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ECONOMIC EVALUATION OF THE CONTRIBUTION OF CAMPO MA'AN NATIONAL PARK TO TOURISM AND TO IMPROVING THE STANDARD OF LIVING AND LIVING ENVIRONMENT OF LOCAL COMMUNITIES

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ABSTRACT: *Why is it that despite the abundance and diversity of resources with ecotourism potential, the benefits of Campo Ma'an National Park do not significantly contribute to tourism or improve the living standards of local communities? This study aimed to determine the economic value of consumer goods and services and tourism. Using the observed preference method, we evaluated the economic benefits derived from the harvesting of non-timber forest products, agriculture, fishing, and tourism. This was achieved by applying environmental economics tools such as productivity effects for calculating consumer goods and services and the transport cost method for calculating the economic value of tourism. The study revealed that the Park possesses a diversity of resources with ecotourism appeal, subdivided into three components: fauna, flora, and landscape. Surveys indicate a high preference (87%) for the landscape and fauna components, highlighting the presence of endemic, rare, and protected mammal, amphibian, and bird species, as well as interesting archaeological and historical sites, rapids and waterfalls. In contrast, we observed a less attractive for flora component (13%) includes mangroves and salt marshes, which constitute the main source of food for both animals and humans. The Park's estimated annual direct use value of USD 77,087,063 was calculated based on the economic surplus generated by supply services and tourism. The majority (78%) of respondents have an average annual income ranging from USD 1,300 to USD 3,600, primarily derived from cocoa sales, fishing, and hunting. This low household income indicates that the park's presence has not significantly improved living conditions or boosted tourism in the area, due to: a lack of political will from public authorities; the failure of project and program approaches; and the limited economic impact of businesses and infrastructure projects. These shortcomings have instead fueled a sense of frustration and resentment among local communities towards the park's conservation services, industrial operators, and technical assistance providers.*

KEYWORDS: Economic assessment, Campo Ma'an National Park, Forest natural resources, level of standard living and quality of life, tourism, environmental goods and services.

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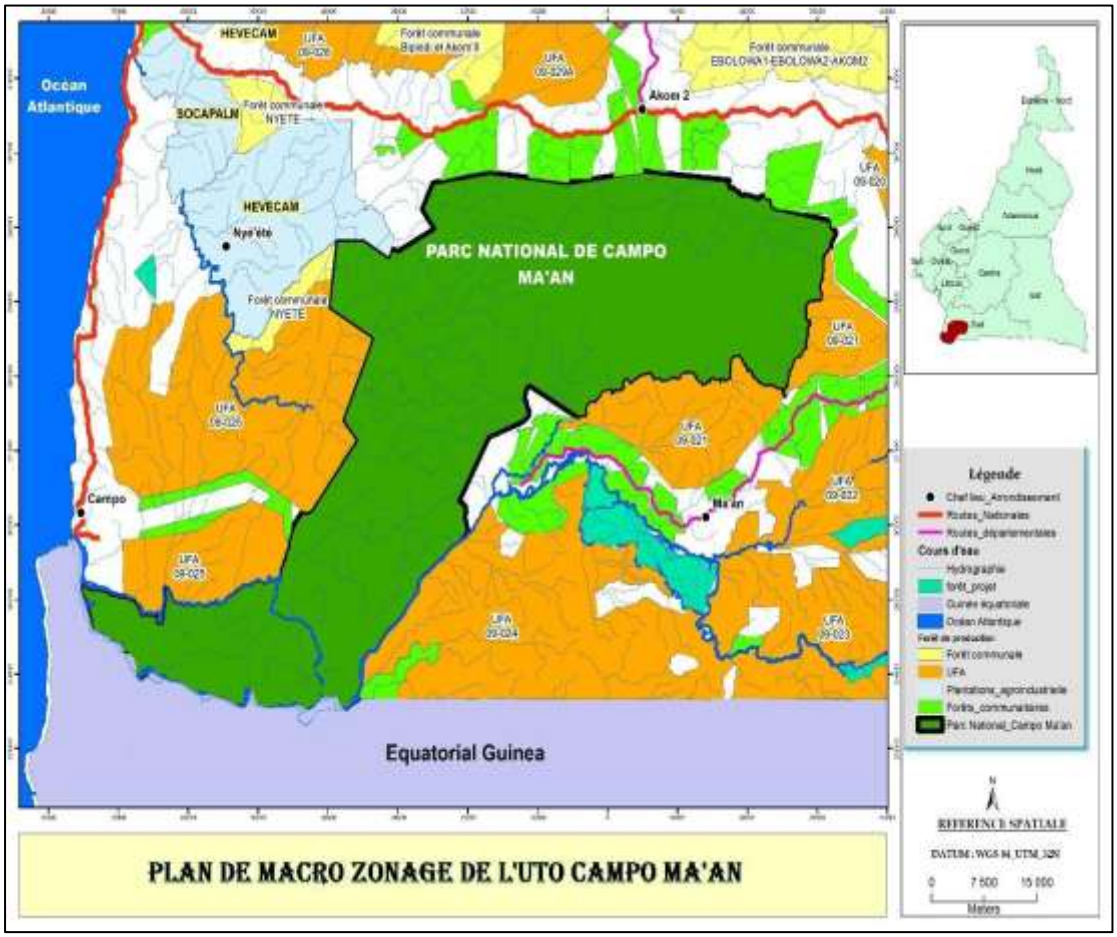
INTRODUCTION

Context of the study area

The zoning of the Campo Ma'an National Park (CMNP) is perceived at two levels: the macro level, consisting of the Campo-Ma'an UTO, showing the interactions between the park and the macro zones on the periphery, as well as other land uses around the park; and the micro level, which concerns the interior of the park, divided according to the type of development or level of protection to be deployed.

A macro-environment consisting of the Manyange na Elombo Marine National Park, created on July 9, 2021, with an area of 42,364 km2 (110,300 hectares); five (5) Forest Management Units (FMUs 09-021, 09-022, 09-023, 09-024,and 09-025); an agro-industrial zone consisting of two agro-industries, namely the Cameroon Palm Oil Company (SOCAPALM) and Hevea du Cameroun (HEVECAM); an agroforestry zone on which several community forests are spread; and the structuring projects (Memve'elé hydroelectric dam, Industrial-port complex, and mining exploration permits) which overlap most of the macro-zones. As shown in the map below:

MAP 1: Macro map zoning of the CMNP and its surrounding area



Source: *Adapted from the 2015-2020 Development Plan report*

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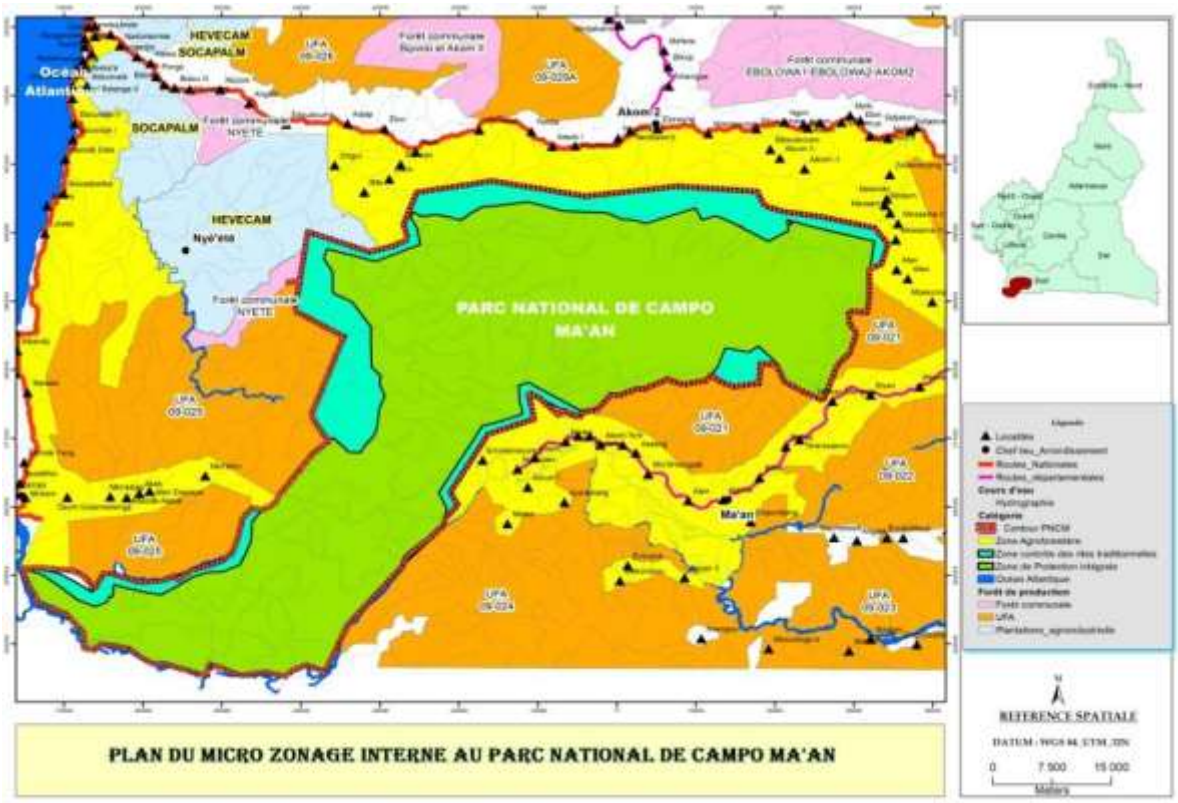
According to Tiani et al. (2001), the plurality of actors has increased population density in the remaining lands, which has risen to 29 inhabitants per km2, further reducing the space allocated to the population for their activities.

A micro-environment, consisting of a physical environment providing resources and assimilating waste; a social environment made up of the users of the CMNP resources (riverside populations, Bagyeli pygmies, workers, eco-guards, etc.); a socio-political environment that regulates life in society and manages power relations (administrative, traditional, municipal authorities, NGOs, management committees, platforms, elites, and those responsible for the conservation service) and an economic environment that reflects the impacts or benefits on the standard and living conditions of the populations resulting from income-generating activities with low impact on nature considered by law as the right of use (artisanal fishing, collection of forest products other than wood, agriculture, livestock farming, etc.). As shown in the map 2 below:

Map 2: Internal micro-zoning within Campo Ma'an National Park



Source: *Adapted from the CMNP 2015-2020 Development Plan report*

Furthermore, the Campo Ma'an area forms an intricate complex of ethnic groups, including seven (7) native to the region, as well as numerous immigrants attracted by industrial activities. Among these populations, the Bakola/Bagyéli people (Pygmies) constitute a minority marginalized by neighboring ethnic groups and rejected by mainstream society due to inappropriate "interventionist" integration policies that add to the complexity of the human environment and the Park region.

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As knowledge about the park improves, interesting caves and archaeological and historical sites are being discovered. The rapids of the Ntem River, the numerous navigable rivers, the Memve'ele Falls, and the cultural diversity concentrated in a relatively small area (coastal fishing people, sedentary forest people, Bakola/Bagyéli pygmies living from fishing and gathering, and cultural mixing) add to the tourist attractions of the PNCM.

In addition to the low utilization of its physical potential (agricultural land, forest, water resources), the local population denounces the difficulties in accessing basic infrastructure and factors of production. Despite the presence of logging companies, agribusinesses, and major infrastructure projects nearby, such as the Mem'vêle hydroelectric dam, the Kribi gas-fired power plant, the construction of the Balam-Krini railway, and the Kribi deep-water port, unemployment is rampant. The industrialization of the area is giving rise to new problems: land disputes between newcomers and local populations, uncontrolled urban sprawl, pollution (land and water) resulting from industrial waste, and urban social issues (drug use, prostitution, etc.).

Problem Statement of this Study

The Problem of the Study

The problem addressed in this study is: why, despite the diversity and specific nature of the resources with ecotourism potential, does the impact of the PNCM (National Park of the Mont Blanc) not significantly benefit either the development of tourism or the improvement of the living standards and environment of the local population?

Research question

What is the contribution of the PNCM to tourism and to the improvement of the living conditions and environment of the populations?

Study Objectives

The overall objective is to determine the economic value of consumer goods and services and tourism.

Specifically:

- Describe the stakeholders involved in the attractiveness of Campo Ma'an National Park's resources for tourism.
- Describe the different forms of subsistence capital in and around Campo Ma'an National Park.
- Evaluate the economic value of tourism and supply services within Campo Ma'an National Park.

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MATERIALS AND METHODS

Foundation and Logic of the Theoretical Approach

In this study, the use of the cost-benefit analysis (CBA) method was recommended. This method estimates, in monetary terms, the net benefits (i.e., total benefits minus total costs) generated by any resource allocation project. Optimal resource allocation occurs when CBA identifies the projects/programs that offer maximum net benefits (Ray, 1986; Dixon et al., 1996). In other words, when revenues exceed total costs.

Economic Valuation Method Applied to Calculating the Economic Value of Key Resources

The economic value of ecosystem goods and services is very often estimated using the stated preference method, which employs tools such as contingent valuation through willingness to pay or peer comparison. Furthermore, the economic value of goods with market value requires the use of tools from the observed preference method, including productivity effects and monetization at market prices.

Calculating the total economic value of a park is a large-scale task. First, it is necessary to list all the ecosystem goods and services provided by the park and evaluate them in order to assign them a monetary value, such as supply services.

Supply Service

The objective is to assess the contribution of non-timber forest products, agriculture, and fishing to the household economy. This is achieved through market prices and quantitative data related to the behavior of economic agents. The data analysis methodology is based on consumer surplus or cost price.

Consumer surplus is the difference between the market price of a good produced and its production cost. To calculate producer surplus, the following data is needed: the number of households engaged in the activity, total annual production, the proportion of this production consumed internally, the cost of production, and the selling price of the product. Once this data is obtained, the calculation is as follows:

- Annual production/number of households = production per household
- Annual production per household – proportion consumed internally = actual share sold
- Actual share sold * selling price = profit per household
- Profit per household – production cost = actual profit per household
- Actual profit per household * total number of households = surplus of producing households

Cultural Services: Calculating the Value of Ecotourism

The value of ecotourism was estimated using the transportation cost method. The transportation cost estimate is the sum of all expenses necessary to visit the study site. This value represents an opportunity cost for exploitation and added value for conservation.

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The expected benefits of tourism development in Campo M'an were assessed by multiplying the average annual number of visits by the average expenditure that a domestic and international tourist is willing to pay to visit the park. This essentially includes park entrance fees, expenses related to food, accommodation, and transportation.

Respondent Selection: Purposive Sampling Method

Purposive sampling refers to various techniques that consist of constructing, based on prior information about the population being studied, a sample that closely resembles that population. Several techniques can be identified at this level. However, within the framework of this thesis, we have focused on the standardized unit sampling method and the "hot sampling" method.

The typical unit Method

This method involves defining control variables to determine an "average" individual, called the typical unit. Only individuals close to the typical unit are then interviewed. This method was recommended for selecting respondents to survey the public's perception of the importance of ecosystem services and the benefits derived from tourism.

The "on-the-spot" survey method

These surveys are conducted in specific locations, immediately after an event, to gather opinions on the spot or "in the heat of the moment." This method was used in selecting respondents regarding the contribution of tourism to conservation and development.

STUDY RESULTS

Description of the standard and living conditions of the populations living in and around the Park

The survey area (Campo-Ma'an) is located in the South Region of Cameroon and has an estimated population of over 192,799 inhabitants with a density of 15.1 inhabitants/km2, who live primarily from agriculture, fishing, and hunting.

Health care needs

The health needs of the populations in the study area are all the greater because they suffer from the lack of modern technical facilities in existing health establishments and from the resurgence of diseases, such as waterborne diseases (42%); malaria (48%); diseases related to old age (3%); nervous and stress-related diseases (5%) and accidents (2%).

As illustrated in Table 2, the majority (69.04%) of the population travels for health care to health facilities located in the cities of Kribi, Yaoundé, and Douala, and the rest of the population resorts to medicinal plants and self-medication.

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Table 1: The healthcare situation of households

Type of healthcare use by household	Number of households	Percentage
Medical travel/evacuations	562	69.04
Use of traditional medicine	37	4.55
Attendance of local health facilities	198	24.32
Self-medication	17	2.09
Total	**814**	**100,0 %**

Source: *Survey data*

Need for Education

Education is characterized by a gross enrollment rate of 87.27%. This reveals significant access to education in the area, although some communities believe that much remains to be done to improve children's education and schooling. This result regarding school enrollment rates, however, masks significant disparities between urban communities, which have higher levels of education, and rural communities. Furthermore, the vast majority of young people (93.78%) indicated that the problem with education was the lack of vocational training programs.

Household Income

Main Activities

The main activities of the heads of households surveyed are: Agriculture (75%); hunting (14%); fishing (9%); and marketing (2%). It is important to emphasize that income sources are not the same in all localities. In the Ma'an district, the main income-generating activities (IGAs) are agriculture, hunting, fishing, and the collection of non-timber forest products (NTFPs).

While in the district of Campo, the main sources of household income are, in order of importance: agriculture, fishing, hunting, and the collection of non-timber forest products. This difference in order is due to the proximity of the sea in the district of Campo.

Estimation of household income based on respondents' statements

Household income was estimated using two approaches: one based on respondents' statements and the other on the collection of empirical data. Household income from agriculture comes primarily from the sale of cocoa and some food crops such as plantains and cassava. Artisanal fishing is practiced occasionally in the backwaters of the Ntem River, and non-timber forest products such as wild mango kernels (*Irvingia gabonensis*) and raffia wine are also sold.

The results of the survey on public perceptions of income from supply services are presented in Table 3 according to the following classification:

- Top group: This group represents households with the highest wages.
- Bottom group: This group corresponds to households with the lowest wages.
- Average/Median: This group corresponds to households whose income represents the average income, and the overall group is that of households whose income is predominantly represented in the locality.

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Table 2: Estimated monthly household income

Household classification	Head group	Average	Overall group	Tail group
Proportions (%)	7%	13%	72%	8%
Annual Income	1001-3000	305-1000 USD	100-300 USD	10-99 USD

Source: *Field survey*

As illustrated in Table 3, the survey results show that the majority of households (72%) have an average monthly income that ranges between USD 100-300.

According to RADEC[1] (2024), this income is slightly higher than the annual household income in the South Region of Cameroon, which ranges from USD 75-225, and in Cameroon as a whole, which ranges from USD 100-275. This difference is explained by the diversity of economic activities that form the backbone of household income. In other words, household heads in the study area generally engage in more than one activity, such as farmer-hunter, farmer-NTFP collector, farmer-hunter-NTFP collector; or fisher-farmer.

Analysis of the problems or expectations of the population regarding the level of access to subsistence capital

An analysis of the problems and expectations of the population in relation to improving the standard of living and environment of living is presented in Table 4.

Table 3 : Analysis of the problems and expectations of the population

Areas of Expertise	Problems diagnosed	Expectations solutions
Health:	55.8% of households suffer from some kind of illness (90% of which are related to malaria and waterborne diseases)	Improve the provision of healthcare.
Education and Vocational Training:	More than 12% of children, including 10.74% belonging to the Bagyeli Pygmy minority, do not attend school regularly.	Raising awareness among Bagyeli Pygmy parents about sending their children to school. Building preschools in rural areas.
	54.78% of children do not have access to preschool. 77% of school-aged youth are unemployed	Improving the availability of quality and appropriate education and vocational training.
Community life	Various informal associations exist and are poorly managed.	Encourage the professionalization of producers.
Infrastructure & Socio-Professional Integration	Average quality of roads (46.9%); Number of households connected to the electricity grid (56.6%)	Improve access to basic infrastructure.

[1] Rapport annuel pour le développement économique de la région du Sud

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	Number of households with access to drinking water (22.3%); Number of young people surveyed with a job (36.9%). Improve access to basic infrastructure	
Expected assistance: Financial	Financial support (76.4%); Material support (58.7%);	Diversification of sources of income
Social Climate:	Numerous identified conflicts related to: Encroachments on the boundaries of the PNCM (National Park of the Mont Blanc); Mismanagement of annual fees; Poaching	Establish a conflict management platform and increase awareness of environmental education.
Employment	Significant deficit in terms of both quantity and quality of local labor (7% exists)	Train the existing workforce and import workers from other regions of Cameroon.
	Very small population, prone to rural exodus towards Kribi	Raise awareness among young people about the dangers of rural exodus. Train young people in small trades (sewing, catering, agricultural entrepreneurship, masonry, carpentry, electricity, etc.).

Source: *Field survey*

In addition to the underutilization of its physical potential (farmland, forests, water resources), local residents complain about difficulties accessing basic infrastructure and factors of production. Despite the presence of logging companies, agribusinesses, and major infrastructure projects nearby, such as the Mem'évele hydroelectric dam, the Kribi gas-fired power plant, the Balam-Krini railway project, and the Kribi deep-water port, unemployment remains rampant despite high levels of education. The industrialization of the area is giving rise to new problems: Land disputes between newcomers and local populations, uncontrolled urbanization of cities, pollution (land and water) resulting from industrial waste, and urban social phenomena (drug use, banditry, prostitution, etc.).

Analysis of the Attractiveness of PNCM Resources for Tourism

Description of PNCM's Key Resources

The economics of these resources are illustrated by Map 3 below:

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Map 2: Internal micro-zoning within Campo Ma'an National Park

Source: *Adapted from the CMNP 2015-2020 Development Plan report*

Furthermore, the regular interactions between the macro and micro areas are likely to alter the spatial and temporal configuration of these two physical entities, contributing either to the enhancement or degradation of natural resources within the Park.

By key resources of the PNCM, we mean: "floristic, faunal, and landscape components of exceptional and additional value for park management."

Thus, using the documentary review (PNCM Management Plan 2015-2019 and its surroundings, map no. 11; p. 74) and reconnaissance visits, we were able to identify the main resources with ecotourism appeal in the PNCM, namely: buffalo caves (02); archaeological and historical sites of interest for the practice of certain rites; the Tree Museum (01); the Ntem Rapids (01); birdwatching sites (03); clearings for elephants, buffalo, and great apes (02); salt pans (02); and caves with picathartes (01)...

The PNCM is full of many other ecotourism sites likely to attract both national and foreign tourists, such as clearings and salt flats for observing large animals like elephants; caves with buffalo and picathartes or even bats; large rocks; the Memve'ele Falls; and rapids; and birdwatching sites.

Stakeholder representations of the ecotourism value of resources

Public perception of the ecotourism value of the Park's resources

In this study, the Park's key resources were presented in three components (flora, fauna, and landscape).

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Through participatory surveys, the ecotourism value of each type of resource was assigned. This assessment was based on three criteria: economic importance (supply); cultural importance (sacred sites), and biological importance (rarity or specificity). Ecotourism resources were thus subdivided into three components: fauna, flora, and landscape.

According to local perceptions, two components stand out for their strong ecotourism appeal: the landscape and the wildlife. The landscape component offers a variety of services (regulation, maintenance, and cultural), while the wildlife component includes mammals, some of which are rare or specific to the area.

Examples include the forest elephant, buffalo, chimpanzee, leopard, giant pangolin, and mandrill (a species strictly endemic to the PNCM). Located near the PNCM, the marine mangrove park has become a major tourist destination due to the presence of an amphibian population, including the Goliath frog, which is endemic to Central Africa. While the less attractive floral component for tourism constitutes the main source of food for animals and humans.

Perception of the advantages and constraints of ecotourism

Opportunities The island of Dipikar, located within the PNCM, certainly presents many opportunities compared to other sites located on the mainland. The massive influx of international tourists to Campo is leading to the modernization and expansion of the already limited or virtually nonexistent accommodation options in the town. However, these job opportunities can only be seized if people are trained and ready to take them. The opposite effect could also occur: the project may not produce the expected multiplier effects, and the working population may migrate to jobs in the large projects currently being developed in the region.

Constraints

Several major projects have been implemented in and around the Campo region. These include the unfinished railway line project, which will run from the east of the country to the deep-water port of Kribi, construction of which began in 2011. To the east of the park, the Memve'ele dam is under construction. These three projects complement the long list of industrial companies already operating in the area surrounding the park.

For instance, the agribusinesses HEVECAM and SOCAPALM, and now including the forestry company WIJMA, these new projects, like those already operating in the area, are highly labor-intensive (HIMO). Significant migration of workers, job seekers, and their families is also observed.

According to Pauw, Bouma & Daniel (2011), a population increase of around 300% is projected over the next decade. This will result in increased pressure on the area's wildlife resources and a further rise in poaching. Another phenomenon that warrants attention is that of laid-off workers who often remain in the camps and simply turn to poaching.

Calculation of the economic value of supply and tourism goods and services

Total economic value (TEV) is an analytical framework used to assess all the values generated by the market and non-market goods and services of an ecosystem. It also represents the

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benefits generated from the resources of the PNCM (National Park of the Mont Blanc) with both use (direct and indirect) and non-use value. The calculation of the economic value of supply and tourism-related ecosystem services (ESEs) corresponds to the estimation of their direct use value. Supply-related ESEs are derived from the profits generated by agriculture, fishing, and the harvesting of non-timber forest products (NTFPs), while cultural ESEs are derived from the benefits of tourism.

Calculation of the economic surplus of supply BSEs

Based on empirical data, we calculated the economic surplus from agriculture, fishing and NTFPs

Income Calculation

Agriculture

Agriculture is practiced by all households (75%). Agriculture is the main source of income. Most of the production is for self-consumption, and only a small amount is sold. The main agricultural products found on the market are: cocoa, plantains, and cassava.

Agricultural plots range in size from 250 m² to 3 hectares. Polyculture is practiced, including intercropping of cocoa and plantain, and cassava and peanuts.

The cultivated areas are presented as follows, categorized by farming household.

Farming households are listed according to the size of their cultivated area, using the following classification:

Agricultural plots range in size from 250 m² to 3 hectares. Polyculture is practiced, including intercropping of cocoa and plantain, cassava and peanuts, etc.

The cultivated areas are presented as follows, categorized by farming household.

Farming households are listed according to the size of their cultivated area, using the following classification:

- Head: proportion of households with the largest plots
- Tail: proportion of households with the smallest plots
- Total: represents the most common plot size among households.
- Average: represents the median area per household.

Table 4: Cocoa plots by class

	Area of cocoa plots by class of agricultural households			
	Average	Head	Overall	Tail
%	5%	21%	62%	12%
Areas	2-4ha	0,5-1ha	0,25-0,5ha	500m^2-250m^2

Source: *Field survey*

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Cocoa is harvested twice a year, corresponding to two production periods: a main harvest from November to March and a smaller harvest from May to July. Cocoa yields in Cameroon differ between the production areas of the Southwest and those of the central and Southern regions. According to CIRAD (2017), cocoa yields in the South range from 100 to 500 kg/ha, with an average yield of 300 kg/ha. In Cameroon, the highest cocoa yields are observed in the Southwest region, where production ranges from 600 to 1200 kg/ha. Cocoa prices have fluctuated between 2000 and 5000 FCFA/kg over the past ten years.

Plantain Bananas

Plantain bananas are cultivated in ten of Cameroon's twelve regions, except the Far North and North regions. The yield of plantain bananas is approximately 30 tons/ha. They are generally grown in polyculture on plots not exceeding 2500 m². However, survey results reveal that 27.5% of households surveyed cultivate plantain bananas in monoculture on plots ranging from 1 to 3 hectares. The weight of a bunch of plantains varies from 10 kg to 35 kg, and the price of a bunch of plantains, depending on its weight, is 1000 to 3000 FCFA/kg.

Self-Consumed Share

Following various field interviews with producers, it appears that, on average, the plantain banana self-consumed by households represents between 65% and 80% of total production

Non-Timber Forest Products

Wild mango kernels generally undergo artisanal processing (paste or balls) before being sold. Unlike cocoa and the sale of raffia wine, which are male-dominated activities, the collection, processing, and sale of wild mango kernels are primarily women's work. Raffia wine is sold by the liter, while wild mango kernels are sold in piles. Palm wine sells for 300 FCFA per liter, and processed wild mango kernels fetch 5,000 FCFA per kilogram.

The production of Irvingia gabonensis is seasonal due to the lack of domestication. The quantities processed are small due to the long distances involved in harvesting, a lack of knowledge of processing techniques, the arduous nature of the processing (which is primarily manual), and low market demand.

The surveys made it possible to estimate the annual quantities sold of palm wine and wild mangoes, summarized in the following lines:

Table 5: The estimation of non-timber product annual quantities sold

Annual quantities sold			
	High	Medium	Low
Wild mango paste	21-50kg	11-20kg	5-10Kg
Liters of palm wine	3000-5000liters	1000-2000liters	500-1000liters

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Calculation of the economic surplus from inland artisanal fishing

Fishing takes place in two seasons. The period from February to March corresponds to the main fishing season. The off-season runs from October to December.

Fish products are sold in piles (large, medium, and small). The weight of the fish piles varies from 0.5 to 2 kg. Annual fish production ranges from 20 to 100 kg per household. The average annual fish production per household is 63 kg. However, 83% of the harvested fish is consumed fresh or dried by households. The price per kg of fish varies according to size, ranging from 1,000 to 4,000 FCFA.

However, whether it is fishery products or the processing of wild mango kernels, 65% are consumed by households, and the rest are sold.

Calculating the economic value of hunting

The creation of the park brought upheavals that shook the economic basis of the populations whose only source of animal protein (98%) comes from game, and 50 to 98% of the animal protein consumed by forest populations in Africa comes from the wild (Ngandju et al..2002). It is also through hunting that these populations derive the bulk of their income and the animal protein necessary for their diet. The survey reveals that ten years ago, a hunter in the Campo region could earn approximately 12,000 FCFA per month from hunting.

However, due to the destruction of wildlife habitats, these incomes have now drastically declined and are currently around an average of 3,000 FCFA per hunter per month (Dounias, 1993). The survey revealed that the uncontrolled occupation of forestry and mining concessions, agribusinesses, and proximity to major infrastructure projects are destroying the habitat of wild animals, forcing them to flee.

However, in the context of this thesis, income from hunting is not taken into account because it does not contribute to the protection of the Park and therefore to the promotion of ecotourism.

Calculation of Costs

The costs for cocoa production consist of the purchase of inputs (pesticides and fertilizers), packaging costs, and paid labor. Furthermore, only households with elevated plots of land use paid labor. Family labor is the most commonly used labor. This labor is free.

Surveys have indicated that charges related to cocoa account for an average of 35% of revenue.

The costs associated with other products are negligible. The processing and sale of non-timber forest products are primarily manual labor-based. Wild mango kernels are crushed with stones. Fishing is carried out using traps, lines, nets, etc. However, for the purposes of this thesis, the costs related to fishing (processing and marketing) are estimated at 5% of annual revenue.

The economic value of supply goods and services was estimated at USD 76,944,915. This reflects what households located on the periphery of the PNCM earn annually through extensive agricultural practices such as cocoa farming; the harvesting of non-timber forest products (Irvingia gabonensis kernels and palm wine/raffia); and artisanal fishing in the Ntem River estuary. This profit derived from marketable goods and services averages USD 3,024 per year and USD 252 per month per household.

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We observe that the average household profit from market products calculated above is relatively close to the average income from participatory surveys, which indicates that 72% of households have a monthly income ranging between 100 and 300 USD[2], or 60,000 FCFA to 180,000 FCFA.

However, given the precarious situation of households living around the PNCM, characterized by difficulties in accessing basic socioeconomic services and factors of production, exacerbated by the absence or inadequacy of incentives, this income falls far short of meeting these populations' survival needs. Furthermore, this impoverishment of the communities is compounded by the illegal and forced land grabbing by large-scale operators (forestry, mining, and agriculture) of the land, the primary source of income.

Calculation of the Economic Value of Cultural Ecosystem Services: Ecotourism

Within the framework of the PNCM (National Park of the Mont Blanc), in addition to supply services, the direct use value includes cultural services through ecotourism.

Cultural services through ecotourism are calculated in this study by estimating transportation costs. The transportation cost estimate is the sum of all expenses necessary to visit the study site. This value represents an opportunity cost for exploitation and added value for conservation.

Tourism remains underdeveloped in Campo-Ma'an. Indeed, between 2014 and 2024, only 1,401 visits were recorded by the PNCM conservation services (see Figure 1), with an average of 130 visitors per year. The years 2014-2019 saw the highest visitor numbers, with peaks recorded in 2016 and 2019, with 206 visitors each. The COVID-19 pandemic (2020-2022) explains the low number of visitors.

This figure remains far lower compared to major gorilla viewing destinations in the mountains and even in the plains, such as Dzangha Sangha in the Central African Republic, where 400 visitors were recorded in 2009 alone. Difficulties in access are probably the main cause of this situation.

Campo is 74 km from Kribi, one of Cameroon's main, if not main, tourist destinations; however, the journey takes at least two hours by unpaved road. There is also a noticeable lack of a proper hotel network. Visitors arriving in Campo have only two guesthouses to choose from. Overall, the accommodation capacity is limited to fewer than 20 rooms.

Figure 1 below illustrates the evolution of visitor numbers within the National Park of Cameroon (PNM) from 2012 to 2024.

[2] 1 USD=700 FCFA

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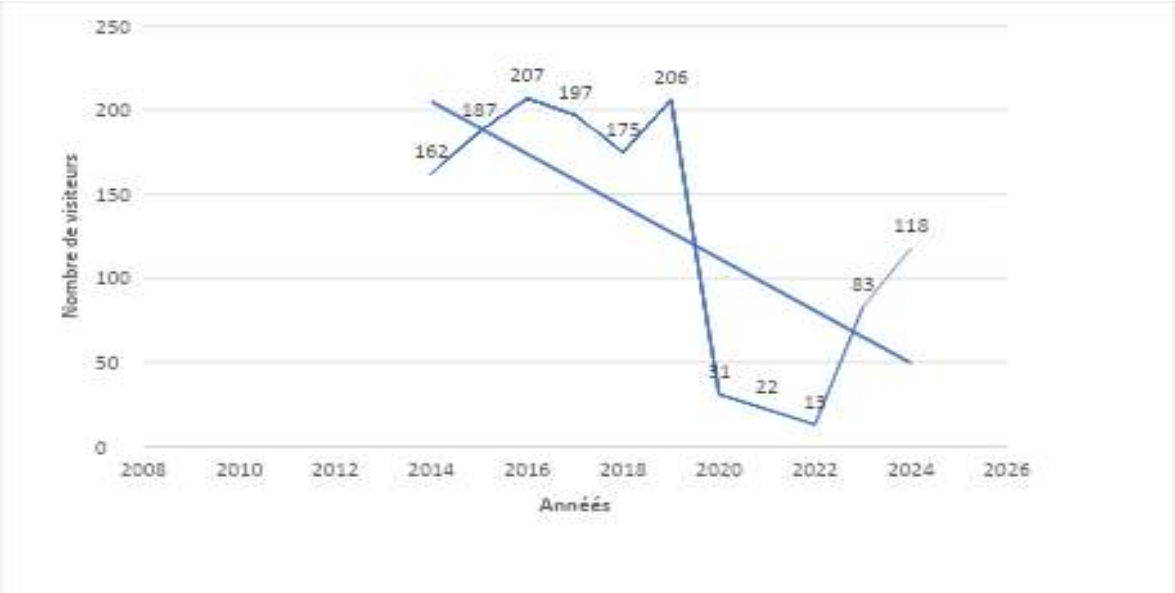
Figure 1: Évolution du nombre de visiteurs de 2014 à 2024



The visitors come from diverse backgrounds: nationals and expatriates. Nationals and residents (31.27%) and expatriates and non-residents (65.5%). A few (3.23%) of these visitors did not declare their origin.

Cameroon's finance law sets the applicable fees for protected areas. Thus, entrance fees to the PNCM (Cameroon National Park) are 5,000 FCFA per visitor for non-resident foreigners; 3,000 FCFA per person for other non-resident foreigners; and 1,500 FCFA per person for Cameroonian nationals. Visitors with a camera or video camera pay an additional 2,000 FCFA and 1,500 FCFA, respectively. All revenue generated is paid into the public treasury. Hiring a local guide costs 5,000 FCFA. Visits typically last from 3 to 14 days. The vast majority of tourists spend an average of 5 days at the PNCM.

Calculating the Economic Surplus Related to Tourism in Campo M'an National Park

The expected benefits from tourism development in Campo M'an are calculated by multiplying the average annual number of visits by the average expenditure a domestic and international tourist is willing to pay to visit the park. This includes, broadly speaking, park entrance fees, expenses related to food, accommodation, and transportation.

For the calculation of revenue generated by tourism, it was estimated that, on average, 130 people visit the Park annually.

Using the travel cost method and based on the current origin of tourists, the projected total annual revenue under current conditions is US$193,919.28. International tourism accounts for 96.15% of total revenue. However, this result is negligible compared to the revenue generated by tourism in other parks located in the Congo Basin. Balole (2018), using the travel cost method, projected total revenue in Virunga National Park at US$248,117,353. According to this author, international transportation accounts for two-thirds of total revenue.

In Uganda, the World Tourism Organization (UNWTO) estimates direct revenue from ecotourism at US$900 million, compared to US$2.1 billion for the entire tourism and transport

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sector. Ecotourism contributes directly to GDP at 3.3%, compared to 7.9% for the tourism and transport sector as a whole. In terms of employment, the direct contribution amounted to 181,200 jobs in 2014, representing 2.8% of total national employment. This represents a 4.9% increase compared to 2023, when the sector's direct contribution was projected to reach 197,375 jobs.

DISCUSSION

Issues and Challenges of Park Resources in Relation to Ecotourism

The study identified and subdivided the Park's natural resources that hold ecotourism appeal into three components: wildlife, flora, and landscape. The study showed that the wildlife and landscape components are those with the highest tourism value. Indeed, among the wildlife components, mammals constitute the Park's flagship resources with very high tourism value.

Tourists visit the Park to observe the elephant (Loxodonta africana cyclotis), the buffalo (Syncerus caffer nanus), the western lowland gorilla (Gorilla gorilla), the chimpanzee (Pan troglodytes), the mandrill (Mandrillus sphinx), the leopard (Panthera pardus), and the giant pangolin (Manis gigantea) (MINFOF, 2005). However, these species are all classified on the IUCN Red List.

Furthermore, studies on the wildlife potential of the park have shown that Dipikar Island is the richest area after the adjacent Southern Corridor (Etoga, G. & Foguekem, D., 2011). The author adds that wildlife faces conflicts with development priorities (agriculture, mining, infrastructure, etc.).

Along the same lines, Balolé (2018), in his doctoral thesis, emphasizes that the main conservation values recognized for Virunga National Park are:

- Spectacular landscapes of exceptional natural and aesthetic beauty;
- The diversity and continuity of habitats, combining mountains with active and dormant volcanoes and plains;
- High endemism of biodiversity;
- High species richness;
- A rich hydrographic system encompassing two basins of Africa's major rivers;
- High biomass of savanna ungulates;
- Great apes and primates, and the integrity of the protected area, which has been designated a national park since 1925.

This list of the main conservation values of Virunga National Park presented by Balole (2018) is similar to the three-component classification of the flagship resources of the PNCM proposed in this dissertation: faunal, floral, and landscape components.

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Furthermore, Balolé (2018) identified approximately 40 tourist attractions in Virunga National Park, but only 5 main attractions—mountain gorillas, Nyiragongo volcano, Mount Ruwenzori, the Rumangabo chimpanzee, and Tchegera Island—are actively exploited and hold the most significant tourist appeal.

However, security remains the primary constraint. Indeed, the author points out that over the past four years, 42 hippos (Hippopotamus amphibius) and 85 elephants (Loxodonta africana) have fallen victim to poaching. This poaching is carried out by organized networks led by men equipped with weapons of war.

The results of Balole's thesis work (2018), presented above on the importance of the ecotourism value of forest resources in the PNVi, are consistent with the results of this thesis dissertation, which emphasizes that the wildlife resource is the one that holds the most important ecotourism appeal, although confronted with poaching and wars; and secondly, there follow the landscape resources, which provide diversified ecosystem services.

Practical application of the limitations of ETS calculation in the context of a tropical forest

Calculation of the use value of medicinal plants

Although the local use value of rainforest medicinal resources is likely high, there is very little research on the monetary valuation of these resources. According to Pearce & Morgan (1994), the lack of such studies is mainly due to the fact that these resources are rarely traded on the market and therefore cannot be valued based on their prices: they are used primarily within rural communities that have limited access to modern therapeutic methods. In the study area, for example, treatments are provided free of charge. Furthermore, due to the isolation of these villages, no medicinal products are integrated into an external marketing network. Their evaluation therefore, requires the use of methods that do not directly rely on market prices. Three evaluation techniques appear feasible for estimating the economic value of traditional pharmaceutical products.

One initial approach is to evaluate these medicinal plants based on the price of their commercial substitutes: this involves calculating the value of traditional pharmaceutical products based on the price of medicines that villagers would buy if they no longer had access to the forest.

However, the application of this method encounters two major difficulties. On the one hand, there are few studies that evaluate the actual effectiveness of traditional treatments; yet, while the quality and effects of modern medicines are known, the consequences of traditional treatments are generally more unpredictable.

The contingent valuation method is also an applicable a priori technique: by assuming that the local population agrees to bear the costs of constructing a dispensary and its regular supply of medicines, this sum can constitute a substitute value for traditional pharmaceutical products.

Finally, it may be possible to use the transport cost method to estimate the value of traditional pharmaceutical products used by local populations: this involves estimating the value of pharmaceutical products based on the travel undertaken to access these resources.

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This evaluation technique has two advantages: firstly, it is well-known and frequently used, even if it is mainly used to estimate the recreational value of natural areas. Secondly, numerous experiments have been successfully conducted in developing countries, and more specifically in Africa (Navrud & Mungatana, 1994; Dixon & Sherman, 1991; Durojaiye & Ipki, 1988), although always for recreational sites. Compared to these initial experiments, the aim here is to broaden the scope of this evaluation method by attempting to develop a demand curve for traditional medicinal products harvested from the study area.

Harvesting in the Tropical Forest: Estimating the Value of Non-Timber Forest Food Products

While non-timber forest products (NTFPs) are the subject of much research in Central Africa, there is, conversely, little work on the monetary valuation of these resources. The dominant perception of these forest products has long been that of complementary foods to cultivated agricultural products, which constitute the staple foods of rural populations.

As Pelé & Le Berre (1967, p. 17) note for Cameroon, "their enumeration is of more documentary than nutritional interest, although one should not neglect the contribution, vitamin or otherwise, that they can constitute."

According to Lescuyer (2000), until the 1980s, non-timber forest products (NTFPs) were considered primarily from a biological and nutritional perspective. Their importance as a food source remained secondary, however, since in most cases, the consumption of these forest products was only occasional, sporadic, and by only a portion of the population.

Panayotou & Ashton (1992) offer several explanations for the lack of attention paid to NTFPs by policymakers: the lack of economic data, the scarcity of international markets for these products, irregular supply and quality, the difficulty of preservation, the availability of artificial substitutes. But the main shortcoming of the work devoted to NTFPs up to that time was to approach them as objects of socio-ecological study and to neglect their economic interest.

CONCLUSION

The study identified and subdivided the Park's natural resources, which hold ecotourism appeal, into three components: fauna, flora, and landscape.

Mammals constitute the Park's flagship wildlife resource, with very high tourism value. Examples include the forest elephant, buffalo, chimpanzee, leopard, giant pangolin, and mandrill (a species strictly endemic to the PNCM). However, due to intensive poaching, these species are all listed on the IUCN Red List.

The landscape component has the highest ecotourism value. They offer a variety of services (provisioning services, regulating services, maintenance and habitat services, cultural services).

The floristic component, consisting of: Non-Timber Forest Products (NTFPs); mangroves, riparian forests, and saline flora with high ecotourism value, constitutes the main source of supply for humans and fauna.

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The economic value of supply goods and services, resulting from the extensive practice of agriculture through the sale of cocoa cultivation, the collection of NTFPs (Irvingia gabonensis kernels and palm wine/raffia); artisanal fishing in the backwaters of the Ntem River was globally estimated at USD 76,944,915.

It is observed that the average household profit from marketable goods is relatively close to the average income reported in surveys, which indicates that 72% of households have an average income ranging from USD 100 to USD 300.

However, given the level of precariousness of households living around the PNCM, characterized by difficulties in accessing basic social and economic services and factors of production and the absence or insufficiency of incentive measures, this income is far from meeting the survival needs of these populations.

Furthermore, this impoverishment of communities is exacerbated by the illegal and forced land grabbing by large operators (forestry, mining, and agriculture), and the structuring projects have not reduced unemployment, developed the local economy, or facilitated access to quality basic social services…

The total economic value of the Park was estimated at USD 77,924,999. However, the largest profit margin (99.56%) comes from use value, and 0.44% from non-use value. Furthermore, 98.92% of the profits are derived from direct use value. This direct use value consists of profits from tourism (0.25%) and, for the most part (98.92%), profits from the main income-generating activities (agriculture, livestock farming, and non-timber forest products).

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