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Central African Republic

Country Environmental Analysis:

Environmental Management for Sustainable Growth

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ACRONYMS AND ABBREVIATIONS

ACEDD	Central African Agency for Environment and Sustainable Development	IMF	International Monetary Fund
AFD	Agence Française de Développement	IPCC	International Panel on Climate Change
AMGP	African Mineral Governance Program	ITCZ	Inter-Tropical Convergence Zone
APFC	Association for the Protection of Central African Republic's Wildlife	LULCF	Land Use, Land Use Change and Forestry
APL	Adaptable Policy Loan	MDGs	Millennium Development Goals
BEAC	Bank of Central African States	MDRA	Ministère de Développement Rural et Agriculture
BECDOR	Bureau d'Evaluation et de Contrôle de Diamant et d'Or	MDTA	Ministry for the Development of Tourism and Handicrafts
CAPE	Commission for Public Hearings on the Environment	MEE	Ministry of Environment and Ecology
CAR	Central African Republic	MEFCP	Ministry of Water, Forestry, Hunting and Fisheries
CAS-CFT	Special Allocation Account for Forestry and Tourism Development	MoM	Ministry of Mines
CDM	Clean Development Mechanism	MPs	Management Plans
CEA	Country Environmental Analysis	MPECI	Ministère du Plan, de l'Economie et de la Coopération International
CFD	Centre for Forest Data	NAPA	National Adaptation Programme of Action
CNEDD	National Commission of Environment and Sustainable Development	NCEP	National Centre for Atmospheric Prediction
COMIFAC	Central African Forest Commission	NGO	Non-Governmental Organization
COMIGEM	Mineral and Gem Agency	NTFP	Non Timber Forest Products
DDR	Disarmament, Demobilization and Reintegration	NTFR	Non-Timber Forest Resources
CEMAC	Economic and Monetary Community of Central Africa	ORGEM	Geological Survey and Mining Development Office
DFAP	Wildlife Exploitation Division	PANA	National Climate Adaptation Action Program
ECOWAS	Economic Community Of West African States	PARPAF	Project for the Support to the Implementation of Forest Management Plans
EIA	Environmental Impact Assessment	PEAs	Forest Operation and Management Permits
EIAPCU	Environmental Evaluation, Impact Assessment, Public Consultations and Environmental Audit Unit	PIM	Perpetual Inventory Method
EITI	Extractives Industry Transparency Initiative	PRADD	Property Rights and Artisanal Diamond Development project
EMP	Environmental Management Plan	PRSP	Poverty Reduction Strategy Plan
EPI	Environmental Performance Indicator	REDD	Reducing Emissions from Deforestation and forest Degradation
ESIA	Environmental & Social Impact Assessment	SADC	Southern African Development Community
FCFA	Central African Franc	SEA	Strategic Environmental Assessment
FIEO	Forest Economic Observatory	SSA	Sub-Saharan Africa
FNE	National Environment Fund	UNDP	United Nations Development Programme
GDP	Gross Domestic Product	UNHCR	United Nations High Commission for Refugees
GIS	Geographic Information System	WHO	World Health Organization
IDP	Internally Displaced People	ZCV	Village Hunting Zones

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EXECUTIVE SUMMARY

I. Preparation of the Country Environmental Analysis

1. The World Bank regularly monitors and reports on many aspects of development in its client countries. The Country Environmental Analysis (CEA) is one of the key country-level diagnostic tools designed to systematically evaluate the environmental priorities for development, the environmental implications of key policies, and the capacity of countries to address their priorities. The objectives of the CEA are to provide an analytical basis for the development of policy recommendations, assist in defining priority investments to address the most significant environmental management challenges, and inform decision-making in relation to the achievement of sustainable economic growth.

2. This CEA consists of three components. Firstly, there is an identification and estimation of the principal sources, costs and trends of environmental degradation. This is followed by an analysis of the current institutional capacity for environmental management. Finally, priority environmental issues are analysed, leading to a set of policy and investment recommendations.

3. Priority areas for analysis were developed in consultation with government counterparts, development partners and civil society stakeholders. The final list of three priorities is as follows:

- Environmental Management in the Mining Sector
- Managing Forests, Woodlands and Wildlife Resources
- Growth that is Resilient to Climate Change

Specialist teams were engaged to study these topics. In addition, two generic CEA tasks were undertaken, (i) an analysis of the costs of environmental degradation and (ii) an assessment of institutional capacity for environmental management. A consultative workshop on the draft version of this report was convened in Bangui by the Ministry of Planning, the Economy and International Cooperation (*Ministère du Plan, de l'Économie et de la Coopération Internationale*, MPECI) on May 6, 2010.

II. Environmental Status: Low Returns on Natural Capital, Human Capital Threatened

4. CAR is a land-locked post-conflict country of approximately 623,000 km², with a population of around 4.4 million people, over 60 percent of whom live in rural areas. The country, which has a rich natural resource endowment, is striving to achieve a transition from extended periods of instability to a situation of sustainable growth and development. Starting from dire economic and social conditions, CAR has made good progress in stabilizing the economy, implementing financial and structural reforms, and restoring its social services. The economy remains undiversified and is based mainly on the mining and forestry sectors, with diamonds and timber accounting for about 90 percent of exports. However, CAR's recovery has been affected by natural, technical and economic problems: flooding of Bangui, breakdown of the major hydroelectric plant, and the global recession affecting prices and production of timber and diamonds. As a result, real GDP growth is projected to decrease from 2.0 percent in 2008 to 1.7 percent in 2009, the lowest since 2005.

5. Social indicators place CAR among the least developed countries in the world. Life expectancy fell from 50 years in the 1990s to 45 years in 2007. Less than 7 percent of the population uses electricity as a source of lighting. Only 30 percent of the population has access to

safe water and less than 10 percent of the population has access to improved sanitation facilities. An inevitable result of poverty, poor governance and conflict, is the neglect of environmental issues.

6. ***Low Rents from Natural Capital:*** CAR is blessed with a relatively high endowment of natural capital, representing 23 percent of her total wealth. Physical capital represents only a small share of total wealth (7 percent), whilst intangible capital is a much greater part of total wealth at 70 percent. Mineral and forest resources represent a smaller proportion of natural capital than was expected, and there is considerable scope to increase and stabilize rents from the country's renewable and mineral natural resources. This is partially due to mining for diamonds and gold being an artisanal activity in alluvial deposits, so that rents are very low. However, production of diamonds is under-reported and new discoveries could also increase the value of mineral assets. Forestry rents are relatively low because of low rates of transformation and high transportation costs. Investments in productivity, complementary infrastructure, improved management, and more effective control by government agencies could result in a significant increase in national income from natural resources.

7. ***Environmental Risks to Health:*** Environmental health risks constitute the main environmental degradation cost, with unsafe water supply, lack of access to sanitation and poor hygiene estimated to cost US\$64 million per year, and indoor air pollution costing another US\$29 million per year. The total estimated cost of environmental degradation, of both human and natural capital, is estimated at US\$130 million per year, equivalent to approximately 8 percent of the GDP.

8. ***Negative Genuine Saving indicates Declining Total Wealth:*** Genuine saving provides a broad indicator of sustainability by valuing changes in natural resources, environmental quality, and human capital, in addition to the traditional measure of changes in produced assets provided by net saving. Negative genuine saving rates imply that total wealth is in decline; policies leading to persistently negative genuine saving are unsustainable. Genuine saving for CAR in 2005 (the most recent year for which sufficient data is available) is estimated at minus one percent of GNI, implying that total wealth is in decline. This negative value contrasts with earlier World Bank estimates, which did not include diamond and gold wealth depletion, excess deforestation, and several forms of environmental health risk, in particular unsafe water supplies. The most significant environmental contribution to declining total wealth is the loss of human capital associated with indoor air pollution and unsafe water, which together almost equal the depreciation of physical capital.

9. ***Biocapacity exceeds Ecological Footprint:*** The Ecological Footprint of CAR is very small, and its biocapacity remains much larger than its current usage, implying that the country could be on a sustainable development path. However, it should be noted that the biocapacity of CAR could be reduced in future years due to the effects of climate change, at the same time that its ecological footprint grows in line with population and income.

10. ***Conclusion - Human Capital Threatened, but Natural Wealth Underexploited:*** In addressing the causes of negative Genuine Savings, it is not sufficient to simply identify the items with the greatest degradation costs. There may be significant costs associated with avoiding damaging factors such as unsafe water supply and indoor air pollution. International experience shows, however, that investing in water or improved household air quality can be highly socially profitable, provided that resources are allocated to the most cost-effective solutions. Natural capital depletion remains relatively low in CAR, and there is considerable scope to increase and stabilize rents from the country's renewable and mineral natural resources, a conclusion reinforced by the significant ecological reserve indicated by the analysis of CAR's Ecological Footprint and biocapacity.

III. Environmental Management Capacity: the Need to Reinforce Positive Trends

11. Responsibility for the environment has evolved considerably over the years, but is primarily focused on the management of protected areas and the conservation of wildlife. In 2009, the Ministry of the Environment and Ecology (MEE) was created, along with numerous other institutional changes aimed at improving environmental management. Although the essential regulatory framework is in place, policies and institutional capacity for environmental management are still weak. Whilst the many new laws and authorities being developed are encouraging in the long term, they have caused uncertainty in the short term.

12. Concern for sustainable resource use, pollution control, and management of the environmental impacts of large scale projects has been growing in recent years, but this interest in the environment has not yet been matched by a corresponding increase in the resources needed for a strong environmental management capability. Basic equipment such as laptops and data collection tools is lacking, and the field presence of MEE is extremely weak. For example, there is a director responsible for regional offices, but with no employees and no vehicles. The Ministry's 2010 budget of US\$ 865,000 is insufficient, and represents only 0.2 percent of total government spending. The Ministry has a severe manpower shortage (57 employees in total) and a critical lack of qualified staff, which is partially caused by civil service rules on recruitment. However, in spite of the setbacks and shortages within this new ministry, the morale of its staff is high.

13. The legal and regulatory frameworks for Environmental Assessment and project licensing are weak. In fact, there is not yet a formal institutional approach to Environmental Impact Assessment (EIA), no guidelines, little expertise to conduct EIA reviews, and an absence of any follow-up or enforcement of environmental and social management plans. Priority areas for support in reinforcing recent positive trends in the creation of institutional capacity for environmental management are:

- The development of implementing regulations for EIA;
- Human Resources planning, to include an in-depth capacity assessment of MEE, its staff levels, and organizational development;
- A capacity building program, focusing on MEE and key sectoral ministries;
- Investment in physical and operational resources for MEE;
- Support for collaboration between MEE and environmental units in key ministries through sectoral operations;
- Integration of environmental management in the Poverty Reduction Strategy Paper (PRSP).

IV. Coordinating Environmental Management in the Mining Sector

14. The mining sector, both industrial and artisanal, has the potential for serious and widely dispersed degradation of the environment, affecting air, water and soil quality, and biodiversity. Currently, there is insufficient government capacity to properly control mining operations or apply environmental management tools to the sector. There is, therefore, the need for a capacity building program for staff of both the Ministry of Mines (MoM) and the MEE. This should be an integrated program to encourage the establishment of cross-ministerial teams, which would also facilitate the sharing of the EIA workload in the sector. The EIA process itself needs to be clarified, including that for artisanal mining.

15. The individual responsibilities of the two ministries should be more clearly defined and both ministries need a significant increase in their human and physical resources for environmental

management. The environmental management focus of the Ministry of Mines should be shifted towards the provision of technical services, in particular for safe working practices. Governance and accountability need improvement, with emphasis on transparency and public availability of information. The development of environmental and social management capacity within the guidelines of the Extractives Industry Transparency Initiative Value Chain approach (EITI++) would be an appropriate means of working towards that goal.

V. Managing Forests, Protected Areas and Wildlife

16. The geography of CAR consists of highly diverse ecosystems, from the dense, humid forests of the Southwest to the savannahs of the North. The pressures on CAR's forests include commercial forestry, bushmeat hunting, fuelwood collection and the harvesting of Non-Timber Forest Products (NTFPs). The commercial forestry sector contributes significantly to the national economy, representing 40-50 percent of exports by value. It is also the most significant sector of private employment, with 4,000 permanent employees and many thousands of temporary or informal workers.

17. ***Sustaining achievements in Commercial Forest Management:*** The management of CAR's production forests has improved over recent years, mainly due to the *Agence Française de Développement* (AFD) sponsored Project for the Support to the Implementation of Forest Management Plans (PARPAF). This and other schemes have focussed on the improvement of environmental and financial management in the sector, including the development and application of permit systems, revenue collection and allocation, and community participation. With PARPAF due to close in 2011, the immediate priority is establishment of an agency to take over the many functions that it has performed, in particular for the review and monitoring of commercial forestry permits. Additional support is also required to achieve more efficient use of the forest industry taxes that are allocated to local communities.

18. ***Non-Timber Forest Products:*** NTFPs are extremely important to CAR, both culturally and economically. Harvesting and trade in NTFPs is widespread and profitable, and the collectors of NTFPs can earn several times the per capita GDP. However, the production and harvest of NTFPs are often poorly managed at community level and can be destructive of forest resources. Most NTFPs are traded within CAR, but some are exported. Few controls exist at any stage in the production and sale of NTFPs, and public revenues are only raised by the sector in the case of exportation.

19. ***Bushmeat:*** As with NTFPs, bushmeat-hunting is a traditional practice, which supports many thousands of families, both economically and nutritionally. Such a diffuse and informal sector is very demanding to regulate. The harvest and sale of bushmeat is theoretically licensed and regulated by law, but the laws are contradictory, and seldom respected. Many actors obtain their livelihoods from this sector. Some communities are able to maintain the sustainability of their bushmeat resources, but, in general, no controls exist. The sustainability of bushmeat-hunting is threatened by Chadian and Sudanese poachers and pastoralists in the north of the country, population growth, increasing affluence and greater access into the forests. In addition, instability threatens food security, increasing people's reliance on this traditional source of food.

20. ***Wildlife and Protected Areas:*** CAR has a relatively high percentage of its land area under Protected Areas (PAs). At about 68,000 km², this area is greater than the international target of 10 percent. However, almost one third of the PAs suffer from little or no management. The key threats to CAR's PAs and wildlife include:

- Insufficient human and financial resources within MEFCP for the management of protected areas;
- A lack of management plans for most PAs;
- Porous international borders and a fragile security situation have led to serious poaching problems and grazing by Chadian and Sudanese pastoralists inside PAs in the north of the country;
- Artisanal diamond exploitation inside PAs has the potential to damage fragile ecosystems;
- Uncontrolled bush fires also damage ecosystems, particularly within the savannah protected areas.

21. **Tourism:** CAR has great potential for tourism, especially ecotourism, but a lack of security and tourist facilities is hampering development. The Ministry for the Development of Tourism and Handicrafts (*Ministère de Développement du Tourisme et l'Artisanat* - MDTA) is poorly funded, and insufficiently focused on promoting private sector investment. Both sport-hunting and more traditional wildlife viewing activities are underexploited in CAR, although this is in large part due to poor security. Increased tourism and trophy-hunting, particularly involving local communities, would generate revenues for both the Government and local people if properly managed.

22. **Integrated Management of Natural Resources:** The issues involved in the utilization and management of forests, protected areas, their associated products and wildlife are linked. Individual actions cannot solve the multiple problems, so an integrated approach is needed, focused in particular on: (i) the reinforcement of MEFCP capacity to better manage forest concessions and protected areas, and to control the trade in bushmeat and NTFPs; (ii) the need to ensure local communities derive economic benefits from forestry, tourism and sustainable resource management, and to improve the level of community involvement in decision-making over resource use; (iii) encouragement of private sector investment, both on value-added processing of forest products, and with a focus on activities such as ecotourism and sport-hunting which can contribute to sustainable management of wildlife populations and at the same time bring benefits to local communities; and (iv) improving the data on which to base the development of strategies and management plans for the sustainable development of forest, woodland and wildlife resources.

VI. Growth that is Resilient to Climate Change

23. Modelling and analysis undertaken for the CEA simulated present climate conditions and potential future scenarios. The climate predictions vary, but the most likely trend over the next 80 years is for an increase in annual average temperatures (1.5°C to 2.75°C) and slight increases in average rainfall (most likely in the order of 5 percent). Rainfall is also likely to become more erratic in terms of storm frequency, duration, and intensity.

24. Whilst the likely effects of the above changes are uncertain, their negative impacts could be far-reaching. The most immediate threats include the following:

- An increased occurrence and severity of flooding could affect the quality of life, particularly in urban areas, and could cause damage to infrastructure, including the road transport system, which would affect the efficiency of trade and commerce;
- Agricultural output and therefore rural livelihoods could be affected by changes in growing conditions as a result of higher temperatures and more erratic rainfall;
- Human health could be affected both by diseases related to increased flooding, and by epidemics associated with increased temperature and humidity.

25. To address the possible impacts of climate change on CAR, efforts should be directed towards the following win-win actions, which would be of benefit to the country even without the threat of climate change:

- Research into water management and irrigation to help address the likely increase in rainfall variability, and to identify crops best suited to higher temperatures;
- Improvement of meteorological data collection and weather forecast dissemination for early warning;
- Design of urban and transport infrastructure for increased flooding;
- Strengthening of health surveillance to monitor changes in disease risks and for early detection of new forms of epidemic;
- Improvement of disaster preparedness, through forecasting and planning.

VII. Recommendations for Policy, Investment and Technical Assistance

26. The analysis undertaken for the CEA led to the development of a series of recommendations for policy, investment and technical assistance, summarized below, intended to help guide the Government and its development partners in maintaining and reinforcing CAR's progress along a sustainable path to economic growth. These recommendations are presented as short, medium, or long term priorities in the table that follows, together with an indication of the primary responsibility for each action, and an initial budget estimate for the investment and technical assistance recommendations.

Policies for Sustainable Growth:

(i) Clarifying and Reinforcing the Institutional Framework for Environmental Management

- within MEE, determine what the responsibilities of the various units should be to ensure there are no overlaps or gaps in meeting the Ministry's mandate. This should be accompanied by a capacity assessment to determine required skills, the capabilities of current staff and the gaps to be filled, leading to a comprehensive capacity building program. The division of roles between MEE and key sectoral ministries also needs regulatory clarification, especially regarding the EIA process;
- issue the regulations establishing the three proposed semi-autonomous environmental agencies: the National Environment Fund (FNE); the Central African Agency for Environment and Sustainable Development (ACEDD); and the National Commission on Environment and Sustainable Development (CNEDD);
- at the policy level, issue a MEE policy letter to highlight the importance of sustainable environmental protection as a government priority, and integrate environmental issues and priorities into the PRSP.

(ii) Cross-Ministerial Collaboration to Promote Sustainable Mining

- review the assignment of roles and responsibilities between MoM and MEE for the promotion of environmentally and socially sound mining, leading to mining sector-specific EIA guidelines to accompany the new EIA regulations being prepared by MEE, and cross-ministerial teaming for review of EIAs and monitoring of environmental and social issues in the field;

- within MoM, conduct an assessment of environmental management skills and capacity, providing the basis for a capacity building program. Such a program should support a shift in focus of MoM environment staff from a largely enforcement role to include technical assistance and facilitation to miners aimed at increasing the efficiency working methods, improving health and safety measures, and creating awareness of the environmental and social impacts of mining;
- support application of the Extractive Industries Transparency Initiative Value Chain approach to address governance issues in the mining sector, incorporating environmental and social performance and sustainable development. Encourage planned efforts to create regional or prefectural level EITI representation.

(iii) Managing Forests, Woodlands and Wildlife Resources

- in the management of commercial forestry operations, prompt action is required to benefit from the support and expertise of PARPAF in setting up a dedicated agency for the allocation and monitoring of logging permits. A specific initiative is also needed to ensure effective use of the forest revenues allocated for community investment. To better encourage the establishment of modern, efficient operating companies, it is recommended that the tender process for PEAs that have not yet been granted be started afresh;
- to help ensure the sustainability of bushmeat exploitation, clarify contradictory laws (for example regarding the collection of taxes on prohibited forms of bushmeat trade), prohibit profit-making from confiscation of illegal game by Government authorities, and require the provision by large forestry and mining companies of on-site alternative sources of protein;
- a priority for wildlife protection is better coordination between MEFPC and the armed forces, and the extension of cross-border collaboration with Chadian authorities, to combat the devastation of CAR's wildlife at the hands of Chadian and Sudanese poachers, and to prevent the intrusion of pastoralists into protected areas. In the north, a transparent evaluation of land use is required to propose a system of zoning that will protect as much biodiversity as possible, while allowing communities access to resources that must be sustainably managed. Amendments to the Wildlife Code are necessary to provide a regulatory framework for the management of community hunting reserves (ZCVs). In the south of the country, the top priority is the implementation of the Dzanga Sangha and the Mbaéré-Bodingué National Park Management Plans. International support is also needed for national inventories of at least vulnerable and threatened species;
- the Ministry for the Development of Tourism and Handicrafts (MDTA) should consider refocusing its efforts on the many unique natural areas with which the country is blessed, emphasizing the promotion of private sector investment in secure areas such as Dzanga Sangha and Mbaere-Bodingue.

Investment and Technical Assistance to Strengthen Environmental Management:

(i) Cost-Effective Investments to reduce Environmental Health Risks

- the most significant physical investments are those required to reduce the health risks associated with unsafe water, poor sanitation and hygiene, and the pollution of indoor air due to cooking with solid biomass fuels. These should be focused on interventions known to be

cost-effective and practicable, such as water source protection, total sanitation initiatives, and improved cook stoves;

(ii) Building Institutional Capacity for Environmental Management

- technical and financial support are required for development of MEE's human and material resources, especially the basic resources needed to make Ministry fully operational, before it loses its initial momentum. This support should include a capacity building program focusing on a core group of environmental and social specialists capable of both reviewing EIAs and monitoring their implementation;
- provide technical assistance to help the various services within MEE determine what environmental information they need to collect, which indicators to track, how this data will be used, where to store the information, responsibilities for organizing and managing it, and to implement such a system;
- develop in-country training resources, including support for the University of Bangui's proposal to establish a master's program in environmental management.

(iii) Investing in Sustainable Mining

- As mining sector environmental and social management requirements are clarified, there will be a need to increase the human resources devoted to these issues in MoM and MEE, and to provide them with them with the physical resources necessary to review EIA's and oversee their implementation;
- Given its importance to livelihoods, particular emphasis should be given to environmental and social management within the artisanal mining sector, including support for the PRADD program, which uses participatory rural appraisals to engage communities in the process of learning about and embracing their rights and obligations under current CAR mining law.

(iv) Promoting Productivity of Forests, Woodlands and Wildlife Resources

- Technical assistance will be required to support the creation of a commercial forestry permitting agency to replace PARPAF, in particular to strengthen capacity to monitor the implementation of concession management and social investment plans. Particular attention is needed to ensure the successful implementation of management plans for permits near Bangui. Additional funding is also required for the Forest Economic Observatory (FIEO), which can be justified on the basis of the Observatory's direct effect on government revenues;
- to ensure the long-term sustainability of the production of NTFPs and bushmeat, participatory management initiatives, where traditional rights are defined in agreement with local communities, should be supported. Such initiatives should promote the inclusion of sustainable NTFP and bushmeat harvests in production forest management plans, and support the organization of harvesters and hunters into cooperatives promoting sustainable practices. Such cooperatives would also provide a mechanism through which to improve rural livelihoods by adding value to NTFPs. Technical assistance should build upon progress made by the PGTCV project, supporting alternatives sources of protein and reinforcing bushmeat control on roads and in markets;

- International support for MEFCP is needed to allow the hiring, training, equipping and functioning of a team sufficiently large to secure priority protected areas. Further development of trophy hunting as a form of sustainable wildlife utilisation will need investment in baseline surveys, which can accompany support for community management of hunting resources based on Local Management Committees and the Village Hunting Zone system, following completion of the ECOFAC project.
- To help attract private investment in ecotourism and sustainable trophy hunting, there is a need for outside assistance to create a modest publicity campaign and provide training courses in tourism.

(v) Investing in Growth that is Resilient to Climate Change

- The Government should begin to invest in climate change preparedness. A first step would be to improve meteorological data collection and weather forecast dissemination for early warning, combined with disaster preparedness planning. This should be accompanied by research into water resource management, the identification of crops best suited to higher temperatures, strengthening of health surveillance to monitor changes in disease risks, and the design of urban and transport infrastructure for increased flooding.

Summary of Recommendations

Recommendations (With initial budget estimate for Investment and Technical Assistance)	Primary Responsibility
Short-Term	
<i>Policies for Sustainable Growth</i>	
Institutional and capacity assessment of MEE	MEE
Issue sustainable development policy letter	MEE
Institutional and capacity assessment of MoM for environmental management	MoM
Establish agency for allocation and monitoring of logging permits	MEFCP
Recommence tender process for PEAs not yet issued	MEFCP
Implement management plans for Dzanga Sangha and Mbaéré-Bodingué National Parks	MEFCP
<i>Investment and Technical Assistance</i>	
Technical and financial support for development of MEE's human and material resources (\$5 million)	MEE
Technical assistance and capacity building for forest permitting agency (to be created) and FIEO (\$3 million)	MEFCP
Medium-Term	
<i>Policies for Sustainable Growth</i>	
Establish FNE, ACEDD, and CNEDD	MEE
Review assignment of roles for environmental management of mining	MoM/MEE
Issue mining sector EIA guidelines	MoM/MEE

Recommendations (With initial budget estimate for Investment and Technical Assistance)	Primary Responsibility
Initiative to ensure effective use of forest revenues for community investment	MEFCP
Clarify contradictory laws on bushmeat exploitation, prohibit profits from confiscation of game, and require large natural resource companies to provide alternative source of protein	MEFCP/MEE
Improve coordination with armed forces and cross-border collaboration for wildlife protection	MEFCP
Amend Wildlife Code to provide framework for ZCVs	MEFCP
<i>Investment and Technical Assistance</i>	
Investments in water supply, sanitation and hygiene, and improved household air quality (budget to be defined through Public Expenditure Review)	DGH/MDRA
Technical assistance for environmental monitoring by MEE (\$1 million)	MEE
Support for expansion of PRADD program (\$2 million)	MoM
Improve meteorological data collection and weather forecast dissemination (\$1 million)	NCEP
Research into crops resistant to higher temperatures, and water resource management for agriculture (\$2 million)	MDRA
Strengthening health surveillance to monitor changes in disease risks (\$1 million)	Min. of Health
Design of urban and transport infrastructure for increased flooding (\$2 million)	DGH/MINT/ MED
Long Term	
<i>Policies for Sustainable Growth</i>	
Support application of EITI++ incorporating environmental and social performance	MoM/MEE
Evaluation of land use in north and zoning for biodiversity protection	MEFCP
Recruit international support for national inventories of most vulnerable and threatened species	MEFCP
Refocus tourism promotion on unique natural areas and promotion of private sector investment in secure areas	MDTA
<i>Investment and Technical Assistance</i>	
Develop in-country training resources, including environmental management at University of Bangui (\$0.5 million)	Univ. Bangui
Increase human and physical resources for review and enforcement of mining sector EIAs (\$1.5 million)	MoM/MEE
Support participatory management initiatives for bushmeat and other NTFPs, including the establishment of producer cooperatives (\$2 million)	MEFCP
Capacity building of National Park guards (\$4 million)	MEFCP
Baseline surveys for trophy hunting and support for ZCVs (\$2 million)	MEFCP
Publicity and training in ecotourism and sustainable trophy hunting (\$0.5 million)	MDTA

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Chapter 1: CONTEXT AND OBJECTIVES

I. Introduction to Country Environmental Analysis

1. The World Bank regularly monitors and reports on many aspects of development in its client countries. In the context of country level environmental analytic work, the Country Environmental Analysis (CEA) is one of the key country-level diagnostic tools designed to evaluate systematically the environmental priorities of development in client countries, the environmental implications of key policies, and countries' capacity to address their priorities.

II. Context: Laying the Foundations for Sustainable Growth

2. The Central African Republic is a land-locked nation of approximately 623,000 km², with a population of around 4.5 million people, over 60 percent of which live in rural areas. The country has generally uniform topography and a climate typical of the Inter-Tropical Convergence Zone (ITCZ); humid tropical forests cover the southwest and the Bangassou regions, the majority of the country is covered with savannah woodland vegetation, which gradually becomes increasingly arid northwards into the Sahel. Arable land accounts for just 3.1 percent of the area of the country; 36.5 percent of the country is covered by forests.

3. CAR, a post-conflict country with a rich natural resource endowment, is striving to achieve a transition from extended periods of instability to growth and development. Since 1980, the Central African Republic (CAR) has experienced sustained periods of political instability and internal conflict. As a result, the country's infrastructure and private sector have eroded, with the disappearance of two-thirds of formal sector enterprises since the mid-1990's, and a collapse of agricultural exports, leading to a decline in real GDP per capita from US\$495 in 1990 to under US\$300 by 2002. Economic growth has accelerated since 2006, with real growth of 4.1 percent in 2006, and 4 percent in 2007, but CAR is still one of the poorest countries in the world¹. Since 2009, CAR has been eligible for special assistance as one of 40 Heavily Indebted Poor Countries (HIPC).

Transition from Instability to Growth

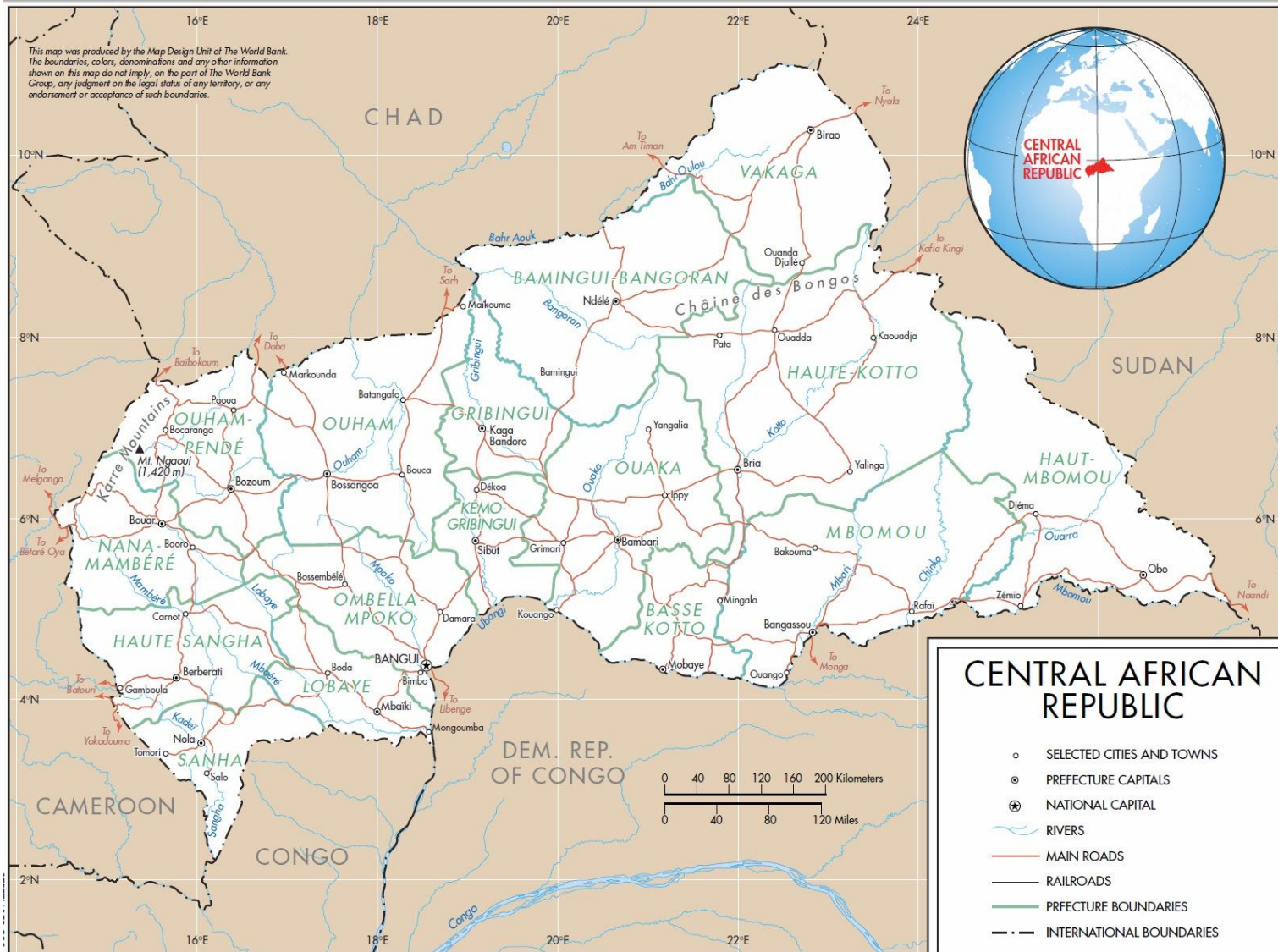
4. A consensus government has been in place since January 2009; the Disarmament, Demobilization and Reintegration process has been launched and is advancing, albeit at a slower pace than envisaged; and an independent electoral commission has been set up with the mandate to organize the 2010 presidential and legislative elections. The security situation remains fragile, as attacks continue in the North, North-East and South-East. The government lacks defence and security forces capable of ensuring security within the entire national territory. In December 2009, UNHCR estimated the number of internally displaced persons at over 162,000, with a concentration on the northern part of CAR. A full deployment of peace-keeping missions is expected to help improve the security situation in the North-East.

5. Starting from dire economic and social conditions CAR has made good progress in stabilizing the economy, implementing financial and structural reforms, and restoring social services. The economy remains undiversified, however, and is based mainly on the mining and forestry sectors, with diamonds and timber accounting for about 90 percent of exports. Already constrained by infrastructure bottlenecks and a poor business environment, economic growth has been further hindered by a series of exogenous shocks in 2008 and early 2009.

¹ <http://imf.org/external/pubs/ft/weo/2009/02/weodata/index.aspx>

http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP_PPP.pdf

Figure 1: Map of the Central African Republic



6. The first of these shocks was the breakdown of the major hydro-power plant, followed by the worldwide price hike for food and fuel, and then the global financial crisis and recession. These events led to a marked slowdown in growth. Real GDP growth slowed to 2.0 percent in 2008 from 3.7 percent in 2007. The global economic crisis affected the CAR economy primarily through the export channel. Low external demand and a steep fall in prices caused timber and diamond exports to contract sharply in 2009, with dampening effects on related activities. Timber production fell by 37 percent and exports declined by 29 percent in volume terms; while production and export of diamonds are estimated to have declined by about 20 percent. As a result, real GDP growth is projected to decrease from 2.0 percent in 2008 to 1.7 percent in 2009, the lowest since 2005.

Raising Agricultural Productivity: Critical for Poverty Reduction

7. Agriculture accounts for 53 percent of GDP and supports the majority of CAR's workforce, including the poorest, most food insecure and most isolated portions of the population. Outside Bangui, 92 percent of working adults are engaged in agriculture. Productivity gains for small-holder farmers are critical to poverty reduction. These productivity gains, especially in terms of yield potential, are within reach for the majority of Central African farmers, but strategic investments are needed to ensure that the stage is set for growth.

8. The agriculture sector in CAR is characterized by positive attributes such as low population density, large land area, extensive hydrographical network, and sufficient rainfall, but is beset by numerous weaknesses: small farm sizes, low productivity, an absence of essential rural infrastructure, low technical capacity, insufficient institutional performance, and disorganized farmers groups. Cash crop production has seen drastic reductions over the last 10 years, and continues to decline. Agricultural products made up 22.3 percent of exports in 1993, but in 2003 this had fallen to 6.5 percent, largely as a result of conflict. The conflicts also had a large impact on cattle herders; many left the country, many more moved into different areas. There is now little knowledge of the character of the herds in CAR, and all size estimates are projections of the last livestock census completed in 1986.

9. Investments are needed in particular to address the absence of essential infrastructure and minimal inputs. Poor roads and a lack of functional post-harvest infrastructure pose serious constraints to increased production and the distribution of staple crops. Pesticides are very rarely used, except in former cotton-producing areas where there is some remaining stock. Only 20 percent of agricultural households use fertilizer, and of these the majority use only manure. High quality seed vendors are very rare, as seed multiplication stations were destroyed in the 2003 conflicts and have not been rebuilt. The low availability of inputs is compounded by a near complete absence of agricultural credit.

10. Despite the drastic reductions, there are opportunities for improvements in a range of cash crops, and livestock population density is low, with accessible sub-regional markets in DRC, Congo, Cameroun, and Gabon. Although there is significant interest in reviving cotton, given regional constraints to profitable cotton production and the isolated, land-locked nature of CAR, investments in cotton production are not likely to significantly improve the well-being of Central African farmers. The Government's objectives, presented in its 2007 strategy for agriculture and rural development, set a target of average annual sector growth of 4 percent between 2005-2015, with higher returns particularly for cassava, combined with investments to bring into production the enormous arable areas and grazing lands still available.

Recent Growth: constrained by Poor Infrastructure and Power Shortages

11. Growth in 2009 has been driven mainly by agriculture, compensating somewhat for the negative external shocks. Owing to the gradual improvements in security in the producing areas and good weather conditions, production of both food and cash crops has rebounded. In the case of cash crops, for instance, the authorities' estimates for 2009 indicate that 2,800 tons of cotton and 4,300 tons of coffee were harvested compared to 950 tons and 3,473 tons respectively in 2008. Growth has also been robust in the construction and service sectors. Growth in industry is projected to slow from 5 percent in 2008 to 3 percent in 2009; real output growth remains severely constrained by power shortages and poorly maintained infrastructure.

Weak Social Indicators

12. The most recent household survey data indicate that 62 percent of the population lived below the poverty line in 2008. The national average hides important differences, with poverty particularly widespread in rural areas, at 69.4 percent. About 64 percent of the active population works in small family farms and 26 percent in the urban informal sector. Employment in the informal sector consists mostly of low-productivity jobs, while the modern sector (public and private) barely employs 1 percent of the active population.

13. Social indicators place CAR among the least developed countries in the world. The 2009 UNDP Human Development Report ranks CAR near the bottom of its Human Development Index (179th out of 182 countries). This trend is reflected in several health indicators: life expectancy has fallen from 50 years in the 1990s to 45 years in 2007; the HIV/AIDS prevalence rate, at 6.2 percent for the 15-49 age group in 2005, is high although considerably below the double-digit rates found in a number of southern African countries; maternal and infant mortality rates have increased over time. Other social indicators are also very low. Less than 7 percent of the population uses electricity as a source of lighting; about 30 percent of the population has access to safe water; and less than 10 percent of the population has access to improved sanitation facilities. As a result of these trends, CAR will not achieve its Millennium Development Goals (MDGs) by 2015.

The Government's Strategy for Growth

14. CAR's first full PRSP adopted in June 2007 sets out the government's priority agenda over the period 2008-10. The strategic framework of the PRSP is based on four pillars: (i) restore security, consolidate peace, and prevent conflict; (ii) promote good governance and the rule of law; (iii) rebuild and diversify the economy; and (iv) develop human capital. Priority spending is projected to increase in the 2010 budget. The main priorities include the implementation of the peace process, with a focus on the DDR program, the organization of elections, and an expansion of public investment. The Government is also expected to continue to clear outstanding salary arrears as well as arrears to suppliers. Limited resources, including grants, make it hard for the government to maintain its expenditure program, which may require difficult trade-offs in 2010 as it strives to implement its poverty reduction strategy while expanding expenditure to meet other commitments. As a central element in the effort to rebuild and diversify the economy, the third pillar calls for exploitation of natural resources, including forestry, wildlife, and fisheries, as well as the promotion and modernization of agriculture. Sound environmental management will be important to sustain and maximize the economic benefit of these initiatives, and is directly linked to the promotion of good governance under the second pillar.

III. Objectives of the Country Environmental Analysis

15. In examining the environmental management challenges ahead for CAR, the principal audience for the CEA is the Government. The CEA will also help define the scope and direction of

possible future donor support to strengthen environmental management, and will help inform and coordinate the activities of civil society and other development partners in this area.

16. The objectives of the CEA are to provide analytical inputs, develop policy recommendations, and define priority investments to help the Government of CAR address the country's most significant environmental management challenges, including environmental aspects of the growth agenda supported through World Bank development policy lending. The CEA is therefore intended to inform decision making and promote ways to achieve sustainable economic growth.

IV. Scope, Methodology and Structure of the Report

17. The priority sectors analyzed in more detail in the third component of the CEA were identified in consultation with government counterparts, development partners and civil society stakeholders. Based on consideration of a variety of factors, including significance in protecting livelihoods of the poor and ensuring the sustainability of economic growth, the following environmental challenges were selected as priorities:

- Environmental Management in the Mining Sector;
- Managing Forests, Woodlands and Wildlife Resources; and
- Growth that is Resilient to Climate Change.

One of the considerations in selecting these topics as priority sectors for the CEA was to avoid duplicating analysis recently undertaken or currently underway. In particular, it was noted that the World Bank was at the same time preparing separate notes on agriculture and food security, as well as a review of public expenditures on water supply and sanitation, so these important topics were not chosen as priorities for detailed analysis in the CEA.

18. Specialist teams were engaged to study the above areas, in addition to the following two generic CEA tasks:

- Estimation of the principal sources, costs and trends of environmental degradation; and,
- Analysis of the current institutional capacity for environmental management.

The work was conducted via desk studies and field visits to CAR, using a variety of analytical techniques. A consultative workshop on the draft version of this report was convened in Bangui by the Ministry of Planning, the Economy and International Cooperation (*Ministère du Plan, de l'Économie et de la Coopération Internationale*, MPECI) on May 6, 2010.

19. Following the present introductory chapter, the second and third chapters are concerned with the costs of environmental degradation and institutional capacity for environmental management, followed by a chapter dedicated to each of the priority sectors listed above. Priority areas for future support are identified in the final chapter, based on an assessment of the environmental constraints to growth. Recommendations for additional action are also provided. Details of the analyses presented in the main report (Volume I) are provided in the technical annexes that make up Volume II.

Chapter 2: THE SUSTAINABILITY OF CAR'S DEVELOPMENT PATH

20. Sustainable development can be defined as the process of maintaining wealth for future generations. A nation's wealth, understood in these terms, includes not only produced, or physical, capital, but also human capital (including educational attainment, knowledge, and health), social capital (such as the strength of institutions), and natural capital (including soil and subsoil assets, and forest resources). Standard national accounts measure the change in a country's wealth by focusing solely on produced assets, but "genuine" saving (also known as adjusted net saving) provides a broader indicator of sustainability by valuing changes in natural resources, environmental quality, and human capital, as well as the traditional measure of changes in produced assets.

21. In order to arrive at an estimate of genuine saving, it is necessary to first calculate the costs of different forms of environmental degradation, which can be divided into two categories, (i) depletion of natural resources, and (ii) the costs of environmental health risks. Negative genuine saving implies that total wealth is in decline: policies leading to persistently negative genuine saving are unsustainable. In addition to serving as an indicator of sustainability, genuine saving has the advantage of presenting natural resource and environmental issues within the framework used by finance and planning ministries, making explicit the growth-environment trade-off. Countries pursuing current economic growth at the expense of natural resources or environmental quality will be notable for their depressed rates of genuine saving.

I. The True Wealth of CAR

22. In estimating the wealth of a nation, attention has traditionally focused on produced capital such as buildings, machinery, equipment, and infrastructure. Increasingly, however, these measures are being extended to account for exhaustible resources, renewable resources, and agricultural land, as well as intangible capital, which encompasses raw labour, human capital (the stock of human skills and know-how), and social capital (the quality of institutions). There is a strong link between changes in wealth and the sustainability of development: if a country is running down its assets, it is not on a sustainable path.

Table 1: Composition of *per capita* Wealth for CAR and the SSA average
(% share of total wealth)

<i>\$ per capita</i>	CAR	Sub-Saharan Africa
Natural Capital	23%	24%
Physical Capital	7%	13%
Intangible Capital	70%	63%

23. Table 1 above compares the composition of *per capita* wealth in CAR with the average for SSA. *Natural Capital* includes the country's finite resources (e.g. mineral assets), renewable resources (e.g. forests and lands) and its environmental services. These resources have been valued at the present value of their rents earned over a 25-year accounting period (2005-2030). *Physical Capital* is the value of physical assets, estimated through the perpetual inventory method (PIM), which derives capital stocks from the stream of investments. *Intangible Capital* (social and human) is a residual figure, which is measured as the difference between total wealth and the sum of natural and physical capital. Total wealth is calculated as the net present value of sustainable consumption

over time (consumption is adjusted to a sustainable level by subtracting the amount of negative savings).

24. CAR is blessed with a relatively high endowment of natural capital, representing 23 percent of her total wealth. This is very similar to the average observed in Sub-Saharan Africa (24 percent), indicating an important dependence on natural assets. Physical capital represents only a small share of total wealth (7 percent), whilst intangible capital is a much greater part of total wealth at 70 percent.

25. While the share of natural assets in CAR's total wealth is almost the same as the average for the rest of SSA, the composition of this natural capital shows some important differences. Agricultural land (cropland and pasture) clearly represents CAR's most important asset (see Figure 2). While the contribution of cropland is comparable to the average share for SSA, as Table 2 shows, the share of pastureland is significantly higher, as is the contribution of protected areas, reflecting in part the relatively low population density in CAR.

Figure 2: Composition of Central African Republic Natural Capital

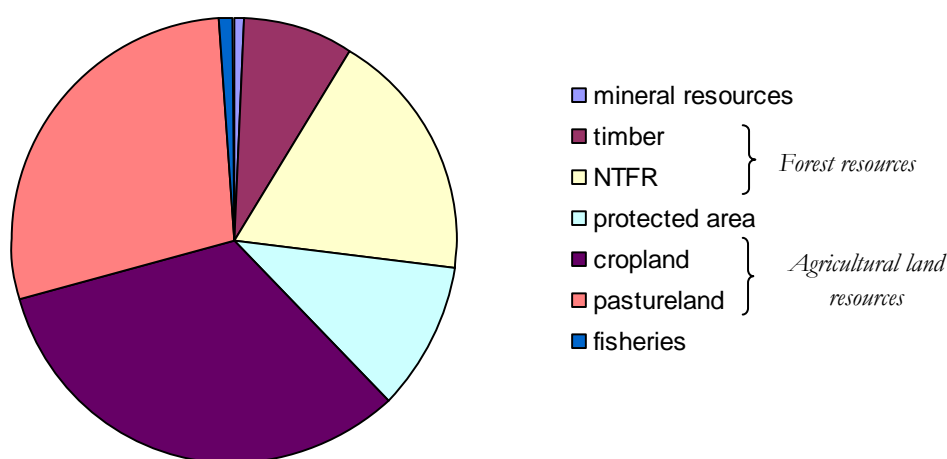


Table 2: Composition of the Natural Capital of CAR compared with the SSA average
(% share of natural capital)

Resource	CAR	Sub-Saharan Africa
Mineral resources	1%	38%
Timber resources	9%	9%
NTFR	5%	5%
Protected Areas	13%	3%
Cropland	38%	36%
Pastureland	33%	8%
Fisheries	1%	1%

26. Mineral resources represent a relatively small proportion of CAR's natural capital, in part because mining is principally artisanal so rents are very low, and partly because production is under-reported. It is also worth noting that new discoveries could increase the value of this asset. Of the forest resources, timber is not as important as might be expected. This is linked to the fact that rents in the forestry sector are also relatively low, given the low rates of transformation and high transport costs. Non-Timber Forest Resources (NTFR) are important, despite the lack of data on fuelwood usage (although almost all domestic energy is derived from fuelwood), and the very limited information on bushmeat.

II. Costs of Environmental Degradation: Equivalent to 8 percent of GDP

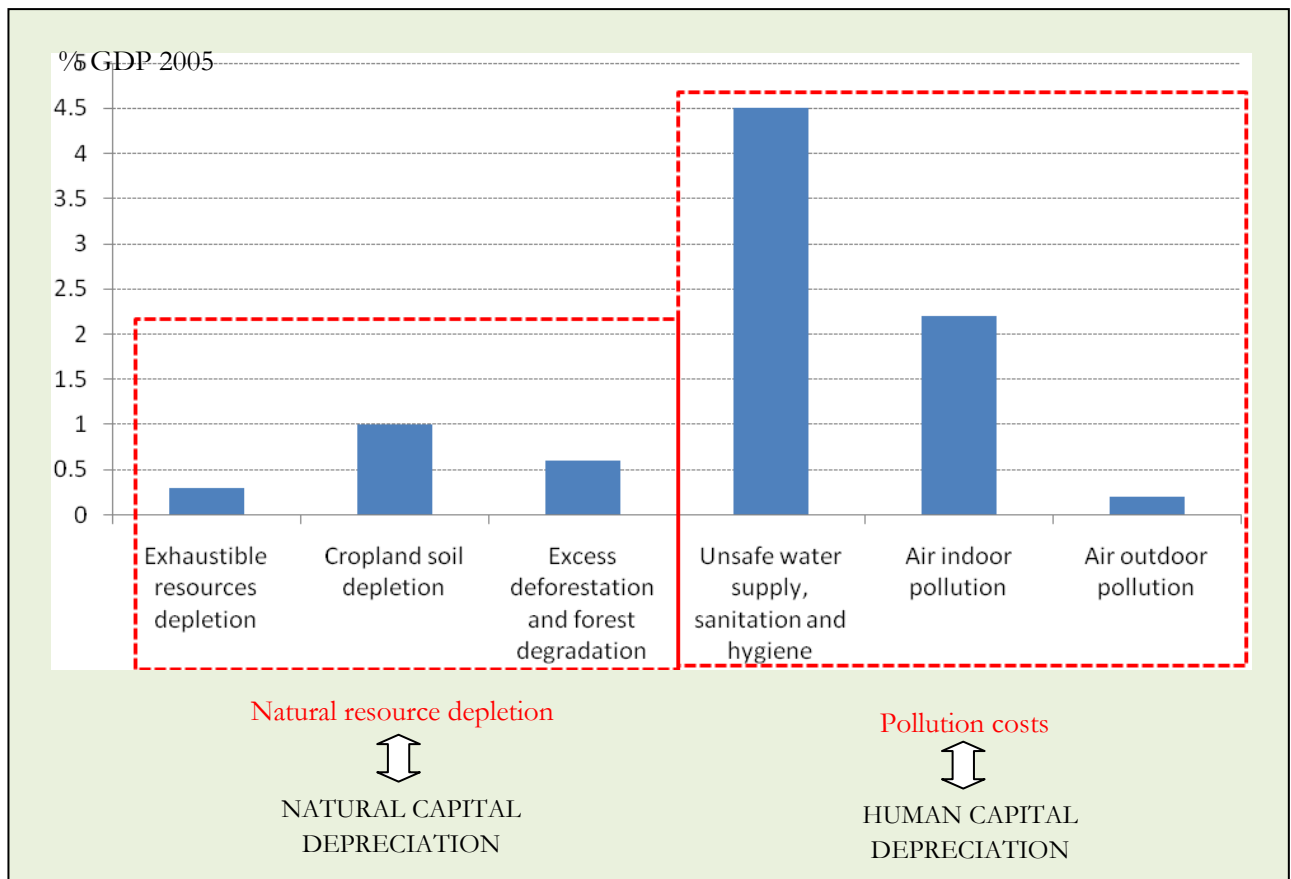
27. The assessment of the costs of environmental degradation in CAR examines the costs associated with the depletion of natural capital, and the costs of human capital depletion as a result of environmental health risks. The depletion of natural capital includes both exhaustible, mineral resources, as well as renewable forest and soil resources. The value of exhaustible resource depletion is calculated as the total rent from diamond extraction (rents derived from gold are not significant with current data). The analysis of forest resource depletion distinguishes between deforestation, leading to a change in land use, and forest degradation resulting in a loss of forest productivity. The cost of soil degradation is derived by valuing net nutrient depletion at the price of lost nutrients. The environmental impacts on human health considered in this assessment are those resulting from unsafe water supply, inadequate sanitation and hygiene, acute respiratory illnesses and chronic obstructive pulmonary diseases caused by indoor air pollution resulting from the use of solid biomass fuels, as well as the health effects of urban air pollution in Bangui. The human capital approach is used to calculate the cost of mortality as the loss an individual's future income because of premature death, and morbidity is valued based on the costs of health care, time lost due to illness, and the cost of pain and discomfort.²

28. Figure 3 below presents the estimates of the costs of environmental degradation in CAR. Human capital depletion represents the main environmental degradation cost, at an annual cost equivalent to approximately 6.5 percent of GDP, of which about half is the cost of premature death, 44 percent is the cost of health care, and the remainder the value of time lost, pain and discomfort. The relatively lower costs of natural capital depletion and degradation reflect their low rents. The total estimated cost of environmental degradation amounts to almost 130 million US\$ per year, equivalent to about 8 percent of GDP.

29. The depletion of exhaustible resources is low, mainly because rents from diamond extraction are very low, although data are particularly poor and disputable. The calculated cost of soil degradation is important; however, this may be an over-estimate as it does not consider the regenerative effect of crop rotation or fallow periods, or the possibility that given the availability of land, opening a new field may be a cheaper alternative than chemical fertilisers for lost soil nutrients. The estimated cost of 'excess deforestation' is based on the difference in net present value between forest and agricultural land, taking into consideration differences in forest types within CAR, and a variety of products provided by forests such as bushmeat, fuelwood, and other NTFPs. The cost of forest degradation is also calculated for different forest types, based on estimated reductions in the net present value of forested land before and after degradation. The depletion of other natural resources, such as fish stocks or groundwater, has not been included for lack of data.

² The cost of pain and discomfort is estimated by valuing the loss of Disability Adjusted Life Years (DALYs) at GDP per capita. Further detail on these estimates and the methodology used is provided in the technical annex presented in Volume II.

Figure 3: Costs of Environmental Degradation

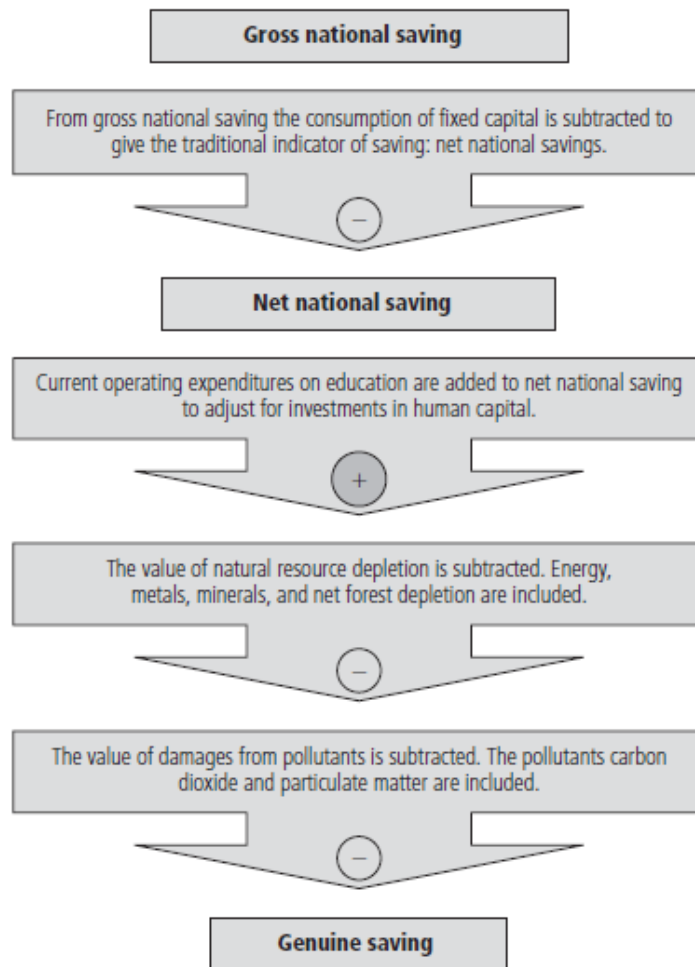


III. Genuine Saving: Declining Total Wealth

30. The standard national accounts measure the change in a country's wealth by focusing solely on produced assets. A country's provision for the future is measured by its gross national saving, which represents the total amount of produced output that is not consumed. Gross national saving, however, can say little about sustainable development, since assets depreciate over time. Net national saving equals gross national saving minus depreciation of fixed capital and is one step closer to measuring sustainability. The next step in measuring sustainability is to adjust net saving for the accumulation or depreciation of other assets - human capital, the environment, and natural resources - that underpin development. The steps involved in adjusting gross national saving to estimate genuine saving are summarized in Figure 4, below.

31. Genuine saving provides a broad indicator of sustainability by valuing changes in natural resources, environmental quality, and human capital, in addition to the traditional measure of changes in produced assets provided by net saving. Negative genuine saving rates imply that total wealth is in decline - policies leading to persistently negative genuine saving are unsustainable. In addition to serving as an indicator of sustainability, genuine saving has the advantage of presenting natural resources and environmental issues within a framework that finance and planning ministries can understand. It makes the growth-environment trade-off explicit, since those countries pursuing economic growth today at the expense of natural resources, environmental quality or human capital, will be notable by their depressed rates of genuine saving.

Figure 4: Steps in Calculating Genuine Saving



32. Genuine saving for CAR in 2005 (the most recent year for which sufficient data is available) is estimated at minus one percent of GNI, implying that total wealth is in decline. This negative value contrasts with earlier World Bank estimates³, which did not include diamond and gold wealth depletion, excess deforestation, nor several forms of pollution, in particular unsafe water supplies. Figure 5, below, provides a decomposition of the genuine saving estimate for CAR in 2005. As the Figure shows, the most significant environmental contribution to declining total wealth is the loss of human capital associated with indoor air pollution and unsafe water, which together almost equal the depreciation of physical capital.

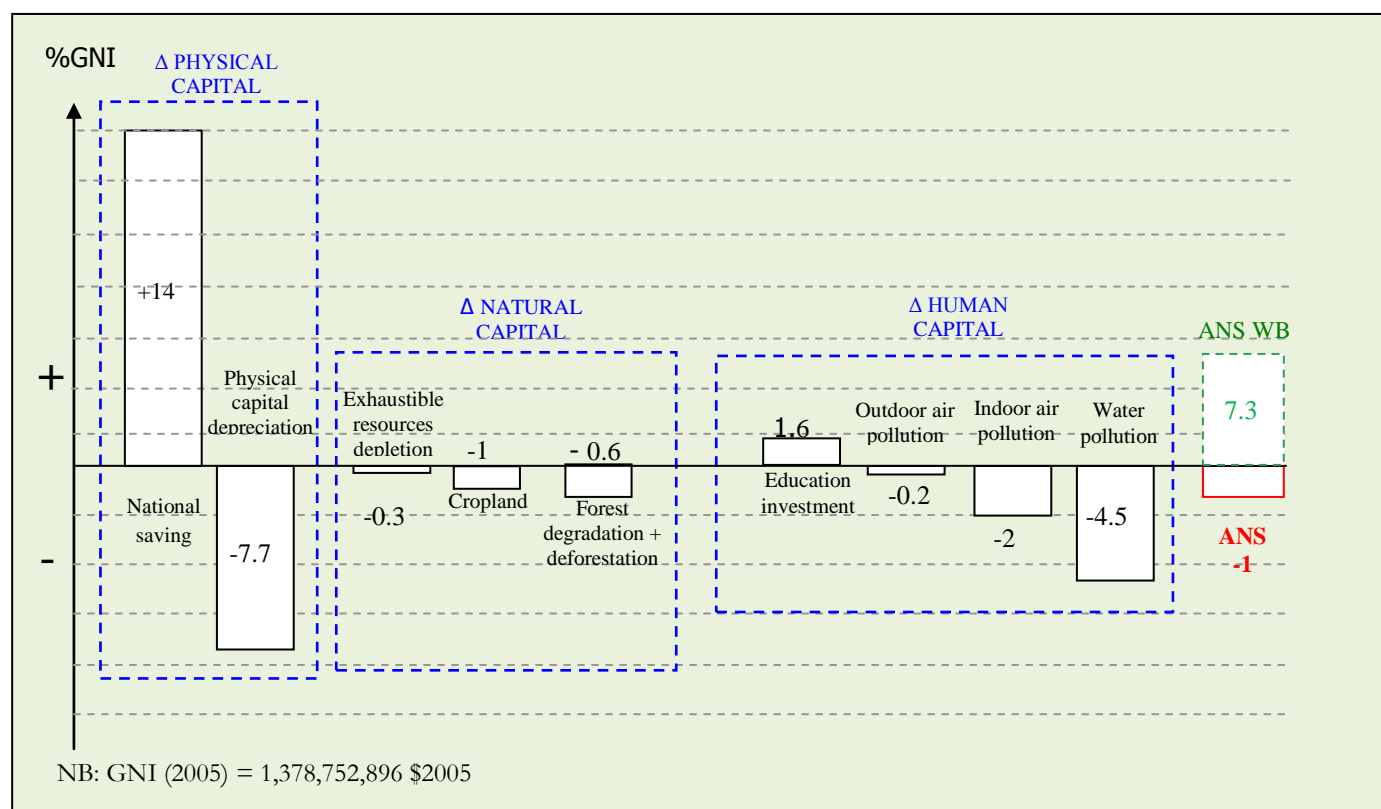
33. If the development process is seen as the management of a portfolio of assets, and growth occurs through the accumulation of different forms of capital, it is possible to infer from the components of Genuine Saving a variety of policy levers that affect the sustainability of development. These policy considerations are presented in Table 3, below.

34. In relation to household air pollution and inadequate water supply, sanitation and hygiene, the key policy consideration is whether cost effective measures can be found to reduce these impacts to socially optimal levels. International experience in these fields indicates that a wide variety of cost-effective interventions are possible, with the Water and Sanitation Program (WSP – a multi-donor partnership administered by the World Bank) estimating that the benefits of

³ “Where is the Wealth of Nations? Measuring Capital for the 21st Century”, World Bank, 2006.

investments in water supply, sanitation and hygiene outweigh costs by a factor of ten, especially in Africa.⁴ Given the potential for cost-effective investments, and the estimated cost (equivalent to 6.5 percent of GDP) of the health impacts of household air pollution, unsafe water, and inadequate sanitation and hygiene, a case can be made for reviewing the adequacy of the budget allocated to addressing these concerns, which is currently limited to about 1 percent of Government spending.⁵

Figure 5: Decomposition of Adjusted Net Saving (ANS), or Genuine Saving



Note: ANS WB indicates earlier World Bank estimates that did not include several forms of natural and human capital degradation.

Table 3: Policy Considerations to Boost Genuine Saving

Asset considered		Main Results	Policies Considerations
Physical capital		<ul style="list-style-type: none"> • Low national gross saving • High depreciation 	<ul style="list-style-type: none"> • What monetary and fiscal policies boost gross saving rates and limit produced capital depreciation?
Natural Capital	Exhaustible	<ul style="list-style-type: none"> • Low diamond and gold depletion 	<ul style="list-style-type: none"> • Do fiscal policies effectively capture mineral rents? • Are such rents effectively reinvested?
	Renewable	<ul style="list-style-type: none"> • Relatively low renewable capital depletion 	<ul style="list-style-type: none"> • Do existing natural resource policies encourage over-exploitation? • How can the productivity of these assets be raised?
Human Capital	Education	<ul style="list-style-type: none"> • Significant investments in education 	<ul style="list-style-type: none"> • Are enough resources reinvested into education? • Are these expenditures effective in raising human capital?
	Health	<ul style="list-style-type: none"> • High human capital depletion because of household air pollution and unsafe water supply 	<ul style="list-style-type: none"> • Are these impacts beyond socially optimal levels, where marginal damages equal marginal abatement costs? • If so, what are the most cost-effective policies to reach this level?

⁴ Maximizing the Benefits from Water and Sanitation Investments, WSP, 2005.

⁵ Draft Public Expenditure Review, Water Supply and Sanitation, World Bank, 2010.

IV. Ecological Footprint vs. Biocapacity: a Significant Ecological Reserve

35. An alternative view of the sustainability of an economy, focusing only on ecosystem services, is provided by the concept of its Ecological Footprint, which measures human appropriation of ecosystem products and services in terms of the amount of bioproductive land and sea area needed to supply these services.⁶ The area of land or sea available to serve a particular use is called biocapacity, and represents the biosphere's ability to meet human demand for material consumption and waste disposal. The Ecological Footprint and biocapacity accounts cover six land use types: cropland, grazing land, fishing ground, forest land, built-up land and carbon uptake land (to accommodate the Carbon Footprint). For each component, the demand for ecological services is divided by the yield for those ecological services to arrive at the Footprint of each land use type. Ecological Footprint and biocapacity are scaled with yield factors and equivalence factors to convert this physical land demanded to world average biologically productive land called global hectares.

36. The Ecological Footprint of the Central African Republic is very small⁷, as is the case in many African countries. Its biocapacity *per capita*, although shrinking because of population growth, remains much larger than its current usage. This means that the country could be on a sustainable development path in its use of ecosystem services. The components of the Footprint are presented in Table 4 below, which indicates that agricultural activities and fuelwood collection represent the largest share of CAR's Ecological Footprint.

Table 4: Biocapacity Supply and Demand for CAR

(Global hectares *per capita* – gha pc)

Supply	CAR	Africa
<i>Total biocapacity supply (gha pc)</i>	<i>3.70</i>	<i>1.30</i>
Demand		
Crops	0.34	0.42
Pasture	0.29	0.09
Timber	0.05	0.05
Fuelwood	0.10	0.13
Fish products	0.02	0.05
Built-up land	0.07	0.05
CO ₂ emissions	0.03	0.26
<i>Total biocapacity demand (gha pc)</i>	<i>0.90</i>	<i>1.10</i>

37. In 2000, the *per capita* supply of biocapacity was 3.7 global hectares; this is compared with the average demand for ecological services of only 0.9 global hectares. This is a very low demand, and consistent with the low consumption levels. Thus, CAR's biocapacity is still much greater than its Ecological Footprint. However, population growth and age distribution in CAR suggest that the total Ecological Footprint will increase rapidly in the future. Fortunately, there remains an important ecological reserve, and there is presently no constraint on natural resources to provide the environmental goods and services to meet the demands of the population. It should, however, be noted that the biocapacity of CAR may in future years be reduced due to the effects of climate change (see Chapter 6).

⁶ Conceived in 1990 by Mathis Wackernagel and William Rees at the University of British Columbia, the Ecological Footprint is now in wide use to monitor ecological resource use and advance sustainable development.

⁷ Global Footprint Network, 2008: www.footprintnetwork.org

38. It is also important to note that while the Ecological Footprint approach highlights the important quantity of land available in CAR, farmers need to be able to invest to use this natural capital. Farmers have very little access to physical or financial capital, and their human capital is limited: as a result, the natural capital, which is a complementary asset, has a very low value. The high amount of natural capital suggested by the amount of biocapacity is thus misleading.

V. Conclusion: Human Capital Threatened, but Natural Wealth Underexploited

39. The composition of CAR's wealth is very similar to that of most low income Sub-Saharan countries. Intangible capital constitutes an important element, physical capital represents a small share, and the country is highly dependent upon its natural capital. Agricultural land (both cropland and pasture) represents the most important share of wealth. Forest resources, particularly timber production, bushmeat, and other NTFP, are also an important contributor to natural wealth. The small share of wealth represented by mineral resources is more surprising, but data on the artisanal gold and diamond sectors are inevitably unreliable.

40. The composition of GDP indicates relatively high investment in CAR education compared with other African countries, but these efforts to build up human capital are hindered by the costs of unsafe water supply, inadequate sanitation and hygiene, and household air pollution. Principally because of these costs, the Genuine Savings calculated for CAR are slightly negative. Further, these costs are likely to increase in the near future as the population is growing faster than investments in water supply and sanitation, and alternatives to solid biomass energy will remain too expensive for the majority of the population.

41. In addressing the causes of negative Genuine Savings, it is not sufficient to simply identify the items with the greatest degradation costs. There may be significant costs associated with avoiding damaging factors such as unsafe water supply and indoor air pollution. International experience shows, however, that investing in water or improved household air quality can be highly socially profitable, provided that resources are allocated to the most cost-effective solutions. Natural capital depletion remains relatively low in CAR, and there is considerable scope to increase and stabilize rents from the country's renewable and mineral natural resources, a conclusion reinforced by the significant ecological reserve indicated by the analysis of CAR's Ecological Footprint and biocapacity.

Chapter 3: ASSESSMENT OF INSTITUTIONAL CAPACITY FOR ENVIRONMENTAL MANAGEMENT

I. Introduction to the Institutional Framework in CAR

42. The institutional framework for environmental management in CAR has changed considerably over the years; starting with the inclusion of an environmental unit within the ministry for Water and Forestry in the late 1980s, eventually leading up to the establishment of a dedicated ministry, the Ministry for Environment and Ecology (MEE), in 2009⁸.

43. The new ministry's Environment Directorate is essentially the same core Environmental Directorate that existed previously within MEFCPE, with additional responsibilities in social economy and local development. The Ecology Directorate is new, and encompasses ecology and risk prevention⁹. Three separate new environmental agencies are also to be created; the National Environment Fund (FNE), the Central African Agency for Environment and Sustainable Development (ACEDD), and the National Commission of Environment and Sustainable Development (CNEDD).

44. The Government's primary environmental concern to date has been forest and wildlife protection, backed by significant donor and international NGO support, though this is now changing. The Head of State and a delegation of senior government officials attended the 2009 Copenhagen conference, and there is a growing sense of the importance of environmental issues affecting CAR. Concern for pollution, and the environmental impacts of large scale public and private sector projects, most notably forestry operations and mining projects, has also grown in recent years. However, this recent interest in environment has not been matched with a corresponding rise in resources necessary to enable a strong environmental management capability.

45. NGO and civil society participation in environmental issues to date has also been largely related to wildlife and forest resource conservation efforts, as well as humanitarian relief as a result of the security issues, movements of internally displaced persons and high levels of poverty and malnutrition throughout much of the country. Environmental concerns are seen by many civil society organizations as secondary to obtaining peace, stability and poverty alleviation.

II. Legal and Regulatory Framework for Environmental Management

46. CAR's first environmental law was published in 1916, prohibiting hunting in reserves. A 1929 decree called for the creation of national parks and reserves and subsequent legislation created various reserves and national parks over the years. The history of formal environmental management in CAR dates back to Decree 89/043 of 23 February, 1989, which established a national committee for environmental issues. This was followed by Order 90/003 on 9 June, 1990, integrating environment into development planning. A Wildlife Code was adopted in 1984¹⁰, and a Forestry Code was adopted in 1990 (and later superseded by a new Forestry Code in 2008). The first (and current) Environmental Code appeared in 2007. Recently established regulatory instruments to manage CAR's environment and natural resources include:

- Law 07.018 of 28 December 2007 – the Environmental Code;

⁸ Prior to the formation of the new ministry, responsibility for environmental management fell to the Ministry for Water & Forestry, Hunting & Fisheries.

⁹ There are two additional directorates under the MEE: (i) Directorate for Resources, which includes the Personnel and Legal Services, Finance and Equipment, and training and documentation; and (ii) Directorate for Regional Services, which will manage 16 prefecture-level service units

¹⁰ The Wildlife code is currently under revision

- Decree 09.239 of 27 August 2009 – establishing the organization and duties of the Ministry of Environment and Ecology;
- Law 08.022 of 17 October 2008 – Forestry Code; and
- Decree 09.117 of 28 March 2009 – establishing the regulations for applying the Forestry Code

Other regulatory instruments currently under development by MEE but not yet approved include:

- Draft decree on regulations for applying and enforcing the Environmental Code;
- Draft regulations for conducting EIAs (still under development); and
- Draft statutes for the National Environmental Fund (FNE), Central African Agency for Environment and Development (ACEDD), National Commission for Environment and Sustainable Development (CNEDD).

III. Environmental Management at the National Level

47. As noted above, the ministry with lead responsibility for defining and implementing the country's environmental policies is the Ministry of Environment and Ecology (MEE). Within MEE, the Environment and Social Economy General Directorate is responsible for:

- Water and air protection
- Soil and subsoil protection, and
- Conservation and biodiversity.
- Management of hazardous chemical wastes, substances and products;
- Environmental evaluation, impact assessment, public consultations and environmental audits (note: this is the unit responsible for EIAs, its activities are described in more detail below in Section 2.4.3)
- Standards for harmful noise and light pollution and human habitations and listed sites
- Emergency and internal operations plans
- Local development
- Evaluation and monitoring of project sponsors

The Ecology and Risk Prevention General Directorate of MEE is mandated for:

- Land management
- Management of humid zones
- Management of fragile ecological zones
- Prevention of biotechnical risks
- Natural disaster and catastrophe management
- Observatory and statistical subdirectorate
- Research, technology and databases
- Environmental information
- Dissemination of new environmental technologies

48. The MEFCP retains primary responsibility for sustainable management of forest resources, including oversight of commercial forestry operations and management of the national parks. Responsibility for forestry industry EIAs and EMPs may eventually migrate to the new MEE, but the status quo is likely to remain in place for some time.

49. Other ministries are aware that under the Environment Code they have environmental responsibilities for programs and projects in their sector, but due to the recent formation of the

MEE, other ministries are reluctant to act until the full mandate of the new ministry, and subsequently changes to other ministries' mandates, becomes clear.

50. Three semi-autonomous environmental agencies (the FNE, ACEDD and the CNEDD), reporting to the Environment Ministry, are also in the process of being created. They are cited in the Environment Code, but remain to be more explicitly defined in statutes. Early drafts of the statutes being prepared by MEE suggest the following split of responsibilities:

- *National Environment Fund (FNE)*: According to the Environmental Code, the FNE will finance activities in the realm of the environment, funded from general taxes and royalties¹¹. The fund will be created to carry out government oversight of programs for biodiversity protection, management and conservation, and to finance public awareness raising and training.
- *Central African Agency for Environment and Sustainable Development (ACEDD)*: A draft statute suggests the Agency's chief function will be to drive the technical and scientific process behind environmental evaluation, including the setting of environmental standards.
- *National Commission on Environment and Sustainable Development (CNEDD)*: The draft statute for CNEDD outlines eight working groups in numerous fields, and it will be responsible for sectoral policies related to the environment, ecology and sustainable development, validating terms of reference for projects deemed to have environmental impacts, ensuring environmental principles are considered during sectoral policy making, and acting as a national centre for environmental expertise.

Ambitious Plans but Basic Needs are a First Priority

51. A key strategic priority of MEE, shared by the Ministry of Economy, Planning and International Cooperation, is to include and integrate environmental issues and priorities into the PRSP, which is under revision. MEE is also developing a policy letter on the environment to highlight the importance of sustainable environmental protection as a government priority. A draft version of the letter reviewed by the CEA team indicated four priorities:

- Integration of environmental concerns in all economic decision-making processes;
- Integration of environmental remediation costs in all major development projects;
- Use of environmentally responsible technologies; and
- Obligatory completion of environmental impact studies prior to initiating any major development projects.

The effort to write regulations to accompany the Environmental Code is still underway. Once these regulations are approved and disseminated by presidential decree, they will become a major driving force for the ministry's work.

52. Despite the strategic priorities listed above, the new ministry's management team is currently focussed on short-term concerns such as obtaining office space and facilities, and defining roles and responsibilities of managers and staff. In late 2009, senior ministry staff developed a work plan with three primary objectives:

- Evaluating how to integrate the principle of sustainable environmental management into all government policies, institutions and national development plans;

¹¹ Including both environment taxes, and unrelated income sources such as tobacco and fuel

- Reviewing the National Climate Adaptation Action Program (PANA) within the context of the PRSP and the needs of communities; and
- Creation of maps to show environmental vulnerabilities in CAR.

These objectives are largely a response to the availability of donor resources for equipping and training for ministry staff.

Leadership: Dynamic but Inexperienced and Under-Staffed

53. The leadership of the ministry is new and motivated. A widely expressed concern is that there is not enough staff with sufficient training to manage the ministries' responsibilities. Although there are no particular measures implemented to monitor or reward performance, staff are enthusiastic about their responsibilities, but morale may flag over time if the ministry is not able to move into its own facilities. The field presence for the new ministry and its three satellite agencies is nonexistent. There is a Director responsible for regional offices, but he has no employees and no vehicle. Ministry managers say they will need to rely on the field staff of the MEFCP. Clearly this is not an acceptable solution as the MEFCP is not able to address environmental and social concerns beyond forest management issues.

Minimal Budget

54. The budget for the new ministry's first full functioning year (2010 fiscal year) is a mere US\$ 865,000 - about 0.2 percent of the total government budget for the year. This figure is less than a tenth the size of the budget of its former ministry parent, the MEFCPE. The 2010 MEE Budget breakdown is shown in Table 5:

Table 5: Ministry of Environment and Ecology Budget, 2010

Category	USD
Personnel	551,042
Operating expenses	58,750
Investment	250,000

55. Ministry officials are hopeful their budget will be increased in coming years, but expect that much of the first year's allocation will go to securing office space for its employees, and procuring computers and other basic office equipment. It is anticipated that some additional funding may be provided by the FNE (once established) although it is as yet unclear how this mechanism would work. Ministry management has also been submitting funding proposals to various donors.

Human Resources: Civil Service Rules Aggravate Shortages

56. The ministry has a severe manpower shortage, both in terms of slots that are not filled, and in terms of a critical shortage of people with appropriate skills to manage the new ministry's varied responsibilities. As of February 2010, the MEE had 57 personnel, including the Minister, with another ten new employees under recruitment. All the key managers have been named, but many of the 22 services (business units) in the ministry only have one or two persons assigned to them. The staff shortage is exacerbated by the fact that new staff cannot be selected according to their skills and experience; civil service hiring rules dictate that the ministry must accept whichever employees the civil service sends them. Several in the ministry indicated that they were sent clerical and administrative workers when they had requested staff with technical expertise.

57. In some cases, people who migrated to the new ministry have been placed in positions for which they have no experience, despite having a skill that may be needed elsewhere within the ministry. One example is a sociologist from the EIA assessment team who has been assigned as head of the Air and Water Protection Unit, a field completely outside his area of expertise. Several senior staff in the ministry indicated they felt help was needed by outside experts to define the roles and responsibilities of the various directorates and services that have been created in the ministry.

Data Gathering and Management

58. Although there are several services in the ministry that nominally have responsibility for information gathering and database management, in fact many of the units will need to establish data collection plans and techniques for their own areas of responsibility. Given the insufficient supply of computers and field equipment, it is unclear how or when a regular system of data collection and storage will be developed. It is understood that much of the natural resources GIS and mapping information has remained at MEFCP following establishment of the new ministry. MEE would therefore benefit from technical assistance to help improve on this lack of coordination and direction to determine what environmental information should be collected, which indicators to track, and how this data will be used for setting priorities, making decisions, and developing policy and regulations. Data storage arrangements and inter-ministerial data responsibilities would also benefit from technical assistance.

IV. The EIA and Licensing Process

59. Environmental and Social Impact Assessment (ESIA) is still in its infancy in CAR, and the system is under development. The establishment of an ESIA process was driven by the requirements of donor environmental and social guidelines, and certain ministries began forming *ad hoc* committees to oversee environmental issues, but to date it is believed that there are less than a half dozen donor projects that have gone through an EIA process involving government ministries. The new Environmental Evaluation, Impact Assessment, Public Consultations and Environmental Audit Unit (EIAPCU) within MEE has lead responsibility for formal environmental assessments in CAR. The unit has eight staff, including an EIA expert, a sociologist, a legal expert and a number of junior staff with professional training but little or no experience in environmental assessment.

60. The Environmental Code's regulations have yet to be put in place, and implementation of the EIA system is not currently possible. As a result, companies work to their corporate standards or rely on donor agency guidelines for conducting environmental assessment. As a temporary measure, EIAs (mainly for forestry and mining projects) are currently reviewed by the relevant ministry, which convenes a multidisciplinary team calling in environmental or social experts from MEE to participate. Public consultations are to be a requirement of the new process¹², and a body to oversee the public consultation process will be created (the Commission for Public Hearings on the Environment - CAPE), but at present no capacity exists to manage consultations.

61. The part-developed regulations and guidelines may cause problems affecting the economic development of the country; for example, legislation for mining operation requires an environmental compliance certificate, only issued in acceptance of an EIA. As there are no guidelines for the EIA and review process or the issue of a certificate of environmental compliance, operating licences cannot be granted¹³. The screening process has yet to be developed and as such it

¹² Section 8 of the Environment Code calls for public hearings or consultations for environmental matters, including any plan, project or program which affects the environment.

¹³ At present, provisional one-year certificates are issued, pending the completion of regulations establishing the official compliance procedure.

is unclear which projects are required or will be required to conduct EIA. In addition to EIA approvals, EIAPCU is responsible for monitoring environmental compliance. The unit does not have any resources for compliance monitoring or enforcement, and as noted, field teams are not yet in place. As a result, there is no compliance monitoring in CAR.

62. It is difficult to assess how the new regulatory framework will work until it has been fully established. An assessment of the draft regulations and procedures currently under development for environmental audits, strategic and sectoral environmental assessments, and EIAs suggested that the framework has been well thought out. However, due to the low number of EIAs being conducted in CAR, there is to date very little local expertise available for carrying out social and environmental assessment; at present no consulting company capable of carrying out an EIA exists, and international firms carry out the work, assisted by individual local experts, such as academics from the university.

Constraints in the EIA Process: Challenges Ahead

63. Despite the fact that the EIA process is not yet fully operational, implementation of such a process is likely to trigger at least three major challenges:

- *Insufficient resources to assess EIAs:* There is only a small number of staff in MEE capable of reviewing EIAs, and the number of EIAs is likely to increase in the future following adoption of the EIA regulations making it a legal requirement for all qualifying projects. Furthermore, efforts to improve security in the country may lead donors and the private sector to increase investment in CAR. Forestry project EIAs are currently handled through PARPAF¹⁴, but these may need to be integrated into the new regulatory process, particularly if the agency to replace PARPAF is not established before PARPAF ends.
- *Insufficient Resources to Monitor ESMPs:* EIA assessment capacity in CAR is currently slim, but ESMP monitoring capacity is virtually nonexistent. Any increase in the number of projects requiring EIAs and ESMPs will require significant on the ground resources.
- *Environment Ministry's role vis-à-vis other Ministries:* the new ministry is in a delicate position in relation to other ministries. It has to play a potentially dual role as the government entity that informs and encourages other ministries to become more environmentally responsible, while also serving as the regulatory enforcer upon their projects. The ministry is new, small, with a young workforce and very little political leverage, and risks being blocked or ignored in trying to carry out its mandate.

V. Roles of NGOs and the Judiciary in Environmental Management

64. There are several environmental NGOs active in CAR, but most are concerned with wildlife conservation. There are also several consulting firms working on donor projects that function much like NGOs, but overall the role of NGO and NGO-like bodies in environmental management in CAR is negligible.

65. Due to the lack of environmental regulations or guidelines, the judiciary has not been involved in environmental matters in CAR in any great way; there is no evidence of any cases of litigation or government pursuing private interests for environmental issues. Once the regulations to support the Environmental Code are approved and enter into force, this situation may change.

¹⁴ See Chapter 5

VI. Recommendations: New Ministry Needs Urgent Assistance

66. MEE's most critical need is to obtain the resources needed to make ministry fully operational, before it loses its initial momentum:

- **Physical and Financial Resources:** MEE needs to ensure the basic resources to allow it to fulfil its functions. This includes obtaining its own dedicated office space, computers and other office equipment, vehicles, and other resources to allow for the establishment of field offices or frequent visits to the field by Bangui staff. Donor support could help kick start this process.
- **Human resources:** In early 2010, the ministry was still trying to complete recruitment of its organizational chart, but even when complete, most units will be understaffed, and many will be staffed with unsuitable employees. The expected increase in workloads due to the new regulations will aggravate the staffing shortfall. Funding is clearly needed to grow the staff base, and MEE should also be granted more authority in terms of being able to hire staff with the necessary skills.
- **Define roles and responsibilities:** An organizational development or performance improvement expert working with an environmental expert could help determine what the roles and responsibilities of the various units should be, to ensure there are no overlaps or gaps in terms of meeting the ministry's mandate.

67. Creation of a core group of environmental and social specialists capable of both analyzing ESIA's and monitoring projects in the field is needed. This team would largely be housed in MEE but could have members from other ministries. The group would receive training in environmental assessment and management under a capacity building program incorporating the following elements:

- **Skills assessment:** The ministry needs an in-depth capacity assessment to determine required capacities and skills, capabilities of current staff and gaps to be filled. This should then be followed by a comprehensive capacity building program.
- **Environmental Evaluation and Monitoring (including SEAs, ESIA's and ESMP's):** Training is recommended for MEE as well as for other ministries that develop, manage or have regulatory oversight over high environmental impact projects.
- **Training Institution capacity building program:** developing a critical mass of Central Africans with environmental knowledge requires development of in-country training resources. The University of Bangui is considering establishing a MSc. program to offer degrees in environmental management. Short courses and workshops for government employees are also needed.

68. Technical assistance is also needed to establish a data management system. Such assistance would help the various services determine what environmental information they need to collect, which indicators to track, how this data will be used, where to store the information, and who will be responsible for organizing and managing it.

69. CAR has severe resource constraints, and despite rising interest in environmental matters, MEE will always be competing for scarce budgetary resources. It therefore needs to be shrewd in attempting to tap as many donor, NGO and other industry resources as it can to gain knowledge and expertise in environmental issues.

Chapter 4: ENVIRONMENTAL MANAGEMENT IN THE MINING SECTOR

70. Mining is the largest source of export earnings for CAR, with diamond exports making up between 40 and 50 percent of export earnings, and representing around 7 percent of GDP¹⁵. The country has significant geological potential, with commercially exploitable deposits including alluvial diamonds, gold, uranium and iron ore. Current mineral production includes diamonds, gold, clay, limestone, sand and gravel. Alluvial diamond and gold production (the two largest mining activities in the country) occur in western CAR, primarily in Nana-Mambéré, Mambéré-Kadéï, Sanha and Lobaye provinces, as well as in the Ouaka and Houte-Kotto provinces in the centre-east of the country (see Figure 6). As yet undeveloped mineral resources include uranium, iron ore, manganese, ilmenite, and rutile.

71. Virtually all the diamonds and gold currently being produced in CAR are mined by artisanal and small scale miners. As much as 10-40 percent of CAR's diamonds and gold are sold through unofficial channels and leave the country illegally through Cameroon and other neighbouring countries. These sales are not taxed or captured in official export statistics, and help foster a secretive culture within the artisanal mining sector, with little benefit sharing for local communities impacted by the artisanal mining activities. Large scale industrial mining operations for gold, diamonds and uranium have yet to begin, mainly due to security and licensing issues.

72. For mining to become a major factor in promoting poverty alleviation there is a need to improve the effectiveness and transparency of artisanal mining, and to attract world class large scale producers who can bring modern methods and environmentally and socially responsible mining practices to the country. Diamond mining is likely to remain predominantly an artisanal activity, given the relative ease of access to the alluvial diamond deposits. With adequate security and business conditions other mineral resources, in particular gold and uranium, have the potential to attract larger-scale investment with the potential for more significant environmental and social impacts.

Artisanal Mining: a Regulatory Challenge

73. The vast majority of diamonds and gold produced in CAR are mined artisanally, in hundreds of small sites spread across the west and centre of the country. An earlier World Bank assessment¹⁶ reports that there are approximately 80,000 registered artisanal miners in the country, with an estimated total population of 300,000 to 400,000 miners in all. In a country of approximately 4.4 million people, this means as many as 10 percent of the population is involved in artisanal mining as a means of livelihood. Most of the mining sites are located in remote areas, far from modern infrastructure or government oversight.

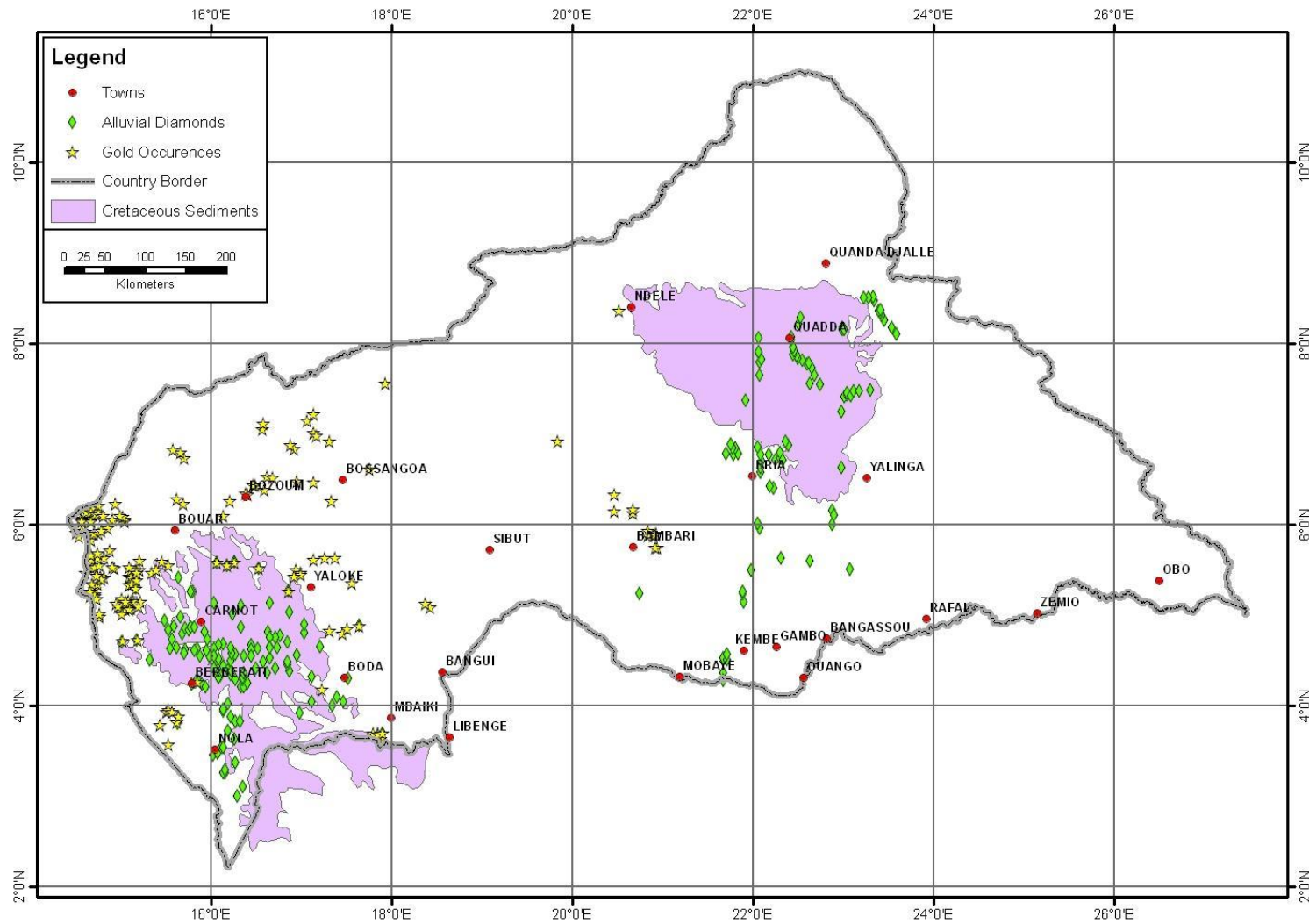
74. The official artisanal mining production chain includes the following components:

- *Labourers* make up the bulk of the artisanal workforce, and carry out basic digging, carrying, washing, and panning activities. They typically work in gangs of 5-10;
- *Registered Artisanal Miners* recruit and organize the labourers, sometimes including the pre-financing of supplies. Artisanal miners must pay a 4 USD annual fee to the local "Mine Brigade" office, and carry a registration card;

¹⁵ Bermudez-Lugo. May 2009. The Mineral Industries of Central African Republic, Cote d'Ivoire and Togo. United States Geological Survey

¹⁶ Wardell-Armstrong, 2008

Figure 6: Diamond and Gold Deposits in CAR¹⁷



¹⁷ Source: Wardell Armstrong LLP. Assessment of the Central African Republic Mining Sector-Draft Report

- *Site Chiefs (Chefs de Chantier)* are artisanal miners who have acquired ownership or access to a piece of land. Chefs de Chantiers are required to pay a portion of the mineral value back to labourers and to keep records of all minerals found within their concession;
- *Field Buyers (Collecteurs)* visit mining concessions frequently and buy the gold and diamonds from the artisanal miners and Chefs de Chantiers. Collecteurs buy the minerals at well below market rates;
- *Buying Offices (Bureaux d'Achats)* buy minerals from the Collecteurs and sell them to the government's buying agency, BECDOR. As recently as a several years ago, a dozen or so Bureaux d'Achats were in operation but a number of them were closed by the government when the Mining Code was revised;
- *BECDOR, or the Bureau d'Evaluation et de Contrôle de Diamant et d'Or*, is the government's buying agent which also has responsibility for tracking all diamond and gold transactions in the country and selling to export markets.

Ten or more Chefs de Chantiers can register with the government to form a cooperative, which can then bypass collecteurs to sell directly to the Bureaux d'Achats. In theory they are also eligible to export minerals directly, through BECDOR, although the value of exports required to qualify effectively render this opportunity unusable. The informal artisanal mining industry, which may be four to five times larger than the registered artisanal mining population, operates with a similar structure, with gangs of labourers employed by gang leaders or families who control the location.

75. Few artisanal miners have any geological training, making them inefficient at finding and mining the minerals. Similarly, they know little about the value or price of minerals, and thus are at the mercy of Collecteurs. The dynamics of artisanal mining is such that most diggers end up in debt to the Collecteurs or others who pre-finance the digging operations through provision of tools and/or food. Despite the health and safety risks and low potential for creating a good livelihood, artisanal mining offers one of the few non-farm sources of income in rural areas, and as such will continue to remain attractive to many people who have few other alternatives.

Large Scale Mining: Great Potential yet to be Realised

76. Large scale mining is relatively new and under-developed in CAR. Gold, uranium and iron in particular have potential for large scale extraction but the security, economic and governance setting is challenging. As a result of the difficult conditions, there are no active large scale mines operating in the country, although several companies have carried out extensive exploration activities in recent years. One medium-sized alluvial diamond producer is poised to start production but is currently waiting for world market conditions and diamond prices to improve so that the operation becomes economically feasible. Originally scheduled to be in production in 2009, the Passendro gold concession is due for closure as the operators were not able to obtain a mining license from the government, despite meeting EIA criteria. Uranium production is also under development but discussions with the government are stalling progress. Several other companies that were conducting explorations have left the country for various reasons.

77. There is no internal rail service within CAR, or rail links to neighbouring countries with seaports. The road system is poor, although there is some river transport and cross-border trade. Current infrastructure in the country is inadequate to support any large scale mining operation, which would require significant investments in transportation, power and water supplies to enable its activities. Artisanal mining is carried out without the use of large equipment or power, and diamonds and gold are low bulk, high value minerals that can be transported by individuals without trucks or rail.

Mining and Conflict

78. There are two broad populations associated with artisanal mining. One group is drawn from rural communities who mine in areas in or near their communities. The other group is migrants, predominantly (but not exclusively) men who move from artisanal site to site in search of work. This group includes CAR nationals as well as migrants from other Central or West African countries and internally displaced people (IDPs) and refugees moving south to escape local rebel clashes and conflict in Sudan and Chad. The health of mining communities has not been closely studied but appears to be similar to that of the general rural population in CAR, which is characterized by high rates of malnutrition, water-borne diseases, malaria, and HIV/AIDS.

79. Unusually, there is no history of conflict between the parties involved in mining in CAR, partly due to the low population density and rural location of most mining areas. There can occasionally be localized friction between local communities and migrants over access to mining lands, or over migrants' lack of respect of local social norms and customs. Tensions also arise between government officers and artisanal miners, as visits to mine sites by officers often lead to confiscation of miners' minerals and tools. In other countries, conflict is a common consequence of large and small scale mining operations pursuing the same minerals, but the absence of large scale operations in CAR means this phenomenon has yet to become common, although it may become more problematic in the future.

I. Stakeholder Analysis and Political Economy

80. Mining Sector stakeholders include government, private sector, civil society and mining-impacted communities and vulnerable populations. Among the Government agencies, the Ministry of Mines (MoM) has lead responsibility for the mining sector, and it issues all permits related to exploration and mining operations, negotiating mining agreements with large scale miners, and policing the artisanal mining sector activities. The ministry is primarily focused on collection of taxes and royalties rather than with enforcement and monitoring of environmental and social issues. MoM has had difficult relations with the large mining companies, and predictions that both the gold and uranium mines would be in production and providing revenue by 2010 were dashed by the global economic slowdown. MoM has an Environmental Protection Unit but this is very small and has no suitably qualified staff¹⁸. The *Brigades Minières* are police units assigned to MoM and responsible for enforcing mining laws, in particular ensuring those working in artisanal mining operations have the correct authorizations. There are plans to replace the Brigades, which are widely seen as ineffective, with better trained *Police Minières*.

81. The Environmental Code allocates oversight of environmental matters in all sectors, including mining, to MEE, although this mandate will not come into force until the accompanying regulations have been published. MEE is also responsible for issuing the environmental certificate of compliance that successfully completes the ESIA process. It remains to be seen what may happen if MoM and MEE were to disagree on whether to issue a large operator a permit, and whether the two ministries will interact when it comes to monitoring and enforcement of ESMPs.

82. The Finance Ministry's primary involvement in the mining sector is to serve as the repository for the revenue from mining activities. The ministry also has the authority to provide tax exonerations or other considerations to attract investors. MPECI oversees the development and implementation of the country's PRSP, which includes development of the mining sector as one of

¹⁸ See Chapter 3 for more detail

its priorities. There are no mining experts within MoP and it relies on MoM for input on mining sector opportunities and objectives.

83. In the private sector, despite high hopes, no large scale mining companies currently produce minerals, and many of the companies that were exploring in recent years have left CAR. The reasons for their departure appear to be a combination of the effects of the global economic downturn and the lack of organisation in CAR agencies. Artisanal diamond miners make up the majority of mining activity in the country, followed by artisanal gold miners. They are suspicious and mistrustful of government officers, due to the punitive and rent-seeking approaches taken to enforce mining regulations. As many artisanal miners are somewhat nomadic, it is difficult to organize them or get them engaged in improving their mining or environmental and social practices. The *Collecteurs* and *Bureaux d'Achat* act as the middlemen between the miners and BECDOR. They benefit from an artisanal mining sector that is poorly organized and unfamiliar with the quality and market value of the minerals they are mining. It is also generally understood that these actors are involved in both the official and unofficial sales channels for minerals. Forestry companies may in the future become concerned by the encroachment of artisanal miners in “their” forests, although at present the problem is not great.

84. Local communities might be affected to some degree by large scale mines, but are more likely to suffer from the effects of artisanal mining. Women and children are involved in the mining sector, but typically earn much less than men who control most of the sites and jobs. Women are also vulnerable to sexual and other violence by male miners. Internally displaced Central Africans, or refugees from neighbouring countries gravitate to artisanal mines. Despite its dangers and hardships, artisanal mining is one of the few economic opportunities for these groups. The majority of NGOs in CAR are focused on humanitarian relief efforts provided to refugees fleeing areas of rebel activity and civil conflict, or malnutrition due to extreme poverty. There are a small number of NGOs working in the forestry and wildlife sectors but none that focus exclusively on mining sector issues.

85. Among the development partners, the World Bank has been working in the CAR mining sector through development policy loan support, including technical assistance for revisions to the Mining Code, and support for CAR’s Extractives Industry Transparency Initiative (EITI) program. The EU provides a small amount of regional funding for mining policy activities through an expert who has been seconded to CEMAC. USAID is working in the artisanal mining sector through its Property Rights and Alluvial Diamond Development (PRADD) Program. The PRADD Program is designed to identify, clarify, and reinforce property rights to land and minerals at alluvial diamond mining pilot sites. The Chinese government and Chinese businesses are present in CAR, and are involved in building new hospitals, road construction, hydroelectric power supply development, and other activities. The Chinese have yet to become active in the CAR mining sector, although given China’s demand for minerals, it is likely that Chinese companies will seek to participate in the mining sector sooner or later.

II. Environmental and Social Issues Associated with Mining in CAR

86. As a result of the relatively low level of government capacity and control over the sector, environmental and social impacts due to mining are largely unregulated. The fact that the majority of mining operations are artisanal exacerbates the challenge of managing these problems. While the impacts of individual artisanal mining sites have fairly small and localized impacts on local vegetation, wildlife and habitats, the cumulative impacts of hundreds sites around the country may lead to increased risk of deforestation, habitat conversion and loss of biodiversity. There are localized cases where artisanal mining has diverted water courses or contaminated the water,

damaging the local ecosystem and limiting local populations' access to water. MEE regulations call for the creation of 200 meter buffer zones near streams where vegetation is left intact and no mining is permitted, but as with many legal provisions in CAR, these regulations appear to be little known and not enforced. While there has been no known use of mercury in the artisanal gold mining sector in CAR (mercury can be used to separate gold from other minerals), the constant influx of artisanal miners from other countries where the use of mercury is common could eventually lead to its arrival in CAR.

87. The creation of temporary camps of artisanal miners or an influx of migrants into existing communities can strain food supplies and overrun already poor water and sanitation facilities, worsens existing health problems. Digging activities and disruption of existing water courses can create pockets of standing water which serve as breeding grounds for malarial mosquitoes and water-borne diseases. The incidence of sexually transmitted diseases, including HIV/AIDS, can increase in mining areas due to prostitution. Artisanal mining involves long hours of hard, dirty and dangerous physical labour, but workers rarely have personal safety equipment such as hard hats, boots, and gloves, and are often unfamiliar or unconcerned with properly shoring up the pits they dig. Health problems related to artisanal mining include strained muscles, broken bones, dehydration, and infections. There are usually no local medical practitioners or equipment available, and no advice on basic health and safety techniques.

88. Relief organizations report whole families are abandoning farming and schools for artisanal mining work in some parts of the country, which causes or exacerbates malnutrition and general poverty, and often creates migrant problems. Migrant miners, especially single males, passing through communities in search of mining opportunities are unlikely to settle or invest locally, rather they contribute to an inflated boom economy by spending money on alcohol and sexual favours rather than on productive long-term investments in land, houses or public services. An estimated 70 percent of the population at mine sites may be under 25¹⁹. Many parents working at artisanal mine sites bring their school age children to help with the work. These children then have to forgo an education while being exposed to the hazards of a mine site.

89. Large scale mining, if it becomes established in CAR, will pose additional challenges for the management of environmental and social impacts. While mining for alluvial diamonds is likely to remain artisanal, there is significant potential for large-scale extraction of gold and uranium in particular. Although large scale surface mining operations typically have major impacts on vegetation and topsoil, remediation techniques can offset most of the negative impacts. The use of significant quantities of water to process the minerals will be more difficult to mitigate, as will the management of any large scale gold mining operations using cyanide to separate gold from other minerals. There are also health and safety issues attached to the mining of uranium, which can generate radioactive waste products. The risk of such impacts from large-scale mining will increase as security conditions improve in regions with commercially accessible resources.

90. Any large scale mining company setting up operations will need to invest in infrastructure improvements, including upgrading transportation links and power and water supplies. Such infrastructure development is likely to have both negative and positive environmental and social impacts, and full ESIA's should be carried out for each infrastructure project. If large scale mining were to begin, the difficulties of sourcing inputs and expertise from outside the country could lead to development of some local support services and value-added industries. While these industries may have some negative environmental impact, the broader socioeconomic effect is more likely to be a positive.

¹⁹ Wardell Armstrong, 2008.

III. Assessment of Mining-related Environmental Policies and Regulations

91. The main policies and regulations governing the extractive sector in CAR are the Mining Code (Law 09.005 of 29 April 2009) and associated regulations (under Decree 09.126 of 2009). The Mining Code establishes rights and responsibilities concerning protected areas, relations with landowners, relations with other miners, health, safety and environment, including requirements for ESIA, consultations, EMPs and site rehabilitation. The associated regulations include a commitment to respect the environmental regulations, and requires artisanal miners to sign an environmental rehabilitation contract as a precondition to receiving a mining permit. These requirements are not fulfilled, however, and enforcement does not occur, despite the fact that a Ministry of Mines Order²⁰ creates the Technical Commission responsible for monitoring and inspection of mining company Environmental and Social Impact Assessments.

92. In addition to these mining-specific regulations, the sector is also governed by the various environmental laws described in the previous chapter – indeed, the Mining Code and Regulations specifically refer to the Environmental Code. Nevertheless, the following specific gaps in the CAR legislation relating to environmental management of the mining sector may be identified:

- *No consideration of pre-operational environmental impacts:* the regulations do not have any provisions for site selection, exploration activities, or pilot plants;
- *Public disclosure for the EIA process is weak:* The regulations require a public hearing, and EMPs must address socioeconomic impacts, but the regulations do not stipulate that a plan for public communications and disclosure be required for each project. Such a plan would involve a series of interactions to gather information on the potential impacts that might be felt by the community, as well as to solicit their input on how to mitigate such impacts. Presentation of a voluminous set of EIA results to a community at the end of the research process leaves communities little leeway to contribute to and take ownership of any aspect of the EMP.
- *Lack of resources to enforce existing policies:* This is the single biggest weakness and it is one common to many African countries. There is a notable lack of sufficient resources within the Ministries of Mines and Environment to adequately enforce the existing policies and regulations.

IV. Institutional Capacity for Environmental and Social Management in Mining

93. The government agency responsible for overseeing all activities within the mining sector from exploration to export is the General Directorate of Mines (known as the “Ministry of Mines”) that sits within the Ministry for Mines, Energy and Hydraulics. The General Directorate of Mines has four Directorates underneath it, and the Environmental Protection Service is located within the Directorate for the Support of Mining Production. This unit is under-resourced and lacking in capacity, consisting of one manager and two administrative assistants based in Bangui, with no resources or ability to monitor field activities. It is assumed that the newly created MEE will become more involved in managing environmental issues in the mining sector, but there appears to be few working relations between the two ministries. Oversight of social and equity issues by MoM is even weaker than for that of MEE; there do not appear to be any social scientists working for MoM. The Ministry of Health is understood to have undertaken some activities in mining communities on disease prevention and HIV/AIDS awareness, although it is unclear how widespread these activities have been or how well they were coordinated with MoM.

²⁰ Ministry of Mines Order 031/07/MMEH/DIRCAB/DGM/DAPM/SPE of 22 March 2007

94. Roles and responsibilities for environmental and social oversight need to be clarified between MoM and MEE. With the completion of regulations for applying the Environmental Code, MEE will theoretically take the lead for management of environmental and related social impacts in all sectors, including mining. But there is still a need for MoM staff to be involved in environmental issues. Also, given resource constraints, it is unlikely MEE will acquire specialized mining environmental and social experts and so it will need to rely on MoM experts for assistance.

Public Participation and Consultation

95. The Environment Code calls for public hearings or consultations for projects and programs which affect the environment, including all major mining projects. The mining regulations state that EIAs must include the results of a public notification process (*enquête publique*), however there does not appear to be any requirement that additional public meetings or other consultations be undertaken with communities or other mining sector stakeholders once the ESIA process is completed. In practice (see Chapter 3) the institutional framework for dealing with public participation is not yet in place, and mining companies in CAR apply World Bank guidelines for consultations. At the national level, the EITI process has two multi-stakeholder groups, a National Council and a Steering Committee, both of which include representatives from civil society, including human rights NGOs, and these bodies meet several times a year. There appears to be no formal consultation process within the artisanal mining sector, although the PRADD Program has introduced consultative processes as a pilot program (see Box 1 below), however there is currently no plan for MoM to roll this approach out more broadly across the country.

V. Strengthening Management of Mining Sector Environmental Impacts

96. The recommendations for improving environmental and social management in the mining sector are similar to those proposed for overall institutional capacity for environmental management, and it is assumed that any initiatives undertaken to strengthen the environmental and social oversight and management capacity in MEE would be relevant and applicable to MoM. As MEE should have ultimate oversight over environmental management in the mining sector, the short term priorities needed to build capacity at MEE as outlined in the preceding chapter are critical to the mining sector.

Define Roles and Responsibilities, and Build Capacity Accordingly

97. Given the need for both MEE and MoM to be actively involved in environmental and social oversight in the sector, it is critical to clarify how roles and responsibilities are to be shared²¹. Ultimately, MEE should have lead responsibility for all national environmental matters, including providing strategic guidance to the government on environmental policy and enforcing environmental regulations. Given the extremely limited resources with which MEE is starting out, an interim solution could be to promote Cross-Ministerial teaming for review of EIAs and EMPs and for monitoring of environmental and social issues in the field. This would ensure the most efficient use of the scarce resources that exist at present, and the arrangement could be readjusted later as needs change and more resources become available.

98. As MEE takes on responsibilities for environmental enforcement, the focus of MoM staff can shift from a largely enforcement role to include technical assistance and facilitation to miners, to increase the efficiency of their working methods, improve health and safety measures, and create awareness for the environmental and social impacts of mining. The Directorate for Support of

²¹ An example of the issues requiring clarification is whether the interministerial technical committee reviewing mining sector EIAs should continue to be chaired by MoM, or whether MoE assume the role.

Mining Production is nominally responsible for this area, but they are woefully under resourced, and are viewed by the miners as an enforcement arm of the government. MoM staff should have access to the same capacity building opportunities as described for MEE in Chapter 3. As with MEE, and in conjunction with the effort to define roles and responsibilities within the two ministries, a skills and capacity assessment should be conducted, providing the basis for a capacity building program.

Box 1: the Property Rights and Alluvial Diamond Development (PRADD) Program

The PRADD Program is designed to identify, clarify, and reinforce property rights to land and minerals at alluvial diamond mining pilot sites. It aims to demonstrate that by strengthening property rights, alluvial diamonds will be brought into the chain of custody, and local benefits from production and marketing of alluvial diamonds will increase.

Participatory Rural Appraisals: a first step to strengthen property claims

Launched in March 2007, the Program is being implemented in three pilot zones in southwestern CAR in close collaboration with the Ministry of Mines. During the first year the project conducted participatory rural appraisals, a census of miners, a socioeconomic survey of all 253 artisanal miners in the pilot area, and mine-specific surveys. The information thus gathered permitted the development of a property rights claims registry of all 253 artisanal miners in the pilot zones linked to a basic production and sales information management framework in a GIS.

In response to a finding from the socio-economic survey indicating that one of the main reasons that so few artisanal miners possess legal documents is simply a lack of awareness, the Program developed and distributed a guide explaining legal documents, how to obtain them, the potential benefits of becoming “legal,” and the link between livelihoods and environmental management in mining areas.

Community Land-Use Planning: a tool to improve environmental management

In its second phase, PRADD provides assistance to mining communities in developing simple land use plans aimed at rationalizing the often anarchic expansion of artisanal diamond mining and better managing the accompanying environmental impacts. Surveys in the pilot areas have confirmed that as artisanal diamond mining expands, the impacts fall disproportionately on women who are left to shoulder an increasing share of the burden of agricultural production even as fields, forests, and water resources are lost or damaged. PRADD supports women community leaders to help them participate more effectively in community land use planning exercises.

Increase Resources for Enforcement of Existing Policies

99. Although mining sector policies and regulations are under review, and environmental policies and regulations are under development, there is a critical need to increase the resources available to support and enforce existing policies and regulations, in particular to:

- Increase human resources devoted to management of environmental and social issues in the mining sector, either by increasing the number of environmental and social specialists working for MoM, or alternatively, working for MEE but dedicated to the mining sector.

These additional resources are needed to review mining EIAs and EMPs and to monitor exploration and production sites;

- Increase physical resources to support oversight of environmental and social issues in the mining sector. There is a critical lack of resources deployed in field offices of both MEE and MoM that should be addressed. The most urgent resources include satisfactory living and working quarters for new and existing staff, vehicles, GPS devices, computers and other technology and tools to map and monitor mining activities and their ongoing environmental and social impacts.
- Strengthen the mining sector ESIA process. MoM lacks adequate capacity to conduct or review mining sector SEAs, EIAs, and EMPs. Given the new EIA regulations being prepared by MEE, mining sector specific EIA guidelines would be helpful.

Reinforce Governance and Accountability

100. While EITI is focused more on revenue transparency than on environmental and social impacts, the multi-stakeholder consultative approach promoted by EITI can lead to more transparency and discussion of these impacts on mining communities. Planned efforts to create regional or prefectural level EITI representation should be encouraged, as well as a broader effort to communicate the goals and results of EITI reporting to the general public. As part of this effort, incentives and penalties for enforcement of mining sector regulations related to environmental and social protection should be reviewed. CAR could benefit from the application of the World Bank's Extractive Industries Transparency Initiative Value Chain approach to addressing governance issues in the mining sector²². This integrated approach looks beyond revenue transparency to improving mineral sector governance, including environmental and social performance and sustainable development, throughout the mineral sector value chain.

Develop and Expand Initiatives for the Artisanal Mining Sector

101. There is also a need to determine how ESIA and ESMP processes could work within the artisanal mining sector. Simple approaches need to be found to educate artisanal miners about environmental and social responsibilities and a system of incentives and penalties created to encourage them to adopt good practices. Funds could be provided to assist artisanal miners to rehabilitate their sites, or to provide employment to others in the community for rehabilitation work

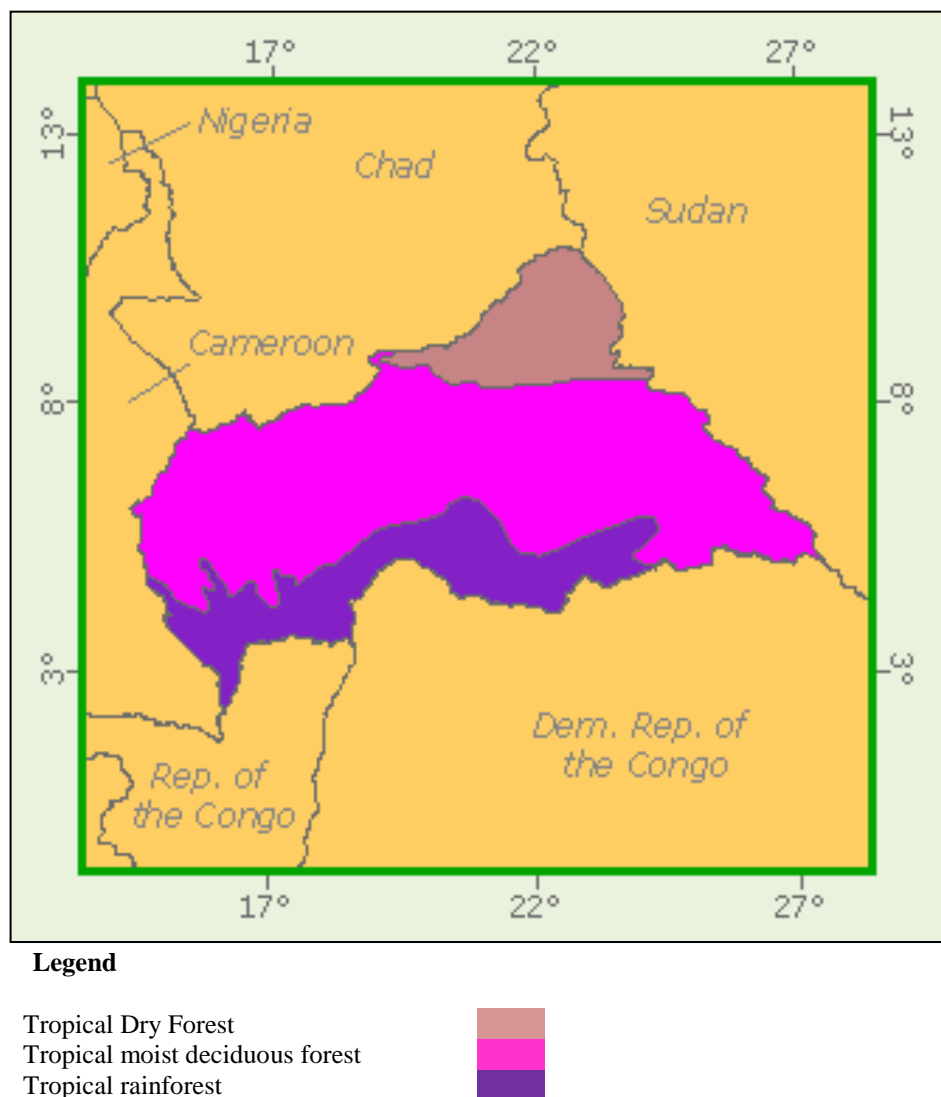
102. The PRADD Program (see Box 1 above) uses participatory rural appraisals to engage communities in the process of learning about and embracing their rights and obligations under CAR mining law. In its second phase, PRADD supports community land-use planning, with an emphasis on the empowerment of women, as a tool to help communities manage the local environmental impacts of artisanal mining. The lessons learnt from the pilot phase of PRADD should be used to help design a broader national effort to better manage the environmental and social impacts of artisanal mining, combined with initiatives to diversify economic activities within mining communities, so that mining is not the sole source of income.

²² EITI++ is a comprehensive initiative to improve governance in extractive industries that was launched by the World Bank in April, 2008. It provides a framework for identifying obstacles to the effective governance along the entire chain of managing EI resources — from granting access to those resources, to monitoring operations, to collecting EI revenues, to improving economic management decisions, to spending resources effectively for sustainable growth and poverty reduction.

Chapter 5: MANAGING FORESTS, WOODLANDS AND WILDLIFE RESOURCES

103. CAR's geography consists of diverse ecosystems, from dense, humid forest in the south-west to savannah in the north, as indicated in Figure 7 below. The gentle gradation in climatic conditions across CAR, together with the relative uniformity of the country's relief, account in part for the broad uniformity of the vegetation, which is predominantly a vast savannah woodland of tropical moist deciduous forest, except for the tropical rainforest found in the south-west (Lobaye, Sangha-Mbaéré and Mambéré-Kadéï prefectures) and in the Bangassou region in the east (Basse-Kotto and Mbomou prefectures), and the tropical dry forest in the sahelian north of the country.

Figure 7: CAR – Ecological Zones²³



104. The importance of woodland and forest resources for livelihoods and economic growth in CAR, and the numerous pressures on their sustainable use, led to the identification of these issues as a priority focus for the CEA.

²³ Map source: FAO, Global Forest Resources Assessment 2000, base map: ESRI

I. Management of Commercial Forest Resources

105. The forestry sector in CAR contributes significantly to the national economy, representing 40-50 percent of national exports by value. Forestry is the most competitive economic sector in the country and is a catalyst for national growth. It is also the most significant sector of formal private employment, with 4000 permanent employees and many thousands of temporary workers. In 2007, the forestry sector accounted for 6.3 percent of GDP, and its direct contribution to the national tax revenue was around 208 million USD, just over 10 percent of the total. The sector is managed by the Ministry of Water, Forestry, Fisheries, and Hunting (MEFCP).

106. CAR has a variety of forest types, much of which is considered amongst the richest in Africa, and includes valuable commercial species such as Sapelli (*Entandrophragma cylindricum*), Ayous (*Triplochiton scleroxylon*) and Aniéggré (*Aningeria robusta*). Table 6 summarises the types and areas of forests found in CAR.

Table 6: Land Cover in the Central African Republic²⁴

Land Cover	Area (ha)
Dense Forest	4, 616,199
Forest-crop mosaic	1, 816,380
Forest-savannah mosaic	22,774,437
Dense deciduous forest	922,923
Other plant communities	30, 970,737
Crop land	917,676
Other use	47,106

107. Production forests are those areas where Forest Operation and Management Permits (*Permis d'Exploitation et d'Aménagement* - PEAs) have been issued or where “national forest” status has been declared²⁵. Forestry areas dedicated to industrial logging in CAR are restricted to the southwest of the country, and these total some 3,600,000 ha. There are currently nine forestry companies operating in CAR, largely dominated by foreign-capital companies (mainly Chinese, French and Lebanese). As CAR is a landlocked country, goods are transported to Douala in Cameroon by rail from Bélabo or by road. Transport increases the production costs of timber from CAR by up to 60 percent.

108. Primary wood processing is carried out at eight industrial sawmills and one veneer plant, with a total input capacity of 500,000 m³/year. Log production during recent years has averaged about 540,000 m³/year, of which nearly one third was exported rough, with 68 percent processed in CAR. The output of domestic processing was 80,000 m³/year, giving a low mean yield of around 22 percent. The limited rates of processing and low yields highlight the scope to increase value added in this sector, and thereby reduce the share of transport costs.

Reforms in Forest Governance

109. The management of production forests in CAR has improved considerably in recent years, primarily due to the Project for the Support to the Implementation of Forest Management Plans (PARPAF), under implementation since 2000 and co-financed by the AFD and the CAR

²⁴ 2008 State of the forests for the Congo Basin

²⁵ There are presently 11 PEAs in existence, with a total area of around 3 million Ha, and 3 National Forests, with a total area of around 675,000 Ha.

government through the Special Allocation Account for Forestry and Tourism Development (CAS-CFT). The 1990 Forestry Code decreed that the State forestry administration was responsible for the establishment of Forest Management Plans and the permit-holding companies were to implement them. To help address the financial and technical constraints to effective implementation of the Forestry Code, AFD provided assistance in the form of the PARPAF Project. Phase 1 included improving administrative capacity for issuing management plans for forest permits, implementation of research and development for biological follow-up in the long term, and preparation of the forestry sector for standards in sustainable forest management. Phase 2 included bringing PEA units under sustainable management, knowledge transfer to the administration to ensure control of the implementation of Management Plans, and continued efforts to modernize the sector.

110. By 2003 the existing Forestry Code was deemed insufficient, particularly with respect to forest management, rural populations, and law enforcement. In November 2006, as part of PARPAF, a participatory reorganization of the institutions managing forestry began, leading two years later to a new Forestry Code issued in October 2008²⁶. Newly introduced management measures included:

- Ceasing special logging permits for small areas with little control, known for their poor forest management;
- Designation as national forests of PEAs granted to companies which did not honour their commitments;
- Introduction of an “eco-tax” doubling taxes for any given area of PEAs not under forest management planning;
- Setting up of a National Inter-ministerial Commission awarding PEAs; and
- Compulsory temporary forest management planning agreements for each newly awarded permit.

111. Forest Management Planning is now fully integrated into the 2008 Forestry Code, which also includes national standards and methodologies for the development of Management Plans²⁷. Assessment of the 2008 Forestry Code shows that it is generally well designed, deals with all the essential pertinent issues, and compares favourably to equivalent legislation in other countries of the region. Further specific management issues covered by the Code include:

- Clear obligations of the forestry companies towards their employees and their families, as well as obligations to support and develop existing communities within the permit area;
- Procedures for participatory management are clearly set out, to ensure equitable distribution of responsibilities, costs and benefits between stakeholders; and
- Regulations governing permitted volumes and locations for small scale or artisanal logging.

112. In addition to the Forestry Code, sustainable management of the sector is further bolstered by the Environment Code of 2007²⁸. Although there are no articles in the code pertaining specifically to forestry, a number of general provisions restrict certain activities within the forestry sector, and provide further environmental protection measures. Specifically, (i) Article 36 on biodiversity stipulates that wildlife be protected via rational management to preserve biological diversity and to ensure the balance in natural ecosystems, and that natural resources must be

²⁶ Law no. 08.022

²⁷ Ministerial Order n°019/MEFCPE/DIRCAB

²⁸ Law N°07/018

rationally managed to satisfy the needs of the current generations without compromising next generations, and (ii) Articles 87-91 relate to Environmental Impact Studies (EIS), which must be carried out for any development or project that is likely to damage the environment.

113. Implementing regulations under the Forestry Code are currently under preparation as part of PARPAF, with eight having been signed to date²⁹. Corruption in forestry and its monitoring in CAR are relatively limited, and previous irregularities in the permit tendering process have been addressed by the 2008 Forestry Code. Timber exports are controlled through a third party contract with BIVAC (Bureau Inspection Valuation Assessment Control, the Government Services & International Trade division of Bureau Veritas Group), covering timber certification at concessions, sawmills, and frontier posts, as well as the management and audit of timber export duties.

Forest Sector Financial Contribution: Impact of Economic Downturn and REDD Potential

114. In addition to the “ecotax” described in paragraph 109 above, the Forestry Code makes provision for three main forestry taxes defined by the finance law:

- A rental tax of 1.25 USD per hectare (of usable surface area) is levied annually;
- A tax on felled trees at a rate of 7 percent of the market price³⁰ per cubic meter of total volume felled; and
- A reforestation tax of 11 percent of the market price on log exports with a market price higher than 42 USD per cubic meter.

115. The taxes described above are distributed according to the scheme shown in Table 7. Communities are responsible for distribution of their tax income provided it benefits local socioeconomic development.

Table 7: Distribution of Forestry Taxes

Taxes	Recipient		
	Treasury	CAS-DFT	Communities
Rent	70 %	30 %	-
Felling	40 %	30 %	30 %
Reforestation	25 %	50 %	25 %

116. The implementation of the community distribution of tax revenue proved to be problematic when paid directly by logging companies to the communities. Fund malfunction (prestige expenditure, embezzlement, and fraudulent accounting) has led the government to request that funds be deposited into a holding account at the Bank of Central African States (BEAC). A Presidential Decree of September 2007 orders the setting up of a committee to vet communities’ proposals for using funds prior to any allocation being authorized.

117. Despite the recent achievements in the management of the sector, during the course of 2008, the economic impacts of external market changes hit the forestry sector in CAR hard. The global downturn, coupled with large stocks of wood product caused prices to crash, and orders to be cancelled. In some cases sales on the European market dropped as much as 95 percent on 2007

²⁹ These are detailed in full in Annexe C, but include such provisions as modalities for permit application, export conditions, and movement of livestock herds in forests and protected areas

³⁰ The Market Price value (M.P.) is established on a 6-month basis using the mean value of wood prices (FOB Douala) of the previous 6months. It is set at the fixed rate of 40 percent of that mean value according Art. 54 of the Finance Law 95.001

levels, causing huge losses of income for forestry companies but also for the government and local communities, due to a sizeable loss in tax revenues. Table 8 shows details of the economic decline in the sector during 2008-2009, resulting from the global downturn.

Table 8: Economic Decline in the Forestry Sector in CAR during 2008-2009

	2008 (Jan-Nov)	2009 (Jan-Nov)	Decline
Log Production (m ³)	531,440	320,834	- 40 %
Sawn wood production (m ³)	69,909	57,803	- 17 %
Log exports (m ³)	149,598	101,374	- 32 %
Sawn wood exports (m ³)	59,633	36,566	- 39 %
Income statements – felling/reforestation/rents (Billion XAF)	4.663	2.699	- 42 %
Export income felling/reforestation/rents (Billion XAF)	2.842	1.215	- 57 %

118. The economic impacts of the decline in sector are far reaching. The treasury clearly loses income due to loss of tax revenues, which in turn impacts on the population of CAR through reduced Government spending. Forestry and tourism investment and development also suffers due to the CAS-DFT's loss in revenue, as do the local communities. The logging companies were forced to reduce their workforce, and cut back on activities such as road maintenance, all of which have a knock-on effect on local livelihoods. Whilst no stakeholders deny the benefits of sustainable forest management an inevitable result of the downturn has been a neglect of certain areas of management responsibility, in particular the updating of concession management plans and social investments.

119. In March 2009, CAR was selected by the Participant Committee of the Forest Carbon Partnership Facility, and AFD announced that it would support CAR in the preparation of its Readiness Preparation Proposal (R-PP), consisting of (i) a national REDD (Reducing Emissions from Deforestation and forest Degradation) strategy, (ii) the establishment of a reference scenario for emissions from deforestation and degradation, and (iii) establishment of a monitoring system for emissions and emission reductions. Although the architecture of the future REDD regime is not yet clearly defined, the three items above are likely to be the minimum requirement to be completed by countries to be considered 'REDD ready' and therefore potentially eligible for REDD carbon transactions. It is not expected that REDD carbon financing will be available for CAR in the near future, but it is very likely that CAR will benefit from financial support from the international community in achieving REDD readiness.

Recommendations: Sustaining the Achievements of PARPAF

120. Despite the significant progress in strengthening forest governance achieved under PARPAF, much remains to be done to sustain the implementation of these reforms. A recent case in point was the award of a logging permit in the delicate environment of the northern fringe of the south-western forest massif, for which the government lacks the capacity to properly supervise forestry activities, and as a result there have been failures in forest management. Even when a company does operate responsibly in accordance with their permit agreement, the MEFCP currently lacks the capacity to manage and supervise systems such as chain of custody. In addition, almost

no finance is provided for forestry research. A study on training needs³¹ carried out in 2008 proposed a two year, 820,000 USD training programme to address present shortcomings.

121. Encouraging institutional developments include the opening of the Centre for Forest Data (CFD), and the Forest Economic Observatory (FIEO). The CFD collects logging data, draws up national statistics, and calculates the taxes owed. A lack of financial resources and technical capacity has hampered these activities, but there are plans for the centre to receive funds for improvement from the EU. The FIEO's objectives are to collect, process and analyse all useful data on the industry to determine profitability, which has a direct effect on government revenues (see below). The FIEO suffers from a lack of financial resources, and hence a lack of staffing and technical capacity.

122. With PARPAF due to end in July 2011, MEFCP has decided that a dedicated agency should replace the project. The agency should maintain support to the forestry management process, and endow the Ministry with strategy and planning capacities for the sector. At present there remains much work to do to establish the proposed agency: it requires an official mandate, staffing and staff training, budgetary support, and external technical assistance. It is important that MEFCP act quickly so as to benefit from the support and expertise of PARPAF in setting up the agency.

123. CAR has made real progress in the environmental and economic management of the forestry sector, resulting in reduced environmental impact and improved socioeconomic conditions. However, there is a real danger that unless the Government takes ownership of forest reforms post-PARPAF, management of the sector, as well as resulting income, is likely to stagnate, or worse, decline. Key recommendations to support the forestry sector and sustain the achievements of PARPAF include:

- Establishment of an Agency to replace PARPAF as soon as possible, so as to benefit from the PARPAF expertise and support for as long as possible before it closes in July, 2011;
- Strengthening of the Ministry's capacity to monitor the implementation of concession management and social investment plans;
- To better encourage the establishment of modern, efficient operating companies, it is recommended that the tender process for PEAs that have not yet been granted be started afresh;
- Particular attention is needed to ensure the successful implementation of sustainable management plans for permits near Bangui. Close cooperation between all relevant administrations and stakeholders will be required;
- A specific initiative is required to achieve effective use of the forest revenues allocated for community investment.

II. Hunting and the Bushmeat Trade

124. While the Congo Basin Forest Partnership 2005 report considered logging in CAR as a medium level threat, the bushmeat market was considered a severe threat. Hunting is an ancient and traditional activity in Central Africa, where domesticated animal husbandry is poorly practiced and where game remains an important source of protein and income for rural and urban populations. Urban populations maintain important exchange relationships with the countryside, which supply firewood, Non-Timber Forest Products (NTFPs) and especially meat from wild animals ("bushmeat").

³¹ GARRIGUE R., PERTHUISOT N. 2008 : *Évaluation des besoins en formation des agents du MEFCPE, TERE et MEFCPE*

Figure 8: Bushmeat for sale in Bangui and Berberati Markets



125. Although it does not figure in national accounts, bushmeat is an important yet hidden contributor to the CAR economy. Hard evidence on the sustainability of the trade is limited, but it is known that 34 species of mammal are threatened with extinction in west and central Africa, of which 17 are primates. Already some local extinctions have occurred, and many non-threatened species are exhibiting diminishing stocks. These losses threaten serious environmental repercussions due to the potential disappearance of species important for ecosystem functions such as seed dispersal and pollination. These threats will continue to mount as implementation of the Government's Rural Development Strategy provides further support for investment in rural roads, reducing the cost of transporting bushmeat to urban centres.

Legal Context and Law Enforcement: A Regulated but Uncontrolled Sector

126. As in all Central African countries, access to bushmeat resources in CAR is theoretically regulated by law. However, these laws are poorly enforced by authorities and rarely respected by citizens. The laws are frequently difficult to understand and are often contradictory. The use of forest resources in CAR is governed by the Forestry Code of 2008, specifying that "controlled use of wildlife for subsistence" is allowed "outside national parks, faunal reserves and sanctuaries". It is unclear what the term "controlled" means in this instance. Commercial hunting and the bushmeat sector are dealt with in more detail in the Wildlife Protection Code³². The Code allows traditional hunting of "ordinary game", but only for those who have traditional hunting rights or have a valid hunting permit. Only certain indigenous hunting techniques are allowed (fibre snares, crossbows and nets); large calibre firearms, night hunting, cable snares and 21 types of poison are prohibited. The same law stipulates that the commerce of bushmeat is formally prohibited. Despite this, taxes are collected by the Regional Direction of Taxes and Commerce to allow transport and sales of bushmeat, and sales quotas are fixed each year by the MEFCP. It is not clearly specified where this bushmeat may legally come from, or who is allowed to sell it to wholesalers. Killing animals of class A is strictly prohibited, and for the other classes, only adult males can be killed, but it is clear that these directives and criteria are not respected by hunters and there is very little in the way of inspection and penalisation.

127. MEFCP is responsible for enforcing the relevant laws in CAR, but is poorly equipped, understaffed (in 2005 there were just over 300 officers for the entire country) and lacking operational budget (USD 44,000 in 2008)³³. Most provinces have a single officer, often with no vehicle or weapon and little in the way of financial means.

³² Law N° 84.045 of 27 July 1984

³³ Roulet and Mamang, 2008

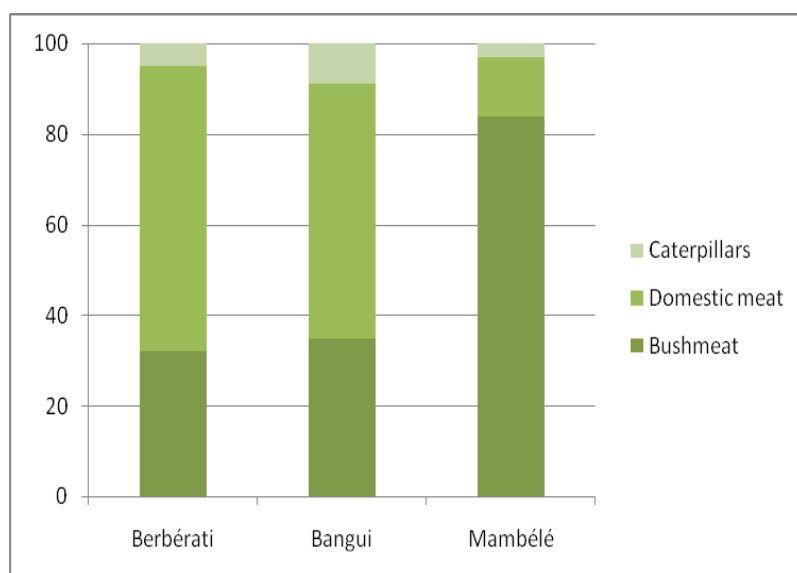
128. Hunters generally fall into two groups; “small scale hunters”, using predominantly indigenous hunting techniques for small and medium sized game, and the “big game hunters”, using modern military weapons to hunt large animals (such as elephant, buffalo, hippopotamus and bongo), many of which are protected. A further threat comes from Chadian and Sudanese poachers, who operate in large groups, use military weapons, and cause huge damage to wildlife and in particular elephants. The poachers operate not only in the north of the country but also invade the east and the southeast, and they have also been present in the Bangassou forests for about fifteen years.

129. Beyond the hunter is a complex chain of actors including wholesalers (some of whom operate under legal licenses, but most of whom operate illegally), semi-wholesalers, retailers, export dealers, and processors, all of whom make their livelihoods from the trade.

Bushmeat Consumption and Socio-Economic Impact

130. There are no reliable nationwide statistics on bushmeat consumption, and most bushmeat surveys carried out to date have only been in Bangui and in some markets in the southwest of the country. Annual consumption in Bangui, a town of 800,000 inhabitants, is estimated³⁴ at 9,500 tonnes or 11.9 kg/person, with a market value of some 21 million USD. Assuming a split of 40 percent urban and 60 percent rural for CAR’s population, it is possible to estimate that total annual bushmeat consumption for the country is around 48,000 tons. The PK12 market in Bangui is the site where the largest amounts of game are traded, with an estimated 4,000 tonnes per year. Much of the game sold in this market comes from the northern region and from subhumid savannas and gallery forests. Figure 9 shows the differing ratios of sources of protein between urban centres such as Bangui and Berberati, and logging areas such as Mambélé.

Figure 9: Sources of Protein Consumption in Urban and Rural Settings in CAR



131. There are a number of different types of actors in the bushmeat trade, but overall numbers of participants are difficult to estimate. Fargeot (2008) estimates that the number of hunters at the national level varies between 37,000 and 147,000. In the Bangassou forest, earnings can be as high as USD 1,000 per year for a hunter operating alone, and can reach USD 3,000 per year for a hunter working for a silent partner (generally a trafficker trading large animals). Some professional hunters

³⁴ Fargeot 2000, 2008

in logging camps increase their gains by becoming wholesalers themselves and by selling at higher prices on urban markets. Wholesalers and retailers can make up to USD 400 per month, and bushmeat restaurants can turn a profit of up to USD 230 per month. From the forest to the urban centres, each actor in the bushmeat supply chain sector makes a profit, and prices may easily triple from the beginning to the end of the commercial network.

Recommendations: Towards Sustainability in the Bushmeat Trade

132. In CAR, ungulates and, in particular, duikers supply the bulk of bushmeat hunted (up to 93 percent for certain sites). Primates, especially small monkeys such as Guenon, Colobus, and Mangabey, are also heavily hunted, as are rodents. In order for hunting and the bushmeat trade not to cause a major conservation problem, harvesting rates must be sustainable biologically, ecologically and economically³⁵. Sustainability, however, is increasingly threatened by a number of factors, in particular (i) rising population pressure and urbanization promoting the large-scale commercialization of bushmeat, (ii) improved access to forests and markets due to investments in roads (both public roads and private ones associated with logging and mineral extraction), (iii) more efficient hunting technologies (including automatic military weapons at low prices, and cable snares), and (iv) political instability and conflict which threaten food security, aggravate poverty and increase dependence on natural resources.

133. These factors are further aggravated by a lack of law enforcement in hunting areas and at market level, contradictory legislation, porous international borders, and a lack of military support in the fight against poaching. The resulting impact of these threats is a clear decline in overall numbers of animals, an upsetting of the ecological balance, and an unsustainable economic future for the sector. To avoid these outcomes, the following actions are recommended to increase control over the bushmeat sector and improve its sustainability:

- Reinforcement of MEFCP capacity to control hunting activities and the commercial bushmeat trade;
- Coordination between MEFCP and the armed forces to combat the devastation of CAR's wildlife at the hands of Chadian and Sudanese poachers;
- Prohibition of any profit-making from confiscation of illegal game;
- Provision by large forestry and mining companies of on-site alternative protein;
- Provision of alternative sources of protein by fostering small scale husbandry and agroforestry;
- Development of participatory management projects, where traditional hunting rights are defined in agreement with local communities;
- Clarification of contradictory laws, for example regarding the collection of taxes on prohibited forms of bushmeat trade.

III. Non- Timber Forest Products

134. Non-timber Forest Products (NTFPs) are particularly important in CAR due to the high biological diversity which increases the number of available products, and lower standards of living which increases reliance on these natural resources. NTFPs in CAR are consumed locally and traded at local, regional, national and international levels, contributing to improved livelihoods of communities by increasing incomes and supporting food security.

³⁵ Bennett, 2008

135. The importance of NTFPs and their sustainable management in Central Africa has been recognized for several decades by international institutions and governments of Central African countries, which have made them a priority in the Convergence Plan of the Central African Forest Commission (COMIFAC). Biodiversity protection conventions, forestry codes, and forestry concession inventories and management plans all take into account the value of NTFPs and the importance of their sustainable management. An improved understanding of the significance of woodland resources to rural livelihoods is particularly important in the context of CAR's Rural Development Strategy, finalized in December 2007, in order to better identify the potential trade-offs involved in the conversion of land for commercial agriculture, including palm-oil, cotton and coffee production, as well as cattle ranching.

136. The role of NTFPs in providing medicines, improving food supply and as source of income is widely documented in CAR³⁶. Hundreds of species of plants, animals and fungi are exploited as NTFPs in CAR³⁷. Dietary NTFPs consumed in CAR are numerous and include wild fruits, tubers, leaves, bark, saps, mushrooms, insects, birds, reptiles, aquatic species, and honey. Non-dietary NTFPs harvested in CAR include *Marantacea* leaves (used as packaging for other products); rattans (*Calamus derantus* and *Onclamus* sp.) and bamboos (used in craft and for production of utensils and furniture); Lianas (used to make "belts" for climbing trees); Fruits of *Strychnos aculeata* (used for making cups); and Shea oil (used in cosmetics and traditional medicine). Perhaps most alarmingly, a number of animal products, including those from protected species such as hippopotami, gorillas, chimpanzees and elephants, are used in CAR for production of ornaments, jewellery, masks and other craft items. Although a significant portion of the NTFPs which are traded in the Bangui markets come from the northern savannas, most surveys on NTFPs in CAR have focused on the dense forests in the south of the country.

Figure 10: NTFPs in Bangui and Berberati Markets



137. In Central Africa, traditional rights to exploit natural resources on State land are allotted to local populations through various forestry laws. CAR is particularly tolerant of traditional rights for local populations, who have access to nearly all of the State's permanent forests. The use of NTFPs is now regulated in the 2008 Forestry Code, which stipulates, among other things, that users or collectors (artisanal or industrial) must have valid permits and maps of NTFPs (issued by the MEFCP). The law advocates sustainable use of NTFPs by prohibiting destructive practices which do not maintain the biological balance of resources. The law also stipulates that the MEFCP is responsible for control of transport and export of NTFPs across the country (according to sub-regional agreements). The fact that management of NTFPs are included in the new Forestry Code shows a willingness to formalize the trading of these resources and to ensure sustainable

³⁶ Hladik 1994; Hladik *et al.* 1996; Tabuna 1999; N'Gasse 2003, 2008; Bonannée 1999

³⁷ Including 97 medicinal plants, 52 species of mushroom, 40 fruit species, and 10 caterpillars species

management and monitoring, but enforcing these new laws will require human and financial means which are not currently available.

NTFP Livelihoods and Revenues

138. In CAR, the harvest, processing, packaging and the trading of NTFPs are essentially linked with the informal sector - for example, products may be exchanged for food, clothes or building materials in remote villages. If products are sold on the national markets, the number of actors increases to include wholesalers and retailers. While it is clear that NTFPs make a significant contribution at the household level in the rural economy, there are relatively few data available, and where statistics do exist, they are frequently incomplete or inaccurate. Research conducted in Bangui markets suggests that NTFP wholesalers and domestic retailers make considerably more money than the average *per capita* income: a caterpillar wholesaler was calculated as earning roughly 7.65 USD per day, and a *Gnetum africanum* retailer 3.7 USD per day. This compares to CAR's income *per capita* of around 1.2 USD per day. Relatively good data exist for only a handful of important products that are traded nationally and internationally. In the Bangassou region, for example, the production of palm wine employs up to 700 full- and part-time people and generates on average 94 USD in monthly profit per person³⁸. For the season 1999-2000, the production of wild pepper (*Piper guineense*) generated 271,000 USD to exporters, whereas harvesters only gained 54,000 USD (i.e. 20 percent) and the Government a meagre 1,625 USD from taxes (CECI 2004). A small amount of NTFPs are legally exported from CAR, and these create government revenue by attracting three separate taxes; "technical taxes" levied on a per kg basis³⁹, a fee for production of a certificate of origin (3 USD per consignment, regardless of size), and an export tax, based on the value of the consignment.

NTFP Recommendations: Ensuring Sustainable Harvests

139. Poverty leads local communities to develop survival strategies where immediately accessible and relatively inexpensive natural resources are utilized to meet basic needs (food, clothing, shelter) and generate income, with little thought to whether the harvest levels or methods are sustainable or not. The ecological pressure on an NTFP depends largely on its level of commercialization and its availability in markets, as well the product's abundance and the harvest method. The environmental impact of NTFP harvesting on forest structure and composition is closely linked not only to the intensity of harvesting, but also to what part of a plant a NTFP is collected from, and how they are harvested. In CAR, almost all harvest methods are destructive, even for products which have a robust added value or are destined for exportation (such as wild pepper), and therefore present a potential long-term source of profit if properly managed. *Piper guineense* host trees are chopped down or the pepper plant is cut off at the base; trees of *Xylopia aethiopica* are cut down to collect grains of Ethiopian pepper, and palm trees (*Elaeis guineensis*) are felled to make palm oil; the root of the mother plant of *Rauwolfia vomitoria* is often mutilated during collection of the bark; rattan is frequently harvested when too young, and often the removal of too much bark from tree species kills the trees. To better ensure the sustainability of NTFP harvests, the following actions are recommended:

- The organization of harvesters of NTFPs, ideally into cooperatives, promoting sustainable harvesting methods;
- Development of participatory management projects, where traditional rights are defined in agreement with local communities;

³⁸ CECI, 2004

³⁹ Example rates: *Piper guineense* – 7 FCFA/kg, *Rauwolfia vomitoria* – 15 FCFA/kg

- The inclusion of sustainable NTFP harvests in production forest management plans;
- Development of “game” farming (e.g. snails and caterpillars) and honey production, with improved production and packaging arrangements;
- Encouragement of national research projects into the design and promotion of techniques to add value to NTFPs, and to improve sustainability and yields;
- International support to initiate national inventories of vulnerable and threatened species and their use.

IV. Protected Areas and Wildlife

140. The network of protected areas in CAR is largely a legacy of the colonial era. In 1916 the first environmental law was published in CAR, which prohibited hunting in reserves. A decree published in 1929 envisioned the creation of National Parks and Reserves, on the condition that these protected areas “did not interfere with economic activity in the regions where they would be created.” Over the years the legislation related to wildlife conservation and protected area management has undergone considerable revision, frequently with respect to the types of hunting that were allowed in certain places. For example, in the 1930s, “Partial Hunting Reserves” permitted hunting for six months out of the year, but these reserves eventually became Faunal Reserves where hunting was forbidden. In the last two decades, three key laws governing protected area management have been passed; the Forestry Code, the Wildlife Code and the Environmental Code. At present, MEFCP is responsible for the management of the country’s protected area network through its Department of Wildlife and Protected Areas. CAR has ratified a number of international treaties and conventions linked to biodiversity protection, including the Convention Africaine d’Alger (1968), on the conservation of nature and natural resources; the World Heritage Convention (UNESCO, 1972), on the protection of cultural and natural World Heritage sites; the Washington Convention (CITES, 1973) on international trade in endangered species of flora and fauna; the Ramsar Convention (1971) on protection of wetlands; and the Bonn Convention (1979) on the conservation of migratory species.

141. Figure 11 shows the locations of CAR’s protected areas, which on paper provide good representation of country’s ecosystems. The Environmental Performance Indicator (EPI)⁴⁰ developed by the Yale Center for Environmental Law & Policy includes the biome protection index, which measures the degree to which a country achieves the target of protecting at least 10 percent of each terrestrial biome within its borders. While CAR fully achieves this goal, this index does not indicate the reality of the situation in CAR’s protected areas, the majority of which are poorly staffed and underfinanced, and as a result suffer from numerous threats. Almost one third of the protected areas of CAR suffer from little or no management⁴¹.

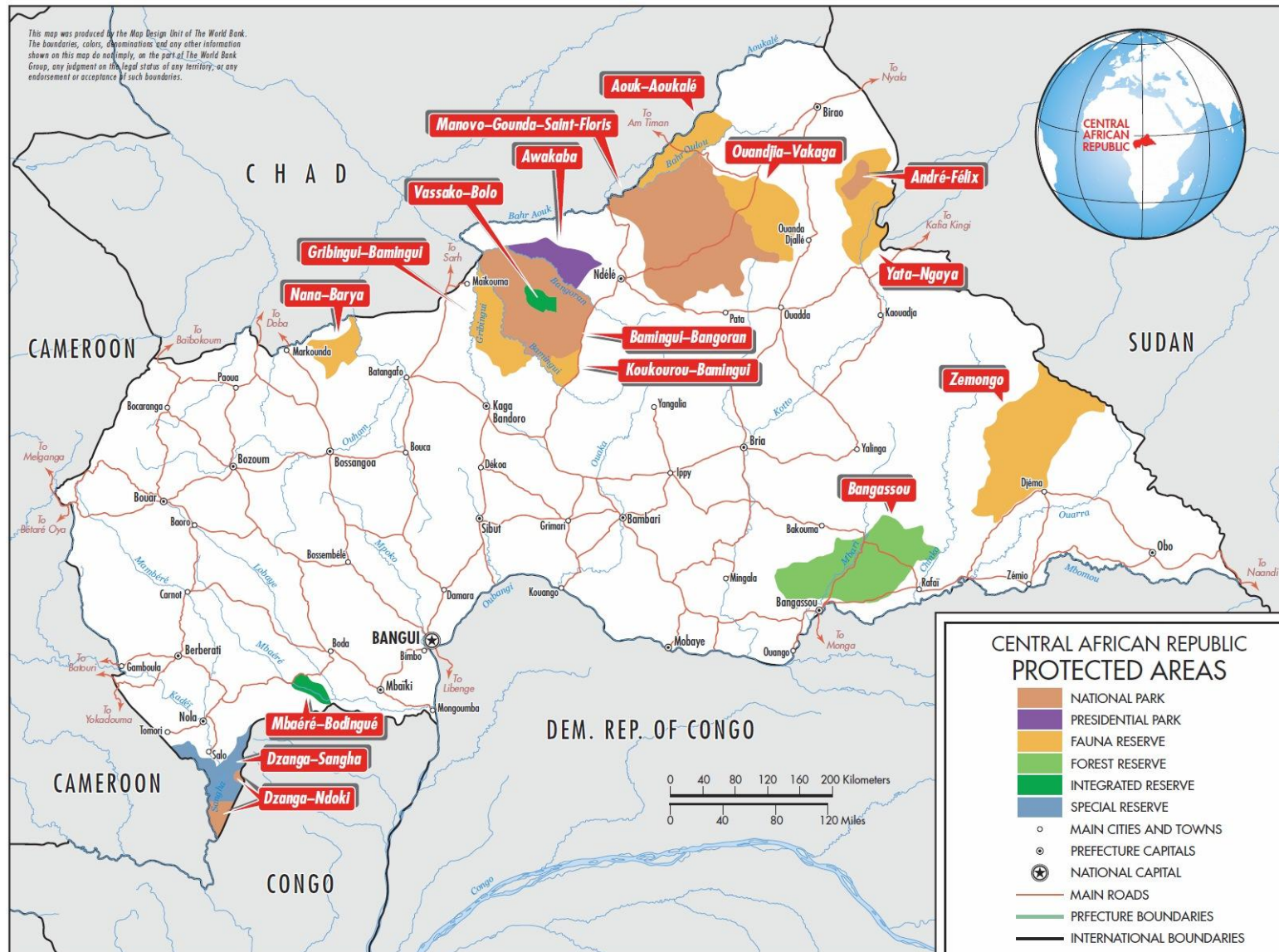
Wildlife: Diverse but in Decline

142. Wildlife in the Central African Republic is particularly diverse due to the variety of ecosystems in the country, and includes vast areas of forest/savanna ecotones known to be particularly rich in biodiversity. Although the different types of savanna in CAR are only slightly degraded, wildlife is still under strong pressure. This is despite the influence of projects such as ECOFAC, which have provided financial support for more than two decades, and in a country where the human population density does not exceed seven inhabitants per square kilometer (the third lowest in Sub-Saharan Africa).

⁴⁰ <http://epi.yale.edu/>

⁴¹ Blom *et al* 2004: 485

Figure 11: The Protected Areas of the Central African Republic



143. In the far north of CAR, an aerial census of large mammals was carried out in 1985 and repeated in 2005, using the same methodology and an identical sampling plan, to monitor the change in animal populations over 20 years. The 1985 census revealed the massacre of elephants by ivory poachers, compared to an earlier census in 1978. In 2005, the situation was worse; rhinos were completely gone from the area and elephant populations had collapsed, with the loss of 90 percent of the population in the Manovo-Gounda St Floris National Park and 56 percent in the Bamingui-Bangoran National Park. For almost all other species, results showed a drastic decrease in densities. For certain species (e.g. kob, waterbuck, reedbuck, topi and ostrich), numbers were so weak that their long term viability was already in doubt in 2005. On the whole, the geographical distribution of wildlife was reduced since the 1985 census, although certain species (such as eland, warthog, and bushbuck) have increased in number within the areas covered. In 2009 a random aerial census within the northern region was carried out by a private operator with considerable experience in the area⁴². Many herds of cattle were observed within the Manovo-Gounda St Floris National Park, along with camps for smoking fish and bushmeat, but no wildlife was seen, save a solitary giraffe.

Priority Recommendations to Address Serious Threats

144. Despite the designation of numerous national parks, Ramsar sites and World Heritage Sites in CAR in recent years, a lack of resources and funding has caused neglect of proper conservation measures, and a failure to protect ecologically significant areas and species from widespread poaching and the effects of overgrazing, in particular in those areas bordering Chad and the Sudan. The lack of security has led to serious threats from heavily armed poachers that neither local communities, the MEFCP, nor even the military are able to confront. Although poaching was initially focused almost exclusively on obtaining ivory, as elephant populations have been seriously reduced, poaching has now begun to shift towards acquiring bushmeat, putting more species at risk. Porous international borders also allow grazing by pastoralists from Chad and Sudan whose large herds of livestock are one of the most serious threats to wildlife in the north of the country. In other areas, artisanal diamond exploitation has the potential to damage fragile ecosystems in protected areas, particularly as this exploitation is frequently accompanied by poaching, and uncontrolled bush fires damage ecosystems, particularly within the savannah protected areas.

145. In the face of such threats, MEFCP has insufficient resources (human and financial) to manage the 68,000 km² of protected areas. A significant increase in budget is necessary to allow the hiring, training, equipping and functioning of a team sufficiently large to secure the protected areas, and to ensure control of hunting activities and trade in bushmeat and NTFPs. In addition to the reinforcement of MEFCP capacity, better coordination is required between the Ministry and the armed forces to combat the devastation of CAR's wildlife at the hands of Chadian and Sudanese poachers, and to prevent the intrusion of pastoralists into protected areas. Beyond enforcement, MEFCP needs to support the development of participatory management projects. In the north, this should form part of a serious and transparent evaluation of land use to propose a system of zoning that will protect as much biodiversity as possible, while allowing communities access to resources that must be sustainably managed. In the south of the country, the top priority is the completion and adoption of the Dzanga Sangha and the Mbaéré-Bodingué National Park Plans. These measures need to be accompanied by efforts to improve local people's understanding of conservation laws and challenges, and international support for national inventories of at least vulnerable and threatened species.

⁴² pers. comm. L. Brontesi

V. Tourism and Trophy Hunting

146. Tourism in CAR is managed by the Ministry for the Development of Tourism and Handicrafts (MDTA). Precise statistics on numbers of tourists are impossible to calculate, as all non-resident visitors to CAR are considered tourists. The 1970s were the heyday for tourism in CAR, when the enormous potential of locations such as Bamingui-Bangoran and Manovo-Gounda Saint-Floris National Parks attracted intrepid investors, who began to develop some infrastructure and manage sites for visitors. Unfortunately, the mid to late 1980s witnessed a significant increase in poaching of rhinos and elephants in the north. As a result, with one notable exception in the south (Dzanga Sangha), tourism in CAR has plummeted drastically over the last two decades. The lack of security in the country discourages visitors in general, and the lack of transportation and quality tourism infrastructure (hotels, restaurants, lodges, managed game viewing sites, etc) seriously hinder development of the tourist industry. Further aggravating the decline in tourism is the reduction in wildlife populations due to the continued poaching and illegal grazing of cattle inside CAR's protected areas.

147. The best example of a tourism site in CAR is the Dzanga Sangha Complex in the southwest, far from the insecurity in the north, and featuring a saline lake with large numbers of elephants, gorilla-tracking, and cultural tourism activities with the local Ba'aka (pygmy) communities. Despite heavy investment and years of development, visitor numbers and revenue remain low. In 2007, a total of 586 tourists generated revenue of around 110,000 Euros. In a manner similar to forestry tax distribution, the funds are divided according to following formula:

- 50 percent goes to the Park administration for re-investment;
- 40 percent is for the community of Yobé-Sangha, where the protected areas are located; and
- 10 percent goes to the CAS-DFT.

148. The ECOFAC project in the N'gotto Forest aided the government in the creation of the Mbaéré-Bodingué National Park in 2007, but the tourism facilities remain rudimentary, the staff lack training, and with the departure of ECOFAC in 2011, it seems unlikely that tourism will develop in the Park in the near future. There have been two notable ventures by the MDTA to encourage tourism near to Bangui (the construction of a hotel at the Boali waterfall and the provision of a poorly stocked crocodile lake) but these ventures do not appear to be successful. Aside from the security and poaching threats, which are at present difficult to overcome, CAR shows considerable tourism potential. The MDTA should concentrate its efforts on creating an investment climate favorable to foreign private tourism investment rather than attempting to create and manage tourism sites in its own right.

Trophy Hunting: A Potentially Important Source of Revenue

149. Sport-hunting has been an important revenue-generating activity for the past several decades, as CAR has been a renowned destination for hunters (typically 100-200 each year) interested in pursuing the large mammals that were once prevalent in the north and east of the country (buffalo, bongo, kob, and eland, amongst others). Until recently, the hunting guide would rent a hunting concession from the government, pay all of the relevant permits and taxes, undertake the promotion necessary to attract clients, and bring them into the country to hunt. More recently, under the guise of ECOFAC, a new model for sport-hunting has been developed: Village Hunting Zones (*Zone Cynégétique Villageois - ZCV*), which aim to involve communities more significantly in the management of the hunting zones and in revenue-sharing. In addition to the revenue which is generated for the State and for communities, sport-hunting also contributes to the economy through

employment: between 500-900 local people are employed in the sector⁴³ as guides, porters, camp personnel, guards, and drivers.

150. Sport hunting is managed by the Wildlife Exploitation Division (DFAP) under MEFCP. The DFAP is responsible for issuing hunting permits, guide licenses, hunting zones and quotas, and for managing the various taxes involved. The most critical legal text with regards to hunting in CAR is the Wildlife Code. This law defines the types of protected areas, their legal status and management regime, as well as protection of wildlife and the organization of traditional and sport-hunting.

151. Revenue from sport hunting has been significant over the years, although precise statistics are hard to come by. A recent review of the sector⁴⁴ indicates that over the past decade sport hunting has generated an average of around 670,000 USD per year. As with forestry taxes and sightseeing revenues, the income generated by trophy hunting is now split between the national treasury and local communities. Table 9 shows the tax revenues generated by trophy hunting in CAR in 2007.

Table 9: Trophy Taxes (in USD) for Selected Target Species⁴⁵

Species	Number Total		Trophy Tax	Total Receipts	Revenue Sharing		
	Quota	Hunted			Treasury (50%)	CAS-DFT (25%)	Community (25%)
Leopard	43	20	1,667	33,333	16,667	8,333	8,333
Eland	129	87	1,667	145,000	72,500	36,250	36,250
Buffalo	292	193	417	80,417	39,583	20,104	20,104
Hartebeest	110	60	333	20,000	10,000	5,000	5,000
Roan Antelope	96	40	625	25,000	12,500	6,250	6,250
Bongo	55	17	2,083	35,417	17,708	8,854	8,854
Waterbuck	27	17	417	7,083	3,542	1,771	1,771
Kob	28	14	333	4,667	2,333	1,167	1,167
Lion	11	3	1,667	5,000	2,500	1,250	1,250
TOTAL	2,164	972		468,104	234,052	117,026	117,026

The sport hunting sector in CAR has been seriously affected by the current lack of security. In addition, transborder poaching by heavily armed hunters freely crossing the borders from Chad and Sudan eliminated both black and white rhino species in the 1980s, and has also largely decimated the elephant population in the north. These factors, along with the increasing prevalence of uncontrolled grazing of domestic animals in protected areas, are seriously threatening the viability of this important source of foreign exchange.

152. Encouragingly, in 2002 a group of seven sport-hunting companies working in northern CAR formed the Association for the Protection of Central African Republic's Wildlife (APFC). The objectives of APFC are to promote development in the region through both sightseeing and sport-hunting tourism, and to work with local communities and authorities to develop a common strategy for dealing with the increasing insecurity caused by poaching. The Association has raised funds to train, equip and pay personnel to undertake anti-poaching missions in the region. Despite their efforts, and a reasonably close collaborative relationship with MEFCP officials, the military has

⁴³ Roulet and Mamang 2008

⁴⁴ Roulet and Mamang 2008

⁴⁵ Adapted from Roulet & Mamang, 2008

shown little inclination to date to address the poaching problem⁴⁶. Confrontations with heavily armed poachers are becoming more frequent and more violent, culminating in the deaths of five trackers working for APFC and ECOFAC in June 2009. Without a serious commitment from the armed forces to restore security in the north, it is likely that poachers will continue large-scale operations, wiping out wildlife, and even the most committed sport-hunting guides will have trouble staying in business.

Further Support for Tourism and Sport Hunting

153. Aside from improvements in security, a number of actions are recommended to improve the management and sustainability of tourism and trophy hunting in CAR. With the departure of ECOFAC in 2011, there is a legitimate concern that the Local Management Committees of the ZCVs will not be capable of handling all their responsibilities. To address this concern, ECOFAC and its partners should focus on increasing the capacity of the Local Management Committees, improving understanding of ZCV system via training and public awareness, and ensuring that ZCVs are included in the updated Wildlife Code. It would also be useful to evaluate the possibilities of developing “green hunting” (hunters pay researchers to track and capture animals, shooting anaesthetic darts rather than live ammunition). More generally, there is a need for outside assistance to assist with the creation of a modest publicity campaign aimed at attracting investors, and to provide training courses in tourism for young Central Africans.

VI. Combined Management of Natural Resources

154. The above analysis of the management of forests, woodlands and wildlife resources in CAR show that despite some encouraging initiatives, legal reforms and projects, and despite the relatively low population density in CAR, these natural resources have already been severely depleted and remain under threat, and the impact of continued mismanagement and misuse could severely affect the natural and socio-economic environment of the country. Over-harvesting or mis-harvesting NTFPs, over-harvesting of bushmeat, poaching, overgrazing, and lack of protected area management combine to cause degradation of forests and protected areas, imbalance in ecosystems, and the continued reduction and even elimination of important food species and protected species. Tourism and sport hunting, and consequently local incomes, are also impacted.

155. Due to the close linkages between the various causes of woodland, wildlife and forest degradation, and due to the potential socio-economic benefits of good management, a combined and participatory approach to their management is needed, emphasizing in particular: (i) the reinforcement of MEFCP capacity to better manage forest concessions and protected areas, and to control the trade in bushmeat and NTFPs; (ii) the need to ensure local communities derive economic benefits from forestry, tourism and sustainable resource management, and to improve the level of community involvement in decision-making over resource use; (iii) encouragement of private sector investment, both on value-added processing of forest products, and with a focus on activities such as sport-hunting which can contribute to sustainable management of wildlife populations; and (iv) improving the data on which to base the development of strategies and management plans for the sustainable development of forest, woodland and wildlife resources.

⁴⁶ DFAP pers. comm

Chapter 6: GROWTH THAT IS RESILIENT TO CLIMATE CHANGE

156. There are few available data for CAR that can be used to build a clear climatological picture for the country as a whole or to use as a basis for future climate projections⁴⁷. The deficiency of meteorological records presents a major difficulty in assessing all aspects of weather and climate risks, and also prevents extrapolation from global climate models. This is because climate models are unable to simulate regional and temporal details with accuracy, and to assess these limitations and make corrections, in situ measurements of the type that are scarce in CAR are needed. To determine the potential impacts of climate change on CAR, and inform government decision making with respect to mitigating future impacts, a detailed statistical analysis and modelling exercise was undertaken as part of the CEA, using several existing global data sets of two main types; those based on statistical analysis using available observations and those based on “reanalyses” (see Box 2). Rainfall presents particular difficulties for weather and climate prediction and research for a number of reasons, and thus it should be anticipated that the quality of the rainfall information for CAR derived from the reanalyses will be less than that for temperature.

Box 2: Modelling Climate using Reanalysis

In order to appreciate a *reanalysis* it is helpful to understand the concept of the basic *analysis*. An *analysis* is the meteorological term for a mass of weather data, collected via various methods across the globe at any one time, which has been filtered and analysed to reduce errors (e.g. observational, recording etc) and eliminate anomalies. Once created, an analysis can then be entered into a weather prediction model for forecasting purposes. Climate models also require *analyses* as inputs, however rather than needing the latest data on the current state of the weather so important to short term, weather forecasting, climate models require average data, taken over sustained periods.

The concept of *reanalysis* is to return over the history of available measurements using the latest assimilation and modelling approaches to recalculate the *analyses* for the extended period, including extra data that was not available at the time of the original analysis. This technique provides a consistent record of the history of the atmosphere across the globe and throughout the depth of the atmosphere, and *reanalyses* are thus of substantial benefit in representing meteorological information for countries, such as CAR, in which few data are available. For this assessment exercise, the *reanalysis* from the National Centre for Atmospheric Prediction (NCEP), by far the most widely used in research and practice, was used, and NCEP *reanalysis* information has been used to derive the basic surface climatology for CAR.

I. Recent Climate Trends: Gradual Warming and Less Predictable Rainfall

157. CAR lies towards the northern end of an area of Africa that has month-by-month changes in the location of an extensive area of convection known as the Inter-Tropical Convergence Zone (ITCZ). The ITCZ is a key aspect of the atmospheric circulation across the entire continent, causing a regular cycle with peak rainfall in boreal summer and lowest rainfall in boreal winter. To the north of the country the rainfall cycle becomes less pronounced as the climate becomes increasingly arid into the Sahel zone.

158. CAR is a tropical country with warm to hot temperatures throughout the year; the warmest months on average are those just ahead of the rainfall season, i.e. March and April, while

⁴⁷ It appears that fragmented data do exist within CAR, however there is no central recording of the data and hence acquisition of a complete set of data is very difficult. Furthermore, where records do exist, measurements are not taken regularly, so a complete temporal record is unavailable.

temperatures tend to be lower during the rainfall season itself. On a daily basis it is reasonable to assume that dry days will tend to be warmer than rain days. Across the year maximum temperatures in the north exceed 33°C 10 percent of the time, while in the wetter south the comparable figure is about 26°C. The frequency of warm days can readily more than double in dry years. Temperatures over CAR have in general increased since 1978, in particular subsequently to 1997. The rate of increase is approximately 0.30°C per decade, with the rate of increase being faster across the northeast of CAR⁴⁸ (0.34°C per decade) than it is over the southwest of CAR⁴⁹ (0.24°C per decade). Maximum temperatures have been rising more quickly than minimum temperatures over the country as a whole: 0.35°C per decade as against 0.21°C per decade.

159. Rainfall totals across the year in CAR reflect its geographical position with the north-south gradient typical of this part of Africa showing average annual totals of around 1300 mm in the north, increasing to in excess of 2100 mm in the southwest. The dry season occurs between December and February, with the rainy season being between June and November. The annual average number of days without rainfall varies between almost 210 in the far north of CAR and a little over 30 in the extreme southwest⁵⁰. In drought conditions these totals rise to about 260 in the north and around 50 to 90 in the southwest. Unlike the relatively steady increase in temperatures over CAR, changes in rainfall across the period 1978 to 2009 shown no evident strong trend but relatively more inter-annual variability. Statistically the average rate of change over these three decades has been a reduction at a rate of about -0.05 mm/day (or -9 mm/year) per decade; it is in the northeast that the main downward trend has occurred (-0.17 mm/day, -61 mm/year, per decade) while a positive trend has been present over the southwest (+0.10 mm/day, +38 mm/year, per decade).

II. Sensitivity of Society to Climate Change

160. Livelihoods in CAR are vulnerable to climate variability in a variety of ways, notably through agricultural productivity and food security, forest production, water resources, health, and exposure to natural disasters:

- Agricultural productivity, including both plant cultivation and livestock production, is heavily affected by the amount and timing of rainfall, the length of the growing season, storm severity, and the number of growing days;
- Forest production is also sensitive to climate conditions. Temperature and rainfall changes can have direct effects on tree growing ranges, growth rates, and productivity, and can also affect frequency and severity of fires. Livelihoods are also sensitive to changes in habitat that affect the production of bushmeat and NFTP's;
- Water resources impact livelihoods in CAR both through dependence on rain-fed agriculture, and because of reliance on hydropower for electricity generation;
- Many diseases are recognised by the World Health Organization (WHO) as being climate sensitive. In particular, temperature influences development rates of both the malaria parasite and its mosquito host, and increased rainfall, especially in drier areas, increases availability of breeding sites, augmenting malaria vector populations;

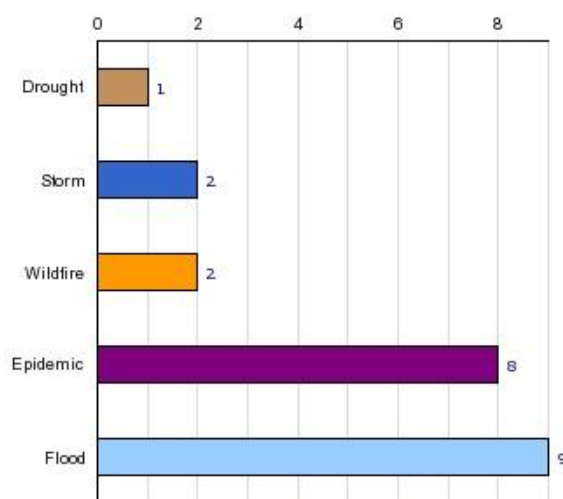
⁴⁸ 20° to 26°N, 7° to 10°E

⁴⁹ 14° to 20°N, 3° to 6°E

⁵⁰The modeling figure for the southwest appears to be on the low side, perhaps because the reanalysis data are representative of an area

- The Prevention Web and EM-DAT databases for CAR (see Figure 12) indicate that flooding is the single largest cause of human and economic loss caused by natural disasters.

Figure 12: Natural Disasters in CAR from 1981 – 2007: Number of Occurrences⁵¹



161. In summary, the CAR population is highly sensitive to the vagaries of the weather and climate. The five socio-economic sectors discussed in this section are clearly sensitive to climate. Climate exerts a profound influence on the lives of poor people who depend on agriculture for their livelihoods and sustenance, who are unprotected against climate-related diseases, who lack secure access to water and food, and who are vulnerable to hydro-meteorological hazard. Climate Risk Management should be recognized as a continuous process, requiring the establishment of capacity for weather monitoring and forecasting, disaster preparedness, analyzing the sensitivity to climate of the economics of the mentioned socio-economic sectors, and accessing financial resources for capacity building and for the implementation of Climate Risk Management practices.

III. Climate Change Projections for CAR

162. The future climate of CAR (to 2095) has been estimated employing the same fourteen Global Climate Models as were used for the simulation of current climatic conditions. Three different SRES Scenarios (A1B, A2 and B1) that define possible future states of greenhouse gases in the atmosphere were used in the modelling exercise (see Box 3). Details of this analysis are presented in the technical annex provided in Volume II.

Temperature: Modest Increases

163. In CAR, no historical temperature trend assessment is possible for the period 1901 to 2005 due a lack of data, but surrounding areas were warming at the rate of perhaps 0.2 to 0.5°C per century according to the IPCC, and there is no reason to suggest that the trend over CAR would not have been similar. The trend in temperature as obtained from the NCEP reanalysis for 1970 to 2009 was almost 0.3°C, near the upper end of the recent range according to the IPCC.

⁵¹ <http://www.preventionweb.net/english/countries/statistics/?cid=33>

Box 3: SRES Emissions Scenarios

The future levels of greenhouse gases are dependent upon human activities and international actions, and on amounts withdrawn from the atmosphere either naturally or again through human activity. In order to handle this uncertainty the IPCC has produced the “Special Report on Emissions Scenarios”, or SRES, in which is outlined the well-known SRES emissions scenarios (IPCC, 2000).

Each scenario is based on a ‘storyline’ covering economic activity, population growth, technological developments etc., but not on international actions (such as under the Kyoto Protocol or the Copenhagen Accord and any later developments), through the century. The 40 scenarios of SRES are grouped into 4 families, each with a “marker”, i.e. a representative, scenario. Most IPCC model predictions used in the latest 4th Assessment Report have been made only using these marker scenarios.

A1B refers to a future in which economies are developed with growth in mind but with decisions taken within a global context – the ‘B’ refers to a balanced use of fossil fuels and renewable and other non-carbon based sources in energy generation; A2 is similar to A1B except that most growth is fossil fuel-based and that decisions are taken regionally, i.e. competitively; B1 is also based on regional decision making but with decision taking placing more weight on environmental considerations.

164. Temperature increases averaged over the 30-year period centred on 2020 are of the order of 0.25°C to 0.5°C. In these early years of simulation there are few differences in emissions between the various SRES scenarios and correspondingly few significant differences in the temperature changes. Differences between the scenarios become more apparent over time, resulting in temperature increases of around 2.25°C to 2.75°C for A2 or A1B by the 30 years centred on 2080, compared to under 2°C for scenario B1. In all three scenarios the positive trend in temperatures appears steady and continuous throughout the century. Until 2080 under B1 the average rate of increase is of the order of a little over 0.2°C per decade, whereas under A2 and A1B it is closer on average to 0.3°C per decade.

165. The potential future extremes of temperature were also modelled as part of the climate analysis exercise, and the results show that for the 2020 period, while the ensemble means for all three scenarios suggest increases in annual average temperatures of around 0.25°C to 0.5°C on 1970 to 1999 values, maximum increases within the ensemble are of order 1.0°C to 1.5°C, while some models indicate that temperatures might *cool* by perhaps as much as 0.5°C. For the period centred on 2050 maximum values are of order 2.25°C for A1B, while minimum values are around 0.0°C for A2. It is only in the period centred on 2080 that all models unequivocally simulate warmer temperatures in comparison with 1970 to 1999; maximum values of changes all exceed 3.0°C, while minimum values are at least 1.0°C for B1, 1.25°C for A2 and 1.75°C for A1B. Table 10 below summarises the projected temperature changes for the three scenarios modelled.

Table 10: Projected Temperature Changes (in degrees C) for the Three Scenarios Modelled

Scenario		Year		
		2020	2050	2080
Scenario B1	Mean	+0.25/+0.50	+1.00/+1.25	+1.50/+2.00
	Max	+0.75/+1.25	+1.50/+1.75	+2.25/+3.00
	Min	-0.25/+0.50	+0.50/+1.00	+0.75/+1.50
Scenario A2	Mean	+0.25/+0.50	+1.00/+1.50	+2.25/+2.50
	Max	+1.00/+1.25	+1.50/+2.25	+3.00++
	Min	-0.50/+0.25	-0.25/+0.75	+1.25/+1.50
Scenario A1B	Mean	+0.25/+0.50	+1.25/+1.50	+2.25/+2.75
	Max	+0.75/+1.25	+1.75/+2.50	+3.00++
	Min	-0.25/+0.25	+0.50/+1.00	+1.75/+2.00

Note: 1) Temperature changes shown are lowest and highest predictions nationwide
2) Temperature increases in the unbounded category are shown as +3.00++

Rainfall: Becoming more Erratic

166. Rainfall is difficult both to measure and to model, certainly more difficult than temperature. Whereas the trend in temperature resulting from greenhouse gas emissions year upon year is in general upwards, rainfall tends to fluctuate much more on a yearly basis, and the indications of specific trends might not necessarily be maintained throughout the 21st Century. Consequently it is common climatological practice to assess rainfall trends over relatively large areas and time periods to reduce the significance of minor fluctuations. The IPCC has assessed rainfall trends over 5° latitude by 5° longitude areas, and, while there are insufficient data for assessment for CAR itself, for the period 1901 to 2005 there appears to have been statistically significant downward trends in rainfall in the Central Africa region of the order 5 percent to 20 percent per century. The extent of the contributions of anthropogenic climate change and of natural climate variability to this downward trend is unresolved. In recent years, however, the Sahel region has seen increased rainfall and over the period 1979 to 2005 there has been a statistically significant *upward* trend in rainfall in the Central Africa region of around 3 percent to 15 percent per decade⁵². Climate history teaches that trends in rainfall are frequently not maintained over extended multi-decadal periods, and caution should therefore be taken in interpreting the results of the current CEA analysis.

167. The general pattern of future rainfall changes in CAR is of an increase of no more than about 10 percent in annual rainfall, even by 2080; in fact frequently the changes are limited to no more than 5 percent in these results. In principle, these results suggest that the positive trend in rainfall of recent years is likely to continue into the future, however, there are also suggestions that possible reductions of up to 5 percent compared to 1970 to 1999 might occur, particularly in the period centred around 2050 (see Table 11). Given that ensemble mean changes are in general positive, and that maximum changes across the ensemble are greater than minimum changes, it can be predicted that the distribution within the ensemble is tilted in the direction of an increase in rainfall. Unfortunately, even the most advanced climate models are limited in their application, and are unable to accurately predict any future changes in the rainfall regimes, such as the possible lengthening or shortening of seasons, and the likely intensity and duration of storm events.

⁵² IPCC

Table 11: Projected Rainfall Changes (in %) for the Three Scenarios Modelled

Scenario		Year		
		2020	2050	2080
Scenario B1	Mean	-5%/+5%	-5%/+5%	0%/+5%
	Max	+5%/+20%	+5%/+20%	+5%/+20%
	Min	-10%/-5%	-15%/-5%	-15%/0%
Scenario A2	Mean	-5%/+5%	+5%/+10%	0%/+10%
	Max	+5%/+20%	+10%/+25%	+10%/+40%
	Min	-10%/-5%	-10%/0%	-20%/-5%
Scenario A1B	Mean	-5%/+5%	0%/5%	0%/+10%
	Max	15%/+25%	+5%/+20%	+5%/+40%
	Min	-20%/0%	-10%/0%	-20%/-5%

IV. Impacts of Climate Variability and Change

168. Based on results of the climate change projections, the likely trend over the next 80 years is for an increase in annual average temperatures (1.5°C to 2.75°C) and an overall increase in precipitation (although with a wide range of +25 percent to -10 percent in the projections) meaning that the country might experience a wetter climate in general, but that extreme events such as storms, floods and drought are likely to occur more often. Based on these predicted changes to the climate, an analysis is presented below of likely physical and economic impacts (positive and negative), as well as an indication of their priority drawing on CAR's National Adaptation Programme of Action (NAPA – see Box 4).

Agriculture, Food Security and Forestry

169. The NAPA places a top priority on retaining food security and agricultural production and also in sustaining forest resources. Farming is an essential activity for more than 70 percent of the population who rely on staple crops produced for food and cash crops for income. The climate projections anticipate increases in annual average temperatures of around 2.25°C to 2.75°C for scenarios A2 or A1B by the 30 years centred on 2080, compared to 1.5°C to 2°C for scenario B1. Increases in mean temperature often accelerate plant growth, giving the crop less time to accumulate biomass and yield. Increases in the variability of temperature can lead to significant heat stress, particularly where extremes of temperature coincide with flowering. Both of these processes are likely to be important under climate change, as has been shown in a number of modeling studies.⁵³ Analysis by the IPCC of average changes across all models under scenario A1B for the end of the century suggest that evaporation will increase a little over CAR. While temperature increases play a role in this evaporation rise, so does increased rainfall, leading to an increase in soil moisture. Temperature increases will also tend to increase evapotranspiration, so that even if rainfall increases, yields may fall.⁵⁴

170. More critical for crop production are the projected rainfall changes. As shown by the climate modelling, evidence suggests that a modest increase in annual rainfall averages is likely. The NAPA report predicts that this increase taken as an average should not produce crop or timber

⁵³ e.g. Challinor et al. 2007; Huntingford et al. 2005

⁵⁴ Thornton et al. 2009

production problems, but it should be noted that whilst the overall average prediction is modest, the range of projections includes annual increases up to around 20 percent or more and decreases of as much perhaps as 15 percent. Furthermore, as discussed above, local rainfall regimes are difficult to predict; any changes in daily rainfall distributions and intensities may cause an increase in flooding and drought frequencies and intensities, events that are more likely to affect agricultural activities than the overall average rainfall increases. Further, rainfall trends, unlike those for temperature, need not be in one direction only - they may plateau or change direction. Crop production may have more dependency on the rainfall trend over specific periods than the longer term horizon.

171. The economic impacts of climate change on forestry are complex and not well documented in CAR, where most of the forestry activity currently consists of the export of timber. Climate change may affect the re-planting and the growing of trees in forests as well as on the quality of new woods and the diversity of species. The government is launching projects under the NAPA to better understand the influence of climate variability including the links with forest degradation and the decrease in forestry production and agro forestry.

Box 4: Prioritization based on CAR's National Adaptation Programme of Action

In May 2008 CAR's NAPA (<http://unfccc.int/resource/docs/napa/caf01f.pdf>) was submitted to the UNFCCC. The document identified six priority areas for action:

- Mitigating the effects of climate dangers on agricultural production and food security;
- Preventing seasonal disease in rural areas;
- Sound management and organization of water resources in rural areas;
- Preventing forest degradation and promoting sound management of forest resources;
- Improving the electrical distribution and opening up of populations by rural electrification; and
- Preventing consequences of abrupt climate change on the populations (early warning system of floods and drought increased).

As part of the CEA assessment, climate change projections were interpreted with respect to the actions listed above to determine climate change-related priority actions for sustainable social, environmental and economic development. In completing the prioritisation exercise two basic approaches were used:

- The Economic Approach - CAR's economy is predominantly agriculturally based with a rural population exceeding 70 percent, many of whom rely on subsistence farming, with over 50 percent of GDP coming from agriculture;
- The Natural Disaster Approach - The most significant disasters in CAR (focussing on the past 30 years) vary according to the criterion selected:
 - Eight of the top ten in terms of mortalities were epidemics. The remaining two, in eighth and tenth position, were the hydro-meteorological catastrophes of 'flood' and 'storm';
 - In terms of numbers of people affected all in the top ten were floods, with the exception in seventh place of a storm.

Flooding

172. As has been described, accurate rainfall distribution and intensity is difficult to predict, but research results suggest that with larger annual rainfall totals come an increase in days with heavy rain and also more rain per day on average than is typical in drier years. With more days of heavier rain, and more rain per day, an increase in flooding risk is to be expected, disproportionate to the relatively small increase in total rainfall. The expected increase in flooding frequency and size is

most likely to impact on agriculture, transport, mining, and health, as well as the general quality of life of citizens of CAR due to economic consequences and the constraints placed on social interactions, communications and the delivery of services, including those for health and education⁵⁵.

173. CAR is a landlocked country with a relatively poorly-developed and maintained road system running through insecure areas. Air transport is the most efficient mode when it can be afforded, but land transport is required for much of the distribution of goods. Roads and rivers are used for transport, and the increase in flooding suggested by the majority of climate models is likely to have a considerable impact on the already poor road network due to the obstruction caused by water during flood events, as well as the damage to roads caused by floods. Flooding may also negatively affect river transportation as may the low water levels likely during times of drought. The NAPA recognises flooding as a priority issue, but does not include transportation as a specific element of this.

Health

174. Several diseases are endemic in CAR, some of which, such as malaria, are directly related to climate. In the north both malaria and meningitis are epidemic. With a warmer climate and increased rainfall, the situation is unlikely to be greatly affected, although the endemic areas may extend northwards. For malaria, an interesting positive impact of the projected climate change is that incubation of parasites and mosquito activity both start to decline above roughly 27°C; thus it is possible that reduced transmission may result from the increased temperatures. Periods with low humidity also present a health threat in CAR, including through promoting influenza. Humidity has not been examined specifically, but on average it is likely to be increased at times through the anticipated higher rainfall but also reduced at other times due to the higher temperatures. While these two effects may roughly balance during the rainfall season, the net effect may be a reduction in humidity in the dry season and hence an increased prevalence of influenza.

175. There are numerous health issues related to the increased flooding expected, in particular in urban areas; septic tanks and latrines can overflow and contaminate water supplies, causing disease such as typhoid, cholera, diarrhoea and hepatitis. Stagnant waters following urban flooding increase breeding sites for mosquitoes, and hence may cause an increase in malaria. The NAPA recognises climate-related diseases and places this issue in the priority list.

Drought

176. In general water availability in CAR is adequate for most needs, including use for power generation. Should the mean projections of rainfall increases be realistic then water security should actually improve. Security of supplies is threatened mainly by occasional drought, a feature more of the north than the south of the country. Increases in rainfall will lessen that threat, but should the lower probability projections for decreases in rainfall prove valid then increased drought frequency is to be expected. The omission of drought in the priority lists of the NAPA suggests that it is viewed as being less significant in impeding social and economic development than is flooding.

Climate Driven Migration and Conflict

177. There has been increasing concern in recent years, as well as a growing body of supporting research evidence, to suggest that climate change may drive both environmental migration (or even

⁵⁵ In August 2005, severe floods hit Bangui, causing widespread destruction of property, contamination of water supplies, and an increase in Malaria and other waterborne disease.

economic migration should conditions deteriorate) and conflict, in particular over insufficient resources. In principle increased rainfall might be expected to reduce the potential for migration and conflict within the CAR region, but the underlying reasons behind these social movements are often complex, with climate interacting with a variety of other factors.

Tourism

178. In recent years, the increased stability and security in CAR has led to the early beginnings of the development of tourism activities, principally in the south-west. The government has shown willingness to encourage the sector to develop in order to provide rural communities with new business opportunities, however as was seen earlier in this report, there is a long way to go in establishing the sector, and many hurdles are yet to be overcome. Tourism is closely linked to climate, the environment and to a country's stability and security. If these factors are affected negatively by climate change this will result in reduced development, economic losses and potentially a lack of sustainability in rural communities' livelihoods.

V. Conclusions and Recommendations

179. The modelling exercise has shown that an increase in mean annual temperatures of between 1.5°C to 2.75°C by 2080 may occur, accompanied by a likely increase in annual precipitation centered around a mean of about 5 percent, although with the possibility of periods of declining rainfall, particularly around 2050. Extreme events such as storms, floods and drought are likely to occur more often. These climatic changes are likely to have numerous impacts on the physical nature of the country as well as the socio-economic environment, and the impact assessment reveals the close climate/hydro-meteorological dependencies of CAR's society and economy. Whilst numerous areas of impact have been identified, climate related priority issues resulting from the assessment are as follows:

- Maintaining agricultural productivity, and safeguarding food security;
- Flooding, its management and consequences, in particular for transportation, mining, and urban infrastructure; and
- Health risks, including epidemics;

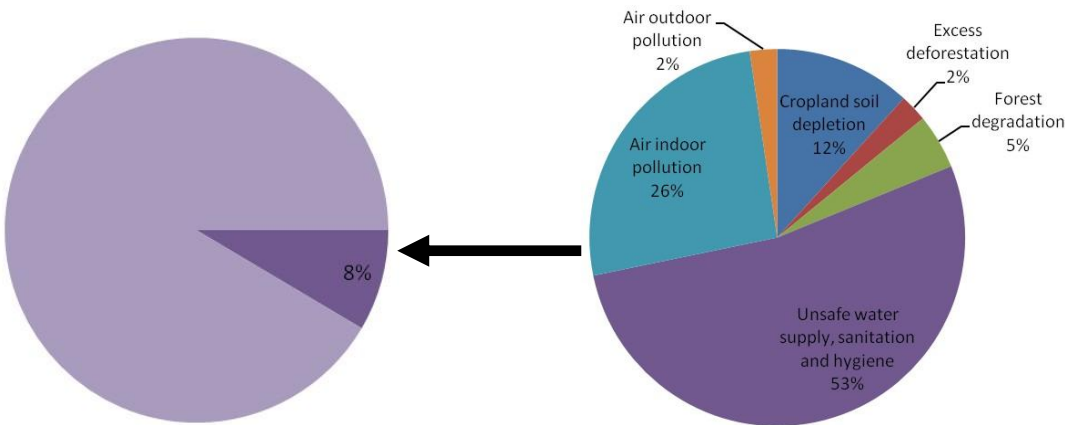
180. The Government of CAR has already started to identify the socioeconomic risks associated with climate change. This is reflected in the published reports and in the participatory initiatives already conducted with stakeholders in the country. To address the predicted impacts of climate change on the natural and socio-economic environment of CAR, the following actions are recommended:

- Research into irrigation to help address the likely increase in rainfall variability, and to identify crops best suited to higher temperatures;
- Improvement of meteorological data collection and weather forecast dissemination for early warning;
- Design of urban and transport infrastructure for increased flooding;
- Strengthening of health surveillance to monitor changes in disease risks and for early detection of new forms of epidemic;
- Improvement of disaster preparedness, through forecasting and planning.

Chapter 7: ENVIRONMENTAL CONSTRAINTS TO GROWTH: PRIORITIES AND RECOMMENDATIONS

181. The economic costs of environmental degradation in CAR are estimated to be equivalent to about 8 percent of GDP, as shown in Figure 13 below.

Figure 13: Quantifiable Costs of Environmental & Natural Capital Depletion in CAR



(Left hand chart = GDP. Right hand chart = total of environmental degradation costs)

182. Among the sources of environmental degradation that could be accounted for, unsafe water supply, sanitation and hygiene impose the greatest cost, equivalent to 4.5 percent of GDP, with death and disease caused by indoor air pollution the second most significant cost, at an amount equivalent to 2 percent of GDP. Costs associated with cropland soil depletion are estimated at roughly 1 percent of GDP; however, this may be an over-estimate as it does not consider the regenerative effect of crop rotation or fallow periods, or the possibility that given the availability of land, opening a new field may be a cheaper alternative than chemical fertilisers for lost soil nutrients. Excess deforestation and forest degradation due to poor forestry management, uncontrolled fires and firewood cutting, and the poor harvesting techniques associated with NTFPs were analysed at having a cost of around 0.6 percent of GDP, with outdoor air pollution being valued at a cost of around 0.2 percent of GDP.

183. The composition of CAR’s wealth is very similar to most low income and sub-Saharan countries. Intangible capital constitutes an important part of CAR wealth with physical capital representing only a small share. The country is very dependent on its natural capital: agricultural lands represent the most important share; forest resources are also an important contributor to natural wealth. The relatively small share of mineral resources is somewhat surprising but can be attributed to the large informal element of the sector, with low rates of investment and low returns.

184. Genuine saving for CAR is estimated at minus one percent of GNI, implying that total wealth is in decline. Decomposition of the genuine saving estimate shows that the most significant environmental contribution to declining total wealth is the loss of human capital associated with indoor air pollution and unsafe water, which together almost equal the depreciation of physical capital. While the composition of GDP highlights CAR’s relatively high investment in education compared to other African countries, these efforts to build human capital are threatened by the costs of air and water pollution, which in the absence of mitigating investments are likely to increase as the population continues to grow and become more urbanized.

Establishing the Path to Sustainable Growth

185. The study has shown that CAR's growth is driven mainly by reproducible capital accumulation, and to some extent human capital. Natural capital depletion remains relatively low. To accelerate economic development, the productivity of natural capital, which is currently very low but has great potential, could be increased. The industrialisation process has not yet begun, and will take time to develop given the need for investments in infrastructure and institutional improvements in the business environment. As a consequence, there is an urgent need to increase growth through improved management of natural wealth.

I. Policy Recommendations

186. This CEA has demonstrated CAR's wealth of natural capital, and has indicated that several natural resources have significant potential to more fully contribute to sustainable economic growth and poverty reduction. A primary macro-policy, therefore, must be to unlock the potential of the country's natural resources in a sustainable manner. Yet the broad conclusion of the preceding analyses is that CAR is in the early stages of establishing the institutional capacity to properly manage its natural resources. A nascent regulatory framework and a lack of human resources, training, funds and equipment means that government ministries and departments are not currently able to ensure the sustainable management of forest, NTFP, wildlife and mineral resources, nor are they able to gather the necessary data to effectively guide the management of these sectors. What revenue is directed to local development is often mismanaged and poorly distributed, and community participation and responsibility is therefore affected.

187. A number of capacity-building and sector management initiatives have been implemented by donors over recent years to address the problems outlined above, with considerable success. Several new government units have been set up, legislation has been updated, and management processes in several sectors have been reformed. However much work remains to be done, and successful support projects such as PARPAF and ECOFAC are due to end imminently. It is critical that the Government and its development partners continue the work started by these and other projects, including through the further development of policy and regulatory frameworks, in particular to clarify responsibilities and remove contradictory elements. Specific policy recommendations for each priority sector are provided below.

Clarifying the Institutional Framework for Environmental Management

188. The institutional framework for environmental management in CAR has changed considerably over the years, and with the recent creation of the MEE, focus is slowly shifting from wildlife protection to overall environmental management, including pollution control, climate change, and the impacts of large scale projects. Laws and policies are under review or development, and various agencies for environmental protection and policy making have been set up. These developments are very encouraging, and demonstrate that CAR is becoming more aware of the environmental challenges of sustainable growth.

189. An immediate need of MEE is to clarify roles within the new Ministry, to help determine what the responsibilities of the various units should be, and to ensure there are no overlaps or gaps in meeting the Ministry's mandate. Based on this analysis, the Ministry needs an in-depth capacity assessment to determine required skills, the capabilities of current staff and the gaps to be filled. This process should form the basis for a comprehensive capacity building program.

190. It is equally urgent that the necessary regulations be established to clarify the division of roles between MEE and key sectoral ministries. Although other ministries are aware that under the Environment Code they have responsibilities for environmental management of programs and projects in their sector, they are reluctant to act until the full mandate of MEE becomes clear. In particular, it is essential that the Environmental Code's regulations regarding environmental and social impact assessment be put in place, without which implementation of the EIA system is not currently possible.

191. Full functioning of the regulatory framework for environmental management will also require the promulgation of the statutes establishing the three proposed semi-autonomous environmental agencies, The National Environment Fund (FNE), the Central African Agency for Environment and Sustainable Development (ACEDD), and the National Commission on Environment and Sustainable Development (CNEDD). Establishment of the FNE, in particular, will help address the critical need for sustainable financing of the MEE and its priority programs.

192. A key strategic priority of the MEE, shared by the Ministry of Economy, Planning and International Cooperation, is to include and integrate environmental issues and priorities into the PRSP, which is under revision. MEE is also developing a policy letter on the environment to highlight the importance of sustainable environmental protection as a government priority. Both these initiatives merit the full support of the Government's development partners.

Cross-Ministerial Collaboration to Promote Sustainable Mining

193. Particular effort in clarifying roles should be specifically directed towards reform of environmental management procedures and capacity for mining in CAR. At the ministerial level, a review of roles and responsibilities is needed, not just within the MoM, but also between MoM and MEE. Given the extremely limited resources with which MEE is starting out, an interim solution could be to promote Cross-Ministerial teaming for review of EIAs and EMPs and for monitoring of environmental and social issues in the field. This would ensure the most efficient use of the scarce resources that exist at present, and the arrangement could be readjusted later as needs change and more resources become available. As part of this cross-ministerial collaboration, it would be useful to develop mining sector specific EIA guidelines to accompany the new EIA regulations being prepared by MEE.

194. In conjunction with the effort to define roles and responsibilities within the two ministries, an assessment of environmental management skills and capacity within MoM should be conducted, providing the basis for a capacity building program. As MEE takes on responsibilities for environmental enforcement, the focus of MoM environment staff can shift from a largely enforcement role to include technical assistance and facilitation to miners, to increase the efficiency of their working methods, improve health and safety measures, and create awareness for the environmental and social impacts of mining.

195. Planned efforts to create regional or prefectural level EITI representation should be encouraged, and as part of this effort, incentives and penalties for enforcement of mining sector regulations related to environmental and social protection should be reviewed. CAR could benefit from the application of the World Bank's Extractive Industries Transparency Initiative Value Chain approach to addressing governance issues in the mining sector, which looks beyond revenue transparency to improving mineral sector governance, including environmental and social performance and sustainable development, throughout the mineral sector value chain.

196. At the commercial level, encouragement of large scale mining companies back into CAR is critical for economic development of the country. Assistance to the MEE and MoM for capacity building, as previously recommended, would also help to improve the EIA review and licensing procedures that have become an obstacle for the successful establishment of large scale mining in CAR.

Managing Forests, Woodlands and Wildlife Resources

197. CAR's biocapacity is still much greater than its ecological footprint. While there remains an important ecological reserve, the CEA has identified weaknesses in the management of forests, woodlands and protected areas that need to be addressed to increase their productivity, and to avoid rapidly escalating environmental costs as the nation's population, urban areas and economy continue to grow. Moving towards sustainable forestry, hunting of bushmeat and harvest of NTFPs, and the eradication of poaching and illegal grazing, requires considerable efforts from the Government to put in place the necessary legislation, processes, and institutional capacity. There is also a need to improve the data on which to base the development of strategies and management plans, for which international support is needed to initiate national inventories of vulnerable and threatened species and their use. Sustainable management of these resources requires a participatory approach, for which the government must involve communities to ensure that they have a shared interest in sustainable outcomes.

198. Continued effective management of commercial forestry requires that MEFCP act quickly to benefit from the support and expertise of PARPAF in setting up a dedicated agency to replace the project. At present there remains much work to do to establish the proposed agency, starting with the definition of its official mandate. In addition, a specific initiative is required to ensure effective use of the forest revenues allocated for community investment. To better encourage the establishment of modern, efficient operating companies, it is recommended that the tender process for PEAs that have not yet been granted be started afresh.

199. Specific policy recommendations to increase control over the bushmeat sector and improve its sustainability include: (i) the clarification of contradictory laws, for example regarding the collection of taxes on prohibited forms of bushmeat trade; (ii) prohibition of profit-making from confiscation of illegal game by Government authorities; and (iii) the provision by large forestry and mining companies of on-site alternative sources of protein.

200. Better coordination is required between the Ministry and the armed forces to combat the devastation of CAR's wildlife at the hands of Chadian and Sudanese poachers, and to prevent the intrusion of pastoralists into protected areas. In the north, a transparent evaluation of land use is required to propose a system of zoning that will protect as much biodiversity as possible, while allowing communities access to resources that must be sustainably managed. In the south of the country, the top priority is the completion and adoption of the Dzanga Sangha and the Mbaéré-Bodingué National Park Plans. These measures need to be accompanied by efforts to improve local people's understanding of conservation laws and challenges, and international support for national inventories of at least vulnerable and threatened species.

201. In parallel with attempts to improve security, the Ministry for the Development of Tourism and Handicrafts (MDTA) should consider refocusing its efforts on the many unique natural areas with which the country is blessed. The objective should be the development of tourist destinations to international standard by the promotion of private sector investment in secure areas such as Dzanga Sangha and Mbaere-Bodingue. Private sector investment should also be promoted for sustainable trophy hunting, and it would be useful to evaluate the possibilities of developing "green

hunting”, by which hunters pay researchers to track and capture animals, shooting anaesthetic darts rather than live ammunition. In this regard, amendments to the Wildlife Code are necessary to provide a regulatory framework for the management of community hunting reserves (ZCVs). More generally, there is a need for outside assistance to assist with the creation of a modest publicity campaign aimed at attracting investors, and to provide training courses in tourism for young Central Africans.

II. Investment Recommendations

202. Most of the policy recommendations indicated above need accompanying investments to ensure their success. The most significant physical investments are those required to address the health impacts highlighted in the analysis of the costs of environmental degradation in order to reduce the risks associated with unsafe water, poor sanitation and hygiene, and the pollution of indoor air due to cooking with solid biomass fuels. This is a very broad field, but investments can be focused on those areas known to be cost-effective and practicable, such as water source protection, total sanitation initiatives, and improved cook stoves.

203. While environmental management is improving in CAR, resources and capacity are critically low. There is enormous potential for improvement of environmental management in CAR through development partner support for technical assistance and capacity building, and considerable improvements could be achieved from relatively low levels of investment.

Building Institutional Capacity for Environmental Management

204. Present institutional capacity for environmental management, in particular within the newly formed MEE, is inadequate, and the ministry urgently needs technical and financial support for development of its human and material resources. MEE’s most critical need is to obtain the basic resources needed to make Ministry fully operational, before it loses its initial momentum. These include obtaining its own dedicated office space, computers and other office equipment, vehicles, and other resources to allow for the establishment of field offices or frequent visits to the field by Bangui staff.

205. Within MEE, a core group of environmental and social specialists capable of both analyzing ESIA’s and monitoring projects in the field is needed. This team could incorporate members from other ministries, and would require a capacity building program focusing on environmental evaluation and monitoring. In addition to short courses and workshops for government employees, establishment of a critical mass of Central Africans with environmental knowledge requires development of in-country training resources, meriting support for the University of Bangui’s proposal to establish a masters program in environmental management. Technical assistance is also needed to help the various services determine what environmental information they need to collect, which indicators to track, how this data will be used, where to store the information, responsibilities for organizing and managing it, and to implement such a system.

Investing in Sustainable Mining

206. One of the obstacles restraining investment in large scale mining is uncertainty over environmental policies and regulations. As mining sector environmental and social management requirements are clarified, there will be a need to increase the human resources devoted to these issues in MoM and MEE, and to provide them with the physical resources necessary to review ESIA’s and oversee their implementation. The most urgent resources include satisfactory

living and working quarters for new and existing staff, vehicles, GPS devices, computers and other technology and tools to map and monitor mining activities and their ongoing environmental and social impacts.

207. There is also a need to invest in environmental and social management processes within the artisanal mining sector, such as the PRADD process, which uses participatory rural appraisals to engage communities in the process of learning about and embracing their rights and obligations under current CAR mining law. Support is required to expand such approaches, and to establish a system of incentives and penalties to encourage the adoption of good practices. Funds could be provided to assist artisanal miners to rehabilitate their sites, or to provide employment to others in the community for rehabilitation work.

Promoting the Productivity of Forests, Woodlands and Wildlife Resources

208. The need for an agency to replace PARPAF has been mentioned under the Policy Recommendations above. Technical assistance will be required to facilitate its creation, in particular to strengthen the Ministry's capacity to monitor the implementation of concession management and social investment plans. Particular attention is needed to ensure the successful implementation of sustainable management plans for permits near Bangui. While there are already plans to support the establishment of the Centre for Forest Data (CFD), additional funding is required for the Forest Economic Observatory (FIEO), which can be justified on the basis of the Observatory's role in collecting, processing and analysing forest industry data, which has a direct effect on government revenues.

209. The development of participatory management initiatives, where traditional rights are defined in agreement with local communities, is particularly important to ensure the long-term sustainability of the production of NTFPs and bushmeat. Such initiatives should promote the inclusion of sustainable NTFP and bushmeat harvests in production forest management plans, and support the organization of harvesters and hunters into cooperatives promoting sustainable practices. Such cooperatives would also provide a mechanism through which to improve rural livelihoods through, for example, "game" farming (e.g. snails and caterpillars) and honey production, with improved production and packaging arrangements, and would also provide a focus to encourage national research projects into the design and promotion of techniques to add value to NTFPs. As with NTFPs, it is local communities that can best manage bushmeat utilisation sustainably, if provided with appropriate support. Technical assistance should therefore be given to build upon progress made by the PGTCV project, support provision of alternative sources of protein by fostering small scale husbandry and agroforestry, and to reinforce bushmeat control on roads and in markets.

210. MEFCP has insufficient resources (human and financial) to manage the 68,000 km² of protected areas. A significant increase in budget is necessary to allow the hiring, training, equipping and functioning of a team sufficiently large to secure the protected areas. Further development of trophy hunting as a form of sustainable wildlife utilisation will need investment in baseline surveys, which can accompany support for community management of hunting resources based on Local Management Committees and the Village Hunting Zone system, following completion of the ECOFAC project.

Investing in Growth that is Resilient to Climate Change

211. The impacts of potential climate change in CAR would be most likely to affect agriculture, public health, and infrastructure for transportation, mining and urban services. The Government

should begin to invest in climate change preparedness, as the earlier actions are taken, the lower the overall costs of climate change are likely to be. A first step would be to improve meteorological data collection and weather forecast dissemination for early warning, combined with disaster preparedness planning. This should be accompanied by (i) research into irrigation to help address the likely increase in rainfall variability, and to identify crops best suited to higher temperatures, (ii) strengthening of health surveillance to monitor changes in disease risks and for early detection of new forms of epidemic, and (iii) design of urban and transport infrastructure for increased flooding.

III. Summary of Recommendations

212. The recommendations discussed above are presented as short, medium, or long term priorities in Table 12 below, together with an indication of the primary responsibility for each action, and an initial budget estimate for the investment and technical assistance recommendations.

Table 12: Summary of Recommendations

Recommendations (With initial budget estimate for Investment and Technical Assistance)	Responsibility
Short-Term	
<i>Policies for Sustainable Growth</i>	
Institutional and capacity assessment of MEE	MEE
Issue sustainable development policy letter	MEE
Institutional and capacity assessment of MoM for environmental management	MoM
Establish agency for allocation and monitoring of logging permits	MEFCP
Recommence tender process for PEAs not yet issued	MEFCP
Implement management plans for Dzanga Sangha and Mbaéré-Bodingué National Parks	MEFCP
<i>Investment and Technical Assistance</i>	
Technical and financial support for development of MEE's human and material resources (\$5m)	MEE
Technical assistance and capacity building for forest permitting agency (to be created) and FIEO (\$3m)	MEFCP
Medium-Term	
<i>Policies for Sustainable Growth</i>	
Establish FNE, ACEDD, and CNEDD	MEE
Review assignment of roles for environmental management of mining	MoM/MEE
Issue mining sector EIA guidelines	MoM/MEE
Initiative to ensure effective use of forest revenues for community investment	MEFCP
Clarify contradictory laws on bushmeat exploitation, prohibit profits from confiscation of game, and require large natural resource companies to provide alternative source of protein	MEFCP/MEE
Improve coordination with armed forces and cross-border collaboration for wildlife protection	MEFCP
Amend Wildlife Code to provide framework for ZCVs	MEFCP

Recommendations (With initial budget estimate for Investment and Technical Assistance)	Responsibility
<i>Investment and Technical Assistance</i>	
Investments in water supply, sanitation and hygiene, and improved household air quality (budget to be defined through Public Expenditure Review)	DGH/MDRA
Technical assistance for environmental monitoring by MEE (\$1m)	MEE
Support for expansion of PRADD program (\$2m)	MoM
Improve meteorological data collection and weather forecast dissemination (\$1m)	NCEP
Research into crops resistant to higher temperatures, and water resource management for agriculture (\$2m)	MDRA
Strengthening health surveillance to monitor changes in disease risks (\$1m)	Min. of Health
Design of urban and transport infrastructure for increased flooding (\$2m)	DGH/MINT/MED
Long Term	
<i>Policies for Sustainable Growth</i>	
Support application of EITI++ incorporating environmental and social performance	MoM/MEE
Evaluation of land use in north and zoning for biodiversity protection	MEFCP
Recruit international support for national inventories of most vulnerable and threatened species	MEFCP
Refocus tourism promotion on unique natural areas and promotion of private sector investment in secure areas	MDTA
<i>Investment and Technical Assistance</i>	
Develop in-country training resources, including environmental management at University of Bangui (\$0.5m)	Univ. Bangui
Increase human and physical resources for review and enforcement of mining sector EIAs (\$0.5m)	MoM/MEE
Support participatory management initiatives for bushmeat and other NTFPs, including the establishment of producer cooperatives (\$2m)	MEFCP
Capacity building of National Park guards (\$1m)	MEFCP
Baseline surveys for trophy hunting and support for ZCVs (\$2m)	MEFCP
Publicity and training in ecotourism and sustainable trophy hunting (\$0.5m)	MDTA

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Chapter 6 – Growth that is Resilient to Climate Change

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