road	:	500 k\$/km
- Relocation	:	30 k\$/hut
- Land cost	:	6 \$/m ² (inner land) 10 \$/m ² (costal land)

Table 1. – Evaluation of alternatives sites for the AES Sonel powerplant and the Central Processing Facility.

Analysis and discussion

The results of the cost analysis are based on a direct link between the gas fields and the gas power plant. However, since then, the choice has been made to locate the CPF and the powerplant in different locations. This means that a 15 km of pipeline has to be added, while the expensive access road to the CPF has to be built anyway. This invalidates the cost evaluation in the Scot Wilson report.

Bipaga alternative. – If the two plants were built together in Bipaga the extra pipeline to Mpolongwé II would not be necessary (saving 6 million \$), land in Mpolongwé would not have to be acquired (saving about 1 million\$) and the access road of Bipaga 2 can be shared with the Central Processing facility, costs will be 7 millions of dollars lower than the alternative of two different plant sites.

The location of the main facilities directly along the coast, means that a fishermen's village will either be moved, or be within the disturbance zone of the project, and a zone mainly reserved for tourism, will be lost. A minimum distance of about 1 km between the village and the industrial facilities, would spare the village, and protect the coastal skyline.

Mpolongwé alternative. – If the two plants were built together in Mpolongwe the pipeline would be 19 km shorter (saving 7.6 km), the access road to Bipaga 2 not necessary (saving 2.5 million \$), but land in Mpolongwé would have to be acquired (cost about 1 million\$), the transmission line 10 km longer (cost 2 million \$). The estimated total costs

will be 11 million\$ lower than the alternative of two different plants.

Resettlement:

If resettlement of Eboudawae becomes necessary, this will be quite expensive, as a whole village will have to be moved to a new location, and a new village created. As the population lives from fishing, this location will also have to be on the coast. The estimated¹⁵⁵ cost for 29 families is 2.9 million \$,

Resettlement in Mpolongwé, would be cheaper as replacement housing can most probably be built in the same village. AES-Sonels estimates the cost of replacement buildings at 0.3 million\$

Recommendations

Build the CPF and powerplant in the same location.

Avoid negative impact on the coastal band by locating the CPF and Powerplant a few km inland.

Central Processing Facility

Project description

The Gas production Project includes:

- 1 Drilling 2 exploitation gas wells offshore (from existing and abandoned wells) with Gas production units offshore
- 2 A Central Processing Facility (CPF), onshore at Eboudawae
- 3 A 3 km pipeline between the 2 production wells, a 14 km pipeline to carry the gas to be treated to the CPF, A 14 km pipeline to inject the glycol back into the wells
- 4 A 21 km pipeline to transport the by-products (water + condensate) from the CPF to the existing well KB-4, where it will be connected and to the existing pipeline linking KB-4 to the Ebome storage platform (USF La Lobe)
- 5 A (15 to 25 km) pipeline to transport the treated gas from the CPF to the onshore power station, between Eboudawae et Kribi, in order to produce electricity from the gas provided by Perenco.

Proposed mitigation measures

Main mitigation measures – in relation to social and health aspects – to be applied during construction and production are the following:

Table 2. – Mitigation measures in the social, health and safety fields proposed in the ESHIA of the Central Processing Facility.

Construction period
(onshore and offshore to be determined outside the turtles' egg laying period (November to March), the whale migration period(September–October), the dolphins' reproduction period (March–April), the fishes' reproduction period and outside the wet season (in order to decrease the erosion risk)
Forbidden to feed, pest or chase the marine fauna.
Forbidden to poach in the area of the project.
Personnel awareness rising on the ecological importance of the mangroves and the flora and fauna on the project location.

¹⁵⁵ Based on the costs of 50.000\$ per building, and two buildings per household. In reality, resettlement costs of villages tend to be usually much higher than budgeted.

Information meeting and awareness raising campaign with traditional and neighbouring authorities and with fishermen at the beginning of the construction work.
Minimize as much as possible the importation of work-force.
Good management of the living quarter, especially in terms of public hygiene.
Monitoring of the water quality in the area of the project.
Implementation of a Health, Safety and Environmental Management Plan.
Presence of a medical team on site during all the construction period.
Creation of a safety zone which also includes an environmental minimisation
Posting a security guard (site keeper) on the area of the project and prohibition to enter the construction zone without permission.
Creation of a safety zone (which can be different from the one during the construction phase), where it will be forbidden to cultivate the ground, to build on, or to use it for any purpose except for commuting (by foot or with a vehicle) over the pipeline which will be located on the beach.
Maintaining the security guard during exploitation (who was employed during the construction phase in the SNH concession phase).
In case of a gas leak of condensate spill : <ul style="list-style-type: none"> • Financial compensation of the affected fishermen ; • Remediation of the damaged zones; • In water, to quickly contain the hydrocarbons by the most appropriate method(s).

Socio-economic data and issues as described in the CPF ESIA

The Wider Kribi Area is inhabited by a young population: 60% under 25 and 20% over 50 years (see Ere Développement, 2003). Ethnic groups are: Batanga, Mabea, Bassa, Bakoko, Béti (Evouzok), while migrants are: Nigerian fishermen, Bamileke traders. Land conflicts are especially important in the coastal areas: as land is bought by hotels, retirees (civil service and private enterprises), locals, and rich people from elsewhere. 100% of coastal land between Kribi and Londji is titled.

80% of the global area is still covered with more or less degraded Biafran forest, 4-5% other forest, 8.6% is used by Hévécam and Socapalm, 6.6% in other agricultural use and 1.53% is actually built.

Eboudawae is a hamlet attached to the Evouzok village of Bipaga 1. At the time of visit there were 29 households (only 7 are Cameroonian) and 207 people. Resettlement may be considered, because the hamlet is : (1) close to the site; (2) close to military terrain (3) surrounded by a swampy river.

In the Ocean province 75% of the fishermen are Cameroonians, but in Eboudawae 75% is Nigerian. Income of fishermen is according to a regional survey 125.000 F/yearly, or about 2.500 F/week or about due to seasonality of the fishing activities (mainly during the main dry season from December to March) and of consumption by the own family. Ngok *et al.* (2005) estimate the average annual value sold by each maritime artisanal fisherman at about 1.000.000 FCFA. The differences between these data sources, clearly indicate that there is a lack of good basic data. Ngok *et al.* indicate that production has been decreasing during the last several years.

Industrial fishing legally only takes place outside the 3-miles' coastal zone, and practically in those areas where the water is deep enough for the trawlers to work. Total and daily yields on industrial fishing have also decreased since 1981, from 4.55 T between 1979 and 1979, and 2.05 T between 1986-90. Reasons are (1)

overexploitation, (2) use of fine prawn nets that also kill juvenile fish, (3) conflicts with artisanal fishermen. Industrial coastal fishing is now absent from the area between the river estuaries of the Lokoundje and Ntem.

Analysis and discussion

Land conflicts are exacerbated by the news of potential gains to be obtained through the presence of industrial development projects such as the pipeline, power plant, CPF, power line. The conflict over the land rights on the CPF site are caused by the fact that the Batanga from Londji, being a coastal people of fishermen, consider that the land is theirs, while the Evouzok an inland population, have received the compensation for it. Such land and ethnic conflicts are common, and often refer to disputes who were the first populations in the area and who initially allowed the other to settle on the land (cf. section 0) .

Data provided by the report should be completed by including the following items:

- 1 A summary map that indicates all the villages and names used in the report.
- 2 Demographic data.
- 3 Presence of Bagyeli in the vicinity of the project.
- 4 Archaeology.
- 5 Grievance procedure
- 6 Impact of the gas pipeline to the power plant is not assessed.

Power plant and transmission line

The powerplant is projected in the Batanga village of Mpolongwé 1, directly east of the tarred road Kribi-Eseka on a site of approximately 16 ha, of which 4 ha are necessary for the plant (Scott Wilson, 2006, page 3-10). It will consist of gas-powered generators and step-up transformers to 225kV, which will be exported from the site via a new 225 kV transmission line. Three families will have to be relocated. Employment for the construction of the plant and transmission line will include an estimated 60 local people, 10% of the total estimated work force of 600.

Three available reports from Scott Wilson deal with an initial ESIA (2006), the resettlement action plan (2007a) and the Community development plan (2007b). The 2006 report, in its social aspects, was based on meetings with government, regional and local representatives as well as visits to a sample of villages.

Social Management Plan

The ESIA of the powerplant and transmission line indicates in its chapter 8 the essentials of the Social management plan.

Consultation with local stakeholders

- Advance information, accessibility of meetings, convenient time, clear understandable non-technical language, right to response during the meeting or followed up within a timeframe.
- Have focus groups
- Use of local community groups such as NGOs
- Stakeholder identification techniques were based on formal and informal meetings, household surveys, literature review, and unscheduled informal meetings .

Have a formal grievance procedure:

- Open to everybody
- With community representatives in committee
- Neutral well respected third party in case of irresolvable issues
- Favour facilitation rather than, arbitration

Resettlement Monitoring organization Monitoring

- Displaced persons: contact at intervals of 6 months, 12 months, and subsequently at regular intervals
- Resettlement organization should be composed of (a) advisory group, (b) manager, (c) Community Liaison Officer (d) Support services unit (e) Village resettlement committees

Analysis and discussion

The ESIA report covers all social aspects, and some of the major issues of the area (potential difficult community relations) are addressed. But it suffers from a lack of knowledge of the local population, a too limited socio-economic survey, and serious lack of data about the affected villages.

Plant site has been chosen based on mostly technical and land-use criteria and the ESIA has not yet been presented to the communities for comments and approval (4.2) The sampling method used for the SE survey does not seem clear: "random sampling" of 21 out of 26 villages and "2 to 4 households (HH)" per village, without indicating the methodology is weak. The sample is clearly insufficient anyway. Basic information for each of the villages should have been included in the report. Sampling should be a weighted proportion of HH in order to include the variation and have an equal possibility of farmers to be included. Both village sampling (among the 26 villagers) or PAP sampling (among the 710 affected HH) are legitimate ways of doing this. Villages are sufficiently small to have a HH count and a sampling of 5-20% of HH (at least 10 per village to obtain usable data.) All 94 physically displaced HH should have a complete SE assessment carried out in order to measure their effective loss, their vulnerability and to have baseline data for future evaluating the impact of the resettlement.

Lack of time is not a valid excuse to skip 5 of the 26 villages, before the important project step of evaluating assets eligible for compensation in the easement were carried out. Villages expressed their anger that project representatives had started staking areas along the right-of-way before they were informed about the project.

Consultation meetings were held in each of the division capitals with authorities and villages chiefs, and subsequently in each village in the presence of sub-prefect or his representative. Responses of project facilitators on important questions were often too optimistic as to the possibilities of the project. The typical answer on employment issues was: "We know that employment is important for the young men of your village and that's why we invite them today to create lists of all the qualification which are abundantly present in your village, so they can be used by the project at the appropriate time". All development related questions were "submitted to AES Sonel for appropriate actions".

Recommendations

Inform all concerned local populations well in advance of important steps of the project, including pre-project crop inventories

Provide the locals with good honest information about the scope and the limits of what the project can mean for the locals. Try to dampen unwarranted expectations that will be counterproductive at later stages of the project.

Resettlement

Available data

All project facilities (CPF, powerplant, transmission line) include physical and economical resettlement of households, in spite of a project design aimed at a minimisation of potential impacts. The original outlay of the facilities includes the following numbers of Project Affected People (PAP) and Households (HH):

Gas processing Facility. – A hamlet of 203 people close to the CPF would probably be better off if resettled to an area further away. No decision has so far been taken as to their resettlement. As most households are of foreign origin and do not hold a land title it will be especially difficult to find a replacement resettlement site with similar land access security along the coast.

Power plant. – Three families, whose land and structures are within the 16.7 ha plant site, would have to be relocated.

Transmission line. – 681 people are affected by the project (power plant and transmission line) of which 54 had legal titles to a total of 35.5 ha of land, while the remaining 270 ha are either . The RAP estimates the number of affected in section c.1

- 1 60 HH in the littoral and 16 HH in the Ocean problems will lose a house and are physically displaced (total 74 HH).
- 2 358 HH lose crops, 48 of whom also lose a house
- 3 54 HH have legal titles, of which 28 lose crops and 2 lose houses, while the remaining lose uncultivated land only.

Only titled land (less than 1% of the will be compensated to people, which is in line with the Cameroonian law. However, international regulation demand that PAPs obtain “similar access” to replacement land elsewhere, which in a region where land disputes are very common is not easy to obtain. The RAP provides AES-Sonel support to PAPs which do not have land titles “in negotiating any new lands as well as incur any costs such as traditional gifts, needed to obtain the land”.

No specific land acquisition rules are set for new houses, but it would be advisable to title all land where the project builds new houses, in order to guarantee that the PAP and his inheritors can have perpetual usufruct of the land on which their house is built.

Relevant legislation

The RAP concerning the powerplant and transmission line describes national legislation and international rules applicable to the project. A summary of the results is provided below.

National legislation. – The relevant Cameroonian legislation relating to resettlement and land requisition is outlined in Table 2.3-1 below (section 2.3, SW Rap report, 2007).

Table 3. – Cameroonian legislation applicable to resettlement

Subject	Law/Decree/Order
	<p>Ordinance No. 74-1 of 6 July 1974 to establish rules governing land tenure -relating to Private and Public Property, National Lands.</p> <p>Ordinance No. 74-2 dated 6 July 1974 - relating to the status of the public domain in Cameroon (the "Land Code").</p> <ul style="list-style-type: none"> • Decree No. 76-166 dated 27 April 1976-relating to the management of the national domain (the "National Domain Decree"); • Decree No. 76-167 dated 27 April 1976 — relating to the management of the private domain (the "Private Domain Decree").
	<p>Law n° 85/009 of 4 July 1985 - Compulsory Acquisition of a Public Utility Decree (PUD) and payment of compensation for the Environment.</p> <ul style="list-style-type: none"> • Ministerial Order N° 0136/Y. 14.4/MINDAF/D220 and 0137/Y.14.4/MINDAF/D220 of 26th August 2005 - Declaring Public Utility for the Construction of the Kribi Gas fired power plant and the 225KV Transmission line from Kribi to Edea respectively. <p>Decree No. 87/1872 of 16/12/1987 implementing Law No. 85/9 of 4/07/85 on expropriation for public utility purposes, Ministry of Town Planning and Housing</p> <ul style="list-style-type: none"> • Relating to set up of the evaluation committee, public notification and public inquiry.
	<ul style="list-style-type: none"> • Decree No 2006/3023 of 29/12/2006 - Fixing the modes of Administrative Evaluation of The buildings in Fiscal Matters • Arrest No 009/MINDIC/DPMPC Du 01/03/2004 - relating to the fixation of prices and tariffs for material, furniture works and other services relating to Public Administration. • Decree No 2003/418 of 25/02/2003 - relating to the compensation payments for crops destroyed by the construction of public utilities.
Cultural Heritage	<p>Law N° 91/008 of 30 July 1991 - The protection of cultural and national heritage. This law identifies the procedures for protection of sites and materials of cultural and national heritage. It applies to cultural sites that may be found along the projected line corridor.</p>

Land for the project facilities (power plant and transmission line) has been acquired through specific public utility decrees.

International legislation. –The relevant international rules and legislation relating to resettlement and land requisition is outlined in Table below (section 2.7, SW Rap report, 2007).

Table 4. – World bank directives applicable to resettlement

Title	Description	Relevance for the project
PS1 : Social and environmental assessment and management systems	Describes policy and procedures involved in elaborating an effective social and environmental management system	Applicable, especially with regards to the grievance mechanisms to receive and address specific concerns.
PS5: Land Acquisition and Involuntary Resettlement	Describes policy and procedures involved for resettlement. Provides guidance on definitions, required approach, benefit eligibility, resettlement planning and instruments	Applicable, as the project will require resettlement both at the plant site and along the way leave of the transmission line
OP 4.12 Involuntary Resettlement, December 2001 Formerly OD 4.30 Involuntary Resettlement, June 1990,	Describes policy and procedures involved for resettlement. Provides guidance on definitions, required approach, benefit eligibility, resettlement planning and instruments.	Applicable, as the project will require resettlement both at the plant site and along the way leave of the transmission line.
OP 4.10 Indigenous Peoples (July 2005) (formerly OD 4.20 Indigenous Peoples, September 1991 & PS7 Indigenous People (April 2006)	Provides guidance to ensure indigenous peoples benefit from development projects and avoid or mitigate potentially adverse impacts.	Not Applicable for the RAP as the direct impact on the indigenous people is very low. Applicable for the Community Development Plan.
OP 4.11 Cultural Property, September 1986, formerly OP11.03	Policy guidance on sites having archaeological, paleontological, historical, religious and unique natural values.	Applicable.

Source: www.ifc.org, May 2006

Adaptation of national laws to international legislation. – International rules go beyond Cameroonian law:

Table 5. – Comparison of World Bank directives and Cameroonian legislation applicable to resettlement

Key tenets of the WB's OP 4.12 covered in part or full by current Cameroonian law include	OP 4.12 and IFC PS5 obligations of the borrower or sponsor that extend beyond those required under Cameroonian law
Requirements to pay compensation in advance where land is expropriated for public use (Law No. 85/009); Requirements to compensate for losses to productive assets and crops (Rule n° 13-MINAGRI/DAG); Requirements to inform and involve local communities and affected persons; Requirements to undertake a mapping and census survey exercise to establish the rights, assets, land owners and tenure of displaced people; and Provision for pre-judicial avenues for resolution of disputes and rights of appeal.	Extent of compensation and types of assistance offered Categories of people eligible for compensation Income restoration and assistance to displaced persons with their efforts to improve their livelihoods and standards of living The extent of resettlement planning and procedural requirements Implementation of sustainable development programs to enable project affected persons to share the benefit of the project. Compensation based on the full replacement cost of lost assets based on full market values and assistance to help improve affected peoples standard of living Ensuring that affected people are given security of tenure to their new property.

Analysis and discussion

The RAP report remains vague about key differences between the Cameroonian law and international regulations. Specific differences of major importance with OP 4.12 are: The Cameroonian law does not recognise any right of compensation on illegal occupied of land, OP4.12 compensates crops and assets irrespective of the legality of land occupation

The Cameroonian law compensates assets with a depreciation for their actual value while OP 4.12 demands that compensation be paid by replacement value, which is usually much higher

The Cameroonian law only compensates "mises en valeur" or "objective improvements and assets" to untitled land and does not specifically recognize the right to replacement land elsewhere

OP 4.12/PS5 demand that livelihood be at least as assured after the project as before, the Cameroonian law is silent about this aspect.

Land is used for about 2-3 years and then lays fallow for 4-5 years, which means that a farmer needs 2-3 times more land than he actually cultivates in order to keep farming.

The Cameroonian law only recognises actually used land. In order to protect the farmer's future livelihood, replacement land should be acquired at the rate of 2 ha of new land for every ha actually cultivated.

Recommendations

Land issues are a major problem in the area. As more than 90% of the land users do not have a land title, access to replacement land for agriculture has to be monitored by the project. The draft RAP provides AES-Sonel assistance for acquiring land under traditional land tenure.

In order to avoid land conflicts, should be allowed to use land under the power transmission line to grow annual crops.

If land cannot be used anymore, actually cultivated land should be replaced within the same community through a written agreement with other land-owners in the village. The village chief and village elders should endorse the new ownership in a public meeting with an official memorandum signed.

In order to protect the farmer's future livelihood, replacement land should be acquired at the rate of 2 ha of new land for every ha actually cultivated.

Specific groups, [Bakola/Bagyeli Pygmies, women (especially widows who do not live in their native village) and foreigners, not belonging to the main clans in the village] are among the most vulnerable groups concerning land access. Various observations and discussions in the villages indicate that their rights to the land they use remain respected by the local community as long as local powerful people don't need the land, but as soon as they need it, everything will be done to push them off the land. This situation is very well described for the Bakola/Bagyeli, but they are not the only ones who suffer from land insecurity.

Compensation rates

Available data

Compensation for crops and trees is paid according to the cost of lost production to the farmer until the establishment of replacement crop. The 2004 compensation rates are a significant improvement over the previous price list of 1981. Compared to compensation prices calculated on the basis of actual yield and prices observed in the markets, by a team of Cameroonian and International scientist for the pipeline, the rate of most food crops and cocoa is as high or higher, while the compensation rate of fruit trees is about

75% lower.

Analysis and discussion

The Rap proposes adapted tariffs for several crops in order to take into account local agricultural practices and local prices. The methodology used in this exercise is not always very clear, as price observations in the Kribi market do not take into account normal seasonal variations that govern agricultural and fruit prices. The compensation of two harvests for the same field is a very generous measure as usually the two crops are not grown on the same fields (see Koppert, 1997 and Cox et al., 2000).

Recommendations

A review of compensation rates based on good data about yields and seasonal prices is necessary.

Detailed socio-economic survey

The Rap report (SW 2007a) describes the detailed socio-economic survey in the villages. The random selection process for the survey is correct, but one should wish to obtain maps and summary details of the major characteristics of the affected villages. The socio-economic questionnaire, applied to half of the affected households, will probably be a reasonable instrument of assessing project impact, though it would have been advisable to include all physical displaced people in the survey.

Key results of the SE survey

The SE results show that the average household size is 5.3, and more than 80% of the households are headed by men. People are Christians, with two thirds are Catholics. The importance of churches is underlined by the fact that 25% consider the church as their main leisure activity. Bassa, Béti and Mabi are the most impacted ethnic groups. Education level of heads of households was part of the questions, but does not appear separated in the answers. Malaria and diarrheal diseases were most often named as ailments. 15% of the households had lost a child to disease during the last three years. Primary and secondary activities are analysed mixing children and adults, and so unfortunately difficult to interpret. Agriculture, hunting, fishing and trade are the most frequently mentioned activities. Only half of the households own animals, mostly chickens (72%), goats (11%) and pigs (10%). Assets most usually owned are for more than 90% of the households a bed, more than 50% a radio, a cell phone and a watch, for 30-50% electricity, a mosquito-net, TV, a gas stove (but only 5% cook on gas) and for 10-25% a stereo set, a video, a motorbike, a kerosene stove. Only 10% own a bicycle and 5% a car. Water comes for 70% of the rural households from surface water, but in the Edea area for a minority also from tap water at home, from neighbours or from boreholes. Households typically spent less than half an hour on fetching water but more than half an hour on fetching fuel for cooking and lighting. Leisure activities take place at home (43%), in the church (25%), at friends' homes (12%) and practicing sport (14%). Leisure activities are close to home.

Though data on household income and expenditures had been gathered as part of the survey, they are not part of the RAP report version of October 2007 that is under review here.

Compared with Cotco surveys along the pipeline, this population appears as probably more affluent in its possessions than any of the pipeline villages.

Compensation consultation

Project affected persons (PAPs) prefer payment in cash to payment in kind. The RAP proposes to assist people with opening a bank account. The Rap proposes to additional assistance to payments to pay for land acquisition, building of structures, clearing of land and providing of seeds. A special fund of 25% of the budget should be created to pay for this, and for specific extra assistance to vulnerable categories and other resettlement related costs. The RAP proposes PAPs the option to receive compensation – for instance for trees – over several years.

People varied almost equally in their desire to move closer or further away from the actual site to create their new farms: land availability is usually mentioned as the main reason. This is also the main reason that, as far as possible, PAPs must chose themselves where they want to go and the project should have a budget available for compensation of land given by third parties. A few families (<5%) want to use the compensation to move to a new village, while another minority (<5%) refuses to move at all.

Analysis and discussion

The report indicates that focus group discussions have been conducted in affected villages, but surprisingly, the report only describes the questions that were asked but none of the answers that were given. This is especially important as any questions concerned payment for existing land, and land tenure for replacement land. As in other consultations for the project, there seems to have been a lack of clarity about what was possible: for instance in one village people asked that their new house would have between 6 and 12 rooms.

Most people seemed to be happy that AES-Sonel builds their new house, others want only technical assistance, and a minority wants to build a new house themselves, using locally available specialists.

Recommendations

Realistic and honest consultation about compensation through the project should be conducted from the beginning. Creating expectations that cannot be fulfilled at a later stage will have a much worse impact on the long time viability of the project than replying negatively to questions during initial meetings.

The impact of the project depends on the amount of land affected for each of the households. The report does not indicate which are the households that are so much affected that their economic livelihood will become affected. Such a categorisation would need more understanding of the agricultural system in the area, individual identification of such affected people, as well as the provision of specific measures to insure their livelihood after the passage of the project.

The important issue of land rights and access to replacement land is especially important for those people who lose more than a negligible amount of land. Pending better the availability of better criteria, the cut off point may be provisionally set at either 25% of the total land or a total loss of more than 0.5 ha.

Estimates from the report that 20% of the 300 ha of the transmission ROW is agricultural land means that the 600 impacted farmers lose on average about 0.1 ha of fields and 0.25 ha of fallow land. As the average loss is rather low, it is all the more important to separate farmers that are heavily impacted from those that are less.

Using compensation money is not an easy task for people who are not used to handling important sums of money. Rather than for replacing the lost crops, people generally perceive compensation money as a way of improving their material situation: housing,

equipment, investment, creating plantations. Lessons from the pipeline project show that guidance should be given to people in order to help them budget and carry out projects with more chance success than what was observed along the pipeline. People need to know sufficiently in advance the amount of money they will receive, and assistance and guidance with defining and calculating their projects, so they will be aware of the investment possibilities at the moment they actually receive the money.

Community Development Plan

Available data

The section on the Bagyeli-Bakola "Pygmies" showed that some 150 settlements are present in the Ocean Province, most of whom along the Kribi-Lolodorf-Eseka road and a minority along the other axes. As a requirement by the World Bank OD 4.20 Cotco, as the owner of the Chad-Cameroon pipeline prepared and Indigenous Peoples Plan for the 30 settlements within 2 km of the pipeline and the other settlements who cross the pipeline in order to reach the main road, an estimated population of 1,000. The IPP was endowed with a trust fund of 600.000 US\$, to be used over a period of 30 years, and for its implementation the FEDEC, a Cameroonian foundation set up, to manage the IPP and the 2.5 million US\$ available for the Campo-Ma'an and Lom-Djerem parks.

These activities had been indicated as priority fields of development during consultations in individual villages and with groups of villages that took place on two separate occasions over a total period of 4 months in 1999 and in 2002. Baseline studies included complete demography of all 120 visited settlements in the Ocean Province, and socio-economic and agricultural baseline data (including field measurements) of directly impacted settlements located within 2 km of the pipeline.

Scot Wilson has drafted a Community Development Plan on October 2007, for the 4 sites 30 households. No reference to Cotco's IPP is made in the report. 18 families were surveyed, and results showed the same level as poverty as observed during the pipeline studies: no material assets, no beds, a few radio-sets. Unfortunately the team did not opt to recruit independent (Pygmy) guides to help them with translation during the consultation meetings, but depended on local village chiefs for that. The report states that exploitation by the other ethnic groups is a grave reality, especially as the latter are still largely unaccustomed to the cash-based community. Tensions with the surrounding population are strong: the Bantu are perceived as oppressors. Agriculture, access to drinking water, health care, and Human Rights were most often cited priorities, which was similar to priorities cited during the Pipeline consultations.

The Scot Wilson report proposes a community development plan that is close to the IPP: based on empowering the population through ID-cards, education, agricultural development, health and organisation of communities, preferential recruitment. A new element is the training of hunters in the use of portable GPS devices in order to map their resources in the forest. The total cost of the Community Development Project for the 4 communities is significantly higher than for the 30 villages of FEDEC's Indigenous Peoples Plan: 3.85 million US\$ compared to 600 thousand US\$.

Analysis and discussion

FEDEC has been functional since 2003, but has not been able to impact significantly, due to lack of funding. However, it has implemented successful actions for the provision of identity cards, assistance to education (school fees and supplies) for children, health (free health care) citizenship (identity cards) and the distribution of agricultural tools and seeds. Most of these actions have been carried out by FEDEC itself. This is contrary to the initial spirit of the IPP, which planned FEDEC as a financing organisation that would

only subsidize actions by existing NGOs but not intervene personally. Consequently, the yearly proceeds of the trust fund have not been enough and the fund itself had to be used for financing.

The effect of FEDECs actions seem mostly short-term, although the objective has been to improve durably agriculture and education level of the people and to better integrate them in the global Cameroonian society.

The issues surrounding the Bakola-Bagyeli have little changed between the Cotco and Scot Walker consultations, and any development scheme should work with them in order to not only protect their environment but also to enhance their propensity to take their destiny in their hands. This should be in spite of the fact that very often in Bantu villages Pygmies are still considered as "owned" by villagers.

The various projects described in this report, in spite of mitigating actions, will probably further decrease the presence of wildlife in the area, and push the Bakola/bagyeli towards a more vegetarian diet. This is not uncommon in hunter-gatherer groups in Cameroon, but will most probably have a negative impact on their health status.

Recommendations

Study ways of integrating FEDECs Indigenous Peoples Plan, the CDP of the powerline, and upcoming new projects (Memve'ele, Mbalam

Do not limit the CDP to the 4 settlements located directly under the powerline, but to all communities in the adjacent area and integrate with all Bakola-Bagyeli groups in the Ocean Province

Include community development and citizen development in potential development actions

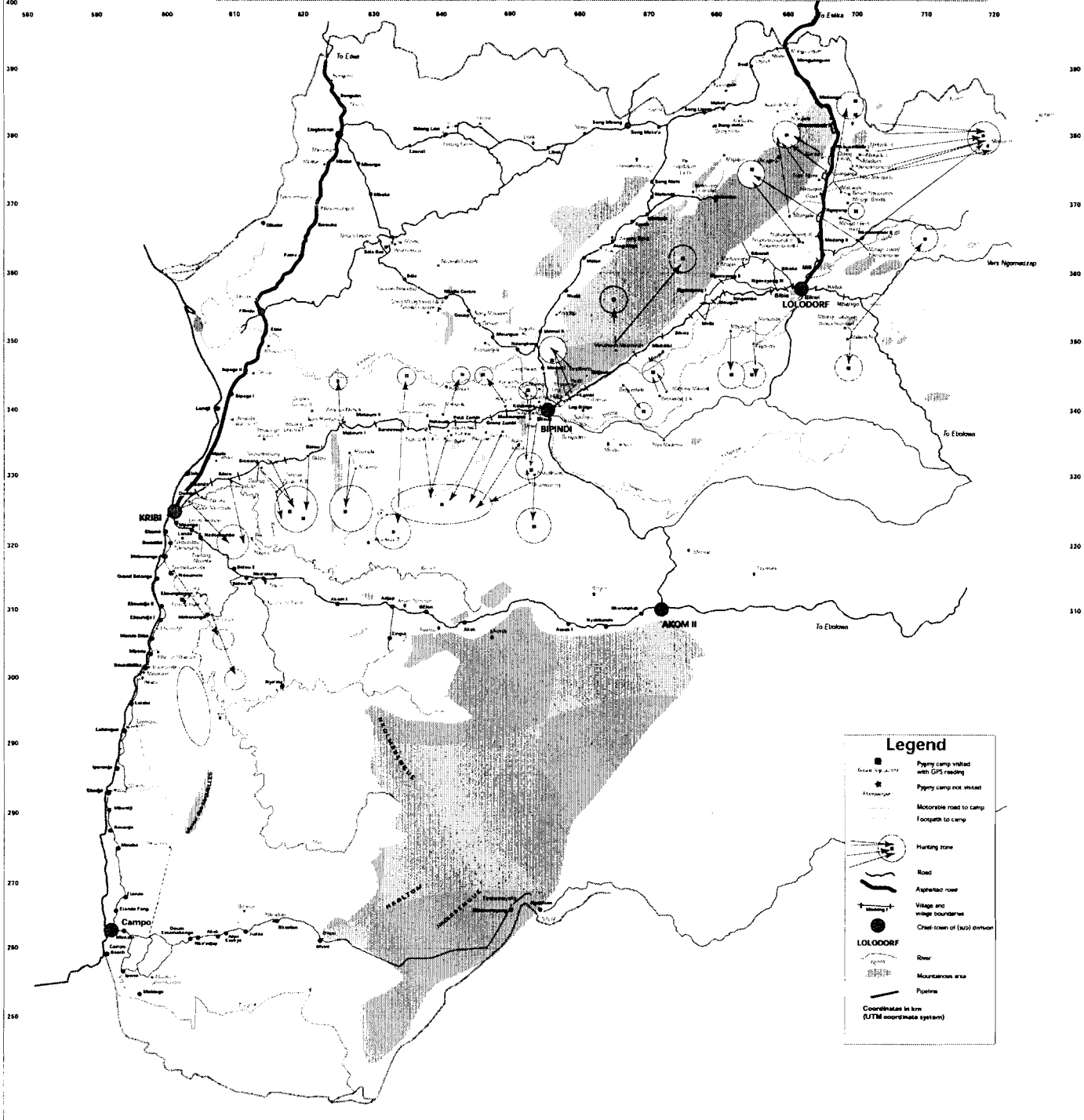
Target economic development actions towards coping with diminished wildlife availability through more agriculture

Study land issues in a global way so that all vulnerable groups (Pygmies, women, foreigners, poor in the village) obtain land security through traditionally respected land rights

Mix specific targeted actions to the hunter-gatherer community with global actions for all communities in order to gain social license for the global project, and avoiding reverse favouritism.

Annex 7
Location of Bakola Pygmy settlements and hunting
areas in South West Cameroon

Location of Bakola Pygmy settlements and hunting areas in South West Cameroon





Annex 8

Inflation monitoring during the pipeline construction

Appendix V. – Inflation monitoring during the pipeline construction

During the pipeline construction, inflation was monthly monitored in markets along the pipeline and control markets not influenced. Local NGOs were recruited to visit the markets, and trained by university students from Yaounde. A simple set of 7 indicator foods was chosen of which monthly two samples were bought in each of the markets. Impact of the pipeline construction was expected to be strong but limited in time, because during very short period (2 to 4 months) all construction activities in an area would take place.

Changes in commodity prices¹ are complex and discerning Project-related effects would be difficult. Commodity prices can be influenced by many factors both internal to Project activities and external forces beyond Project control. In fact, both internal and external forces can be acting simultaneously to influence prices. (Chad Development project, 2006)

Prices for agricultural products tend to be highly seasonal and prices can show marked seasonal changes; typically being highest just before harvest. These fluctuations are complicated by other factors such as the size of the previous harvest and expectations for the next harvest, supply and demand into and from other producing and consuming areas.

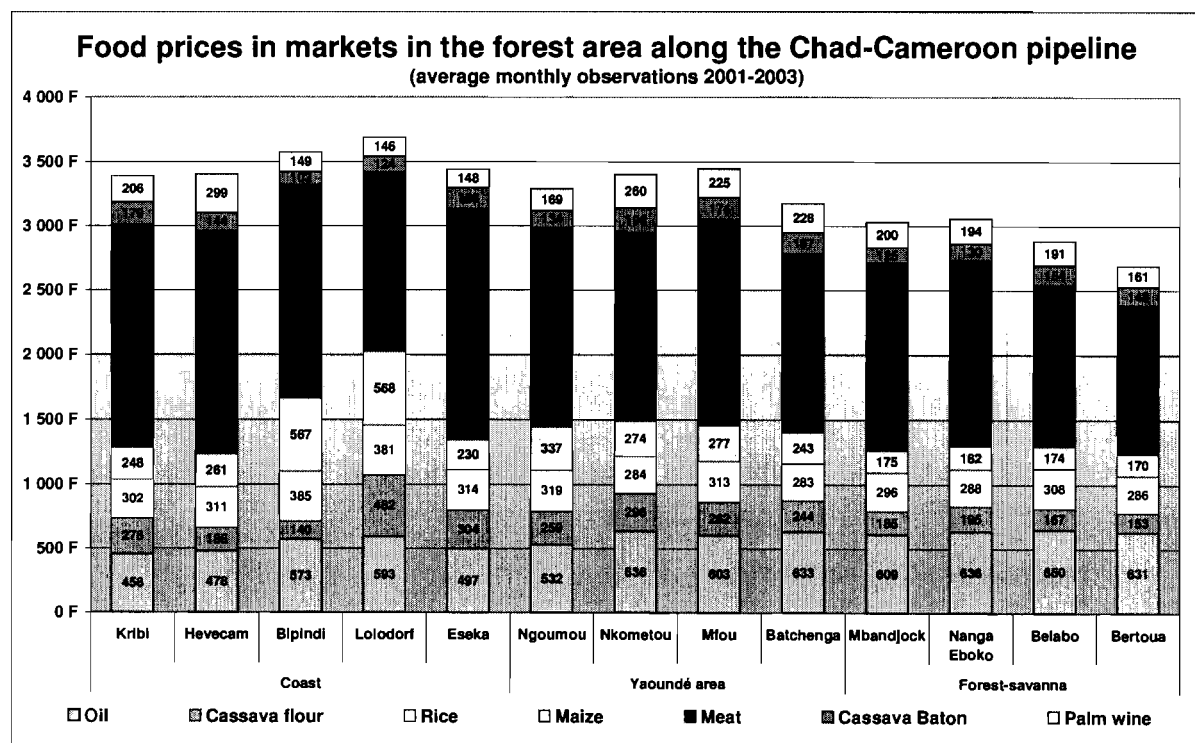


Figure 1. – Foodprices in markets of the forest area along the Chad Cameroon Pipeline (2001-2003). (Chad Development Project, 2006 and adapted from crude data)

¹ Chad Development Project (2006) - Inflation Monitoring in Cameroon - January 2001 – July 2003, and graphs adapted from the crude data.

The two graphs in this section tend to show that (1) for reasons of poor supply to the markets, the markets in the Ocean region tend to have higher prices than elsewhere in the country, and (b) seasonal and variations tend to be stronger than variations cause by the project.

The coastal region appears as the more expensive one, mainly because of the high price of meat. This has implications for all projects in the area, as butchered meat is often so much more expensive than bush meat, that most people prefer bush meat. Markets in Bipindi (where the meat price has been estimated from the results in neighbouring markets) and Lolodorf are so poorly supplied with foods that the resulting price becomes the highest of the 13 monitored markets. The presence of wage-earners in Kribi and Hévécam, keep the prices slightly lower, because it attracts more sellers and thus greater competition.

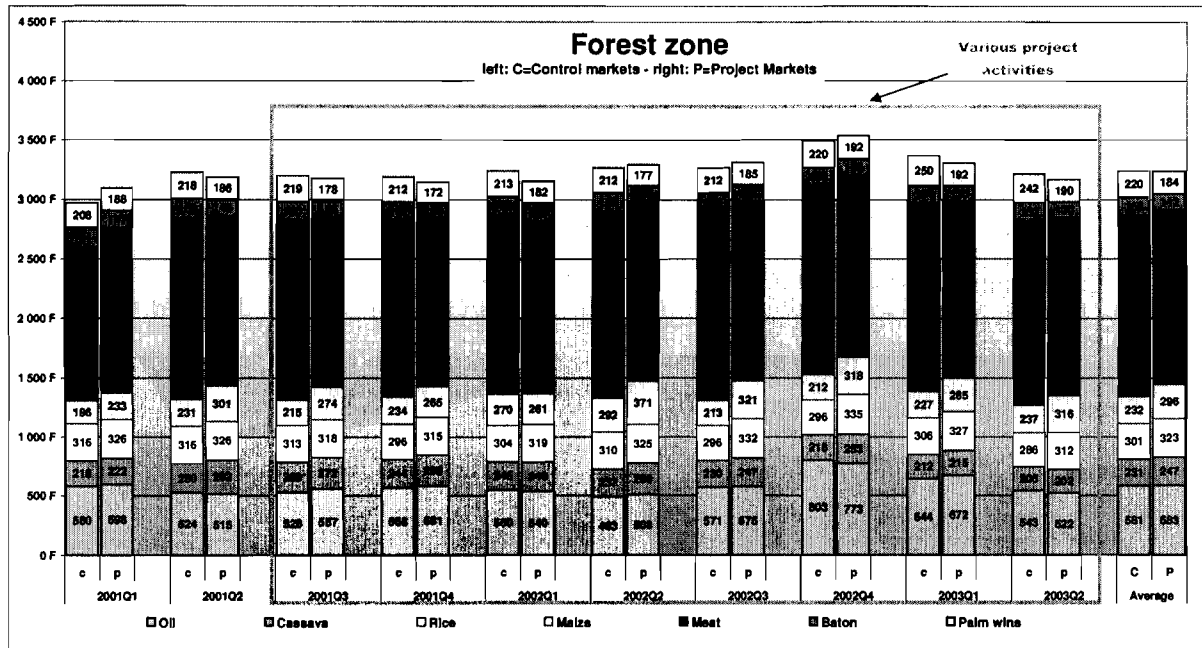


Figure 2. – Impact of the Chad-Cameroon pipeline construction on prices in project markets and control markets. (2001-2003). (Source: Chad Development Project, 2006)

The impact of the pipeline construction on prices was difficult to derive from the available data. During the main construction period (between the second quarter of 2001 and the first quarter of 2003) Project markets were during 5 quarters cheaper than control markets and during three quarters the same or slightly higher.

Housing

The influx of the many workers has led to a bonanza for the people that had rooms to let. Normally, in small villages and towns there is hardly a market for renting rooms, and prices are very low: two-three thousand francs per month for a simple un-cemented room, up to five thousand for a room with cemented floor and walls, and often an extra 1000 FCFA for electricity, if available. People that use rooms are mostly pupils and students that have come from the villages and have no close relatives that can house them.

During the pipeline construction most employees (expats, nationals) were housed in Project camps, rented hotels, and mansions rented and equipped by the contractors. Among the migrant job seekers, many had relatives and lived for free with them. The minority that had to rent rooms in towns was responsible for rapid price rises: not only because of a lack of rooms, but also because the locals wanted to profit from the short period that the project was in their location.

Room prices during the project rose to 6-10 thousand FCFA for a simple room, to 8-15 thousand FCFA for a cemented room.



Annex 9

Archaeology within the regio of Kribi

ARCHAEOLOGY WITHIN THE REGION OF KRIBI

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For more than twenty years now, an intense archaeological research in Southern-Cameroon in general and specifically in the coastal region (Kribi-Campo area) is noted. This can be explained by three main factors:

- The setting of environmental protection and conservation projects
- Integration during heavy public works (e.g road lolodorf-kribi-campo, Chad-Cameroon pipeline, gas factory and the central thermal industry of Kribi...) of archaeological research teams
- The presence of multidisciplinary research teams working in the area

1- GEOGRAPHICAL FRAMEWORK

This region is situated on the coast, at about a quarter south-west of Cameroon i.e. between 2°10'-2°52' latitude north and 9°50'-10°10' longitude east. It is limited in the west by a line of the Atlantic coast, in the south by river Ntem that serves as a natural boundary with equatorial guinea, in the east by the first foothills of the Ntem mountainous mass and in the north by the road linking kribi-Akom II to Ebolowa.

Found on coastal lowlands, this area presents a semi-orange profile at the foothills of Ntem with crests presenting peaks above 1000m. Three main rivers flow in the area: in the north, we have the river kienké, in the centre, Lobe which with its more than 10m water falls, that flows directly into the sea, and in the south, the Ntem that is the most important and the longest.

The coastal humid climate has four main unequal seasons: We have two rainy and two dry seasons. Precipitations range from 2900mm at Kribi to 2700mm at Campo.

The dense humid forest covers the area. It is highly deteriorated along the main road axes due to the slash and burn farming that is a consequence of the demographic pressure, forestry exploitation and introduction of many industrial farming zones. Letouzey (1968) marks two units that link the ecology of the region: the biafran and the coastal forests. The first covers the eastern piedmont nearby hills and foothills of the Ntem. This represents a forest low and mean altitude with a high rate of precipitations, rich in cesalpinaceae

The coastal forest on the other hand is a sub-type of the one mentioned above. The main difference between these two types of forest resides mainly on two plant species: *Lophira alata* and *Sacoglottis gabonensis*. In 1968, Letouzey said « This forest corresponds to an individualized floristic district that possesses specific characteristics due to human activity ». The forest with *Lophira alata* may be a result of extensive clearings for farming purposes over many years.

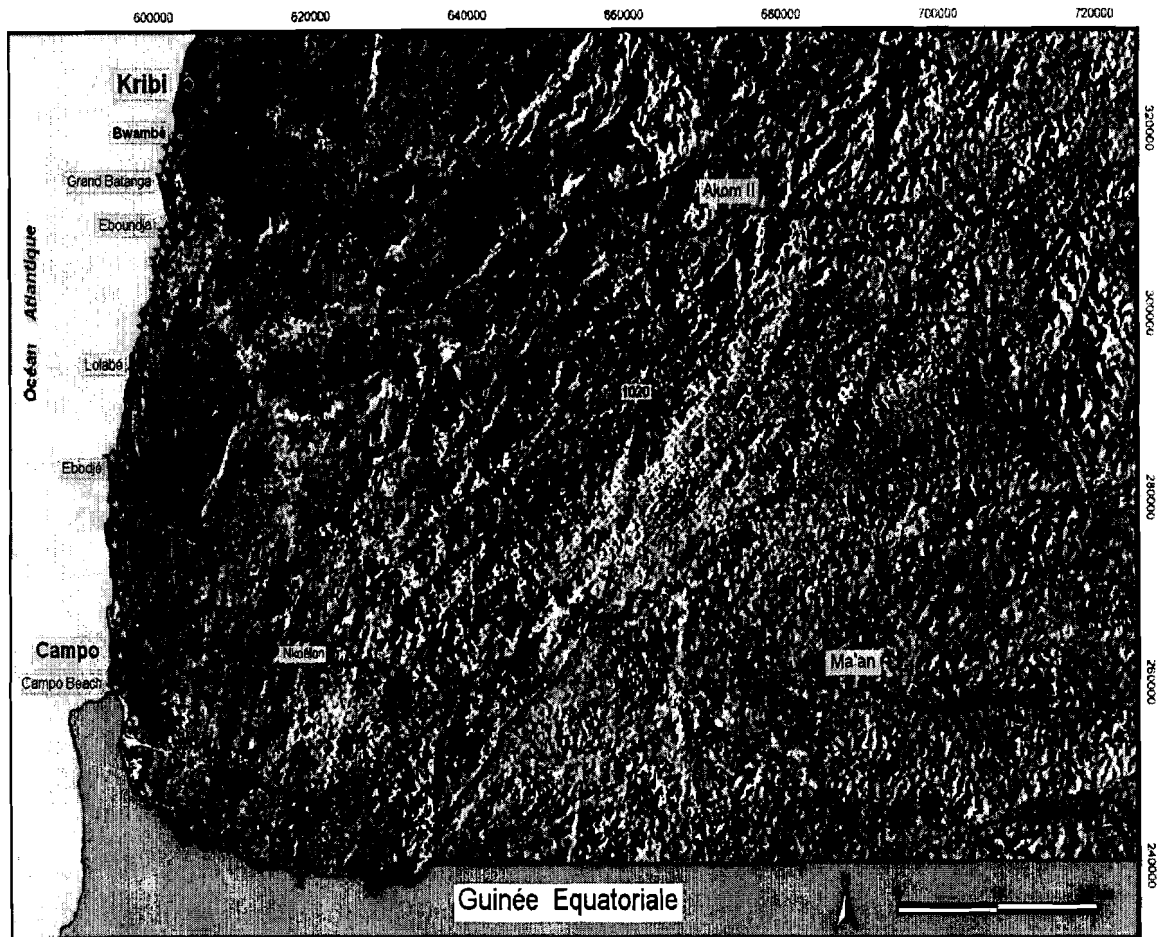


Figure 1: The quarter south-west of Cameroon, localisation of archaeological sites within the the region of Kribi (in Oslisly 2006).

2- HISTORICAL BACKGROUND OF THE KRIBI REGION

2-1- Data before 1960

Knowledge on the Palaeolithic and Neolithic periods of Cameroon is advanced by Marliac who in 1971 notes the presence of two polished axes discovered in the soil at Kribi by R.P Carret and collected around the 1950s-60. They were then deposited at the Douala museum. This is the oldest reference we have of the region.

2-2- Research from 1960-1987

2-2-1- Data from the japanese team (from 1975 to 1987)

The « Tropical african geomorphology research project » headed by Professor Hiroshi Kadomura of the Hokkaido university did the first field trips on geomorphology in some parts of Cameroon amongst which we have the quarter south-west notably along the road axes : Edea-kribi-campo/Kribi-akom II-Ebolowa/Kribi-bipindi from november 1975. Field

campaigns done in 1975/76, 1980/81, 1982/83 and 1984/85 ended with some reports and published articles. At the Ebolowa-akom II road, archaeological sites with reference, Loc 15, 16 and Loc 18 revealed some flakes and other lithic material. Loc 162, 164, 167 situated along the Kribi-campo road were characterised by a microlithic industry with many white quartz flakes, fine retouched points and a grattoir on loc 164 (Omi et al.1977). Loc 175 at the upper clayey-sandy level reveals some charcoal dated at 2480±120 BP (I-13144) (Hori et al.1986)

The Campo beach site is found on a marine terrace overhanging the Ntem estuary. A section of this terrace, revealed a level of charcoal at about 50cm in the soil and dated at 960±50BP (KSU 501) together with some pottery shreds (Hori, 1982). This human settlement might be an indication of the late iron age. The banks of the Lobe were not left aside as some organic levels here were dated. This Japanese team also did some studies along a section of the banks of Lobe at the level of the bridge and initiated some dating on the organic levels.

2-3- RESEARCH WORKS FROM 1990-2003

2-3-1- Data from Kueté (1990)

Kuete in 1990 during the sampling of his work notes the presence of charcoal and some pottery. At a village called Talla, on the road Kribi-akom II, he makes mention of some areas rich in organic material. At levels situated between 50cm-120cm some charcoal and pottery shreds were found. At Grand-batanga, he also notes the existence between 30 to 70 cm of some pottery. At Eboundja, a section situated between 75-105 cm produced some pottery, charcoal in association with quartz pebbles. At the village called Lolabe-biyo the presence of some charcoal at a depth of about a metre was noticed.

2-3-2- Data from Ossah Mvondo (1992-1994)

Field surveys were undertaken by Ossah Mvondo from 1992 in the Ntem and Ocean division. Following these, the site called Biyan along the Meyo centre to Ma'an road was located. The three main areas of surveys were:

- The Akoatan rockshelter where was found a polished axe-hoe tool
 - The Zookom sector revealed slag
 - Messeng revealed pottery sherds, slag and polished axe-hoe tools (Ossah Mvondo, 1998).
- Surveys undertaken at Akom II subdivision and more precisely at Nko'ongop (2°47'-15''N-10°40'50''E) lead to an excavation of a surface area of about 4sq.m. Here was found, pottery sherds in association with charcoal at about 20-70 cm in the soil. Further research revealed in

the same area not only an iron mine Nkomekok but also aged blacksmiths in the villages called Nemeyon and Efulan II situated on the way Biboulemam to Angong.

2-3-3- Data from Oslisly and his team (2000-2003)

From January 2000, Oslisly (Oslisly, 2001; Oslisly et al. 2001) began surveys at the Lolodorf-Kribi-campo region. Following this, Ateba (2003) did an inventory and a preliminary study of the lithic material of the Ocean division. Other sites as that of Mbikiliki 1 near Lolodorf revealed a bladelet on quartz, flakes, a point, a grattoir. Stone tools were found at Mvile 1 situated on the road Lolodorf-Bipindi. Ateba reaffirms that « the hewed quartz flakes were surely a man's action ». The site of Mangouma 1 produced two grinders. The site of Saballi 1 and 4 situated around the pipeline storage revealed 10 flakes on quartz, two points and four grinders.

Oslisly (2001) locates more than fifty sites, distributed in five main zones: The Kribi-bwambe ; Eboundja-mbode ; Lolabe-bouandjo ; Campo and Nkoelon.

- The Kribi-Bwambé zone

It extends from the agglomerations of Kribi to the Lobe river mouth. Four important sites were located: Kribi hotel, Ebome, Bwambe and Bwambe beach (Oslisly, 2001). The sites of Bissiang 1 and Bikondo near Kribi revealed for the first, a bifacial tool and a bladelet while on the other we had the a bladelet, the second revealed some white quartz stone flakes (Ateba, 2003).

- Eboundja-Mbode zone

This area long of about 15km has a crest-line of about 40m above sea level. Four main sites were discovered here (Oslisly et al. 2001). Amongst these we have: Eboundja 3, Nlende-dibe 3, Malongo 1, Boussibiliga 1. The site Eboundja 3 seemed the most interesting as this revealed a pit under an archaeological level (fig 3 and 4). The preliminary analysis presented a greatly complex decorated ceramics Nlend (2002) after an inventory of the different archaeological sites, undertook a specific study of the following sites : Boussibiliga 1 (1570±70 BP) Nlende-dibe 3 (1900±50 BP) and Malongo 1 (2340±60 BP). The following lithic material was obtained in the area of Eboundja-Mbode At Eboundja 1: three axe-hoes on quartz, two pebble stones were found. The site of Nlende-dibe 1 revealed an axe-hoe and many flakes. Nlende-dibe 4 on the other hand produced a bifacial tool and an axe-hoe (Ateba, 2003).

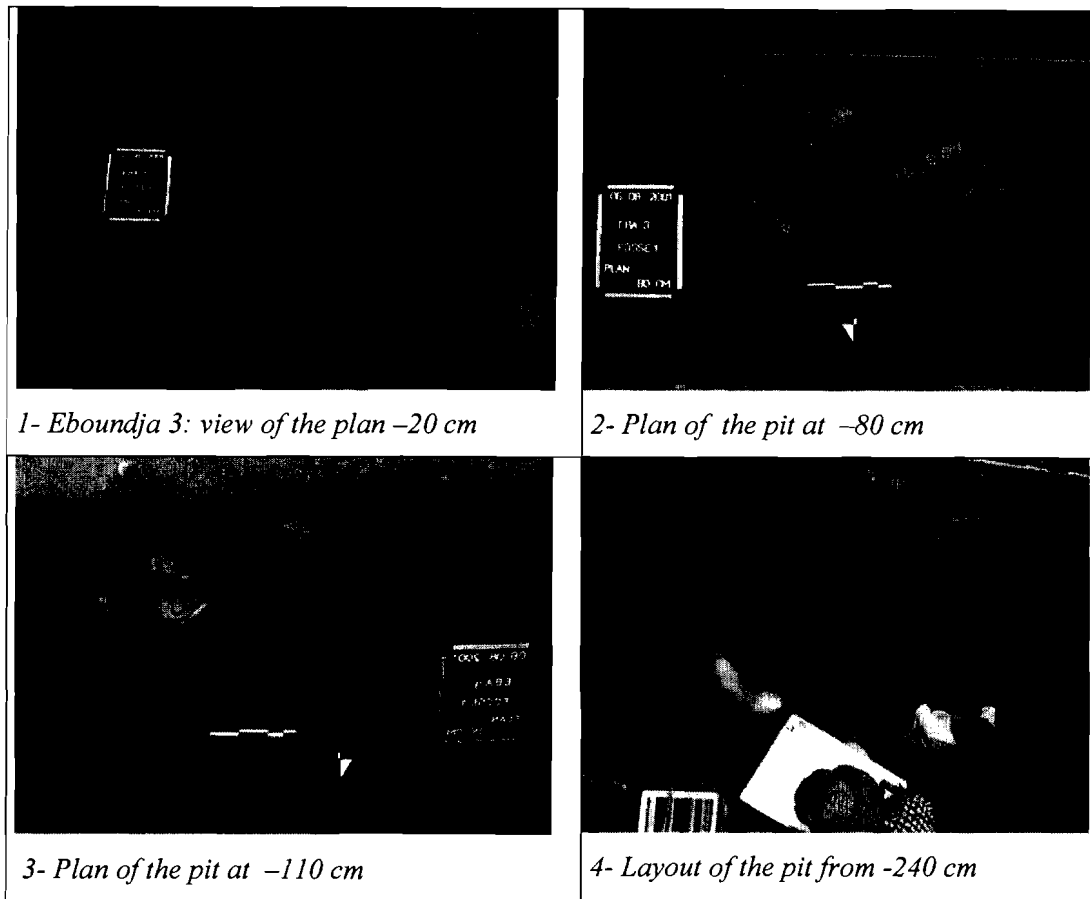


Figure 2: The four plan view on the different steps of the excavation of the pit at Eboudja 3.

- Lolabe-Bouandjo zone

Situated in the outskirts of Lohengue, Lolabe is a site where was discovered four pits. The road slopes showed levels of hewed quartz flakes. At Ebodje/Bouandjo, the surface collection produced pottery, and hewed stones together with a hand-axe

An inventory of the site of Lohengue 1 revealed a bladelet and a point on quartz while that of Bouandjo 1 produced an axe-hoe, and three hammer stones (Ateba, 2003).

- The Campo zone

This area revealed many archaeological sites Here, two sites were located : Campo 1, 2, 3, 4, Bokombé-plage, Itondé-Fang and Campo beach. Campo 1 is presently located at the Catholic Church's establishment. Three refuse pits were discovered and excavated. These revealed iron slag, pottery with opened and incurved edges Zana (2000). The latter notes the ornamental nature of the pottery that is made up of parallel striated revolving impressions on comb. The available dates are estimated at 1830 ± 30 BP corresponding to the old Iron Age. A remarkable

phenomenon in this area is the one observed with the vases that are turned up side down with some stacked up on others and always oriented with the base up right on iron tools.

Campo 2 is the site found in the campus of government high school of Campo. An excavation of a pit was carried on and this made it possible to trace a link with the preceding site. Bokombé-plage is a deposit situated on the seaside and characterised by a non decorated ceramics, quartz flakes were obtained at the surface of the soil (Zana, 2000). Campo 3 and 4 are found at the entrance of the town called Campo were refuse pits are easily identifiable (Oslisly, 2000b). Campo beach is the site located on the banks of the Ntem estuary. Here was always found some pottery sherds.

Ateba (2003) acknowledges at the site of Itondé-Fang the presence of two retouched flakes and a point.

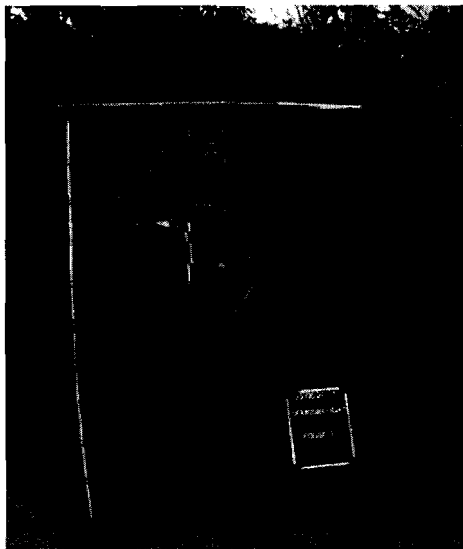


Figure 3: General view of the pit at Boussebiliga.

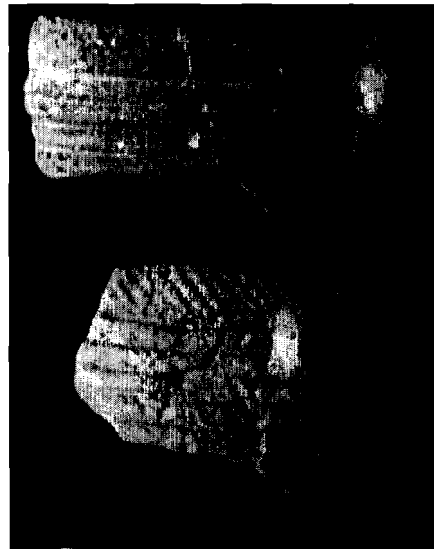


Figure 4: Boussebiliga : Fragment of an upright edge presenting a prehension knob

- The Nkoélon Area

This area is situated in the agglomeration of Campo. The presence of rock shelters and rocky piles is a particularity. In this structures were found, flakes, grattoirs on white quartz.

The rockshelter at Akok-begnât 1 is situated at an hour walk by foot from the village Akok-begnât. Here the surface collection produced a hammer stone and two points on quartz. Akok-begnât 2 is a site discovered by Oslisly (2001) and excavated by Ateba (2003). Here we had

1361 flakes, 73 retouched flakes, six notched tools, eight points, a grattoir and two axe-hoes. According to (Ateba,2003), the presence of heavy duty tools in general and axe-hoes in particular may explain the transitional phase in the economy i.e. from an economy of predation to that of production by the introduction of farming. The available dates at Akok-begnat range from 3650 to 410 BP.

Oslisly (Oslisly, 2001; Oslisly et al.2001) presents a chronological sequence of the region Kribi-campo. We thus have:

*** The late Stone Age**

This is estimated around 30.000 to 5000 years and characterised by the presence of stone tools made from a cloudy or translucent quartz, many flakes, notched tools, grattoirs, bifacial tools and points.

*** The Neolithic stage**

This stage is known in west-Cameroon for 4000 years and in the region Kribi-campo, around 3000 years. These populations settled by setting their villages up on the hilltops. Stone pebbles were used to hew axe-hoe tools that were then used for farming purposes. They equally had good knowledge and mastery in the different technics of stone polishing and pottery. This period can be estimated between 1000 and 300 BC.

*** The old Iron Age (Iron Age I)**

Situated from the second century BC by the presence of slag and highly corroded iron tools. During this period, the iron mineral of very good quality might have been obtained from the massif des mammelles where it was known for a long time.

*** The late Iron Age (Iron Age II)**

This mainly concerns the pre-colonial period, and represented from XIIth century by extensive villages that settle near beaches of the sea.

According to Oslisly (2001) the chronological sequence presented above shows an irrefutable continuous human presence in the coast of Cameroon for about a millennium i.e. from 2600 to 1500BP. This can be explained by the rich coastal flora and fauna that favoured the slash and burn farming together with fishing activities in the sea.

2-4- Archaeological research work from 2004 to 2007

2-4-1- The works of Nlend

After his master degree, (Nlend, 2004) brings forth the problem of the decreasing nature of radiocarbon dates at Kribi and thus proposes some explanation for this phenomenon. He notes that, many dates obtained are situated between 2400 and 1700BP for Kribi and campo then

follows a radiometric fall around 1800 to 600BP. This could be seen as a human deflation in the region.

2-4-2- Data from Oslisly

Oslisly (2006) notes that the Malongo tradition is characterised by impressions on revolving combs while that of Bwambé is characterised by marking sticks. Oslisly et al (2007) and members of his research team later on undertook research works on the surface area reserved for the central thermal industry at Kribi. This area thus seemed a potential archaeological site.

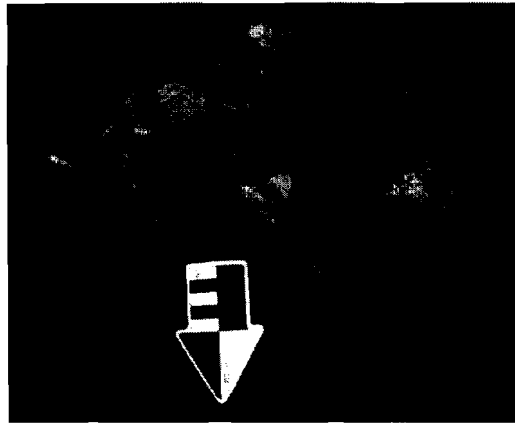


Figure 5: Proximal end of the pit of zone 2 revealing pottery shreds and charcoal

2-4-3-The results of Eggert

Eggert et al. (2006) in an interdisciplinary work, excavated the site of Bwambe and characterised the ceramics as being more or less globular, with short fluted edges; the bases are levelled as well as convex. The main decoration technics are either impression or incision. The archaeobotanical analysis revealed that the population of Bwambe used millet (*Pennisetum glaucum*).

2-4-4- The works on the Chad-Cameroon pipeline

Following the archaeological surveillance of the Chad-Cameroon pipeline project, 13 archaeological sites were discovered from Lolodorf to Kribi and distributed as follows: 08 pits, 02 iron furnace, 02 rock shelters, 01 hewing workshop (Gouem Gouem, 2005). The most important was that of Ndtoua (rockshelter) that revealed four archaeological levels that date up to the fifth millennium BC and the third century AD (Lavachery et al., 2005a, 2005b, 2006).

3- SUMMARY AND PROSPECTIVE OF ARCHAEOLOGICAL RESULTS OF THE KRIBI AREA

Research works undertaken since 2000 show not only the importance of the coast but also the fruitful results obtained in this field of study. The results obtained show that since about 5000BP, most of the listed sites were either found up on the hilltops or on crest lines.

It is worth noting here that most of the artefacts obtained are revealed in two ways: firstly, the hewed stones are always found in a stratigraphic level enclosed in lateritic pieces of gravel. Pottery sherds on the other hand are either found in the clayey-sandy formation at the surface of the lateritic horizon for settlement levels or most often in dugged structures commonly known as pits which with respect to time remain older. The same observations are also noted in Gabon (Oslisly 1993 ; 2001)

The typological and ceramic analysis of most the sites and specifically the reference site called Bwambé sets the pace for a chronological sequence for the quarter west of southern-Cameroon. We thus have:

Late Stone Age

This period estimated to 5000 years is characterised by the presence of stone tools hewed on cloudy translucent quartz or jasper. We also observe the presence of many flakes, tools with notches, points, grattoirs, small bifacial pieces.

Neolithic Stage

In the west of Cameroon, it is known around 4000BP and in our field of work around 3000 BP. These populations settled by establishing their villages up on the hilltops and started the first clearings of the forest with stone axes and dug the soil with axe-hoe tools. Thus, this Neolithic stage is known in the Malongo tradition and situated between 1000 to 300BC.

Iron Age

This is known from the IVth to the IIIrd century BC in the form of highly corroded iron tools. These metalworkers known around 300BC and 900AC produced a highly diversified ceramic in the form as well as in the decorative structures. Due to the high demographic pressure we had not only an increased number of archaeological sites but also a considerable impact on the coastal forest. The palynological analysis also reveal the presence specific plant species known in opened landscapes as *Pycanthus angolensis* and those highly influenced by man as *Alchornea cordifolia* comparable to those we know present nowadays. (Oslisly et al.2006).

The archaeological potential within the Kribi region should lead to the sensitization of backers and the various study and research programs to integrate archaeology in their managing plans. Through this process, it will be possible to have good knowledge of the history of southern-

Cameroon in general and that of the coast in particular. The important study of the African history will pass through a cross study of the different research sources amongst which is archaeology.

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Annex 10
Minutes of the Stakeholders'workshop, at Kribi, 14
February 2008

MINUTES OF MEETING (Annex 10a)

Project: **Regional Environmental Assessment Kribi Region, Cameroun**

Subject: **Stakeholder workshop on the draft REA report**

Date: **14 February 2008**

Venue: **Palm Beach Plus Hotel, Kribi**

Participants: see list attached

Agenda: see note attached

Official opening session

CPSP and OCEAN Divisional officer: Refer to the notes at the end of this document.

Morning session

In the morning, the following was presented:

1. Introduction
2. Baseline
3. Projects and plans in the region of Kribi
4. Cumulative impact assessment

Questions and remarks

1. Inventory of all impacts
Some participants suggested that the REA should make an inventory of all impacts generated by the existing industries or ago-industries units as well as forest exploitation in the Kribi region. This then will permit to master the additional impacts induced by the new projects avoid the occurrence of the past mistakes.
2. CO₂ calculation methodology
Clarification was asked on the methodology of calculation of the level additional CO₂ associated with the developments of the new projects on the Kribi area. Indeed, the MINEP has carried out similar studies / assumption and other results were found.
3. Concern on fishing
Fishing activities are more likely to suffer from the new development projects in the Kribi region.
4. Level of details
More detailed data, especially for the baseline was requested, for instance on rainfall, oxygen levels in water, biodiversity data, types of whales and types of turtles (6 types),

etc.

This point was again raised, emphasizing, this time, the need for more details on mangrove forests and their conservation.

5. Timing for this workshop

The full report should have been sent to the participants previously to this workshop in order participants to evaluate properly the quality (especially of the baseline) and analysis made.

6. Definition of various terms

Definition of various terms was raised. Participants inquired about the definition and or meaning assigned to such terms as impacts/effect/risk, direct/indirect, cumulative effects, etc. It was pointed out that precise and generally recognized definitions exist in the matrix to qualify each type of impacts. This should be used.

7. Missing studies

The REA should be based on all studies carried out in the Kribi area. The report or the summary provided to participants does not seem to have all information available in various reports published through the different studies.

8. Spelling mistakes

Few spelling mistakes were found, for instance it is not Adalam, but the mine of Minim-Martap near Adamawa. It was suggested to review the spelling properly.

9. Land conflicts

Precision were given on land issues. Land tenure in Cameroon has different classifications: (i) national domain, (ii) state private land, (iii) individual private land and (iv) public domain. It was clarified that land issues in the Kribi region involved the land of the national domain. It was suggested that the expression 'Land conflict' used in the report be clarified.

10. The term 'nuisances'

The term '(environmental) nuisances' is often used. It should be specified what nuisance is meant by this.

11. Direct benefits for the population

Participants inquired on the direct benefits expected from the various projects for the local population. Recommendations in that respect in the REA report.

12. Privatization of agro-industries

The privatization of agro-industries has a lot of social negative impacts. The privatization in this sector should be considered in the study and their negative impacts analyzed.

13. Capacity of the Navy (crucial to the ministries)

Referring to the remarks on absorption capacity, a question was raised. Can the absorption capacity of the region be increased by increasing the capacity of the Government to deal with all these developments and proper planning and implementation? (Captain of the Navy). The issue of the lack of marine inspection and enforcement was raised in the REA presentation. The Captain suggested that the report recommends raising the capacity of the Navy in the Kribi region, since the Navy serves

as transport media for the Ministries delegates. Since the Navy does not have any boats, the Ministries of Fisheries and Transport cannot carry out their inspection offshore.

14. Positive and negative impacts

A point was raised regarding positive and negative impacts. It does not seem that the REA study considers positive impacts.

This was further emphasized that positive impacts should be considered in order to establish the balance between the carrying capacity of the region and the impacts caused by the projects.

15. Geographical zone

One participant did not understand and agree that a difference was made between a 'centre' of the Kribi region and a Kribi region. According to this participant, it is not true that most impacts will be in the center (as defined), especially considering the petroleum pollution and the current which drag the marine pollution along the coast.

16. SEA study a good initiative for the country

The initiative of the CPSP on carrying out a REA, which is a Strategic Environmental Assessment (SEA) and the holding a workshop to involve local population and consider their opinion was praised, since it is the first of its kind in Cameroon. In fact, the REA should be equally considered as Strategic Environmental Assessment (SEA) study as compared to a classic environmental impact assessment (EIA). An SEA serves for planning purposes. It is it a great tool to integrate all existing government orientations, directions and policies as well as requirements of existing and applicable national and international regulations in a concrete land use planning and/or environmental strategy. The study scopes the study in its international context by considering all international agreements which apply, for instance, the RAMSAR convention. Some art of the Kribi region may be in soon qualified RAMSAR site.

This REA is an important tool to steer developments; its recommendations should be used at strategic level; for future planning purposes.

Several participants appreciated the initiative of having such REA in the Kribi region.

(Recommendation) In this, such study, i.e. Regional Environmental Assessment and/or cumulative impacts assessment studies could be carried out in other could region or zones where several developments are planned in order to identify the real impact (i.e. cumulative) on this zone and determine the planning for the region and mitigation or compensation measures.

17. Clarification on SEA (compared to a normal EIA)

The essence of a SEA or REA is to compare the carrying (or absorption) capacity of an area to the types of impacts induced by a certain number of projects planned. An SEA serves for planning purposes. This concept and distinction is not (clearly) made in the study as presented. Such analysis should result in NEB: (Net environmental benefits for the region) 2nd generation and MDP (mechanism of clean development).

The absorption capacity for these developments also determines to what extent negative effects will occur; it can have important impacts on people living in the area.

18. Archeology

Archeology was not mentioned in the summary given to participants and the presentation. Any such study should give due consideration to archeology or

archeological sites in the Kribi region since land use planning in the area will be very sensitive.

19. Carrying (or absorption) capacity

The SEA should determine the absorption or integration capacity of the Kribi region to accommodate new projects. Any baseline study associated with the SEA should focus on the ecological balance of the region, the environmental absorption capacity of the region and the type and numbers of new projects envisaged.

20. Focus on energy projects

Clarification was given on the fact that this REA study is to focus on energy projects. This is not made clear by consultants who present and treat all projects equally. This may be made clear in a scoping work.

21. Mistakes on projects description

Some adjustments in the text of the document were suggested:

- Memvélé dam: operator is Sud energy, not AES Sonel
- Mamelles iron mine: operator interested is not Cam Iron, but xxx?
- The railway Edea-Kribi will be constructed for the transport of bauxite to the export port. There may also be production of aluminum near the port.

22. Estimation of the population

A better estimation of the population should be made or it should be made clearer what estimation is made. It's especially important for the supply of drinking water to the population.

23. Other projects, not mentioned

More projects are planned in the region than what was mentioned (MINEP).

Another participants gave other projects planned in the region:

- Plan for the management of the land tenure and domains
- Management planning for industrial zones
- Non commercial port (leisure port)
- SNV: study of the land tenure and domain conflicts

24. Pygmies

Substantial deforestation caused by the various projects may endanger the pygmies who are now living in the forest. The study should give specific attention to this problem and suggest solutions for mitigation/solution in order to ensure that pygmies will not be affected.

As follow up of this issue, another participant warned about the practice of some NGOs which make their living using the pygmies' protection.

25. Impact on tourism

There is concern regarding the numerous and importance of impacts which are to be expected in the region. The main concern is: will it be possible to maintain tourism in the region?.

Another participant expressed his concern on the hosting capacity for tourism. It seems to be too low at the moment to allow growth of the tourism activities.

26. Impact on health

Not much is said about physical impacts on human, like health issues: pulmonary disease and other diseases.

27. Indicators

It would be useful to indicate a set of indicators that could be measured in 15 years to evaluate where the region stands.

Morning session, summary of answers

- The consultant thanked MINEP for the useful explanation given on the differences of an SEA compared to a standard EIA. Emphasizes that more detail in this type of general study is not required; sometimes too much detail is already in the report. The consultant also found a good idea to emphasize the concept comparison of carrying capacity to the types of impacts. This concept is implicitly in the report.
- The team explained that the terminology is defined in the full report
- the consultant will include all development projects that have been indicated by stakeholders so far
- Regarding the remarks on pygmies, the consultant explained that previous projects in the country have shown negative effects of treating pygmies separately and giving too much attention (only) to this ethnic group. For this reason, it was chosen in the report to talk about 'ethnic diversity' and the preservation of it. That means pygmies, but also other ethnies. The consult has re-assured the audience that socio-economists who have very good knowledge of the region have been involved and have made a thorough study on social aspects, including recommendations for improvement of the existent EIA for which the social analysis was not always judged sufficient.
- The consultant pointed out that various remarks are discussed in the section on recommendations and answers will be given then in the afternoon.
- The consultant explained that privatization is not part of the ToR. The study deals with impacts of the projects, privatization is not a project. It can however, be mentioned in the political context.
- Concerning missing information, the consultant has called for the support of the audience in collecting extra information and has given an email address to send any additional relevant information that participants detain or places where additional information can be found.

Afternoon session,

In the afternoon, the following was presented:

4. Recommendations for an optimal investment in the region
5. Recommendations for a strategy of environmental management
6. Recommendations and alternative for the projects

Questions and remarks

28. Port projects

The distance between Grand Batanga and Lolabé was asked. (answer: 20Km).

The proposition of the consultant to merge the 2 feasibility studies in order to make one single port was discussed. Few participants gave different information and point on views. Moreover there seem to be 3 ports, not 2: the multipurpose (or commercial port)

planned by the government, the port of Sundance and another either for the bauxite, either for the Mamelles iron ore deposit.

For some participants, a commercial port and a mineral port would seem to be incompatible. The merge of the 2 mining ports could be considered, but a separate commercial port could be created. (Ministry of Water and Energy)

Another participant gave additional information on the iron port. Sundance has for objective to have the port in 2011. They would like to go ahead with their project.

However, for some other participants (seemed to be majority), a single multipurpose port would be a very good idea to minimize impacts and optimize the use of space.

29. Developments should follow the regional planning, not other way around

The importance of planning in order that projects and development occur according to these plans was highlighted. Such study (REA) helps to concretize plans for the region. It was also pointed out that mostly the opposite occurs: local development try to occur around a project, with no planning. Developers should fit in an existing plan of the region.

30. Level of details and tone for the Gas-to-energy project

Details on p 15 and 17 of the summary given to participants, regarding the Gas-to-power project were not found appropriate to such a REA study. The SEA should not address project specifics. Recommendations should take into consideration the government decision about the site. Investment should be promoted and instead.

31. Transport corridors

on the map presenting the various alternatives for the region, the transport corridors have been drawn as straight lines. It seems quite rare that such straight line be possible. An EIA would determine which route is the most appropriate considering ESS aspects.

32. Consideration of the current institutional setting

Regarding the institutional strengthening, the recommendations should be in line with the current institutional situation / setting.

33. Follow up of the REA

Local delegates should meet and talk about the planning issues as identified in the REA study.

Another participant emphasized that the Government support is necessary and important to follow up the planning and strategy recommendation for establishing a platform for stakeholders in view of all the development planned for the coming period.

Follow up actions on this study should be made. An implementation strategy should be set up and local stakeholders fully involved in the process.

34. Urbanisation plan for Kribi city

Referring to the extension of the city recommendations, the sub-prefet also call for the necessity to have a urbanization plan for the development of the Kribi city and asked to have this included in the recommendations of the report.

35. Decentralisation

Was the perspective of decentralization taken into consideration the REA? (Council will have more influence in this process?)

36. Concern about the number and importance of impacts in the region

- are the recommendations strong enough for instance regarding one port development?
- Are there any impacts from other projects?
- Less inhabited areas should be preferred for project location.
- The restoration of ecosystem is missing.

37. Participation of local experts in the study

Few remarks that more local experts should have been involved in such a study.

38. Health facilities

Since every single project will have impact on people in the region and maybe on their health, infrastructures for health matters, additional health facilities will be needed. Hospitals and other improved health facilities are required.

39. Positive remarks

expressed that he is happy about the report and its general recommendations.

Afternoon session, summary of answers

- The consultant thanked the audience for all the remarks made. It is considered as a great enrichment for the study and will be considered adequately.
- the consultant is very pleased about the initiative of the REA for such a diverse and dynamic region and is very pleased to be part of this process towards a sustainable development for the region.
- the general idea of one port is supported by various stakeholders; however, some are worried because of future flexibility of port operation
- The detail of the REA recommendations is mainly at strategic level; for the various projects more detail will be required at the feasibility levels and the ESHIA / EA levels;
- The recommendations regarding the Gas project have more detail because more information is available (within separate EIA's) and these projects will be implemented soon; additional EIAs have been recommended. The wording will be reviewed in order that it does not seem negative. This was not the intention of the consultant.

Official closure session

CPSP and OCEAN Divisional officer: Refer to the notes at the end of this document.

ATELIER

sur l'Etude d'impact cumulatif des projets dans la région de Kribi

le 14 Février 2008 à Kribi (Hôtel Palm Beach Plus)

PROGRAMME DES TRAVAUX

Horaire	ACTIVITES	Lieu / Responsables
08H – 08H30	Inscription des participants	Secrétariat de l'Atelier
08H30 – 09H00	Cérémonie d'ouverture de l'Atelier : <ul style="list-style-type: none">- Mot de bienvenue du Représentant de M. l'ADG/ Président CPSP- Allocution d'ouverture du Préfet du département de l'Océan	<ul style="list-style-type: none">- SNH- Préfet du département de l'Océan
09H00 – 09 H 30	Pause-café	<ul style="list-style-type: none">- Hôtel Palm-Beach Plus(Tous les participants)
09H30 – 12H00	Exposé : <ul style="list-style-type: none">- Présentation de l'Etude d'impact cumulatif des projets dans la région de Kribi (1^{ère} partie)- Débats	<ul style="list-style-type: none">- Consultant Royal Haskoning- Participants
12H00 – 14H00	Pause-déjeuner	Hôtel Palm-Beach Plus (Tous les participants)
14H00 – 16H00	Exposé (suite et fin) : <ul style="list-style-type: none">- Présentation de l'Etude d'impact cumulatif des projets dans la région de Kribi (2^{ème} partie)- Débats (suite et fin)	<ul style="list-style-type: none">- Consultant Royal Haskoning- Participants
16H30	Cérémonie de clôture de l'Atelier <ul style="list-style-type: none">- Mot de clôture du Représentant de M. l'ADG/ Président CPSP et Allocution de clôture du Préfet du département de l'Océan- Cocktail de clôture	<ul style="list-style-type: none">- SNH et Préfet du département de l'Océan- Tous les participants



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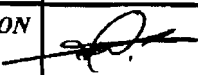
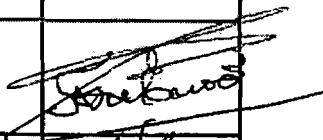
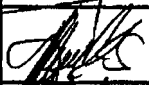

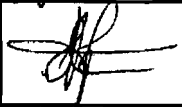

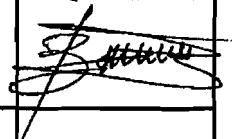


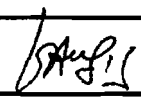

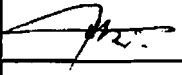
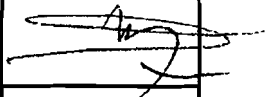

PROJET C A P E C E



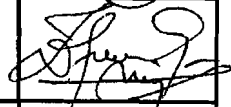
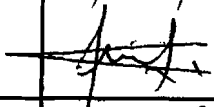
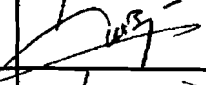
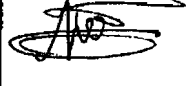
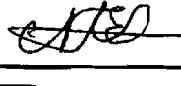
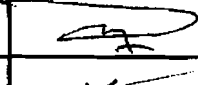
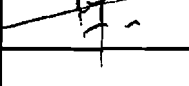
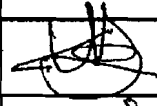

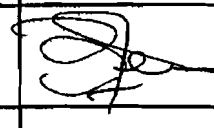
ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE DE L'ETUDE D'IMPACT CUMULATIF DES PROJETS DANS LA REGION DE KRIBI

LE 14 FEVRIER 2008

FEUILLE DE PRESENCE

N° D'ORDRE	NOMS ET PRENOMS	ORGANISME	FONCTION	EMARGEMENT
1	M. NDUM AUGUSTINE BROH	CPSP	SECRETAIRE PERMANENT DU CPSP	
2	M. VILON Jean Francois	MINATD	PREFET DE L'OCEAN	
3	M. ELONGBAN Jean - Claude	MINADT	SOUS PREFET DE KRIBI	
4	M. BENAG BELL	MINATD	MAIRE DE LA COMMUNE URBAINE	
5	M. ^{me} NAFBA PAULETTE	MINADT	MAIRE DE LA COMMUNE RURALE	
6	HON. OYONO MARTIN	Deputé	DEPUTE	
7	M. ^{me} MAVER HON. BOUTOULI PAULETTE	Deputé's	DEPUTE	
8	M. KOUM JEAN JACQUES	SNH	DIRECTEUR	
9	M. TEKEU JEAN CLAUDE	MINEP	INSPECTEUR N° 1	
10	M. EBWELE FILS LEROY	MINEP	DIRECTEUR	

11	M. ENOH JOHN CHU	SNH	CHEF DEPT	
12	M. MINKENG SAMUEL ROGER	CPSP	CHEF DE SECTION ETS	
13	M. BODO ABANDA ERNEST	FEDEC	PCA	
14	MME NGOM FRIDA	CPSP/SNH	ADJ. CHEF SECTION AC	
15	M. MEKA JEAN FRANÇOIS	CPSP/SNH	CEA	
16	M. NGA MVOGO ACHILLE	SNH	CADRE	
17	<i>PODIE Luc</i> M. GHONANG JEAN PIERRE	MINEE	DIRECTEUR	
18	M. NGUESSEU <i>André</i>	MINEE	S/DIRECTEUR	
19	DR MALOUM	MINEPIA	DIRECTEUR	
20	M. MATIP OSCAR	MINIMIDT	DIRECTEUR	
21	M. OLINGA ONDOA J.P.	MINEPAT	DIRECTEUR	
22	M. <i>BATEL</i> Henri Laurent	BANQUE MONDIALE	Responsable Communication	
23	M.	BANQUE MONDIALE	DIRECTEUR	
24	M.	BANQUE MONDIALE		
25	M. <i>ÉTOUNGOU Valérie</i>	MINEP	DELEGUE	
26	M ^{me} <i>Djiodjip ANNIE FLORE</i>	MINFOF	DELEGUE	
27	M. <i>AFANEMBENG A. Joseph</i>	MINEPIA	DELEGUE	
28	<i>MR ESSA GA Ndji</i> M. <i>Clément</i>	MINSANTE	DELEGUE	
29	M. <i>NENYOU EZE Michel</i>	MINTP	DELEGUE	

30	M. NTEP Jean Paul	MINIMIDT	DELEGUE	
31	M. EYIKE E.	MINEE	DELEGUE	
32	M. DIBENGUE Florentin	MINEPAT	DELEGUE	
33	M. NGOUN Martin	MINADER	DELEGUE	
34	M. BELLO JEAN	MINTOUR	DELEGUE	
35	M. ABATE THOMAS.	MINAS	Representant DELEGUE	
36	M. ELLA NLEM J. Pierre	MINDEV.URB	DELEGUE	
37	M. LV PINAN Benoit	MINDEF/BS	CDT/Lo DELEGUE	
38	M. KOUEDI Patrice	MEAO	ccad/64	
39	M.	CRFDA		
40	M. MAC Wlance BOBE	MINCOM	DELEGUE	
41	M. NGUIMBRA Antoine	PAK	CDT.	
42	M.	PAD		
43	M.	HEVECAM		
44	M.		EXPLOITANT FORESTIER	
45	M.	PERENCO		
46	M. KWEDI Bernadette	COTCO		
47	M.	COTCO		
48	M.	AES-SONEL		

49	M.	SOCAPALM		
50	M.	CAMIRON		
51	M. NDOUMBE NKOTTO	FOCARFE	Coordonnateur	[Signature]
52	M.	FOCARFE		
53	M. BENJAMIN TCHOFFO	CARFAD	Directeur Executif	[Signature]
54	M.	RELUFA		
55	M. 1- MPAROT Celestin 2- Ubi ONGBWA Felix	FEDEC (RAPID)	Directeur Pédagogique des enseignants Principaux	[Signature]
56	M.	WWF		
57	M. Gordon Ajonina	CWCS	Co-ordinator	[Signature]
58	MME BOOH, Elizabeth	VISUAL COMMUNICATIONS	Lise Booh	
59	M. NDENGAMIN FRANCOIS	GRAND BATANGA	chef	[Signature]
60	M. FOKALLY Samuel	LONDJI	chef	[Signature]
61	M.	KRIBI VILLAGE		
62	M.	EBODGE		
63	M. EBOTI JOSEPH	EBODAWOE	chef Vi	[Signature]
64	M. NZIGUI-SABIHOUGA JA HAKI	BIPAGAI	chef du vill.	[Signature]
65	M. ENGDRELE NGORELE	MPOLONGWE	chef de village	[Signature]
66	DR FOLACK	IRAD	chef de Centre IRAD Kribi	[Signature]
67	PROF. TCHAWA	UNI YAO I		
68	DR NGUENE FRANCOIS ROGER	ROYAL HASKONING	Consultant	[Signature]

69	M. NKOUMBELE NGANDE SERGE ALAIN	ROYAL HASKONING		
70	M. Rued Platzburg	ROYAL HASKONING	Consultant	
71	MME CORRIOL	ROYAL HASKONING	Consultante	
72	MME AMVOUNA Marie	ROYAL HASKONING	consultant	
73	M. Serge Alain NKOUMBELE NGANDE		INGENIEUR	
74	Nyongwezi MALINGA Zili	Opella	Chef de groupe	
75	UNONEMAN G. Colin	DADAFO MINTOAT	DELEGUE	
76	Thompson Namanga	Royal Haskoning	Consultant	
77	PIUS N. MOSIMA	Royal Haskoning	Consultant	
78	KOFFI Joseph	CPSP Umilitaire	Services	
79	KENISE Michel	CPSP UR/Sud	Bioph	
80	MANOBA OUYO E	MEA 8	Directeur	
81	BESHA KOK	SNH/CPSP	SAC-AD	
82	EDONGUE Jean	chef GBS	GBS	
83	NZOUANGO FRANCIS	NCMD	Promoteur Economie	
84	KOME DIVINE KOME	CAF X'ARME	Suite Prejet	
85	NGUEN RABIA	Copel	Suite Prejet	
86	YIAGNICHI Aboubakar	CBL/DGAE	Suite prejet	
87	Bala Meyebeme	COO/SPECIAL DECAN	Suite Prejet	
88	TABI ATANGANA	Regiseur Adjoint	Suite Prejet	
89	NKERBU FERLUS	chef S.T.	Suite Prejet	
90	NGAM ALBERT-RICHARD	chef Prof.	Suite Prejet	

**ETUDE D'IMPACT CUMULATIF DES PROJETS DANS LA
REGION DE KRIBI**

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**ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE
DU CONSULTANT ROYAL HASKONING**

CEREMONIE D'OUVERTURE

**Mot du Représentant de Monsieur l'Administrateur
Directeur Général, Président du Comité de Pilotage
et de Suivi des Pipelines**

Kribi, le 14 février 2008

**Monsieur le Préfet du Département de l'Océan,
Monsieur le Sous-Préfet de l'Arrondissement de Kribi,
Monsieur le Maire de la Commune Urbaine de Kribi,
Monsieur le Représentant de la Banque Mondiale,
Mesdames et Messieurs,**

C'est un grand honneur pour moi de vous souhaiter, au nom du Ministre Adolphe Moudiki, Administrateur-Directeur Général de la Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et de Suivi des Pipelines (CPSP), la bienvenue dans cette salle, à l'occasion du séminaire atelier sur la présentation du rapport provisoire relatif à l'Etude d'impact cumulatif des projets dans la région de Kribi, organisé par le CPSP.

L'organisation des présentes assises rentre dans le cadre du souci permanent des pouvoirs publics de préserver les écosystèmes marins et côtiers du Cameroun.

En effet, dans la perspective de l'agrandissement certain du tissu industriel de la région de Kribi, zone couverte par le Plan de Gestion de l'Environnement du Pipeline Tchad/Cameroun, les services du consultant Royal Haskoning, de nationalité hollandaise, ont été sollicités, pour réaliser l'étude qui nous rassemble ce jour : « Impacts cumulatifs des projets dans la région de Kribi ».

Au terme de cette étude, il est apparu indiqué pour le CPSP, de réunir les différents acteurs intervenant dans cette région, pour partager les propositions de conclusions de cette étude, dans l'optique d'une meilleure prévention et gestion des impacts de toutes ces activités.

Mesdames et messieurs,

Depuis deux mois et demi, ce consultant a abattu un travail remarquable sanctionné par un rapport riche en enseignements, qui sera soumis à votre attention tout à l'heure.

Je vous exhorte, au nom du Ministre Adolphe Moudiki, Administrateur Directeur Général de la Société Nationale des Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines, à ne ménager aucun effort

pour apporter toute votre contribution à l'enrichissement du travail réalisé par ce consultant, dans l'intérêt bien compris de la préservation de l'environnement et des populations de la région de Kribi.

C'est sur cette note que j'achève mon propos, tout en souhaitant plein succès à nos travaux.

Je vous remercie pour votre bienveillante attention./

**CEREMONIE D'OUVERTURE DE L'ATELIER DE PRESENTATION DU
RAPPORT PROVISOIRE DU CONSULTANT ROYAL HASKONING SUR
L'ETUDE CUMULATIF DES INVESTISSEMENTS DANS LA REGION DE KRIBI
KRIBI, LE 14 février 2008**

**ALLOCUTION DE MONSIEUR Jean François VILON
PREFET DU DEPARTEMENT DE L'OCEAN**

Monsieur le Sous-Préfet de l'Arrondissement de Kribi ;

Monsieur le Maire de la Commune d'Arrondissement de Kribi 1^{er} ;

Monsieur le représentant de l'Administrateur Directeur Général de la Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et de Suivi des Pipelines (CPSP) ;

Monsieur le Représentant de la Banque Mondiale ;

Mesdames et messieurs les Délégués et responsables des services publics ;

Mesdames et messieurs les responsables des ONGs et autres associations de protection de l'environnement ;

Mesdames et Messieurs,

C'est avec un plaisir immense que je me retrouve en ce lieu ce matin à l'occasion de la cérémonie d'ouverture de l'Atelier organisé par le Comité de Pilotage et de Suivi des Pipelines en vue de présenter aux différents acteurs économiques intervenant dans la localité, le rapport de l'étude d'impacts cumulatifs des projets en cours ou à réaliser dans notre cité balnéaire Kribi.

Je voudrais d'entrée de jeu exprimer ma profonde gratitude à Monsieur le ~~représentant~~ de l'Administrateur Directeur Général de la Société Nationale des Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines, *de lui avoir fait l'honneur en me désignant pour présider les présentes assises.*

Permettez-moi également de souhaiter une chaleureuse bienvenue dans cette somptueuse salle de conférence de l'Hôtel Palm beach plus, à tous les participants à cette rencontre dont l'importance n'est plus à démontrer.

Mesdames et Messieurs,

Cette rencontre en effet, comme l'a également évoqué le Représentant de Monsieur l'Administrateur Directeur Général de la SNH, Président du Comité de Pilotage et de Suivi des Pipelines, vise un objectif précis à savoir révéler à toute personne ou institution intéressée, d'une part les premiers résultats de l'étude d'impacts cumulatifs des investissements projetés dans la ville de Kribi ou ses environs, et les enjeux y afférents, et d'autre part de susciter des réactions en vue d'un éventuel amendement des conclusions dudit travail.

C'est donc l'occasion pour moi d'interpeller tous les participants ici présents, afin qu'ils s'imprègnent parfaitement des mesures qui seront mises en œuvre pour une bonne gestion des impacts ^{de la} cumulatifs des projets dans la région de Kribi, qui vous vous en doutez, connaît un essor considérable en ce qui concerne son tissu industriel. *dont la mise en phase œuvre ne fait plus l'objet d'un doute*

Mesdames et Messieurs,

Contrairement à d'autres pays, les zones côtières camerounaises constituent des espaces particulièrement sensibles du fait de leur position stratégique sur l'échiquier géopolitique, mais aussi du fait de leurs richesses avérées ou potentielles, qui en font des pôles de convergence des intérêts multiples, parfois des sources de conflits multiformes.

Que ce soit du point de vue des activités industrielles ou touristiques, de la recherche minière, de la prospection et de l'exploitation du pétrole ou du gaz naturel, des trafics des marchandises à l'importation comme à l'exportation, la pêche maritime ou de la collecte des ressources naturelles, de l'occupation de l'espace, chacune de nos côtes accumule des avantages comparatifs qui en font des zones de prédilection pour des investissements productifs.

Ces investissements, faut-il le souligner, s'accompagnent toujours d'impacts sur l'environnement qu'il convient de maîtriser pour un développement durable des régions concernées. Ceci est en effet, une préoccupation pertinente du Gouvernement de la République qui se soucie de

**ETUDE D'IMPACT CUMULATIF DES PROJETS DANS LA
REGION DE KRIBI**

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**ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE
DU CONSULTANT ROYAL HASKONING**

CEREMONIE DE CLOTURE

**Mot du Représentant de Monsieur
l'Administrateur Directeur Général, Président du
Comité de Pilotage et de Suivi des Pipelines**

Kribi, le 14 février 2008

**Monsieur le Préfet du Département de l'Océan,
Monsieur le Sous-Préfet de l'Arrondissement de Kribi,
Monsieur le Maire de la Commune Urbaine de Kribi,
Monsieur le Représentant de la Banque Mondiale,
Mesdames et Messieurs,**

Comme à l'ouverture du présent atelier sur l'Etude d'impact cumulatif des projets dans la région de Kribi, il me revient l'honneur de vous dire, au nom du Ministre Adolphe Moudiki, Administrateur-Directeur Général de la Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et de Suivi des Pipelines (CPSP), la satisfaction du CPSP sur le déroulement harmonieux de ces assises qui s'achèvent et surtout sur la qualité de l'exposé et des débats qui ont eu lieu.

Ceci laisse penser, au regard de ces débats parfois passionnés mais riches, que les objectifs de cet important forum d'échanges à savoir, partager les propositions de conclusions de cette étude, formulées par le Consultant Royal Haskoning, dans l'optique d'une meilleure prévention et gestion des impacts des projets dans la région de Kribi, ont été atteints.

Je ne saurais oublier de remercier nos partenaires dans la mise en œuvre de certains de ces projets, à savoir notamment la Banque Mondiale, pour sa représentation effective aux travaux, ainsi que les différents intervenants dans cette région, qui ont été conviés à ces assises. Leur participation effective a été déterminante pour l'atteinte des objectifs de cet atelier.

Mesdames et messieurs,

Je ne doute aucun instant que le partage d'expérience qui a prévalu tout au long de cette rencontre, constituera à terme, un atout pour le renforcement de la collaboration pour une gestion efficace des impacts cumulatifs des projets dans la région de Kribi, qui constitue une zone dont la sensibilité, du point de vue environnemental, est évidente.

Je vous remercie de votre bienveillante attention./

**CEREMONIE DE CLOTURE DE L'ATELIER DE PRESENTATION DU
RAPPORT PROVISOIRE DU CONSULTANT ROYAL HASKONING SUR
L'ETUDE CUMULATIF DES INVESTISSEMENTS DANS LA LOCALITE DE KRIBI
KRIBI, LE 14 février 2008**

**ALLOCATION DE MONSIEUR Jean François VILON
PREFET DU DEPARTEMENT DE L'OCEAN**

Monsieur le Sous-Préfet de l'Arrondissement de Kribi ;

Monsieur le Maire de la Commune d'Arrondissement de Kribi 1^{er} ;

Monsieur le représentant de l'Administrateur Directeur Général de la
Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et
de Suivi des Pipelines (CPSP) ;

Monsieur le Représentant de la Banque Mondiale ;

Mesdames et messieurs les Délégués et responsables des services publics ;

Mesdames et messieurs les responsables des ONGs et autres associations
de protection de l'environnement ;

Mesdames et Messieurs,

Après une journée ^{laborieuse} ~~fatigante~~ de partage et de réflexion sur le rapport élaboré
par le consultant Royal HASKONING et portant sur l'Etude d'impact cumulatif des
projets dans la région de Kribi, nous voici au terme de l'atelier organisé par le comité de
Pilotage et de Suivi des Pipelines et qui a regroupé plusieurs acteurs économiques
intervenant dans cette localité.

Notre cité capitale Kribi, est en effet de nos jours une cible pour la réalisation de
grands projets développant qui entraîneront assurément dans cette localité et ses
environs un essor économique considérable, suite aux effets induits escomptés.

C'est pour cette raison que les problèmes environnementaux qui découleront de
ces investissements restent pour l'heure une préoccupation majeure, tant pour le

Gouvernement que pour les partenaires au développement dont nous saluons particulièrement l'implication dans la préservation de notre environnement pour assurer un développement durable.

Mesdames et Messieurs,

Les travaux de ces assises ont certainement fait l'objet d'un intérêt partagé, et se sont déroulés dans un esprit de convivialité et une atmosphère de participation active de tous. Ceci a permis d'atteindre les objectifs fixés au départ et qui viennent de nous être rappelés par le Représentant de Monsieur l'Administrateur Directeur général de la Société Nationale des Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines. *En effet il s'agissait d'effectuer un travail préalable bien fait,*

d'y apporter des amendements afin d'avoir un document mieux exploitable par les décideurs.

Vous avez, ^{ainsi} à l'issue des échanges fructueux, touché du doigt, la problématique de la préservation de l'environnement en général, et de la zone côtière de Kribi en particulier, pour un meilleur épanouissement des populations riveraines.

Cette préoccupation, vous le savez bien, rentre dans le cadre de la politique des grandes ambitions prônée par S.E. Monsieur Paul BIYA, Président de la République, politique qui vise entre autres objectifs à permettre à chaque camerounais de vivre dans un milieu écologiquement sain.

Je garde tout de même espoir que les résultats des présentes assises constitueront pour tous les acteurs une banque de données permettant d'avoir une vue globale sur les impacts potentiels des projets annoncés et ceci dans une perspective *d'environ 15 ans de longue durée.*

Sur ce, tout en vous souhaitant un bon retour dans vos familles respectives, je déclare clos, les travaux de l'Atelier de présentation du projet de rapport relatif à l'Etude d'impact cumulatif des projets dans la région de Kribi.

Vive le Cameroun,

Je vous remercie./.



**Workshop agenda, list of presence, opening and closure speech
(Annex 10b)**

See attached document

Annex 11
**Lessons learned: Example of analysis of alternatives for the
gas-to-power project which could have been carried out**

Presentation of the project

The Gas-to-power project is composed of:

1. the Sanaga Sud gas field (offshore) and Central Processing Facility (CPF) at Eboudawaé / Bipaga I site
2. the Kribi power project (power plant and transmission line) with the power plant located at Mpolongwé II,
3. the gas pipeline between the CPF (Bipaga I) and the power plant (Mpolongwé II)
4. the industrial site at Bipaga I site.

Planned project

- CPF site at Eboudawaé / Bipaga I
- Power plant at Mpolongwé II
- Gas pipeline system: from Sanaga South field to Eboudawaé (approx. 15 km) and from Eboudawaé to Mpolongwé II (approximately 15 km), both passing by Londji.
Total length: approximately 30 km.

Operators involved

The operators are Perenco/SNH for sub-project 1, AES Sonel for sub-project 2, and SNH for sub-project 3 and 4.

Further information

These projects are numbered 1, 2, 3 and 4 in Table 4-1, Figure 4-1 and Figure 8-1. They can also be located on Figure 4-7.

Chapter 4 provides for further project description. In Chapter 4, those projects are described separately. In this Chapter, it is consciously chosen to group those as sub-projects under one single so-called Gas-to-power. This choice will be further explained later in this section.

Comparison of different scenarios

This section compares the planned situation to two alternatives

- Planned project: described above and in Chapter 4.
- Alternative 1:
 - CPF on power plant site (i.e. at Mpolongwé II)
 - Industrial estate moved either by extension of the Mpolongwé site (on the Eastern or Southern site) or near the deep sea port location
 - Gas pipeline system: from Sanaga South field to Mpolongwé II (approx. 11 km), not passing off the Londji shore.
- Alternative 2:
 - The power plant on CPF site site (i.e. at Bipaga I)
 - Industrial estate remains at the Bipaga I site
 - Gas pipeline system: from Sanaga South field to Eboudawaé / Bipaga I (approx. 15 km), passing off the Londji shore.

Comparison of impacts of these three different scenarios is presented in the table below.

Figure 10-1. Gas-to-power project such as planned and alternatives proposed

Figure 10-1 a) Planned situation

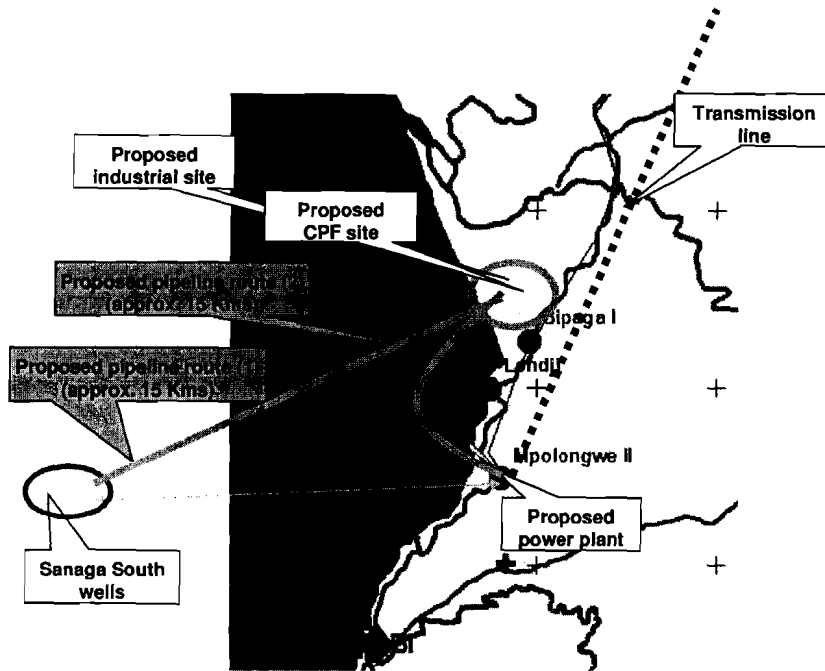


Figure 10-1 b) Alternative 1

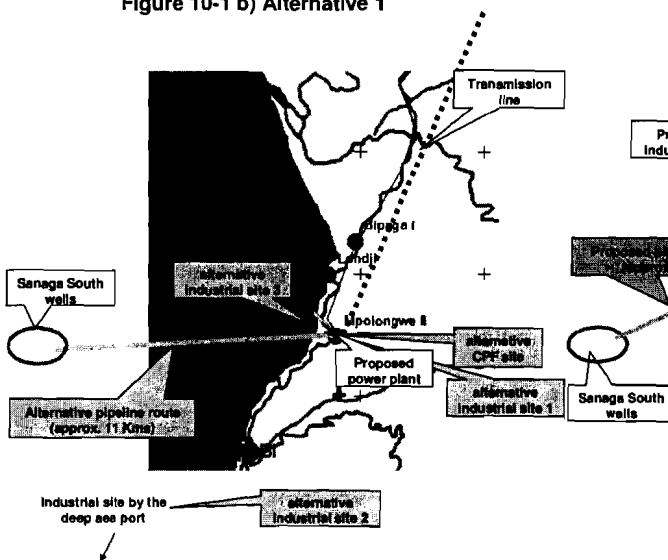


Figure 10-1 c) Alternative 2

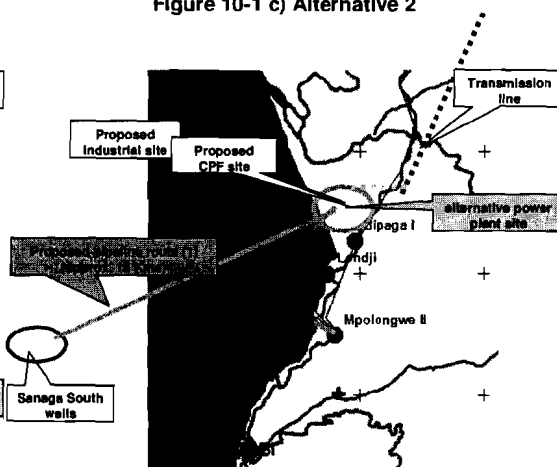


Table 10-1. Comparison of impacts of planned situation and alternatives for the Gas-to-power project

Gas-to-power project ⇒ Aspects potentially affected ↓	Planned situation (Mpolongwé + Bipaga)	Alternative 1 (Mpolongwe only)	Alternative 2 (Bipaga only)
Infrastructure needed	<ul style="list-style-type: none"> • 2 access roads • 30 Kms pipeline • Pipeline passing twice off the Londji shore • Disruption of Eboudawaé village (206 inhabitants) and resettlement in the short to mid term • Resettlement of 6 families from Mpolongwé II • Both sides would need their own facilities, • Both sides would need their own sanitary infrastructures, including all drinking water (digging of wells, waste water pipe connection (5 km extra to Kribi) or building own waste water treatment plant), waste collection • Environment includes very sensitive areas (swampy zones and river catchment leading to mangrove forest in the Lokondje estuary) • Swampy areas represents brings unstability to equipment and can rise to unsafe situations 	<ul style="list-style-type: none"> • One access road (0.1 km) • 11 km pipeline (mostly offshore and approx. 3Kms onshore), not passing off the Londji shore • Resettlement of 6 families from Mpolongwé II • Possibility of sharing facilities (less space and resources needed) • Shared costs for sanitary infrastructures • Environment is less sensitive and already highly disturbed 	<ul style="list-style-type: none"> • One access road (5 km) • 15 km pipeline (mostly offshore off the Londji shore) • Disruption of Eboudawaé village and resettlement in the short to mid term • Possibility of sharing facilities (less space and resources needed) • Shared costs for sanitary infrastructures • Environment includes very sensitive areas (swampy zones and river catchment leading to mangrove forest in the Lokoundje estuary)
Environmental	<ul style="list-style-type: none"> • Deforestation of 28+16 ha, of forest which is potentially of high biodiversity value. • High risks of coastal and inland erosion • Maximum environmental and social disturbance due to the doubling of 	<ul style="list-style-type: none"> • Deforestation of 16 ha, however, it is already a highly disturbed secondary forest. • Minimise coastal erosion risks • Less environmental and social impacts due to the fact that the pipeline is shorter 	<ul style="list-style-type: none"> • Deforestation of 28 ha, of forest which is potentially of high biodiversity value. • High risks of coastal and inland erosion • Relatively high environmental and social disturbance due to the sensitivity of the chosen site (SNH)

Gas-to-power project ⇒ Aspects potentially affected ↓	Planned situation (Mpolongwé + Bipaga)	Alternative 1 (Mpolongwe only)	Alternative 2 (Bipaga only)
	<p>activities (having 2 sites) and sensitivity of the chosen site (SNH)</p> <ul style="list-style-type: none"> ○ High risks of contamination, increased erosion or sedimentation in sensitive marine habitats ○ Maximal construction activities duration and magnitude for pipelines, maximal period of disturbance for marine species such as disturbance of turtles and ceteceans through noise emissions ○ Highest disturbance of terrestrial ecology by construction and operational activities as all activities due to the 2 sites and sensitivity of chosen site (SNH) ○ High light disturbance at night to turtles from the CPF as the site is located close to the coast • Marshy ground crossed and risk of mangrove forest disturbance, the latter which could result in disturbance to (the habitat of) e.g. protected manatees and crocodiles. • Additional disturbance along the access road (additional 5 km) from the Edea-Kribi road) 	<p>and the route goes through less sensitive environment</p> <ul style="list-style-type: none"> ○ Reduced risks of e.g. contamination, increased erosion or sedimentation in sensitive marine habitats ○ Less extensive construction activities for pipelines, reducing the period of disturbance for marine species such as disturbance of turtles and ceteceans through noise emissions ○ Less disturbance of terrestrial ecology by construction and operational activities as all activities will take place at 1 rather than at 2 sites ○ Less deforestation (more efficient land use possible at 1 rather than 2 separate sites) ○ Less possible light disturbance at night to turtles from the CPF as the alternative site is located further away from the coast • No marshy ground crossed and no risk of mangrove forest disturbance (as opposed to the Eboudawaé site), the latter which could result in disturbance to (the habitat of) e.g. protected manatees and crocodiles. • the planned access road is of minimum length (few 100 m) as the site is close to the Edea-Kribi road. No additional disruption of the environment is to foreseen. 	<ul style="list-style-type: none"> ○ High risks of contamination, increased erosion or sedimentation in sensitive marine habitats ○ Less extensive construction activities duration and magnitude for pipelines, however, still maximal period of disturbance for marine species such as disturbance of turtles and ceteceans through noise emissions, however still construction of the 5 km access road through the forest ○ Less cumulative disturbance of terrestrial ecology by construction and operational activities as all activities will take place at 1 rather than at 2 sites, however still construction of the 5 km access road through the forest ○ High light disturbance at night to turtles from the CPF as the site is located close to the coast • Relatively high disturbance of terrestrial ecology by construction and operational activities as all activities due to the sensitivity of the chosen site (SNH) • Marshy ground crossed and risk of mangrove forest disturbance, which could result in disturbance to (the habitat of) e.g. protected manatees and crocodiles. • Additional disturbance along the access road (additional 5 km) from the Edea-Kribi road)
Social	<ul style="list-style-type: none"> • Disruption local population using the forest West of the SNH site. • Resettlement of a coastal village to a 	<ul style="list-style-type: none"> • More social impacts due to the fact that the pipeline goes further overland • Replacement site for impacted houses 	<ul style="list-style-type: none"> • Disruption local population using the forest on West of the SNH site. Resettlement of a fishermen's village composed of foreigners

Gas-to-power project ⇒ Aspects potentially affected ↓	Planned situation (Mpolongwé + Bipaga)	Alternative 1 (Mpolongwe only)	Alternative 2 (Bipaga only)
	<ul style="list-style-type: none"> new site, that will have to be on the coast as well 20 km North of Kribi, which leads to more transport problems 	<ul style="list-style-type: none"> can be found within the village boundaries, access to equivalent quality replacement land is easy 	<ul style="list-style-type: none"> who will have difficulties to find a new village along the coast Resettlement is only necessary if the two plants are less than 1 km from the coast
Resettlement	<ul style="list-style-type: none"> Eboudawaé: In the long term, with the industrial site activities, the hamlet of Eboudawaé would probably will have to be relocated, i.e. 206 inhabitants Mpolongwé: 3 families <hr/> <ul style="list-style-type: none"> Total: 206 inhabitants + 6 families, total cost of relocation (approx.) 3.3 million \$ 	<ul style="list-style-type: none"> Mpolongwé: 3 families <hr/> <ul style="list-style-type: none"> Total costs: +0.3 million\$ Resettlement costs low (30.000\$/building) as houses can be displaced within the village boundaries 	<ul style="list-style-type: none"> Eboudawaé: In the long term, with the industrial site activities, the hamlet of Eboudawaé would probably will have to be relocated, i.e. 29 households with 206 inhabitants Resettlement costs high (50.000\$/building) as a new village with all facilities has to be created <hr/> <ul style="list-style-type: none"> Total costs: Estimated 290 households with on average 2 buildings: 2.9 million\$
Health	<ul style="list-style-type: none"> Safety risks: the swampy zones part of the site represent an unstable basis of infrastructure, which represents additional safety risks. Two sites will be cleared and related health risks double Presence of swamps increases risk of malaria 	<ul style="list-style-type: none"> Dry already mostly cleared area, will lead to little extra risk for malaria 	<ul style="list-style-type: none"> Presence of swamps increases risk of malaria Stress to the population if resettled to a new village
Economy	<ul style="list-style-type: none"> Risk to tourism between Londji and Bipaga Occupation of land which could be used for tourism purposes Set up of site and maintenance costs higher due to swampy nature of the environment 	<ul style="list-style-type: none"> Preserves tourism potential from the coastal area Mpolongwé: land used in such a way that land value is optimized. Otherwise, this land would have been difficult to sell for other purposes (low agricultural value, not much attractive) Substantial reduction in investment costs by developing 1 rather than 2 sites Possibility of reduction in operational costs through sharing 1 site and its 	<ul style="list-style-type: none"> Risk to tourism between Londji and Bipaga Occupation of ground which could be used for tourism purposes Set up of site and maintenance costs higher due to swampy nature of the environment Substantial reduction in investment costs by developing 1 rather than 2 sites Possibility of reduction in operational costs through sharing 1 site and its facilities

Gas-to-power project ⇒ Aspects potentially affected ↓	Planned situation (Mpolongwé + Bipaga)	Alternative 1 (Mpolongwe only)	Alternative 2 (Bipaga only)
Financial	<ul style="list-style-type: none"> • 30 km pipeline • 95 km power transmission line • 5 km Access road • Earth works & foundation • Resettlement • Land costs (28 ha coastal land, and 16 ha inland) • Land of Bipaga is already owned by SNH 	facilities <ul style="list-style-type: none"> • 19 km less pipeline: -7.6 million\$ • 10 km more transmission line: + 2 million\$ • 5 km less Access Road: - 2.5 million\$ • Earth works & foundation: -1 million\$ • Less Resettlement costs: -2.9 million\$ • No need for Bipaga land: -2.8 million\$, except if land is already owned by SNH 	<ul style="list-style-type: none"> • 15 km less pipeline: -6 million\$ • 95 km power transmission line: no difference • 0.1 km less Access Road (-0.05 million\$) • Earth works & foundation: PM • Less Resettlement costs: - 0.3 million\$ • No need for Mpolongwé land: -0.96 million\$
Estimated Cost difference	Baseline cost	Baseline cost – 13.8 million\$, if Bipaga is already owned by SNH: - 11 million\$	Baseline cost – 7 million\$.
Comment		<ul style="list-style-type: none"> • This description presumes that both plants can be built on the 16 ha available 	<ul style="list-style-type: none"> • This description presumes that both plants can be built on the 28 ha available • From what was understood, due to the swampy areas in the zone and other characteristics, this option would not be considered as safe for the construction of a power plant by AES Sonel.

Cost estimates used : transmission line : 200 k\$/km , pipeline 400k\$/km, access road 500k\$/km, relocation 30 k\$/hut-house in the village and 50 k\$ if a new village site has to be found, land cost 100 k\$/ha on the coast and 60k\$/ha inland. These estimates are based on the AES-Sonel evaluation, SW, 2006, appendix E)

Recommended alternative

Considering the comparison presented by the table above, the Alternative 1 is highly recommended. Additional rationale and consideration for this choice is given below.

Environmental rationale

- Preserve tourism potential from the coastal area
- Substantial reduction in investment costs by developing 1 rather than 2 sites
- Possibility of reduction in operational costs through sharing 1 site and its facilities
- Minimise coastal erosion risks
- Less environmental and social impacts due to the fact that the pipeline is shorter and the route goes through less sensitive environment
 - Reduced risks of e.g. contamination, increased erosion or sedimentation in sensitive marine habitats
 - Less extensive construction activities for pipelines, reducing the period of disturbance for marine species such as disturbance of turtles and cetaceans through noise emissions
 - Less disturbance of terrestrial ecology by construction and operational activities as all activities will take place at 1 rather than at 2 sites
 - Less deforestation (more efficient land use possible at 1 rather than 2 separate sites)
 - Less possible light disturbance at night to turtles from the CPF as the alternative site is located further away from the coast
- No marshy ground crossed and no risk of mangrove forest disturbance (as opposed to the Eboudawae site), the latter which could result in disturbance to (the habitat of) e.g. protected manatees and crocodiles.

Health and Safety rationale

- Disruption local population using the forest on the East site of the SNH site.
- Presence of a swampy area with increased risk of Malaria
- Stress related to resettlement of villages

Socio-economic rationale

- In Mpolongwé only a few buildings will have to be replaced which can be done within the boundaries of the present village.
- In Bipaga, if Ebodawae has to be resettled, a new site for a complete village will have to be found. Because the population lives from fishing, the new village site will have to be on the coast,
 - More impact on livelihood
 - More impact on fishing due to a longer off-shore pipeline
- Bipaga is further away from Kribi, so workers on the plant will either have to travel further, or settle in the neighboring villages where less facilities are available
- Risk of visual pollution of the coast line is more present in Bipaga
- As the overland part of the pipeline is longer in Mpolongwé, more negative impact on local agriculture.

Financial rational

- Alternative 2: Bipaga alternative.

Infrastructures: If the two plants were built together in Bipaga the extra pipeline to Mpolongwé II would not be necessary (saving 6 million \$), land in Mpolongwé would not have to be acquired (saving about 1 million\$) and the access road of Bipaga 2 can be shared with the Central Processing facility, costs will be 7 millions of dollars lower than the alternative of two different plant sites.

The location of the main facilities directly along the coast means that a fishermen's village will either be moved, or be within the disturbance zone of the project, and a zone mainly reserved for tourism will be lost. A minimum distance of about 1 km between the village and the industrial facilities, would spare the village, and protect the coastal skyline. However, the traffic from the access road to the industrial site which is the same as the one to the village provides high safety risks for the villagers. In this, the Eboudawaé hamlet would be safer and have a better quality of life if resettled.

Resettlement: If resettlement of Eboudawaé becomes necessary, this will be quite expensive, as a whole village will have to be moved to a new location, and a new village created. As the population lives from fishing, this location will also have to be on the coast. The estimated¹⁵⁶ cost for 29 families is 2.9 million \$,

Total estimated saving compared to planned scenario (infrastructure & resettlement costs):
.4 millions \$ (7+0.3-2.9)

- Alternative 1: Mpolongwé alternative.

Infrastructures: If the two plants were built together in Mpolongwé the pipeline would be 19 km shorter (saving 7.6 km), the access road to Bipaga 2 would not be necessary (saving 2.5 million \$), but land in Mpolongwé would have to be acquired (cost about 1 million\$), the transmission line 10 km longer (cost 2 million \$). The estimated total costs will be 11 million\$ lower than the alternative of two different plants.

Resettlement: Resettlement in Mpolongwé, would be cheaper as replacement housing can most probably be built in the same village. AES-Sonels estimates the cost of replacement buildings at 0.3 million\$

Total estimated saving compared to planned scenario (infrastructure & resettlement costs):
13.6 millions \$ (11+2.9-0.3)

Financial analysis of the AES Sonel ESHIA report

- Costs evaluation of initially planned alternatives

The box below shows the alternatives from the ESIA report¹⁵⁷, and indicates that Mpolongwé 1 is the cheapest alternative. Initial analysis of different site alternatives [apparently] considered only options where the two plants would be built in a single location.

¹⁵⁶ Based on the costs of 50.000\$ per building, and two buildings per household. In reality, resettlement costs of villages tend to be usually much higher than budgeted.

¹⁵⁷ Scott Wilson (2006) ESIA appendix E, page 2. Task carried out by an AES –Sonel team in 2004 and the site included: of the site : around 12 hectares for the location of the plant, the step-up substation, onshore gas and alternative fuel treatment and storage facilities. It appears from this text, that both the CPF and the powerplant were

Figure 10-2: Costs comparison of location alternatives from the Kribi power project ESHIA

The below table show an evaluation of costs variations related to selected criteria for each site. Mpolongwe 1 is considered as base case.

	MPOLONGWE 1	MPOLONGWE 2	BIPAGA 2	EBOME	G. BATANGA
Transmission line	0 km	(+ 0.7 km) +140,000 \$	(- 10 km) -2,000,000 \$	(+ 5 km) + 1,000,000 \$	(+ 10 km) + 2,000,000 \$
Pipeline	0 km	(+ 0.7 km) + 280,000 \$	(+ 8 km) + 3,200,000 \$	(- 2 km) - 800,000 \$	(+ 4 km) + 1,600,000 \$
Earth works & Foundations	0	0	+ 1,000,000 \$	+ 500,000 \$	+ 200,000 \$
Access road	(0.1 km) + 50,000 \$	(+ 0.7 km) + 350,000 \$	(+ 5 km) + 2,500,000 \$	(+ 4 km) + 2,000,000 \$	(+ 9 km) + 4,500,000 \$
Relocation	(10 huts) + 300,000 \$	(0 hut)	(0 hut)	(7 huts) + 200,000 \$	(4 huts) + 100,000 \$
Land cost	+ 720,000 \$	+ 720,000 \$	+1,200,000 \$	+ 1,200,000 \$	+ 720,000 \$
Total	+ 1,070,000 \$	+ 1,410,000 \$	+ 5,900,000 \$	+ 4,100,000 \$	+ 9,120,000 \$

Costs assumptions:

- Transmission line : 200 k\$/km
- Pipeline : 400 k\$/km
- Access road : 500 k\$/km
- Relocation : 30 k\$/ hut
- Land cost : 6 \$/m2 (inner land)
10 \$/m2 (costal land)

Table 1. – Evaluation of alternatives sites for the AES Sonel powerplant and the Central Processing Facility.

- Analysis and discussion

The results of the cost analysis are based on a direct link between the gas fields and the gas power plant. However, since then, the choice has been made to locate the CPF and the powerplant in different locations. This means that a 25 km of pipeline has to be added, while the expensive access road to the CPF has to be built anyway. This invalidates the cost evaluation in the Scot Wilson report. If the two plants were built together the extra pipeline to Mpolongwe 1 would not be necessary (costs 10.000 K\$) and the access road of Bipaga 2 can be shared with the Central Processing facility, costs will be at least 5 millions of dollars lower than other alternatives.

The location of the main facilities directly along the coast, means that a fishermen's village will either be moved, or be within the disturbance zone of the project, and a zone mainly reserved for tourism, will be lost.

- Costs evaluation of proposed alternatives, considering actual situation

Baseline: The actual situation (two-sites alternative) has the following characteristics:

initially supposed to be located on one unique site, which makes it all the more surprising that they are now so far apart.

- 30 km pipeline
- 95 km power transmission line to Edea
- 5 km Access road
- Earth works & foundation
- Resettlement in Bipaga and Mpolongwé
- Land costs (28 ha coastal land, and 16 ha inland)
- Land of Bipaga is already owned by SNH

Alternative 1 Mpolongwe: The combined CPF-Powerplant site of Mpolongwe would be 11 million \$ cheaper, considering that the site of Bipaga is already owned by SNH:

- 19 km less pipeline: -7.6 million\$
- 10 km more transmission line:+ 2 million\$
- 5 km less Access Road: - 2.5 million\$
- Earth works & foundation: -1 million\$
- Less Resettlement costs: -2.9 million\$
- No need for Bipaga land: -2.8 million\$, except if land is already owned by SNH

Alternative 2 Bipaga: The combined CPF-Powerplant site of Bipaga would be 7 million \$, considering that the site of Bipaga is already owned by SNH:

- 15 km less pipeline: -6 million\$
- 95 km power transmission line: no difference
- km less Access Road (-0.05 million\$)
- Earth works & foundation: PM
- Less Resettlement costs: - 0.3 million\$
- No need for Mpolongwé land: -0.96 million\$

Economical and business rational

The industrial site which is desired at Bipaga is not yet certain. Moreover, the type and number of industries and their requirements (facilities, transportation, safety, environmental conditions and other requirements) is also not yet known what industries it would be, what their will be. On an economical and business point of view, it would be much more advised to choose the option which for the time being has the less economical costs, less environmental, social and health negative impacts and which still leave flexibility for later extensions. This option is now that both CPF and the power station would be build on the Mpolongwé site. Later, at least three direct options can imagined for the potential industrial sites. Those three options offers different characteristics, which can be assessed, at the time that the industries requirements will be known, in order to choose the best suited location for business purposes, and considering ESH aspects.

Moreover, according to our understanding of the zoning plan of the MEAO, this zone will be restricted to tourism. Once the MEAO plan will be approved, SNH may:

- Have difficulty to extend the site if an important number of industries would be interested to come to such location
- Be faced to stricter conditions of operation in view of not disturbing adjacent tourism activities (stricter environmental, social and health measures)

In this, SNH may restrict potentials for future extension by buying a site of a certain space (28ha) which will probably be very difficult to extent and operate.

The swampy zones are not only of environmental concerns but also safety and economic one. Swampy zones provide an unstable environment which can lead to unsafe situation, especially with dangerous substances like gas. As a result, costs for setting up the site and maintenance of it will be higher. Some industry may not want to be on such grounds for those reasons.

Recommendations for any chosen alternative

Recommendations on alternative situations are made above, (i.e Alternative 1 is highly recommended); however, it remains the choice of the promoters to decide which alternative they will choose.

In any case chosen (planned situation, Alternative 1 or Alternative 2), the following recommendations are applicable:

- The gas-to-power project should be considered as one and not three separate projects, even though several sub-parts will be operated by different developers.
- After that the choice for the site of the Gas-to power project is made, update or make (a) new ESHIA(s) considering the actual situation. The actual situation has already changed since the making of the respective ESHIAs and would be further changed after the final decision on the project set up. ESHIAs assumptions and studies should reflect those decisions.
 - If the planned situation is maintained, update the 2 ESHIAs to actual situation (which have changed since the making of the respective ESHIAs) and consider the recommendations for improvement of the 2 ESHIAs in Annex 6. An additional ESHIA will need to be made for the pipeline between the CPF (SNH site at Bipaga I) and the power plant (AES Sonel site at Mpolongwé II)
 - If the Alternative 1 (Mpolongwé) is chosen, this can be done by updating the ESHIA of the Kribi power project (of AES Sonel). In this case, refer to Annex 6 for recommendations on improvement of this ESHIA.
 - If Alternative 2 (Bipaga) is chosen, make a new ESHIA as the Sanaga South ESHIA lacks a lot of actual data.
- Consider recommendations and comments on the social aspects of the made ESHIAs (Perenco/SNH and AES Sonel ESHIA.s) in Annex 6.
- Additional field surveys for biodiversity (considering direct and indirect impacts) are needed. The current data in both ESHIAs is based on (limited) literature and no actual investigations have been made in the project zone and surroundings.
- It is recommended to build the CPF and power plant in the same location.
- Avoid negative impact on the coastal band by locating the CPF and power plant a few km inland.



ATELIER

sur l'Etude d'impact cumulatif des projets dans la région de Kribi

le 14 Février 2008 à Kribi (Hôtel Palm Beach Plus)

PROGRAMME DES TRAVAUX

Horaire	ACTIVITES	Lieu./ Responsables
08H – 08H30	Inscription des participants	Secrétariat de l'Atelier
08H30 – 09H00	Cérémonie d'ouverture de l'Atelier : <ul style="list-style-type: none">- Mot de bienvenue du Représentant de M. l'ADG/ Président CPSP- Allocution d'ouverture du Préfet du département de l'Océan	<ul style="list-style-type: none">- SNH- Préfet du département de l'Océan
09H00 – 09 H 30	Pause-café	- Hôtel Palm-Beach Plus (Tous les participants)
09H30 – 12H00	Exposé : <ul style="list-style-type: none">- Présentation de l'Etude d'impact cumulatif des projets dans la région de Kribi (1^{ère} partie)- Débats	<ul style="list-style-type: none">- Consultant Royal Haskoning- Participants
12H00 – 14H00	Pause-déjeuner	Hôtel Palm-Beach Plus (Tous les participants)
14H00 – 16H00	Exposé (suite et fin) : <ul style="list-style-type: none">- Présentation de l'Etude d'impact cumulatif des projets dans la région de Kribi (2^{ème} partie)- Débats (suite et fin)	<ul style="list-style-type: none">- Consultant Royal Haskoning- Participants
16H30	Cérémonie de clôture de l'Atelier <ul style="list-style-type: none">- Mot de clôture du Représentant de M. l'ADG/ Président CPSP et Allocution de clôture du Préfet du département de l'Océan- Cocktail de clôture	<ul style="list-style-type: none">- SNH et Préfet du département de l'Océan- Tous les participants



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PROJET C A P E C E



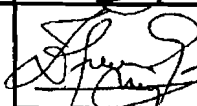
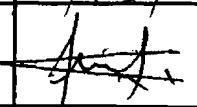
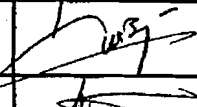
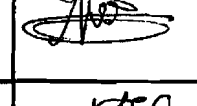
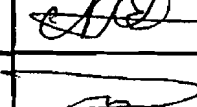
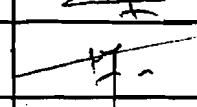


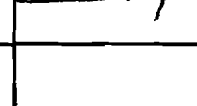
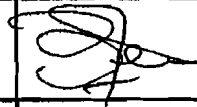
**ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE DE L'ETUDE D'IMPACT CUMULATIF
DES PROJETS DANS LA REGION DE KRIBI**

LE 14 FEVRIER 2008

FEUILLE DE PRESENCE

N° D'ORDRE	NOMS ET PRENOMS	ORGANISME	FONCTION	EMARGEMENT
1	M. NDUM AUGUSTINE BROH	CPSP	SECRETARE PERMANENT DU CPSP	
2	M. VILON Jean Francois	MINATD	PREFET DE L'OCEAN	
3	M. Eloumban Jean-Claude	MINADT	SOUS PREFET DE KRIBI	
4	M. BENAE BELL	MINATD	MAIRE DE LA COMMUNE URBAINE	
5	M ^{lle} NATIBA PAULETTE	MINADT	MAIRE DE LA COMMUNE RURALE	
6	HON. OYONO MARTIN	Deputé	DEPUTE	
7	M ^{lle} MAURICE MAURICE HON. BOUTOULI PAULETTE	Deputé	DEPUTE	
8	M. KOUM JEAN JACQUES	SNH	DIRECTEUR	
9	M. TEKEU JEAN CLAUDE	MINEP	INSPECTEUR N° 1	
10	M. EBWELE FILS LEROY	MINEP	DIRECTEUR	

11	M. ENOH JOHN CHU	SNH	CHEF DEPT	
12	M. MINKENG SAMUEL ROGER	CPSP	CHEF DE SECTION ETS	
13	M. BODO ABANDA ERNEST	FEDEC	PCA	
14	MME NGOM FRIDA	CPSP/SNH	ADJ. CHEF SECTION AC	
15	M. MEKA JEAN FRANÇOIS	CPSP/SNH	CEA	
16	M. NGA MVOGO ACHILLE	SNH	CADRE	
17	<i>PODIE Luc</i> M. GHONANG JEAN PIERRE	MINEE	DIRECTEUR	
18	M. NGUESSEU <i>André</i>	MINEE	S/DIRECTEUR	
19	DR MALOUM	MINEPIA	DIRECTEUR	
20	M. MATIP OSCAR	MINIMIDT	DIRECTEUR	
21	M. OLINGA ONDOA J.P.	MINEPAT	DIRECTEUR	
22	M. <i>BATE Henri Laurent</i>	BANQUE MONDIALE	Responsable Communication	
23	M.	BANQUE MONDIALE	DIRECTEUR	
24	M.	BANQUE MONDIALE		
25	M. <i>ÉTOUNGOU Valère</i>	MINEP	DELEGUE	
26	M ^{me} <i>Djiodjip ANNIE FLORE</i>	MINFOF	DELEGUE	
27	M. <i>AFANEMBENG A. Joseph</i>	MINEPIA	DELEGUE	
28	M. <i>ESSA GA Ndji Claude</i>	MINSANTE	DELEGUE	
29	M. <i>NENYOU EZE Michel</i>	MINTP	DELEGUE	

30	M. N'FEP Jean Paul	MINIMIDT	DELEGUE	
31	M. EYIKE E.	MINEE	DELEGUE	
32	M. DIBENGUE Florentin	MINEPAT	DELEGUE	
33	M. NGOUN Martin	MINADER	DELEGUE	
34	M. BELLO JEAN	MINTOUR	DELEGUE	
35	M. ABATE THOMAS.	MINAS	Representant DELEGUE	
36	M. ELLA NLEM J. Pierre	MINDEV.URB	DELEGUE	
37	M. LV BINAN Benoit	MINDEF/BS	CDT/Bo DELEGUE	
38	M. KOUEDI Patrice	MEAO	ccad/64	
39	M.	CRFDA		
40	M. MAC Wiliane BOBE	MINCOM	DELEGUE	
41	M. NGUIAMBA Antoin	PAK	CDT.	
42	M.	PAD		
43	M.	HEVECAM		
44	M.		EXPLOITANT FORESTIER	
45	M.	PERENCO		
46	M. KWEDI Bernadette	COTCO		
47	M.	COTCO		
48	M.	AES-SONEL		

49	M.	SOCAPALM		
50	M.	CAMIRON		
51	M. NDOUMBE NKOTTO	FOCARFE	Coordonnateur	[Signature]
52	M.	FOCARFE		
53	M. BENJAMIN TCHOFFO	CARFAD	Directeur exécutif	[Signature]
54	M.	RELUFA		
55	M. 1- MBAROT Célestin 2- UBI OMBWA Felix	FEDEC (RAPID)	Directeur RAPID Administrateur Principal	[Signature] [Signature]
56	M.	WWF		
57	M. Gordon Ajonina	CWCS	Coordinateur	[Signature]
58	MME BOOH, Elizabeth	VISUAL COMMUNICATIONS	Lise Booh	
59	M. NDENGAMIN FRANCOIS	GRAND BATANGA	chef	[Signature]
60	M. FOKALLY Samuel	LONDJI	chef	[Signature]
61	M.	KRIBI VILLAGE		
62	M.	EBODGE		
63	M. EBOTI JOSEPH	EBODAWOE	chef Vi	[Signature]
64	M. NZIGUI-SABICHOUGA JANIK	BIPAGAI	chef du vill.	[Signature]
65	M. ENGBORELE NGORELE	MPOLONGWE	chef de village	[Signature]
66	DR FOLACK	IRAD	chef de Centre IRAD Kribi	[Signature]
67	PROF. TCHAWA	UNI YAO I		
68	DR NGUENE FRANCOIS ROGER	ROYAL HASKONING	Consultant	[Signature]

69	M. NKOUNBELE NGANDE SERGE ALAIN	ROYAL HASKONING		
70	M. Rued Platzburg	ROYAL HASKONING	Consultant	
71	MME CORRIOL	ROYAL HASKONING	Consultante	
72	MME AMVOUNA Marie	ROYAL HASKONING	consultant	
73	Mr Serge Alain NKOUNBELE NGANDE		INGENIEUR	
74	NYONGEDI MALINGA Eli	Opella	Chef de groupe	
75	UNONEMAN G. Cathin	DDAF/D MONT	DELEGUE	
76	Thompson Namanga	Royal Haskoning	Consultant	
77	PIUS N. MOSIMA	Royal Haskoning	Consultant	
78	KOFFI Joseph	EPSP Umikuta	Services	
79	KENMISE Michel	CPSP UR/Sud	Bioph	
80	MANOBA Ouwou E	MEA 8	Directeur	
81	BESSA Kou	SNH/CPSP	SAC-AD	
82	EDONGUE Jean	chef GBS	GBS	
83	NZOUANGO FRANCIS	NCMD	Promoteur Economie	
84	KOME DIVINE KOME	CAF N'ARUE	Suite Prefet	
85	NGUEB RABIA	Copel	Suite Prefet	
86	YIAGNICKI Aboubakar	CBL/DGAE	Suite Prefet	
87	Bala Meyebeme	COO/SPECIAL DEPT	Suite Prefet	
88	TABI ATANGANA	Regisseur Adjoint	Suite Prefet	
89	NKERBU FERLUS	chef S.T.	Suite Prefet	
91	NGAM ALBERT-RICHARD	chef Prot.	Suite Prefet	

**ETUDE D'IMPACT CUMULATIF DES PROJETS DANS LA
REGION DE KRIBI**

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**ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE
DU CONSULTANT ROYAL HASKONING**

CEREMONIE D'OUVERTURE

**Mot du Représentant de Monsieur l'Administrateur
Directeur Général, Président du Comité de Pilotage
et de Suivi des Pipelines**

Kribi, le 14 février 2008

**Monsieur le Préfet du Département de l'Océan,
Monsieur le Sous-Préfet de l'Arrondissement de Kribi,
Monsieur le Maire de la Commune Urbaine de Kribi,
Monsieur le Représentant de la Banque Mondiale,
Mesdames et Messieurs,**

C'est un grand honneur pour moi de vous souhaiter, au nom du Ministre Adolphe Moudiki, Administrateur-Directeur Général de la Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et de Suivi des Pipelines (CPSP), la bienvenue dans cette salle, à l'occasion du séminaire atelier sur la présentation du rapport provisoire relatif à l'Etude d'impact cumulatif des projets dans la région de Kribi, organisé par le CPSP.

L'organisation des présentes assises rentre dans le cadre du souci permanent des pouvoirs publics de préserver les écosystèmes marins et côtiers du Cameroun.

En effet, dans la perspective de l'agrandissement certain du tissu industriel de la région de Kribi, zone couverte par le Plan de Gestion de l'Environnement du Pipeline Tchad/Cameroun, les services du consultant Royal Haskoning, de nationalité hollandaise, ont été sollicités, pour réaliser l'étude qui nous rassemble ce jour : « Impacts cumulatifs des projets dans la région de Kribi ».

Au terme de cette étude, il est apparu indiqué pour le CPSP, de réunir les différents acteurs intervenant dans cette région, pour partager les propositions de conclusions de cette étude, dans l'optique d'une meilleure prévention et gestion des impacts de toutes ces activités.

Mesdames et messieurs,

Depuis deux mois et demi, ce consultant a abattu un travail remarquable sanctionné par un rapport riche en enseignements, qui sera soumis à votre attention tout à l'heure.

Je vous exhorte, au nom du Ministre Adolphe Moudiki, Administrateur Directeur Général de la Société Nationale des Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines, à ne ménager aucun effort

pour apporter toute votre contribution à l'enrichissement du travail réalisé par ce consultant, dans l'intérêt bien compris de la préservation de l'environnement et des populations de la région de Kribi.

C'est sur cette note que j'achève mon propos, tout en souhaitant plein succès à nos travaux.

Je vous remercie pour votre bienveillante attention./

**CEREMONIE D'OUVERTURE DE L'ATELIER DE PRESENTATION DU
RAPPORT PROVISOIRE DU CONSULTANT ROYAL HASKONING SUR
L'ETUDE CUMULATIF DES INVESTISSEMENTS DANS LA REGION DE KRIBI
KRIBI, LE 14 février 2008**

**ALLOCATION DE MONSIEUR Jean François VILON
PREFET DU DEPARTEMENT DE L'OCEAN**

Monsieur le Sous-Préfet de l'Arrondissement de Kribi ;

Monsieur le Maire de la Commune d'Arrondissement de Kribi 1^{er} ;

Monsieur le représentant de l'Administrateur Directeur Général de la
Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et
de Suivi des Pipelines (CPSP) ;

Monsieur le Représentant de la Banque Mondiale ;

Mesdames et messieurs les Délégués et responsables des services publics ;

Mesdames et messieurs les responsables des ONGs et autres associations
de protection de l'environnement ;

Mesdames et Messieurs,

C'est avec un plaisir Immense que je me retrouve en ce lieu ce matin à
l'occasion de la cérémonie d'ouverture de l'Atelier organisé par le Comité de
Pilotage et de Suivi des Pipelines en vue de présenter aux différents acteurs
économiques intervenant dans la localité, le rapport de l'étude d'impacts
cumulatifs des projets en cours ou à réaliser dans notre cité balnéaire Kribi.

Je voudrais d'entrée de jeu exprimer ma profonde gratitude à Monsieur le
~~représentant~~ de l'Administrateur Directeur Général de la Société Nationale des
Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines, *de lui avoir fait*

l'honneur en me désignant pour présider les présentes assises.

Permettez-moi également de souhaiter une chaleureuse bienvenue dans
cette somptueuse salle de conférence de l'Hôtel Palm beach plus, à tous les
participants à cette rencontre dont l'importance n'est plus à démontrer.

Mesdames et Messieurs,

Cette rencontre en effet, comme l'a également évoqué le Représentant de Monsieur l'Administrateur Directeur Général de la SNH, Président du Comité de Pilotage et de Suivi des Pipelines, vise un objectif précis à savoir révéler à toute personne ou Institution Intéressée, d'une part les premiers résultats de l'étude d'impacts cumulatifs des Investissements projetés dans la ville de Kribi ou ses environs, et les enjeux y afférents, et d'autre part de susciter des réactions en vue d'un éventuel amendement des conclusions dudit travail.

C'est donc l'occasion pour moi d'interpeller tous les participants ici présents, afin qu'ils s'imprègnent parfaitement des mesures qui seront mises en œuvre pour une bonne gestion des impacts cumulatifs des projets dans la région de Kribi, qui vous vous en doutez, connaît un essor considérable en ce qui concerne son tissu industriel. *dont la mise en phase avec ne fait plus l'ombre d'un doute*

Mesdames et Messieurs,

Contrairement à d'autres pays, les zones côtières camerounaises constituent des espaces particulièrement sensibles du fait de leur position stratégique sur l'échiquier géopolitique, mais aussi du fait de leurs richesses avérées ou potentielles, qui en font des pôles de convergence des intérêts multiples, parfois des sources de conflits multiformes.

Que ce soit du point de vue des activités industrielles ou touristiques, de la recherche minière, de la prospection et de l'exploitation du pétrole ou du gaz naturel, des trafics des marchandises à l'Importation comme à l'exportation, la pêche maritime ou de la collecte des ressources naturelles, de l'occupation de l'espace, chacune de nos côtes accumule des avantages comparatifs qui en font des zones de prédilection pour des investissements productifs.

Ces investissements, faut-il le souligner, s'accompagnent toujours d'impacts sur l'environnement qu'il convient de maîtriser pour un développement durable des régions concernées. Ceci est en effet, une préoccupation pertinente du Gouvernement de la République qui se soucie de

**ETUDE D'IMPACT CUMULATIF DES PROJETS DANS LA
REGION DE KRIBI**

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**ATELIER DE PRESENTATION DU RAPPORT PROVISOIRE
DU CONSULTANT ROYAL HASKONING**

CEREMONIE DE CLOTURE

**Mot du Représentant de Monsieur
l'Administrateur Directeur Général, Président du
Comité de Pilotage et de Suivi des Pipelines**

Kribi, le 14 février 2008

**Monsieur le Préfet du Département de l'Océan,
Monsieur le Sous-Préfet de l'Arrondissement de Kribi,
Monsieur le Maire de la Commune Urbaine de Kribi,
Monsieur le Représentant de la Banque Mondiale,
Mesdames et Messieurs,**

Comme à l'ouverture du présent atelier sur l'Etude d'impact cumulatif des projets dans la région de Kribi, il me revient l'honneur de vous dire, au nom du Ministre Adolphe Moudiki, Administrateur-Directeur Général de la Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et de Suivi des Pipelines (CPSP), la satisfaction du CPSP sur le déroulement harmonieux de ces assises qui s'achèvent et surtout sur la qualité de l'exposé et des débats qui ont eu lieu.

Ceci laisse penser, au regard de ces débats parfois passionnés mais riches, que les objectifs de cet important forum d'échanges à savoir, partager les propositions de conclusions de cette étude, formulées par le Consultant Royal Haskoning, dans l'optique d'une meilleure prévention et gestion des impacts des projets dans la région de Kribi, ont été atteints.

Je ne saurais oublier de remercier nos partenaires dans la mise en œuvre de certains de ces projets, à savoir notamment la Banque Mondiale, pour sa représentation effective aux travaux, ainsi que les différents intervenants dans cette région, qui ont été conviés à ces assises. Leur participation effective a été déterminante pour l'atteinte des objectifs de cet atelier.

Mesdames et messieurs,

Je ne doute aucun instant que le partage d'expérience qui a prévalu tout au long de cette rencontre, constituera à terme, un atout pour le renforcement de la collaboration pour une gestion efficace des impacts cumulatifs des projets dans la région de Kribi, qui constitue une zone dont la sensibilité, du point de vue environnemental, est évidente.

Je vous remercie de votre bienveillante attention./

**CEREMONIE DE CLOTURE DE L'ATELIER DE PRESENTATION DU
RAPPORT PROVISOIRE DU CONSULTANT ROYAL HASKONING SUR
L'ETUDE CUMULATIF DES INVESTISSEMENTS DANS LA LOCALITE DE KRIBI
KRIBI, LE 14 février 2008**

**ALLOCATION DE MONSIEUR Jean François VILON
PREFET DU DEPARTEMENT DE L'OCEAN**

Monsieur le Sous-Préfet de l'Arrondissement de Kribi ;

Monsieur le Maire de la Commune d'Arrondissement de Kribi 1^{er} ;

Monsieur le représentant de l'Administrateur Directeur Général de la
Société Nationale des Hydrocarbures (SNH), Président du Comité de Pilotage et
de Suivi des Pipelines (CPSP) ;

Monsieur le Représentant de la Banque Mondiale ;

Mesdames et messieurs les Délégués et responsables des services publics ;

Mesdames et messieurs les responsables des ONGs et autres associations
de protection de l'environnement ;

Mesdames et Messieurs,

Après une journée ^{laborieuse} ~~festive~~ de partage et de réflexion sur le rapport élaboré
par le consultant Royal HASKONING et portant sur l'Etude d'impact cumulatif des
projets dans la région de Kribi, nous voici au terme de l'atelier organisé par le comité de
Pilotage et de Suivi des Pipelines et qui a regroupé plusieurs acteurs économiques
intervenant dans cette localité.

Notre cité capitale Kribi, est en effet de nos jours une cible pour la réalisation de
grands projets développant qui entraîneront assurément dans cette localité et ses
environs un essor économique considérable, suite aux effets induits escomptés.

C'est pour cette raison que les problèmes environnementaux qui découleront de
ces investissements restent pour l'heure une préoccupation majeure, tant pour le

Gouvernement que pour les partenaires au développement dont nous saluons particulièrement l'implication dans la préservation de notre environnement pour assurer un développement durable.

Mesdames et Messieurs,

Les travaux de ces assises ont certainement fait l'objet d'un intérêt partagé, et se sont déroulés dans un esprit de convivialité et une atmosphère de participation active de tous. Ceci a permis d'atteindre les objectifs fixés au départ et qui viennent de nous être rappelés par le Représentant de Monsieur l'Administrateur Directeur général de la Société Nationale des Hydrocarbures et Président du Comité de Pilotage et de Suivi des Pipelines. En effet il s'agissait d'enrichir un travail préalablement fait,

d'y apporter ^{ainsi} des amendements afin d'avoir un document mieux exploité par les décideurs. Vous avez, à l'issue des échanges fructueux, touché du doigt, la problématique de la préservation de l'environnement en général, et de la zone côtière de Kribi en particulier, pour un meilleur épanouissement des populations riveraines.

Cette préoccupation, vous le savez bien, rentre dans le cadre de la politique des grandes ambitions prônée par S.E. Monsieur Paul BIYA, Président de la République, politique qui vise entre autres objectifs à permettre à chaque camerounais de vivre dans un milieu écologiquement sain.

Je garde tout de même espoir que les résultats des présentes assises constitueront pour tous les acteurs une banque de données permettant d'avoir une vue globale sur les impacts potentiels des projets annoncés et ceci dans une perspective d'environ 15 ans de longue durée.

Sur ce, tout en vous souhaitant un bon retour dans vos familles respectives, je déclare clos, les travaux de l'Atelier de présentation du projet de rapport relatif à l'Etude d'impact cumulatif des projets dans la région de Kribi.

Vive le Cameroun,

Je vous remercie./.

