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Annex 1: Incremental Cost Analysis

1. Broad Development Goals

The Government of Chad has established its priorities in the area of biodiversity conservation through preparation of a National Biodiversity Strategy and Action Plan (NBSAP). This plan calls for a variety of short- and long-term measures aimed at enhancing conservation of biodiversity. Enhanced protected area management is an important component of this goal-setting document. Other important environmental planning measures include a National Plan Against Desertification (adopted) and a National Environmental Action Plan (NEAP, under preparation).

The Government has also committed itself to policies of participatory natural resources management, decentralization and empowerment of local communities. Related policy reforms aimed at achieving these objectives were launched in the wake of a 1999 Sectoral Consultation on Rural Development.

2. Global Environmental Objective

The project's **development objective**, to which it will contribute in part, is to ensure that the globally and nationally significant biodiversity of southeastern Chad is sustainably used by, and provides benefits to, current generations while being conserved for the benefit of future generations.

Global benefits are expected through conservation of biodiversity within MNP, its buffer zones, and biological corridors and at neighboring protected areas, the latter being supported through project co-financing. GEF support is focused on the rehabilitation and conservation of MNP itself, and that GEF-supported activities at the two broader geographic levels – (i) cantons surrounding MNP and (ii) greater Moyen Chari – and its linkage to co-financed activities within these wider areas, have as their ultimate aim the strengthening of MNP itself.

Through policy support at the level of the Moyen-Chari prefecture and at the national level, and through an anticipated replication effect, the project is also expected to contribute to the conservation of globally significant biodiversity in other parts of Chad. This will be achieved at two geographic levels: (i) within protected areas (Ref. Emerging Priority I) and (ii) in the broader productive landscape (ref. Emerging Priority II).

Finally, while the above benefits will be achieved through direct project actions, it is also intended that future benefits will accrue through an expected replication effect. The latter will be engendered through the demonstration of a functioning model of protected area management, which is currently lacking in Chad.

3. Baseline

A summary of the threats facing globally significant biodiversity at each of the project sites, along with their underlying causes, is provided in Annex 3. This section summarises the baseline activities related to each of the project's activity areas, corresponding with the project outputs defined in Section 4 below, Alternative Project. It also briefly describes the likely scenarios that can be derived from combining the threats and baseline analyses.

A. *Summary of problems under the baseline scenario*

PROBLEM 1: MNP OPERATES AT A LOW LEVEL OF EFFECTIVENESS DUE TO MULTIPLE BARRIERS

As described in the main text, MNP's human resources, is insufficient in number (barely forty) in relation to the area they have to cover (114,000 hectares), consists of more than 60 per cent wardens, and lacks professionalism. The inadequate level of professionalism is reflected in major gaps in the preparation of the monthly activity reports and the filling in of monitoring and offence reporting forms. Lack of knowledge of either legal or regulatory texts governing their activities means that the wardens are aware neither of the seriousness of the offences committed by delinquents nor of the extent of the required penalties

The Park's infrastructure, comprised of buildings, camps and tracks, has been severely affected by age and by the many socio-political events that have taken place in Chad. The roads through the Park have not been remade since the events of 1979, while the Wain and Kar camps have existed in name only since February 1998.

Order No. 17/MEE/DG/DPFPN/98 of 23 June 1998 established the regulatory framework for MNP. They prohibit all activities within the Park – cultivation, grazing, hunting, collection of fruits, cutting of wood and straw, fishing, beekeeping and traditional rites. Article 3 of the Order enacting the regulations provides for a participatory administrative mechanism that comprises three committees. However, effective establishment of participatory management with the local communities has not been possible due to the lack of leadership and professionalism in park management.

Baseline spending in this area is mainly related to central government support for the operating expenses of MNP estimated at \$45,500 during the life of the project, as well as some rehabilitated structures through French financing valued at about \$282,000.

PROBLEM 2: RESIDENTS OF SURROUNDING COMMUNITIES AND TRANSHUMANTS CAN POTENTIALLY PLACE SIGNIFICANT PRESSURE ON MNP'S NATURAL RESOURCES WHILE BEING UNABLE TO PARTICIPATE MEANINGFULLY IN PARK MANAGEMENT

Numerous direct threats have been identified and described in the main text and Annex 3. These include poaching, extensive methods of agriculture, transhumant and sedentary pastoralism, natural resource extraction and bush fires. These pressures are related to various factors, including an absence of alternatives on the part of these local communities as well as the limited likelihood of penalty under the current weak enforcement structure. Taken together, these constitute important incentives in favor of continued degradation.

Baseline spending in this area includes external support from French SCAC, Swiss, FAO and CARE International for activities such as small-scale community development and micro-credit. Total baseline support is estimated at \$1,050,000 during the life of the project.

PROBLEM 3: MNP IS BECOMING INCREASINGLY ISOLATED FROM THE SURROUNDING LANDSCAPE, INCLUDING PROTECTED AREAS AND THE PRODUCTIVE LANDSCAPE

Human and livestock population increases, together with the unplanned nature of development within the productive landscape surrounding MNP, mean that the Park's connections with the genetic diversity

found within this broader landscape are becoming increasingly tenuous. This process is threatening both the natural process of rehabilitation through wildlife inflows as well as the long-term viability of MNP's fauna populations through an enhanced 'island effect.'

There is currently very little baseline spending related to the conservation of biological corridors within Moyen-Chari. Most of this comes from projects such as FAO, and the Swiss. In addition, the EU funded CURESS project for Zakouma National Park (\$8,772,000) constitutes a major part of the baseline as without that project, the corridor work would not be possible. The baseline is estimated at \$9,367,000.

B. Impacts on globally significant biodiversity

The following are the main ecological impacts associated with the above baseline conditions:

- ?? Direct loss of already low wildlife populations, in some cases below threshold levels where they may naturally restore themselves. Poaching may also be preventing previously extirpated species from re-establishing themselves.
- ?? Genetic isolation of wildlife populations, which are another reason why faunal populations, including previously extirpated species, have been slow to recover at Manda
- ?? Degradation of habitat and associated ecological changes create conditions for rise of opportunistic, 'weedy' species, decreased 'naturalness'

4. GEF alternative project

This section presents the scenario associated with the GEF alternative, which aims to transform the above three problem areas into three positive outcomes.

OUTCOME 1: MNP operates within a well-functioning, participatory management system.

Under this outcome, global benefits are expected to accrue through the transformation of MNP into a welcoming haven for globally significant and other biodiversity. A substantial reduction in direct threats is expected under this outcome. Incremental support for this outcome is estimated at US\$620,000 from GEF and US\$6,000 in support from France (SCAC).

Outcome 2: Residents of surrounding communities and transhumants are placing significantly less pressure on MNP's natural resources, while obtaining benefits from sustainable development

This outcome will lead to further significant reductions in direct threats facing MNP's biodiversity. The role of local communities will be substantially altered from the current negative role of threat source to a positive one of active participant in PA management and sustainable use activities. Incremental support for this outcome is estimated at US\$500,000 from UNDP, and US\$245,000 from GEF.

OUTCOME 3: One or more wildlife/livestock corridors are functioning in support of the rehabilitation of MNP wildlife, in maintaining ecological connectivity between MNP and its associated landscapes, and in supporting sustainable pastoral management.

9. This outcome will involve the development of clear data and information concerning at least one biological corridor linking MNP to outside faunal populations. In the short term, this/these corridor(s)

will facilitate the rehabilitation of these populations; in the long term, they will substantially reduce the genetic isolation facing these populations. Incremental support for this outcome is estimated at US\$862,000 from FFEM, US\$350,000 from the European Union and US\$535,000 from GEF.

5. Scope of Analysis

10. The scope of the analysis includes the following distinct geographic levels:

?? Manda National Park

?? The immediate surroundings of Manda National Park (surrounding 4 cantons)

?? Greater Moyen Chari, including protected and productive areas within the prefecture, together with Zakouma National Park on the Moyen Chari border, within Salamat prefecture.

The area of intervention of the GEF project includes the first two, and a selection of 1-2 corridors (to be decided) of the third.

6. Costs

Baseline sustainable development expenditures within the systems boundary of the project outcomes are estimated at US\$10,744,500.

Including the above baseline expenditures, the total cost of the alternative project necessary to ensure sustainable development and the conservation of globally significant biodiversity is US\$13,273,250. The total additional, or incremental cost, which is the difference between the baseline and the alternative project, is US\$2,528,750.

Development Objective :

	Baseline (B) (existing environmental management)	Alternative (A) (additional biodiversity conservation measures)	Increment (A-B)
Global Benefits	<p>?? Limited human and financial capacities are putting core biodiversity areas at risk</p> <ul style="list-style-type: none"> ○ Direct loss of already low wildlife populations, in some cases below threshold levels where they may naturally restore themselves. Poaching may also be preventing previously extirpated species from re-establishing themselves. ○ Genetic isolation of wildlife populations, which is another reason why faunal populations, including previously extirpated species, have been slow to recover at Manda ○ Degradation of habitat and associated ecological changes create conditions for rise of opportunistic, ‘weedy’ species, decreased ‘naturalness’ 	<p>?? Conservation capacities are strengthened</p> <p>?? Direct wildlife losses are prevented / minimized through more effective controls on poaching and improved community relations</p> <p>?? One or more wildlife corridors prevent genetic isolation and permit rehabilitation of MNP wildlife populations</p> <p>?? Habitat used by globally significant biodiversity is conserved intact</p>	<p>?? Increased conservation capacities facilitate conservation of core biodiversity areas within MNP</p> <p>?? Reduced poaching relieves pressure on wildlife populations, allowing recovery to pre-Civil war levels</p> <p>?? Wildlife populations at MNP are replenished and maintain genetic robustness</p> <p>?? Rare transitional habitat is conserved, as well as supporting globally significant wildlife populations</p>
Domestic Benefits	<p>??Uncontrolled exploitation may exceed sustainable use levels</p> <p>??Ecotourism is completely impractical due to poor organization of MNP</p>	<p>?? Sustainable use protocols are developed, as appropriate</p> <p>?? Clearing of trails, improved management and recovery of fauna populations lay the groundwork for ecotourism</p>	<p>?? Long-term sustainable use, and higher long-term sustainable yields, are ensured.</p> <p>?? Higher long-term revenues from ecotourism</p>

Outcome 1 - MNP operates within a well-functioning, participatory management system						
Outputs	Baseline (B) (existing environmental management)		Alternative (A) (additional biodiversity conservation measures)		Increment (A-B)	
Activity Area 1.1 Staff and infrastructure development	Gov't France	\$3,500 \$282,000 \$285,500	GEF France France (SCAC) Gov't	\$80,000 \$282,000 \$6,250 \$3,500	GEF France	\$80,000 \$6,250
	TOTAL		TOTAL	371,750	TOTAL	\$86,250
Activity Area 1.2 Regulatory development and implementation	Gov't	\$3,500	GEF Gov't	\$40,000 \$3,500	GEF	\$40,000
	TOTAL	\$3,500	TOTAL	\$43,500	TOTAL	\$40,000
Activity Area 1.3 Ecological monitoring and data management	Gov't	\$3,500	GEF Gov't	\$90,000 \$3,500	GEF	\$90,000
	TOTAL	\$3,500	TOTAL	\$93,500	TOTAL	\$90,000
Activity Area 1.4 Compliance monitoring	Gov't	\$21,000	GEF Gov't	\$80,000 \$21,000	GEF	\$80,000
	TOTAL	\$21,000	TOTAL	\$101,000	TOTAL	\$80,000
Activity Area 1.5: Management planning and implementation	Gov't	\$14,000	GEF Gov't	\$330,000 \$14,000	GEF	\$300,000
	TOTAL	\$14,000	TOTAL	\$344,000	TOTAL	\$300,000
Activity Area 1.6 : Lessons learnt for policy and regulatory reform		0	GEF	\$30,000	GEF	\$30,000
			TOTAL	\$30,000	TOTAL	\$30,000
Outcome 1 totals	Gov't	\$45,500 \$282,000	GEF France France (SCAC) Gov't	\$620,000 \$282,000 \$6,250 \$45,500	GEF France (SCAC)	\$620,000 \$6,250
	TOTAL	\$327,500	TOTAL	\$953,750	TOTAL	\$626,250

Outcome 2 – Residents of surrounding communities and transhumants are placing significantly less pressure on MNP’s natural resources, while obtaining benefits from sustainable development						
Outputs	Baseline (B) (existing environmental management)		Alternative (A) (additional biodiversity conservation measures)		Increment (A-B)	
Activity Area 2.1 Community outreach and awareness raising among local communities and transhumants regarding MNP	Care Chad	\$15,000	GEF	\$60,000	GEF	\$60,000
			UNDP	\$250,000	UNDP	\$250,000
			Care Chad	\$15,000		
	TOTAL	\$15,000	TOTAL	\$125,000	TOTAL	\$110,000
Activity Area 2.2 Community participation in MNP conservation and rehabilitation activities	France (SCAC)	\$135,000	UNDP	\$250,000	UNDP	\$250,000
	Care Chad	\$40,000	France (SCAC)	\$135,000		
			Care Chad	\$40,000		
	TOTAL	\$175,000	TOTAL	\$425,000	TOTAL	\$250,000
Activity Area 2.3 Participatory design and implementation of small scale community development projects and micro-credit program	France (SCAC)	\$220,000	France (SCAC)	\$220,000	GEF	\$75,000
	Care Chad	\$20,000	GEF	\$75,000		
	FAO	345,000	Care Chad	\$20,000		
	Swiss	250,000	FAO	345,000		
			Swiss	250,000	TOTAL	\$75,000
	TOTAL	835,000	TOTAL	910,000		
Activity Area 2.4 Pilot implementation of sustainable use methods	Care Chad	\$25,000	GEF	\$110,000	GEF	\$110,000
			Care Chad	\$25,000		
	TOTAL	\$25,000	TOTAL	\$135,000	TOTAL	\$110,000
Outcome 2 totals	France (SCAC)	\$355,000	France (SCAC)	\$355,000	UNDP	\$500,000
	Care Chad	\$100,000	UNDP	\$500,000	GEF	\$245,000
	FAO	345,000	GEF	\$245,000		
	Swiss	250,000	Care Chad	\$100,000		
			FAO	345,000		
			Swiss	250,000	TOTAL	\$745,000
	TOTAL	\$1,050,000	TOTAL	\$1,795,000		

Outcome 3 – One or more wildlife/livestock corridors are functioning in support of the rehabilitation of MNP wildlife, in maintaining ecological connectivity between MNP and its associated landscapes, and in supporting sustainable pastoral management						
Outputs	Baseline (B) (existing environmental management)		Alternative (A) (additional biodiversity conservation measures)		Increment (A-B)	
Activity Area 3.1 Ecological data collection and analysis	EU	\$8,772,000	EU	\$8,772,000	EU	\$350,000
			GEF	\$135,000	GEF	\$135,000
			France (SCAC)	\$278,750	France (SCAC)	\$278,750
	TOTAL	\$8,772,000	TOTAL	\$763,750	TOTAL	\$763,750
Activity Area 3.2 Monitoring and information systems developed along key migratory corridors			GEF	\$160,000	GEF	\$160,000
	TOTAL	\$0	TOTAL	\$591,000	TOTAL	\$591,000
Activity Area 3.3 Demonstrate methods for enhancing the effectiveness of wildlife/livestock corridors	FAO	\$345,000	GEF	\$240,000	GEF	\$240,000
	Swiss	\$250,000	FAO	\$345,000		
			Swiss	\$250,000		
	TOTAL	\$595,000	TOTAL	\$835,000	TOTAL	\$240,000
Outcome 3 totals	FAO	\$345,000	GEF	\$535,000	GEF	\$535,000
	Swiss	\$250,000	EU	\$8,772,000	EU	\$350,000
	EU	\$8,772,000	FAO	\$345,000		
			Swiss	\$250,000		
	TOTAL	\$9,367,000	TOTAL	9,902,000	TOTAL	\$1,397,000
Project totals	TOTAL	10,744,500	TOTAL	13,273,250	TOTAL	\$2,528,750

Annex 2 - Logical Framework Matrix

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
Development Objective	The globally and nationally significant biodiversity of southeastern Chad is sustainably used by, and provides benefits to, current generations while being conserved for the benefit of future generations			
Immediate objectives	<p>(1) To ensure the conservation and sustainable use of Manda National Park (MNP) and its immediate surroundings while</p> <p>(2) demonstrating the use of wildlife/livestock corridors as a technique for rehabilitating and maintaining the biological and genetic diversity of protected areas in southeastern Chad</p>	<p>Threat reduction indices show substantial (>60%) reduction in major threats facing MNP biodiversity by the end of the project.</p> <p>Several formerly extirpated species have been recorded and are believed to be increasing to sustainable population levels, within MNP by the end of the project.</p> <p>Increased reports of faunal presence along selected migratory wildlife corridors by the end of the project.</p> <p>Wildlife surveys at MNP suggest population increases difficult to account for other than by in-migration from corridor, by end of the project.</p> <p>Sedentary and pastoral communities have benefited from the sustainable use and community development activities.</p>	<p>Ecological monitoring surveys at MNP</p>	<p>Chad maintains political and economic stability</p> <p>Climatic changes are not overly disruptive</p> <p>Government revenues increase from oil industry allowing sustainable financing of recurrent costs</p>

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
Outcomes	1 – MNP operates within a well-functioning, participatory management system	<p>?? By end of year 4, at least 75% of MNP staff have minimum --- level of academic background, with at least 50% having training in related fields such as forestry, wildlife management, etc.</p> <p>?? Updated and more appropriate set of regulations in place by end of year 2.</p> <p>?? Baseline ecological monitoring data has been collected and is inter-comparable with subsequently gathered data, thus providing clear guidance on ecological trends and trends in threat reduction.</p> <p>?? Compliance monitoring achieves 400% increase in effective areas patrolled compared with baseline.</p> <p>?? Management plan adopted by end of year 3.</p> <p>?? Lessons learnt synthesized and disseminated at national level by year 6</p>	<p>?? Legal documents, gazettes and notifications</p> <p>?? Project annual reports</p> <p>?? Annual data reviews beginning end of year 1</p>	<p>?? Surrounding communities can be convinced that it is in their own interest to abide by new regulations (see outcome 2)</p> <p>?? Trained and qualified staff can be encouraged to remain and to build 'institutional memory' while encouraging continuity of management</p> <p>?? Ecological data can provide meaningful results during relatively short time-frame of project</p> <p>?? Observed threat reduction can be sustainably maintained beyond project completion</p>

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
	2 – Residents of surrounding communities and transhumants are placing significantly less pressure on MNP’s natural resources, while obtaining benefits from sustainable development	<p>?? Key identified threats have been reduced from baseline levels as follows:</p> <ul style="list-style-type: none"> o Poaching incidence reduced by 80% o Agricultural encroachment eliminated o Bushfires reduced by 15 % o Other forms of illegal resource extraction reduced by 70% <p>?? Residents of 30% of surrounding communities have benefited from micro-enterprise / micro-credit schemes by end of year 3</p> <p>?? Residents of 70% of surrounding communities have participated in, and earned income from, MPA conservation and rehabilitation activities (road clearing, construction, etc.)</p> <p>?? Key identified pastoralist groups have benefited from awareness-raising and development activities, including well digging, micro-credit, and alternate sources of fodder</p> <p>?? Pilot program for fuelwood alternative energy supply to Sarh is operational by end of year 4.</p>	<p>?? Workshop summary reports</p> <p>?? Quarterly threat reduction assessments, based on compilation and analysis of daily ranger patrol records</p>	<p>?? Appropriate, long-term / stable balance can be struck with surrounding communities concerning sustainable use issues</p> <p>?? Surrounding communities see the connection between conservation and development</p>
	3 – One or more wildlife/livestock corridors are functioning in support of the rehabilitation of MNP wildlife, in maintaining ecological connectivity between MNP and its associated landscapes, and in supporting sustainable pastoral management	<p>?? Increased reports of faunal presence along selected migratory wildlife corridors</p> <p>?? Wildlife surveys at MNP suggest population increases difficult to account for other than by in-migration</p> <p>?? Transhumants report less conflicts with farmers</p> <p>?? Vegetation studies show stable or improved vegetation condition in demonstration corridors</p>	<p>?? Reports of consultations with members of surrounding communities</p> <p>?? Ecological monitoring surveys at MNP</p>	<p>?? Migratory corridors do not become successful targets of increased attention by poachers or ad hoc transhumants</p>
	<p>Outcome 1 - MNP operates within a well-functioning, participatory management system</p> <p><i>Activity Area 1.1 Staff development</i></p> <ul style="list-style-type: none"> o Review of MNP staffing requirements, including development and dissemination of a staffing plan, with clear job descriptions including requirements (education, etc.) and job responsibilities o Staff profiling against job descriptions o Staff changes as necessary, including retirement packages and new staff recruitment 			

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
Activities	<ul style="list-style-type: none"> o Development and implementation of a staff training programme, including staff exchanges with Zakouma National Park and joint training programmes. Investigate possibilities of regional-level training through ECOFAC programme in Cameroon. o Review of staff remuneration levels and examination of possible sustainable incentive programmes <p><i>Activity Area 1.2 Regulatory development and implementation</i></p> <ul style="list-style-type: none"> o National experts undertake a performance review of experience under current regulatory arrangements (No 17/MEE/DG/DPFPN/98 of 23 June 1998) and provide proposals for regulatory revisions including, <i>inter alia</i>, possible sustainable use protocols. o Broad-based (village-level) stakeholder consultations and round-table discussions / negotiations, chaired by MEE, on nature of revised regulations o Final adoption and dissemination of revised regulatory regime o Implementation, as appropriate, of sustainable use protocols <p><i>Activity Area 1.3 Ecological monitoring and data management</i></p> <ul style="list-style-type: none"> o Review existing ecological monitoring and data management systems created and /or in current use in Chad, in particular those used by the EU Zakouma and FFEM projects o Design and implement a short-term monitoring and data management programme to establish necessary baseline data, building on surveys conducted during PDF-B o Design and pilot implementation of an appropriate and financially sustainable long-term ecological monitoring and data management system for MNP that will be capable of effectively integrating with other systems in southeastern Chad and, where possible, nation-wide. This system should be used initially to verify logframe impact indicators, with respect to changes induced from baseline situation. This should include monitoring of threat reduction indicators as well as more traditional ecological indicators (wildlife populations, etc.). o Provide necessary equipment for short- and long-term monitoring and data management programmes and provide training in its use <p><i>Activity Area 1.4 Compliance monitoring</i></p> <ul style="list-style-type: none"> o In conjunction with staffing review (see 1.1 above), prepare a detailed compliance monitoring plan, including patrolling schedules and methods, reporting protocols, procedures to follow in cases of non-compliance, infrastructure and equipment needs, etc. o Provide necessary infrastructure and equipment to facilitate compliance monitoring programme, including transport, communications, road improvements, accommodations for rangers, etc. <p><i>Activity Area 1.5 Management planning and implementation</i></p> <ul style="list-style-type: none"> o Tie together elements of Activity Areas 1.1 – 1.4 into a comprehensive site management plan. o Implementation of additional conservation activities not specified above but rather defined within site management plan <p><i>Activity Area 1.6 Lessons learnt for policy and regulatory reform</i></p> <ul style="list-style-type: none"> o Synthesise lessons from Manda and Zakouma projects o Disseminate lessons at national level (parliamentarians, Ministries, NGOs, public) 			

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
	<p>Outcome 2 – Residents of surrounding communities and transhumants are placing significantly less pressure on MNP’s natural resources, while obtaining benefits from sustainable development</p> <p><i>Activity Area 2.1 Community outreach and awareness raising among local communities and transhumants regarding MNP</i></p> <ul style="list-style-type: none"> o Select 10-15 communities around MNP, along with relevant pastoralist groups, for pilot outreach programme. These should include a broad representation of ethnic groups, types of resource users (farmers, fishermen, etc.) and geographic distribution. Beneficiaries should understand the connection between conservation and development. o Develop awareness materials for communicating MNP regulatory developments and project livelihood activities to beneficiaries o Organization of village-level consultations (building on those conducted during PDF-B) to build awareness of conservation and MNP objectives o Participatory workshops covering 100% of surrounding communities have been held by end of year 1 <p><i>Activity Area 2.2 Community participation in MNP conservation and rehabilitation activities</i></p> <ul style="list-style-type: none"> o Develop a program for learning from and recording communities’ traditional knowledge of area wildlife and their movements, as well as traditional knowledge of plants. This will include an effort to gather information on wildlife presence and movements within zone surrounding MNP. o Ensure that surrounding communities benefit from employment opportunities created by conservation and rehabilitation activities within MNP. <p><i>Activity Area 2.3 Participatory design and implementation of small-scale community development projects and micro-credit program</i></p> <ul style="list-style-type: none"> o Building on investigations conducted during PDF-B Phase, identification and planning of small-scale community development projects will be accomplished through a participatory process, which helps individual communities develop simple planning approaches to optimize the use of their respective land areas o Specific activities likely to be implemented include the following: (Note: Additional details will be found in UNDP project document. Goal is to leverage additional co-financing to extend pilot program results to additional communities in years 4-7) <p><i>Activity Area 2.4 Pilot implementation of sustainable use protocols</i></p> <ul style="list-style-type: none"> o Based on results of Activity 1.2, and with community participation, design, guide, and monitor implementation of, a clearly defined set of sustainable use activities to be undertaken by licensed residents. o Monitor and update sustainable use protocols based on ongoing experience <p>Outcome 3 – One or more wildlife/livestock corridors are functioning in support of the rehabilitation of MNP wildlife, in maintaining ecological connectivity between MNP and its associated landscapes, and in supporting sustainable pastoral management</p> <p><i>Activity Area 3.1 Ecological data collection and analysis</i></p> <ul style="list-style-type: none"> o Ecological data, particularly concerning wildlife populations, as well as land use data, is collected for PAs and broader landscape areas in the MNP sub-region. Methods will include aerial and satellite imagery and various methods of ground-truthing. 			

	Description	Verifiable Indicators	Means of Verification	Risks and Assumptions
	<ul style="list-style-type: none"> o Geographically referenced data is analysed using GIS methods, permitting an improved understanding of wildlife populations and movements within the area and their relationship with land use and migratory transhumantce patterns. o Key migratory corridors for MNP are identified <p><i>Activity Area 3.2 Monitoring and information systems developed along key migratory corridors</i></p> <ul style="list-style-type: none"> o One or two priority migratory wildlife corridors are selected for demonstration o Partnerships are developed with local people, including transhumantts, along migratory wildlife corridors, for exchange of information and support <p><i>Activity Area 3.3 Demonstrate methods for enhancing the effectiveness of wildlife corridors</i></p> <ul style="list-style-type: none"> o Official recognition of defined areas as wildlife/livestock corridors, o Land use planning within these zones, involving local canton governments, local chiefs, transhumants and Zakouma Park officials were relevant o Regularisation and formal recognition of transhumance rights, within a co-management plan for the corridor, developed by MPN, Zakouma, and pastoralists o Passive and active methods are tested for enhancing the effectiveness of the corridors as sources for rehabilitating MNP wildlife populations. These may include the following: re-directing of farmers away from wildlife/livestock corridors; awareness-raising; installation of incentives for wildlife and livestock movements. o Participatory monitoring and enforcement of the plan 			

Annex 3: Threats/ causes /activities

Causal relationship and activities for Manda National Park

Methodology

The present project has been designed using a logical framework approach. This has included stakeholder identification and consultations, participatory development of a threats and underlying cause analysis, and the formulation of activities aimed at addressing and removing identified causes of biodiversity loss and related barriers.

Section 2.b.i. of the main text of the brief includes a sub-section on the ‘threats, causes and barriers baseline.’ Working from the bottom-up, this section identifies three levels of threats:

- ?? Root causes: These represent fundamental socio-political challenges and problems facing Chad, recognition of which is essential to effective project design. Three root causes are identified and discussed.
- ?? Intermediate causes: Also known as ‘underlying causes’, these represent the main controlling factors underlying the identified threats to biodiversity. Five intermediate causes are identified and discussed.
- ?? Proximate causes: These kinds of causes, also termed ‘direct threats,’ typically represent actions taken by people that directly cause losses of biodiversity.¹ Five types of direct threats have been identified and discussed.

In addition, section 2.b.i identifies a series of ‘barriers’ which, while not necessarily having a direct cause-effect relationship with the above factors, nevertheless constitute the ‘enabling environment’ within which individual causes, and thus the overall problem, persist.

This annex presents in schematic form the relationship among the three types of identified causes, along with the relationship among the causes, barriers and project activities. Its aim is to present the logic underlying the project design so that the reader may easily recognize the reasoning behind project activities and more specifically, the way in which these activities aim to address the identified chain of barriers and causes.

The annex is presented in three tables. **Table 1** shows the relationship among root, intermediate and proximate causes. **Table 2** highlights the impacts on biodiversity resulting from the proximate causes. Finally, **Table 3** presents the relationship among intermediate causes, barriers and project activities.

In summary, according to the analysis presented in the tables, project activities will address both intermediate causes and barriers, and in doing so, will substantially reduce the incidence and impacts of direct threats to biodiversity at MNP.

¹ Non-anthropogenically -mediated proximate causes may also be identified in some projects, e.g., drought, but will often not be remediable through project interventions

Table 3-1: Root Causes, threats matrix

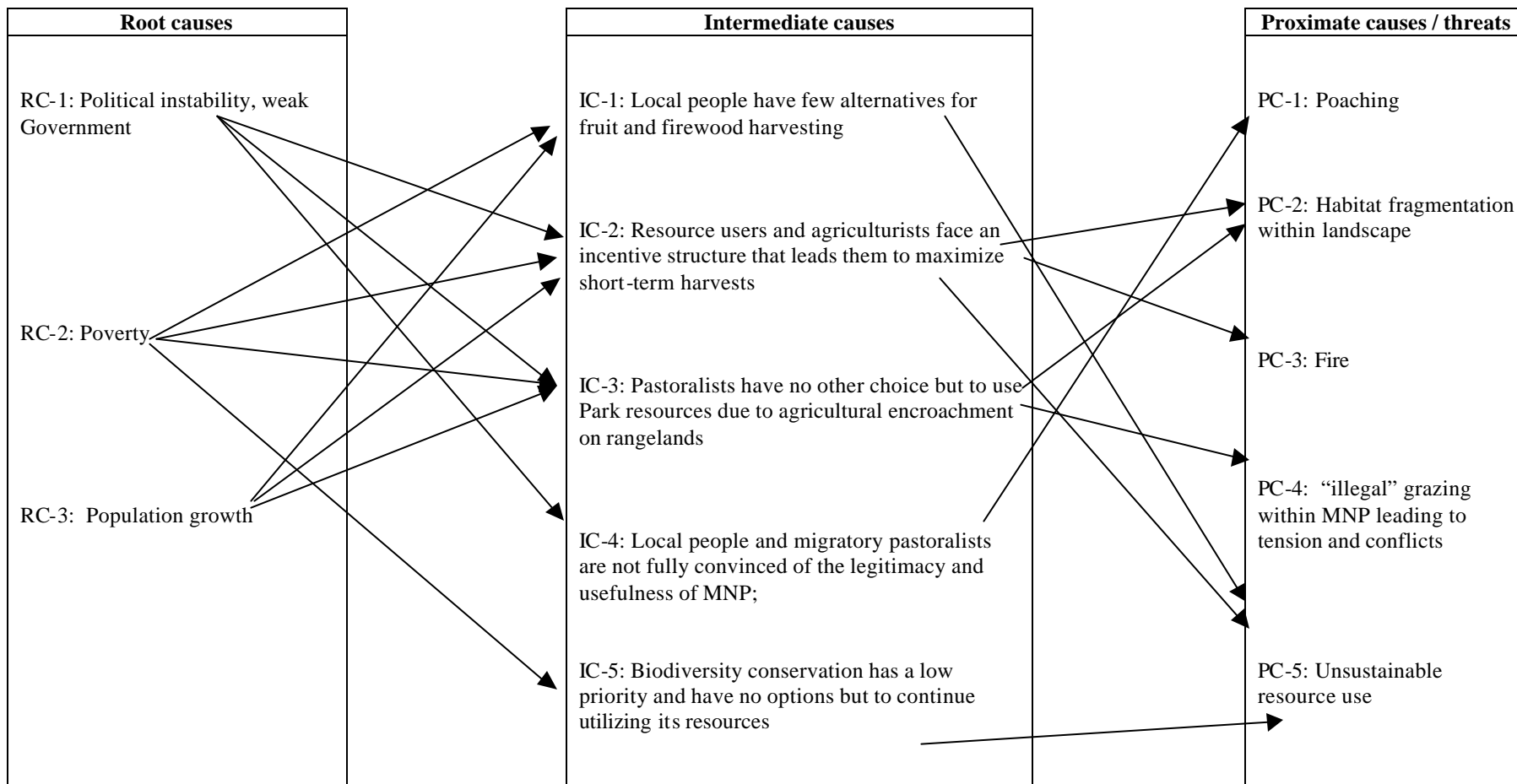


Table 3-2: Proximate causes and biodiversity impacts

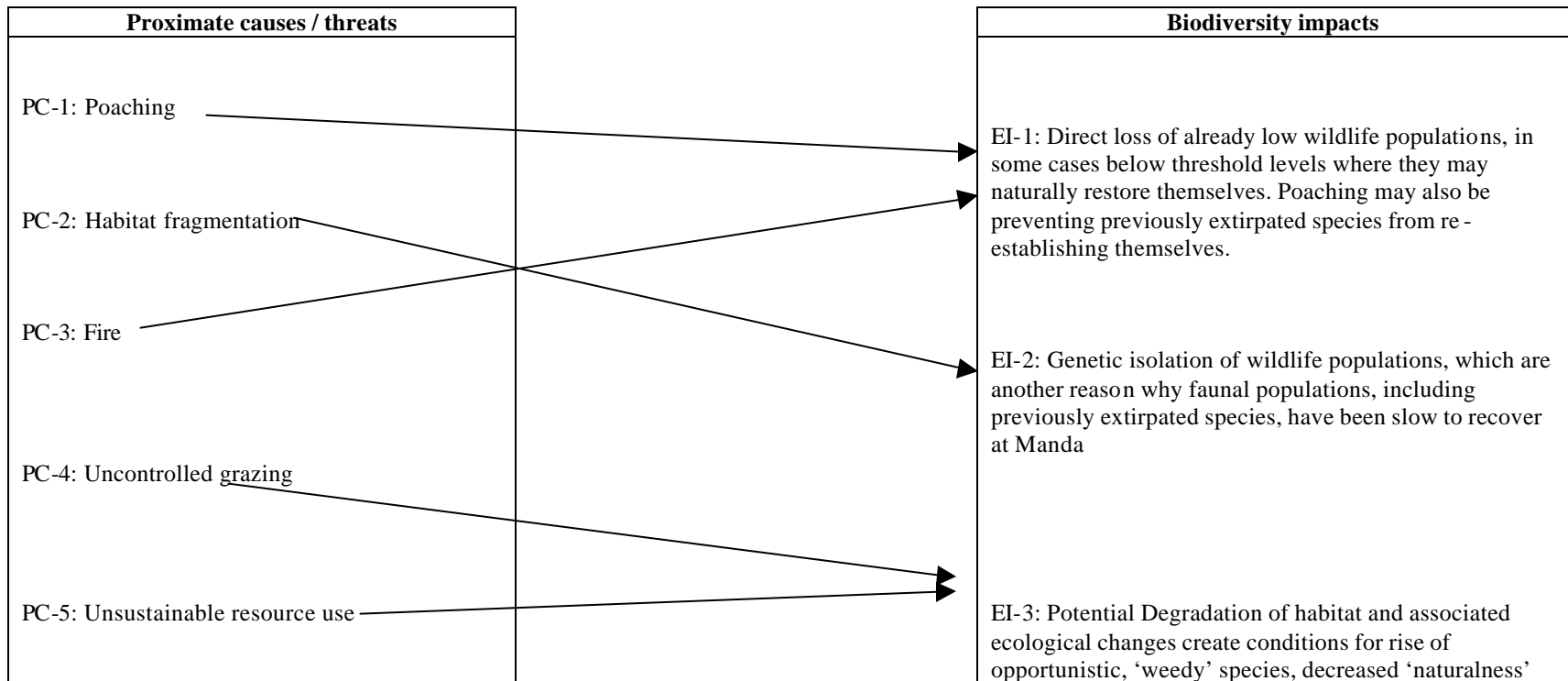
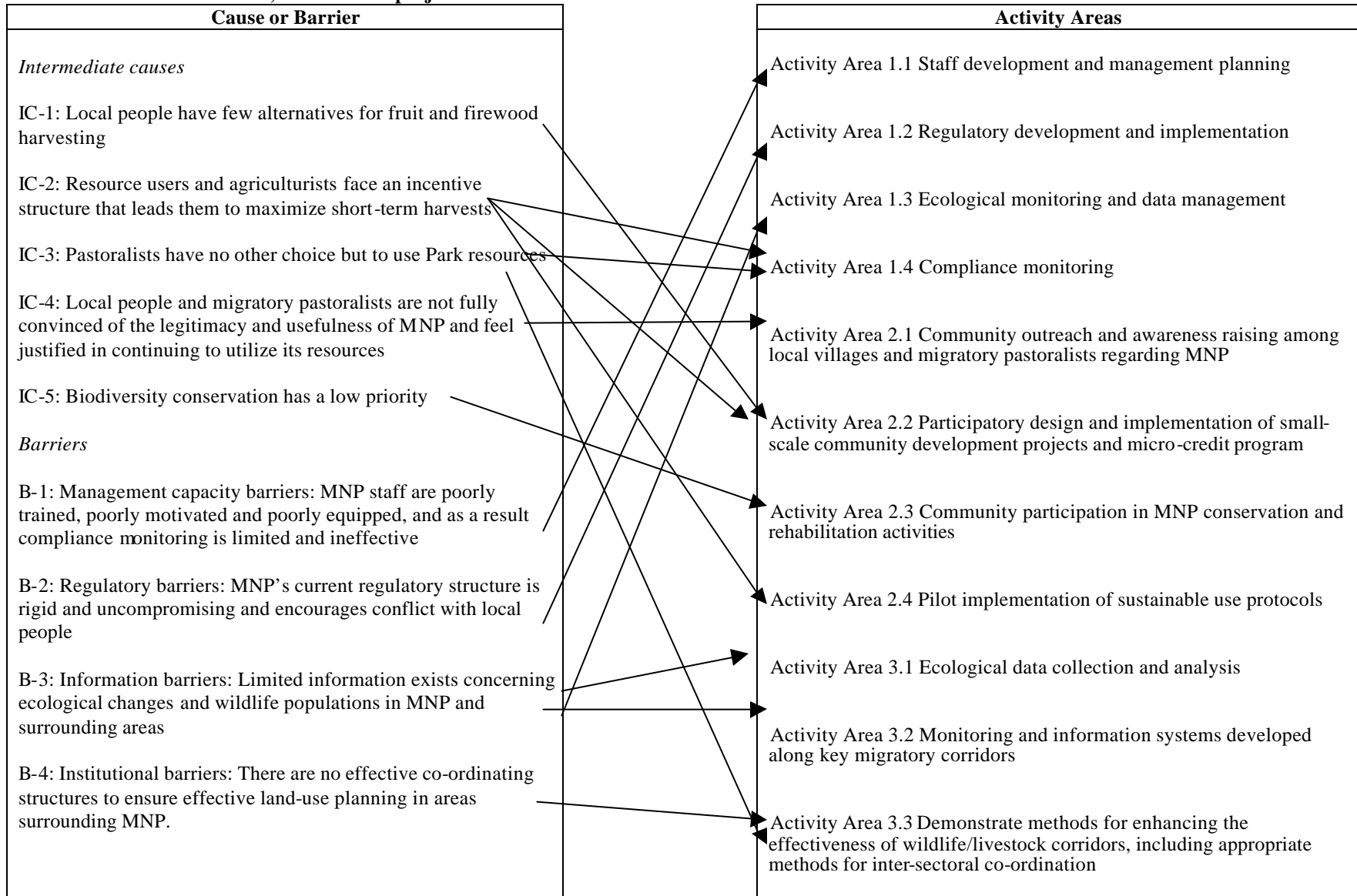


Table 3: Intermediate causes, barriers and project activities



ANNEX 4A: TECHNICAL REVIEW

By Michael M Horowitz
March 23, 2003 - Revised

Project Number: PIMS 836
Project Title: Participatory Management of Manda National Park
Implementing Agency: United Nations Development Programme (UNDP)
Requesting Country: Chad
GEF Focal Area: Biodiversity

GENERAL STATEMENTS AND COMMENTS

I have read and reviewed the proposed project with great interest. My principal concerns are that the project document (1) does not persuasively argue that the biodiversity of the Manda National Park is subject to “substantial anthropogenic disturbances” due to “unsustainable practices” of fishing, herding and farming carried out by the indigenous peoples of the area; and (2) that it doesn’t convincingly demonstrated how these indigenous peoples will benefit from placing “significantly less pressures on MNP’s natural resources, while concurrently playing an active and participatory role in MNP’s conservation, rehabilitation and related planning...”

The way the project document has been written conveys, perhaps unintentionally, the position that the well being of the proposed park and the well being of the local poor people it seeks to exclude from the park are mutually opposed, and that given the choice the well-being of the park must take precedence. It does not however persuasively demonstrate why there is an inherent incompatibility between the two.

In Section 39, the document embraces the discredited “tragedy of the commons” argument of Garrett Hardin, that open access to productive resources inevitably generates destructive competition among the users. My own research on pastoral production systems in West Africa confirms those of many others that the contrary is true. The Sahelian and Sudano-Guinean environments are threatened not by the “traditional” tenure of farmers and herders, but by efforts aimed at privatization of pastoral and shifting horticultural (“swidden”) lands.

Clearly, as huge areas of land are removed from traditional production through the establishment of large, private, irrigated farms producing export crops that require industrial processing (like sugar and cotton) and through the establishment of bio-reserves that exclude small farmers and herders, pressures on reduced land surfaces that remain available to them markedly increase. It is not, then, legitimate to indict the “traditional practices” of smallholders as the principal causes of the consequent declines in output and the adverse effects on long-term environmental productivity. Indeed, the accusation of unsustainability seems to be challenged by Para. 14,

presenting “positive” environmental results “despite the virtually permanent presence of nomadic, semi-nomadic and sedentary pastoralists.”

Another major concern of the review is that, although the document states prominently that “local communities and community-based organizations will play an important role in project implementation, as well as benefiting from the development of alternative sustainable livelihoods...” (Section 5.), it doesn’t go on to make a convincing case that livelihoods alternative to those currently practiced in the region will be both economically remunerative and environmentally sound.

Finally, the document treats the project-affected peoples as if they were homogeneous and undifferentiated. In fact, they are heavily segmented not only by ethnicity, age, and gender, but also by wealth, education, and most critically by access to persons of power. The actions proposed in the document will not benefit all affected people equally. There is need to show (1) that the number of “winners” will far outweigh the number of “losers,” and (2) that there will be adequate and sustainable compensation for those who lose. It is critical that the project convincingly confront these concerns.

KEY ISSUES CONSIDERED

1. Scientific, technical and social equity soundness of the proposed project. The notion of a wildlife reserve to attract tourists to that region of Chad is interesting. But as has been stated above, the proposal needs to demonstrate that (a) without the reserve, wildlife is threatened; and (b) that its costs will not be borne by the already poor herders and farmers of the region. That some of the “project-affected people” (PAPs) might be hired as park workers is unlikely to be adequately compensatory. The draft proposal completely ignores the proposed project’s gender implications. It is critical that it confront the effects on pastoral and horticultural women of their exclusion from lands that previously were accessible for economic activities. It must also demonstrate net positive impacts on children, on the elderly, and on persons from different socioeconomic backgrounds. Paragraph 81 notes that “detailed biological and socioeconomic surveys will be undertaken” and that “surveys will assess the social and economic impact of the project...,” but nowhere does it state how these assessments will inform on implementation. If the assessments demonstrate that the effects of the project on local people are, on balance, negative, will the project then be terminated? In any case, it is clearly better for these assessments to be made in advance of a commitment to implementation, that is, in advance of any commitment to fund the project.

2. Replicability of the project. Since the proposed project document has not persuasively demonstrated its social, economic, or environmental sustainability, it is premature to make a judgment as to whether it might be replicated elsewhere.

3. Sustainability of the project. We have strongly questioned the project’s social sustainability, that is, the project document does not persuasively show how local poor people will be net beneficiaries of it. Clearly, some might find employment; but a far larger number are likely to find the project threatens their pastoral and horticultural economies without providing them with appropriate compensation. While the project itself is likely to be environmentally

sustainable, it will inevitable cause increased pressure on the adjacent nonproject environment, since the same number of farmers and herders (and, overtime, a larger number) will have to survive with less productive land

4. Project fit within the context of GEF goals and operational strategies. As an anthropologist with long experience in the region, I have focused on the likely impact of the project on local peoples and their production systems. I'm not privy to GEF's operational strategies, and cannot assess whether the proposed project articulates with them well or poorly.

Specific Comments and Questions In the first version of this review, I listed a number of comments and questions cued to paragraphs in the draft. In the hopes that they will be useful in moving to a revised text, I will repeat them here:

Para. 18. Are Mbororo, Foulate, and Foulbe distinct ethnic groups or do they describe different communities all speaking FulfulDe?

Para. 19. Who grows cotton? Is it produced by the same people who grow consumption crops (millet, sorghum, cassava) on swiddens or it produced by a land-owning group? Is the cotton rain fed or irrigated?

Para. 21. Here the document states that agriculture is not practiced in the protected area. Does this mean that the problem is uniquely the use of parkland by keepers of ruminant livestock (cattle, sheep, goats)?

Para. 23. Given the long and mutually supportive relationship between herders and farmers in the region – with farmers leaving crop stubble for livestock, and livestock restoring some fertility to the farmlands with manure – is it true that farmers believe that herders destroy the environment or is it that persons hired to translate say that they do? (Local people can become adept at saying what they believe their interviewers would like to hear.)

Para. 24. It is noted that pastoralists “were unanimous in not understanding the justification for [the parkland’s] existence”. If, as many researchers have demonstrated, sudanosahelian herding does not destroy the environment, why should pastoralists accede to their exclusion from the park?

Para. 33. What studies have been carried out since the Order of June 1998 prohibiting all productive activities in the Park to demonstrate how the order affects the well being of local peoples who previously used its resources? The paragraph notes the composition of the scientific and technical community being “specialists in natural resources management.” Are there no specialists on the social and economic dimensions of development on the committee? If there are, the report might indicate who they are and what their specific project responsibilities might be. If there are no specialists on the projects social and economic dimensions, that also should be stated. Given the statement in Para. 34, that “Effective establishment of participatory management with the local communities has not been possible...” it appears to this reviewer that such dimensions have not been adequately explored.

Para. 35. The section on “Initiatives by the FAO” notes an interest in using irrigation. Have the health (malaria, schistosomiasis, onchocerciasis) and mobility consequences of irrigated agriculture in the region also been explored?

Para. 35. The section on “initiatives by NGOs...” notes the work of ACRA in socioeconomic development of the peripheral zone, but it doesn’t explore what that work was. Readers might like a bit more detail here.

Para. 38. The section on “Extensive methods of agriculture,” defines *agropastoralism* as “the association of crops involving the use of animal traction.” That is a curious use of the term, which more commonly refers to a combination of farming and herding. (Some writers use “agriculture” to refer to farming with the plow, and “horticulture” to refer to hoe and digging stick cultivation.

Para. 38. The section on “Transhumant and sedentary pastoralism” refers to the census of 1972. Are you comfortable with the data from that census? Was it carried out in the same season and under the same meteorological conditions as that of 1993? I suggest some skepticism about these figures. In the same section, it states that “most of the offences identified by the wardens...were committed by transhumant pastoralists...” Are the wardens members of the same ethnic groups as the herders? There may be predisposition to assume that whatever herders do is environmentally destructive – i.e. like Garrett Hardin. This assumption is not supported by a good deal of the intensive ecological studies carried out with West African pastoralists.

Para. 38, section on “Bush fires.” This is an important point, that bush fires can be both harmful and beneficial. It might be worth elaborating it, and also expanding on what are the ‘shared interests’ of the surrounding populations.

Para. 39. I am not persuaded that “Pastoralists have an incentive to maximize herd sizes,” if by that the draft means that they want to have more animals than they can effectively husband.

Para. 40. The brief mention of “poverty” as a “crushing burden on the people and the environment” needs to be expanded. Is the assumption here that affluent peoples are not environmentally destructive? In any case, you need to show how participatory management of the Manda National Park will make poverty less crushing on the people and their habitat. Why wouldn’t affluence also burden the environment (albeit differently from poverty)?

The document must not only state that environmentally sound management will benefit everyone, including poor herders, poor farmers, and poor fishers, it should also spell out *how* they will benefit from it? This has not persuasively been done. Nor does the draft persuasively show (Paras. 43 and 44) how local communities and current generations will become “active participants in PA management and sustainable use activities.”

Para. 47, Outcome 2. The draft document doesn’t explain how local farmers and herders will place “significantly less pressure on MNP’s natural resources, while concurrently playing an active and participatory role in MNP’s conservation, rehabilitation, and planning.” Will this not force them to put more pressure on resources external to the Park? And again, in Para. 50, where

“Village-level participation in this process is considered essential...” there is no convincing presentation of the benefits of the proposed park to the local people. Not only will they lose access to lands that have been important to them, they may well find that such benefits as might be generated will be captured by an elite few. The next section, AA-1.4, states that “other activity areas are expected to help substantially reduce existing pressures from surrounding communities,” but it doesn’t spell out what these are. Is it possible that in addition to increased poverty from being deprived of access to productive resources, the local people will also be hassled by the police?

Para. 51. “Within each Activity Area, the special needs of transhumants due to their seasonal mobility will be evaluated and explicitly addressed. It is important that transhumants gain as much from the project as local communities...” I completely agree. But the document is not persuasive as to how the special needs of transhumants will be addressed. The next paragraph too, where the project aims “to create a positive connection in local stakeholders’ minds between the existence and continued effective protection of MNP...” is indeed worthy, but it doesn’t persuasively spell out how that will be achieved.

Para. 52, AA-3.2 again states that “the support and participation of transhumants will be strongly encouraged”, but it doesn’t explain how. What are the benefits to the herders? And, if there are benefits, which herders will capture them (as they do not live in socially and economically undifferentiated communities.

Para. 58 states that the “project’s strong emphasis on multi-stakeholder participation will also improve possibilities for sustainability,” yet it doesn’t, as noted above, clearly and convincingly state how the benefits to all stakeholders will exceed the liabilities. As an example, there is no focus on how the project might benefit fishers. It must clearly be demonstrated that, however well intentioned MNP is, it will not worsen the lives of the already poor: the vast majority of the farmers, herders, and fishers, who are included in the listing of “stakeholders” in Para. 66.

Para. 63. The statement that the project is central to their “civilizing development” could be read as offensive and should be deleted from the text.

Nowhere in the document is there any mention of the project’s gender implications. If access to productive resources becomes more restricted because of the Manda project, how will that affect women, children, the elderly? Para. 81 notes that “detailed biological and socioeconomic surveys will be undertaken” and that “surveys will assess the social and economic impact of the project...” but it doesn’t state *how* these assessments will inform on implementation. If the assessments demonstrate that the net impacts on local people are negative, will the project be terminated and the *status quo ante* be restored?

This STAP review has intentionally focused on those items in the text that leave the impression of being socially and environmentally problematic. I hope you find these comments useful in proceeding to a revised text.

ANNEX 4B: RESPONSE TO STAP REVIEW

UNDP regrets that the STAP reviewer was not sufficiently cognizant of GEF mandates and objectives. The STAP reviewer's comments from an anthropological point of view were helpful in strengthening the pro-poor elements of the project. However, the lack of understanding of the GEF mandate led to a series of reviewer comments that required rebuttal rather than constructive solutions.

The project proponents would like to thank the STAP Reviewer for bringing to their attention a number of important issues related to the importance of local stakeholders, including local communities and transhumants, for the success of the project. The Reviewer provides good insights from an anthropological perspective that are very constructive and have been taken into account in a revised Brief. We share the reviewer's concern with the welfare of these stakeholders and have made a number of efforts to ensure that the final project design brings no harm to these target groups and, in net terms, proves beneficial to them in the long run.

The overview to the STAP review highlights several principal concerns. The issues associated with these concerns are discussed below, along with the steps taken in this revised draft to address them.

Issue a): Whether local resource use practices in and around MNP are 'unsustainable'

The reviewer points out that the project brief "doesn't persuasively argue that the biodiversity of Manda National Park is subject to 'substantial anthropogenic disturbance' due to 'unsustainable practices' of fishing, herding and farming carried out by indigenous peoples of the area." The Brief states that the "substantial anthropogenic disturbance" was due to the decimation of MNP's wildlife which took place during Chad's Civil War of the 1970s and 1980s. MNP's wildlife was nearly destroyed by human actions occurring amidst the acute social disarray and privation that accompanied the Civil War. Currently, wildlife populations remain at low levels – a small fraction of what the protected area could, and previously did, sustain. Thus, the current sustainable take of these populations, which remain well below the area's maximum sustainable yield, is zero. Present levels of anthropogenic disturbance and poaching of these populations, which appear often to take place incidentally within the context of other activities (herding, felling of timber, etc.), may thus also be characterized as unsustainable.

The STAP reviewer also states "The way the project document has been written conveys, perhaps unintentionally, the position that the well-being of the proposed park and the well-being of the local poor people it seeks to exclude from the park are mutually opposed, and that given the choice the well-being of the park must take precedence." We believe that this is a misunderstanding of the project's rationale and the description in the Brief. It has been explained that there are clear win-win opportunities that the project will enhance and sustain. The fact that the population of wild graziers was decimated due to poaching, means that such a grazing dependent ecosystem can deteriorate unless this is redressed. One way of doing so, is to

encourage a rational and coordinated system of pastoral use (domestic graziers), which would also generate benefits to the people. Other win-win strategies have been described in the Brief.

Issue b) Tragedy of the Commons.

The brief discusses the apparent rapid increase in Moyen Chari's livestock populations in the past 2-3 decades. This factor, exacerbated by tendencies pointed out by the reviewer, e.g., land privatization for production of export crops, has tended to increase grazing pressures on lands surrounding MNP. Nevertheless, the brief is careful to note that "...the extent of lands heavily affected by overgrazing appears this far to be minimal within the park itself and may not be extensive in Moyen Chari as a whole..." and therefore overgrazing is only a potential threat. The revised brief incorporates references to other causes of land pressure, including land privatization, and adjusts language elsewhere to avoid conveying the impression that transhumant and other pastoralists, or their traditional techniques of land use, are being blamed for the actual or potential threat of land degradation. Furthermore, it has been clarified throughout that the project sees pastoralism as potentially compatible with wildlife conservation.

Issue c): whether local communities and migratory pastoralists will benefit from, or rather be harmed by, project activities

The baseline, business as usual, situation is that the Park will continue to exclude farmers and pastoralists from using the resources inside the park, thus leading to greater tension and conflicts, as well as greater forgone benefits and opportunity costs. The GEF Alternative will ensure that benefits accrue to local populations in four ways:

1. Controlled access/use in selected areas of the park
2. Employment benefits from infrastructure development and potential tourism
3. Participation in development of Park management plan, and therefore ownership of the plan.
4. Sustainable use and therefore improved productivity of buffer zones.

These aspects have been clarified and highlighted in the revised Brief.

The Reviewer also points out that the Brief "... doesn't go on to make a convincing case that livelihoods alternative to those currently practiced will be both economically remunerative and environmentally sound." This is a good point, and has been added to Component 2. Activities related to micro-project development will first be subject to cost/benefit and environmental impact assessment analyses, using a participatory method as a learning tool for local communities.

The Reviewer questions whether "The actions proposed in the document will not benefit all equally". We have taken this issue very seriously. It is certainly a risk that the project team needs to be aware of (see section on risk) and the project design incorporates an element of monitoring for equitable sharing of benefits between farmers and pastoralists, between elders and youth; between men and women, and readjusting activities where necessary. Alternative income and sustainable use regimes will be targeted to these groups, and the design of the micro-credit scheme (co-financing) will ensure that it is equitably distributed.

The Reviewer states: “the proposal needs to demonstrate that (a) without the reserve, wildlife is threatened; and (b) that its costs will not be borne by the already poor herders and farmers of the region.” The first point has been made under the “Threats analysis”; wildlife are already threatened due to past poaching and present and potential unsustainable use. On the second point, a distinction has to be made between the existence of the park (which goes back many years), and the actions of the project. The park’s establishment and gazettelement has created opportunity costs for the farmers and herders, by prohibiting all access to the resources. The project’s goal is to reduce these costs by allowing sustainable use back into the Park, and provide alternative income generation activities to reduce poverty in the region.

The Reviewers comments on sustainability and replicability therefore have to be seen in light of this response. The benefits of the project will go far beyond just providing additional employment.

Specific comments:

Paragraphs 18-24: The three ethnic groups are all distinct groups. Cotton is rain-fed and grown by all farmers, some more than others. The Park officials have been able to keep crops out of the park, but it is an ever-present demand/threat. Pastoral use of the park is subject to different interpretations: farmers want it prohibited (because it is competitive), park rangers do not understand that it can be potentially complementary to wildlife production; and pastoralists understand well that they can be compatible, and have no other choice but to use park resources. The project’s challenge is to bring all these different stakeholders to a common understanding and vision on how to sustainably manage the natural resources while conserving globally significant biodiversity.

Paragraphs 33 and 34: No studies have been undertaken on the impact of the park; all information is anecdotal. Composition of the Committee is intended to include social disciplines; this has been clarified in the Brief. But nevertheless, there is a perceived gap in the capacity of park and canton officials to adequately incorporate social, economic and anthropological perspectives. The capacity building element of Component 1 will redress this. Although details on project implementation are to be worked out during project appraisal, it is expected that the project team will include social experts.

Paragraph 35: FAO’s irrigation program is not expected to target our project zone.

Paragraphs 38-39: The proponents are in agreement with the Reviewer’s assessment of pastoral situation, and this is reflected in the fact that the project’s objectives and activities do not exclude transhumants but in fact aim to work with them to develop mutually beneficial land management. The Brief has been edited to better reflect the state of the art in terms of pastoral development. Pastoralists have no option but to use park resources, as their rangelands are diminishing due to encroachment and gazettelement. Current strict no-use rules in the Park lead wardens to label any use as illegal, thus increasing tensions. The challenge for the Project is therefore to build capacity of park, canton and farming communities to better understand and integrate pastoral concerns.

Paragraphs 40 and 47: There is a direct link between poverty and environment. The project's component 2 is designed to address this issue, by building capacity for local people to participate in biodiversity conservation, as well as provide incentives (such as regulated access to park resources, access to micro-credit) for obtaining benefits at the local level. This aspect has been clarified and better defined in the revised Brief. Indicative activities are also given as examples. However, in keeping with the principle of flexibility and adaptive management, it will be up to the local communities, park management and project team, to concretely define the activities that will be undertaken.

Paragraphs 51 and 52: The proponents are in agreement with the Reviewer and the Brief has been strengthened as a result of these observations. The types of activities potentially of benefit to pastoralists has been better defined. Component 3 is focusing on developing ecologically viable corridors for both wildlife and livestock.

Paragraph 58: Component 2 is aimed at ensuring sustainability of benefits to local communities. This will be done through developing and implementing sustainable use regimes. These regimes/protocols when imbedded in canton plans will allow local communities to regulate use, for example by professional fishermen.

Paragraph 63: The original sentence was an unfortunate transliteration from French and has been edited.

Paragraph 81: The proponents are in agreement; principles of adaptive management, continuous monitoring and feedback loops, have been built into the project design. The project team and steering committee (which will include representatives of the local communities) have the responsibility of monitoring progress and taking corrective action where necessary. Gender issues are prominent in Component 2 where it is expected that women will be closely involved in community development activities, and in sustainable use regimes for fuel wood, medicinal plants, etc.

Annex 5: Public Participation Strategy

The following plan was developed as a result of consultations with all relevant stakeholders and target population during the PDF B phase of the project.

Activity/Component	Participants	Expected results during implementation
Conservation surveillance and information gathering	Min Env't and Water Park Agents Local communities ² University and research institutes NGOs	Participation in analyzing Aerial surveys; field truthing of remotely sensed data; codification and dissemination of local knowledge; establish a joint "monitoring group" including all stakeholders
Management of park infrastructure, including boundaries, buildings, roads, water and tourism	Min Env't and Water MNP staff Local communities NGOs	Participation in decision making; employment opportunities
Promotion of "image" of MNP	Min Env't and Water Media Local Communities	Participation in development of documentaries and other media products
Legalisation of the MNP and responsibilities over the Corridor	Min Env't and Water Min Agriculture Transhumant Herders Farmers	Participation in development and dissemination of legal texts
Awareness raising on improved management of buffer zone and the Corridor	NGOs Local Communities Transhumant herders Min Agriculture Min Env't and Water	Joint planning committees developed and functioning, that supervise and evaluate progress; Joint action between government extensionists and local communities
Local initiatives for development, territorial management, and decision making	Local Communities NGOs Extensionists Research institutions	Strengthen local institutions for decision making; participatory development of techniques for natural resource management and alternative income generation; train local communities for business management;

² Local communities include all segments of the population, including traditional chiefs, village leaders, canton/district leaders, producers, women, and youth.

Annex 6: Biodiversity significance

I. Ecological and biodiversity importance of Moyen-Chari Region

Situated in the extreme south of the country, Moyen-Chari is one of Chad's 14 prefectures. It covers an area of 59 000 km². The capital is the town of Sarh. Moyen-Chari is bordered on the south by the Central African Republic, on the east by Salamat, on the north by Guéra prefecture, on the north-west by Chari-Baguirmi and Tandjilé prefectures and on the west by Logone oriental prefecture (**Annex 7**).

Moyen-Chari has the highest rainfall of all Chad's prefectures. The climate is Sudano-Guinean with a semi humid tropical regime and an annual rainfall of between 900 and 1350 mm spread over a period of six to seven months (May to November). The rest of the year comprises the dry season, with a total absence of rainfall. Moyen-Chari thus has a climate conducive to harmonious ecosystem development.

By reason of this climate, the dominant vegetation is open Sudano-Guinean wooded forest savanna. As a function of the different levels of rainfall, there are two major phytogeographic components:

- ?? At 900 mm rainfall the savannahs with Combretaceae, representative of the Sudanian climate, with *Anogeissus leiocarpus*, *Combretum glutinosum* and *Terminalia avicenoide*, predominating;
- ?? Above 1000 mm rainfall are the Caesalpinaceae savannas, of South Sudanian to Guinean affinity, with a denser pattern made up of multi-stratum ligneous populations 8 to 10 m high (*Afzelia africana*, *Daniella oliveri*, *Isobertinia doka*, *Butyrospermum Parkii*, *Khaya senegalensis*, ...).

The landscape comprises two geomorphological units – the low argillaceous plateaux known as Koro and the many accumulation plains subject to flooding. Apart from a few rocky outcrops of low altitude, such as Mont Niellim situated north-east of Manda Park, the landscape of Moyen-Chari is almost monotonous.

Traversed by the main river, the Chari, whose source is at N'Délé in the Central African Republic, Moyen-Chari has numerous water courses flowing through it. The *Bahr Sara* on the left bank is the main tributary of the Chari. With its many meanders and interlinking channels, the *Bahr Sara* discharges upstream of the town of Sarh, near Manda Park. On the right bank the *Bahr Aoûk*, the *Bahr Keita*, the *Bahr Salamat* and the *Bahr Korbol* discharge a substantial quantity of water into the Chari. The Chari, serving as a collector, drains these waters towards the major Sahelian Chadian receptacle, Lake Chad. Moyen-Chari also has lakes, the largest of them Lake Iro which covers around 95 km². Located in Kyabé sub-prefecture, this endorheic lake is partially bounded on the southwest by ferruginous plates. A residual lake, it is believed to be the last remnant of a former much larger body of water which occupied the whole of the depression between the *Bahr Salamat* and the *Bahr Aoûk*.

According to the 1993 population census, Moyen-Chari has 738 595 inhabitants, with a density varying between 2 and 20 inhabitants/km². The vast majority of this territory's population consists of relatively homogeneous indigenous ethnic groups known as *Sara*. Other non-*Sara* groups (Niellim, N'dam and Gor) practice the same habits and customs. These various ethnic groups are heavily represented in the town of Sarh and its environs, including the Manda region. The monograph on the population of Moyen-Chari in 1993 estimates the sedentary population at 96.6%, 48.5% of them young people under the age of 15, with a predominance of women (51.3%). The employed economically active population of Moyen-Chari is 55.0%, with economically active men (58.9%) being more numerous than women (51.4%). Population mobility indicators are high everywhere in the prefecture. Other groups of migrants have also established themselves in Moyen-Chari. They are migrants from Biltine, Guéra and Chari-Baguirmi prefecture.

The Moyen-Chari prefecture enjoys a natural context highly favourable to the development of biodiversity. In its Sudanian biogeological part, Moyen-Chari possesses major biological wealth, particularly in the south-west where MNP is located. This region is the point of meeting and convergence between biological species from the forest ecosystems and those from semi-humid to humid environments. It constitutes a natural prolongation between the tropical forests of the Congo basin and the humid Sahelo-Sudanian regions. The establishment of numerous protected areas in Moyen-Chari is aimed at protecting biological diversity.

In Moyen-Chari there are a number of protected or conservation areas - MNP (114 000 hectares), the classified forests of Djoli-Kéra (93 700 hectares), Haut Bragoto (214 000 hectares), Hélibongo (1 254 hectares) and Bébo (12 460 hectares); the Aouk hunting preserve (2,000,000 hectares), the controlled hunting area of Lac Iro and the community reserves of Nyala and Hyrnan.

These areas constitute a network for the exchange of biological elements. Unfortunately, this flow is increasingly being breached by the land pressure on the area. Currently the south-west of Moyen-Chari, particularly MNP, is the most seriously threatened part.

The biological diversity of Moyen-Chari in terms of flora is still little known because of the insufficiency of taxonomic research. However, a number of studies indicate the presence of many small species in the gallery forests or forest islets - *Erythrophleum*, *Monanthes*. The interest from the flora standpoint of the Kou forest remnant located in MNP should be mentioned. Other humid-climate species such as *Macaranga schweinfurthii*, *Trichilia retusa*, *Tristemma mauritanum* border the north of Moyen-Chari (9°30').

Species stated to be endemic in a number of countries have recently discovered in Moyen-Chari. Examples are: *Aponogeton fotianus*, an Asian Commelinacea new to Africa (*Cyanotis axillaris* (Fotius) ; *Scholleroopsis lutea*, an Antederiacea recently reported in Cameroon by R. Letouzey and found in Chad ; *Phyllanthus cerastostemum*, a spectacular species described in Zambia (1967), *Gardenia subacaulis* found at Kaba by Audru, *Brachystelma constrictum*, described in 1966 on the basis of material coming from Ghana but collected by Audru at Bediol in Chad, *Murdannia clarkeana*, described in Kenya in 1952 and collected by Audru and A. Gaston at a number of locations in Chad, *Disophylla tisserantii*, described by Tissérand in the Central African Republic but found in Cameroon by Letouzey and by Audru in Chad, *Ctenium newtonii* collected by Audru, Dronne and A. Gaston, *Melanocentris abyssinica*, described in Chad by Gilet (1965) and reconfirmed the following year by Gaston, *Rhincosia albae-pauli*, described in Senegal and found in Chad by Fotius and *Robbireia delileana milneredhead*, reported in Mali but also found in Chad. The monograph on the Moyen-Chari region by O. Djimadoum (1998) in the context of the national strategy and plan of action for biodiversity confirms the existence of this wealth of flora described in the 1960s and the 1970s.

Fauna resources are very well represented in Moyen-Chari. The most representatives are: *elephant, giraffe, rhinocero, buffalo, urebi, leopard, greater kudu, gazelle, reedbuck, cob, lion, forest duiker, water buffalo, sassaby, hippopotamus, roan antelope, hyena, genet, civet, hunting dog and cheetah*. In short, all of the major fauna of the Sudan in the savannahs of Africa is well represented in Moyen-Chari.

This humid habitat is also home to other groups of fauna, such as reptiles, these include some species that appear in the IUCN's red list, such as the African grooved tortoise (*Geochelone sulcata*), the Senegal and Nubian flapshell turtles (*Cyclanorbis senegalensis* et *Cyclanorbis elegans*), large and dwarf crocodiles, pythons, monitor lizards (*Varanus exanthematus* and *Varanus niloticus*) and cobras (*Nadja nigicolis*).

The major water resources, vast flood plains and permanent water holes (ponds) in Moyen-Chari are real ecological niches for hydrophilic species. They have diversified bird and fish populations which make

Moyen-Chari of significant ornithological interest. Hundreds of species of birds, some of them migratory, have been listed. The majority of the national avifauna lives in this hydrological complex, thus giving it importance from the heritage standpoint equivalent to that of the large national mammal fauna. More than 160 species of fish were counted there in 1982, and the most abundant are: *Protopterus annectens*, *Protopterus aethiopi*, *Polypterus senegalensis*, *Polypterus bichir lapradei*, *Heterotis niloticus*, *Mormyrus rume*, *Mormyrops deliciosus*, *Gymnarchus niloticus*, *Hydrocicon brevis*, *Alestes dentex*, *Alestes nurse*, *Distichodus brevipennis*, *Distichodus rostratus*, *Citarinus citharus*, *Citarinus latus*, *Citarinus distichoidoides*. Recent studies have identified other unknown fish species in the waters of the region. It thus remains to be demonstrated whether they are endemic. The originality of this avifauna territory stems in particular from its geographical location naturally contiguous to the human forest basis of Oubangui-Chari.

Rodents also have a significant presence in the region. They are the house mouse (*Mus musculus*), the black rat (*Ratus ratus*), the wild rat (*Awycanthus abyssinicus*), the porcupine (*Hystrix cristata*) and amphibians, namely the common toad (*Bufo bufo*), the running frog (*Kassina senegalensis*), and the tree frog (*Hyperolius concolor*). A number of endemic species of rodents have been reported in Chad (Lechavalier 1936 and Dejean 1995).

To sum up, a non-exhaustive list of the fauna describes the biological wealth of Moyen-Chari: 44 mammal species, 250 bird species, a dozen reptiles and rodents, 160 fish species.

II. Manda National Park

Tables 6-1 to 6-3 present information on flora and fauna species identified at Manda National Park.

1. Flora

Plant species of the *Caesalpinaceae* and *Combretaceae* families, belonging to the Sudano-Guinean province, remain dominant. In the south of the Park, a number of families from the sudanean domain such as *Meliaceae* and *Mimosaceae* (*Prosopis africana*, *Parkia biglobosa* etc.) are also very well represented. More to the north-east of the Park, there appear Sahelian species such as *Acacia sp.*, *Balanites aegyptiaca*, *Zizifus mauritiana* etc. Many of the flora species inventoried have not been classified because of the difficulty of transcribing them (local terminology, oral nature of the data) and because of the passage of bush fires just before the diagnosis, especially in the case of grass species. Unfortunately, it is apparent that the ecosystems of the zones immediately adjacent to the Park, particularly those located along the N'Djaména-Sarh road axis, are degraded.

The species are classified into three strata:

1. The upper stratum consists essentially of *Danellia oliviera*, *Khaya senegalensis*, *Isobertinia doka*, *Anogiessus leocarpus*, *Ficus platiphylla* ;
2. The middle stratum is dominated by *Terminalia macroptera*, *Anogeisus leiocarpus*, *Afzelia africana*, *Isobertinia*, *Parinaris exelsa*, *Mitragyna inermis*, *Prosopis africana* ;
3. The undergrowth is the province of *Detarium micropum*, *Grewia mollis*, *Bauhinia reticulata*, *Parinaris exelsa*, *Vitex doniana* and *Vitex simplicifolia*, *Ximonia americana*, *Strychnos sp.*

There is a kind of hierarchization in the distribution of species in MNP. From south to north there is wooded to shrub forest, with wooded forest in the centre of the Park and clear forest and/or wooded savanna towards the extreme north. A denser pattern is apparent towards the east of the Park with the gallery forest because of the Chari River.

Table 6– 1 below provides a list of plant species found during a survey conducted by the PDF-B at Manda.

Table 6-1: Typology of plant species inventoried in MNP in 2000

Family	Species
Anacardiaceae	<i>Borassus aetiopum</i> <i>Sclerocarya bierrea</i>
Bombaceae	<i>Andansonia digitata</i>
Caesalpinaceae	<i>Afzelia africana</i> <i>Daniella olivera</i> <i>Detarium microcarpum</i> <i>Erythopheum africanum</i> <i>Cassia sp.</i> <i>Isoberlinia doka</i> <i>Burkea africana</i> <i>Oxytenanthera abyssinica</i>
Combretaceae	<i>Anogeissus leiocarpus</i> <i>Combretum glutinosum</i> <i>Combretum nigricans</i> <i>Combretum micranthum</i> <i>Combretum collinum</i> <i>Combretum aculatum</i> <i>Guiera senegalensis</i> <i>Terminalia laxiflora</i> <i>Terminalia macroptera</i>
Olacaseae	<i>Ximenia Americana</i>
Loganiaceae	<i>Strychnos spinosa</i> <i>Strychnos innocua</i>
Ebenaceae	<i>Diospyros mespiliformis</i>
Euphorbiaceae	<i>Hymenocardia acida</i>
Meliaceae	<i>Khaya senegalensis</i>
Mimosaceae	<i>Acacia seyal</i> <i>Acacia raddiana</i> <i>Acacia sieberiana</i> <i>Acacia macrothyrsa</i> <i>Acacia ataxacanta</i> <i>Acaciadudgeoni</i> <i>Mimosa pigra</i> <i>Tetrapleura andongensis</i> <i>Parkia biglobosa</i> <i>Prosopis Africana</i>
Moraceae	<i>Ficus glumosa</i> <i>Ficus gnaphalocarpa</i> <i>Ficus platyphylla</i>
Rhamnaceae	<i>Ziziphus mauritania</i> <i>Ziziphus americana</i>
Rosaceae	<i>Parinaris excelsa</i> <i>Gardenia ternifolia</i>

Family	Species
Rubiaceae	<i>Gardenia crubescens</i> <i>Gardenia aqualla</i> <i>Mitragina inermis</i> <i>Sarcocephalus latifolia</i>
Sapotaceae	<i>Vittelaria paradoxa</i>
Simaroubaceae/Zigophyllaceae	<i>Balanites aegytiaca</i>
Fabaceae	<i>Afromosia laxiflora</i>
Tiliaceae	<i>Grewia mollis</i>
Verbenaceae	<i>Vitex doniana</i> <i>Vitex simpliciflora</i>
Polygalaceae	<i>Securida longipedunculata</i>

Source: Kolmagne Mallah Naré, 2000.

2. Fauna

Table 6 – 1 and **6 – 2** provide time-series data on estimated species numbers and locations at Manda National Park from the 1950s to present.

Annex 6-2: Typology of fauna and some bird species inventoried in MNP in 2000

Family/Order	Species	Scientific Name	Number of observations	Location
Acinonyx	Cheetah	<i>Acinonyx jubatus</i>	1	1 ; 2 ; 4 ; 5
Anatidae	Comb duck	<i>Sarkidiornis melanotos</i>		3
	Spur-winged duck	<i>Avica sp.</i>		1
Artiodactyls	Hippopotamus	<i>Hippopotamus amphibius</i>	6	6 ; 3
Bovidae /Riduncinae	Red hartebeest	<i>Alcephalus buselaphus</i>	4	1; 2
	Buffalo	<i>Syncerus caffer</i>		1
	Forest duiker	<i>Cephalopus grimmia</i>		1
	Roan antelope	<i>Hippotragus equinus</i>	12	1; 2; 3; 4; 5
	Waterbuck	<i>Kobus ellipsiprymnus</i>	4	1; 2
		<i>defassa</i>	9	1; 2; 4; 5
	Bushbuck	<i>Tragelaphus scriptus</i>	9	1; 2; 3
	Southern reedbuck	<i>Redunca arundium</i>		
	Red-fronted gazelle	<i>Gazella rufifrons</i>	13	1; 2; 3
	Kob	<i>Kobus kob</i>		
Common reedbuck	<i>Redunca redunca</i>			
Bucerotidae	African gray hornbill	<i>Tockus nasutus</i>	1	2
Canidae	African hunting dog	<i>Lycaon pictus</i>		
Cercopithecidae	Baboon	<i>Papio anubis</i>	4	
Cercopithecidae	Vervet Monkey	<i>Cercopithecus aethiops</i>		
	Patas monkey	<i>Erythrocebus patas</i>	1	2
Cervidae	Deer	<i>Cervus sp.</i>		
Ciconiidae	Saddle-billed stork	<i>Lephippiorhynchus</i>	1	2

		<i>senegalensis</i>		
Felidae	Panther	<i>Panthera pardus</i>	1	2
Phasianidae	Helmeted guinea fowl	<i>Numida meleagris</i>	2	1 ; 2
Reptiles	Nile crocodile	<i>Crocodilus niloticus</i>	2	2
Vivenidae	Civet	<i>Vivetra civeta</i>	2	1 ; 4
Suidae	Warthog	<i>Phacochoerus aethiopicus</i>	14	1 ; 2 ; 3 ; 4
Struthionidae	Ostrich	<i>Struthio camelus</i>	4	1 ; 2

Source: Park wardens' mission reports

Not on location: 1: Manda; 2: Djoli ; 3: Niellim/Wain ; 4: Guéré ; 5: Mairoum ; 6: Koutou

Annexe 6-3: Estimated populations of some fauna species

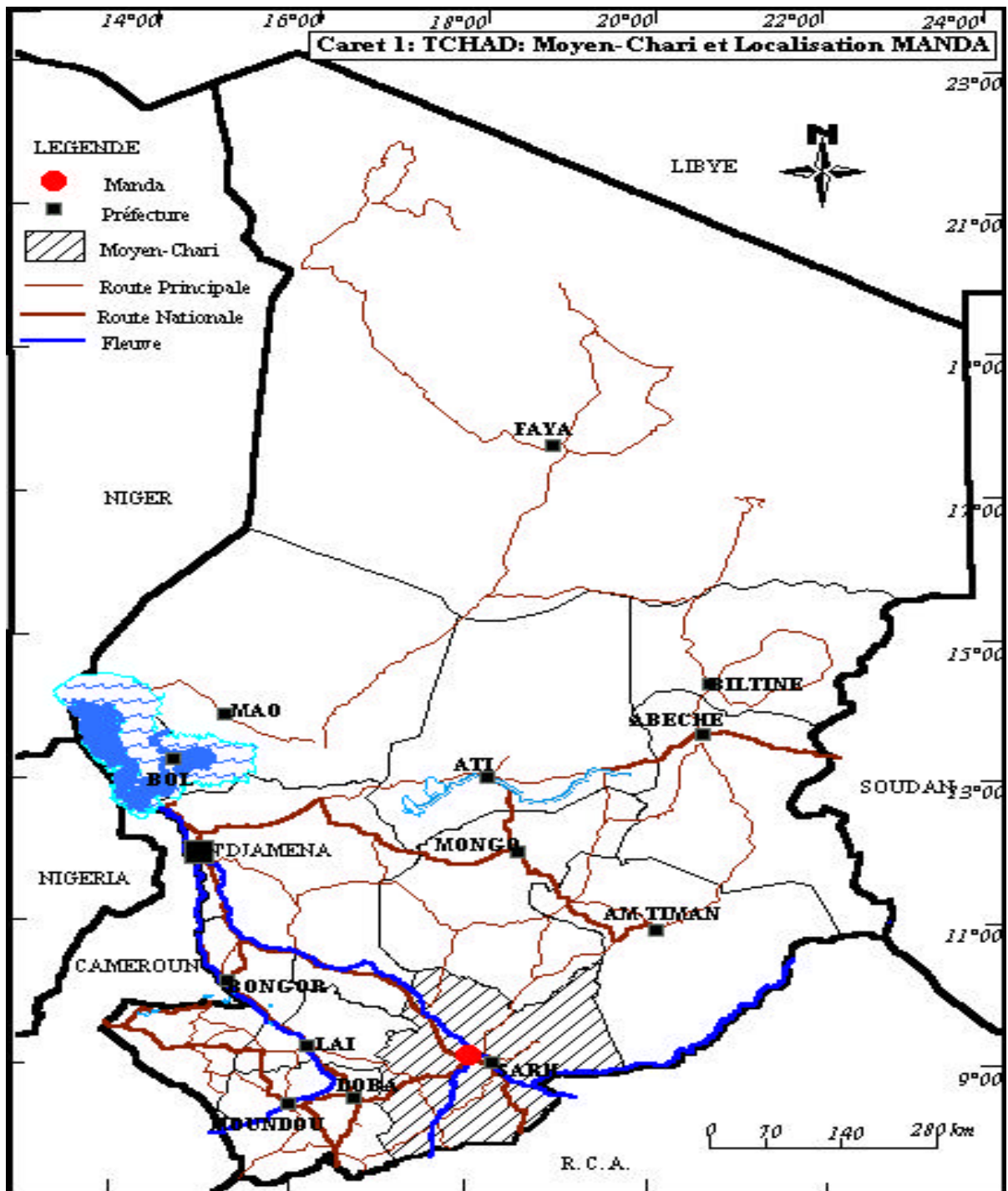
Species	1951	1965	1970	1981	1989	1995-96
Ostrich	A few	A few	A few	5 to 15	0	30-40
Water buffalo	50 to 60	200 to 300	800 to 1000	?	0	15-20
Buffalo	200 to 300	300 to 400	800	?	One track	Two tracks
Cob	100 to 200	900 to 1000	3000 to 3500	300 to 600	20 to 30	80-100
Waterbuck	200 to 250	600 to 700	5000	100 to 150	A few tracks	35-40
Crocodile	?	?	?	?	?	3-6
Baboon	?	?	?	?	?	80-100
Sassaby	15 to 20	35 to 50	100 to 150	?	00	5-10
Derby eland	120 to 150	400 to 500	800 to 1000	30 to 50	0	One track
Elephant	50 to 80	300 to 400	1500 to 2000	40 to 60	0	0
Giraffe	?	A few	A few	?	0	0
Bushbuck	30 to 40	100 to 150	200	50 to 100	40 to 50	70-90
Hippopotamus	A few	150	300	20 to 40	One track	5-7
Roan antelope	100	120 to 150	500	?	A few	30-40
Striped hyena	?	?	?	?	?	10-15
Leopard	rare	50 to 60	80 to 100	30 to 55	0	20-25
Lion						3-5
Hunting dog	?	?	50 to 80	?	?	15-20
Warthog	50 to 100	600 to 800	2000	100 to 200	80 to 100	250-400
Common reedbuck	50	150 to 200	200	100 to 150	A few tracks	40-60

? = not mentioned in the estimate; 0 = no direct observation or tracks

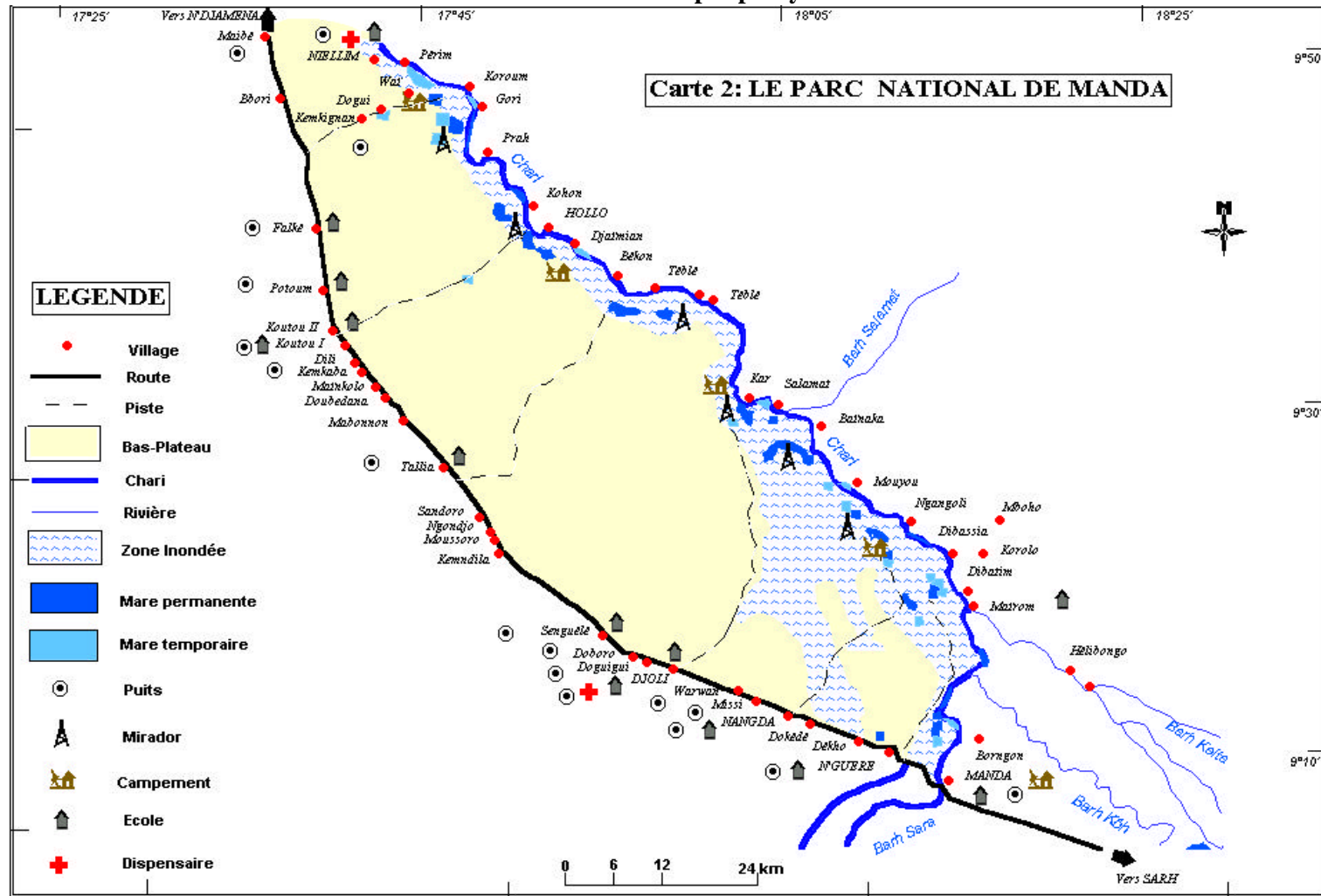
Source: CHAI Norin, Activity Report 1996.

Annex 7: Maps

7-1: Location of MNP in Moyen-Chari



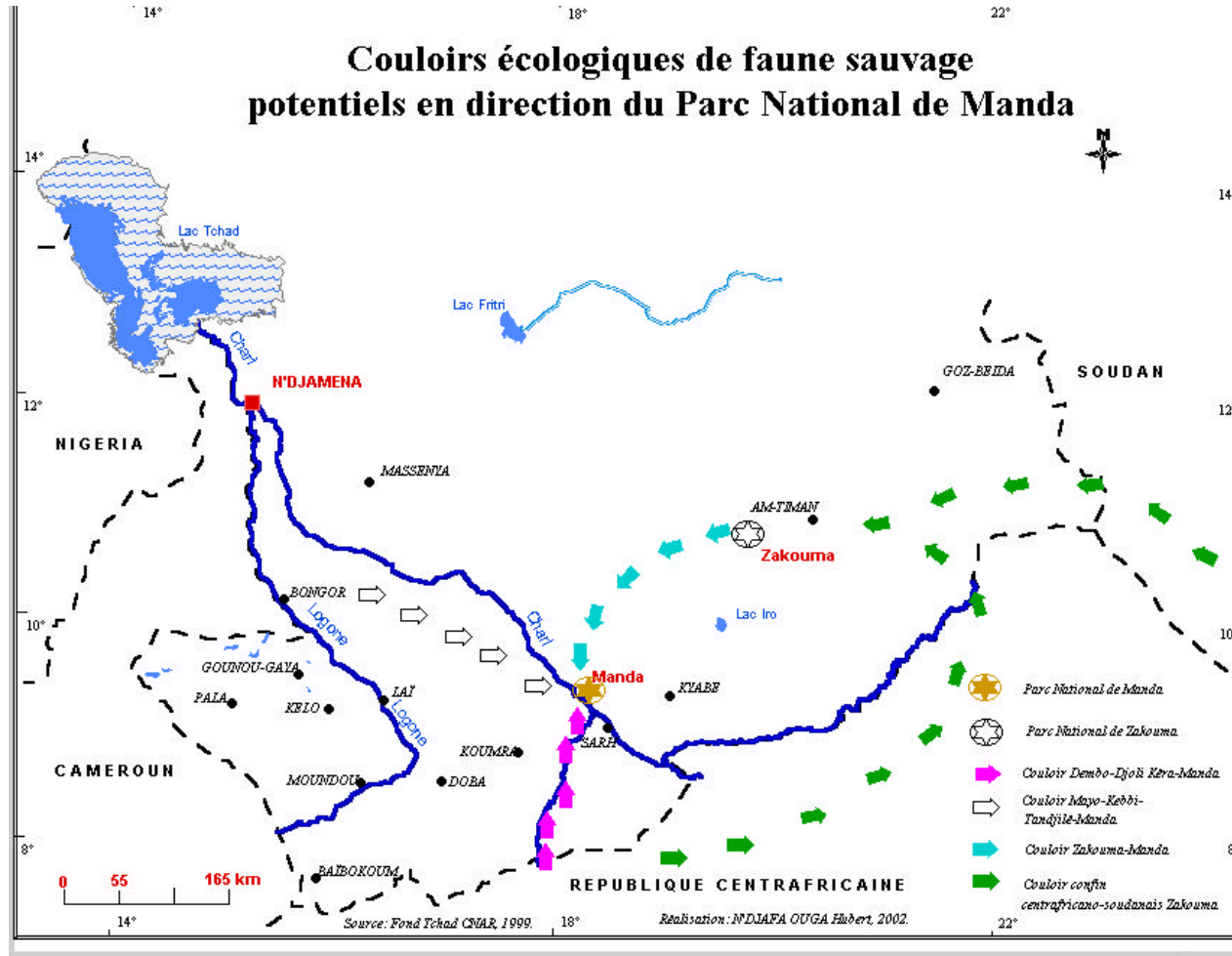
7-2: MNP and its periphery



Source: Acan 1996

Revisé: NDIJEA OUIAGA Hubert 2001

7-3: ECOLOGICAL CORRIDORS



Annex 8: GEF Operational Focal Point endorsement letter (see separate file)