Action for a Sustainable Environment
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NACHTIGAL HYDROELECTRIC DAM: WHAT ARE THE ENVIRONMENTAL IMPACTS?

Briefing Note

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Introduction

In 2010, Cameroon, in its Growth and Employment Strategy Paper (GESP), set the objective of becoming an emerging country by 2035. . This objective was reaffirmed in its National Development Strategy 2030 (NDS-30). In this regard, several overarching projects have been initiated in the agro-industry, transport, mining and energy sectors, etc. The implementation of these projects has led to enormous losses in forest cover. Among these projects, those of high interest include: the construction of the Lom Pangar hydro-electric dam, which caused an estimated loss 36,000 ha of forest cover; the continuous extension of the SudCam agro-industrial project which has already converted more than 10,000 hectares of forest into rubber plantations in the locality of Meyomessala, precisely in the Dja and Lobo Division, South Region of Cameroon and the 2019 declassification of 60,000 hectares of forest, a part of FMU 09-025, in the Campo and Niete Sub-divisions for agro-industrial purposes by CAMVERT, the company, who has already cleared more than 2,500 hectares of this declassified plot for the establishment of an oil palm plantation.

This phenomenon of loss of forest cover should not be overlooked in the case of the Nachtigal upstream hydroelectric dam construction project, which is located on the Sanaga River, 65 km from the city of Yaoundé and which is being implemented by the Nachtigal Hydroelectric Power Company (NHPC), with the support of several shareholders, comprising: The government of Cameroon (15%), Electricité de France (40%), AFRICA 50 (15%), STOA (10%), and the International Finance Corporation (20%)[2].

It is a common knowledge that large hydroelectric dams have a significant impact on the environment as their implementation leads to various negative impacts, such as: deforestation and land degradation, the destruction of aquatic ecosystems, the drowning of several natural habitats of fauna and agricultural lands, etc. Would these impacts be any different for the ongoing Nachtigal dam project, which covers 4 divisions of the Central Region, namely Mfoundi, Lekié, Haute Sanaga and Mbam and Kim? In accordance with the environmental law in force, the Nachtigal project was subjected to an environmental and social impact study in 2006, which was revised in 2011 in the light of the requirements of the said law.

This document is part of ASE's independent follow-up on the forest cover dynamics following the implementation of the dam construction. It also highlights the present environmental impacts on the ground and examines the effectiveness of the environmental measures recommended in the Environmental and Social Management Plan (ESMP) so as to make recommendations that address the damage caused by this project.

[1] Cameroon vision 2035
[2] https://www.nhpc.cm

Location and description of the Nachtigal upstream hydroelectric dam construction project

The Nachtigal hydroelectric dam, with a capacity of 420 MW, which has been under construction since 2018, is located in the Guinean-Congolese semi-caducious rainforest, which is the northernmost zone of the Guinean-Congolese region, bordering the Sudan-Zambesian region. It is a forest-savannah transition zone, subdivided into Guinean-Sudanese peri-forest savannahs and Guinean-Congolese semi-caducious forests. The hydroelectric plant of this project consists of the following elements[3] :

• Two roller compacted concrete dams (with a total length of 2,000 m; height above foundation about 15 m) on the Sanaga River to create a 27.8 million m^3 reservoir with a surface area of 4.21 km^2 at normal operating level;

• A headrace lined canal (about 3.3 km long and 14m deep on average) to transfer water to the hydroelectric power plant with a maximum flow rate of 980 m^3 corresponding to the design flow of the hydroelectric power plant equipment;

• A hydroelectric power plant with seven 60 MW Francis turbines able to operate either as a run of river plant or an intermediate peaking plant.

• A power plant to generate electricity from the environmental flow (riparian release) to be discharged downstream of the dam;

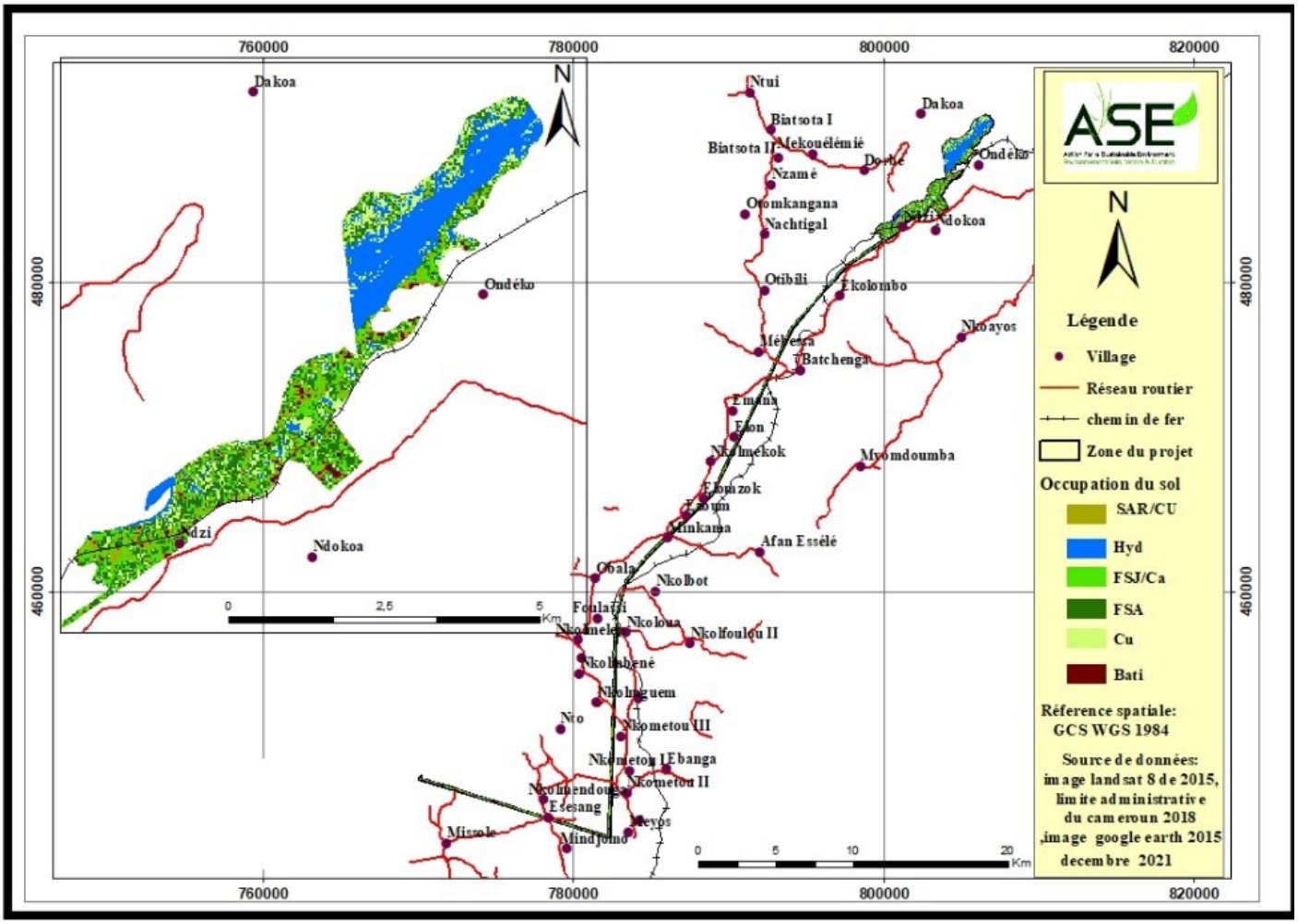
• A double busbar 225 kV generation substation and a 50.3 km 225 kV double circuit transmission line equipped with two bundle conductors to transport the power produced from the power plant generation substation to the Nyom 2 connection substation.

[3] Summary Environmental and Social Impact Assessment of the Nachtigal Dam, p.3

Forest cover dynamics in the construction site of the upstream Nachtigal hydroelectric dam between 2015 and 2021

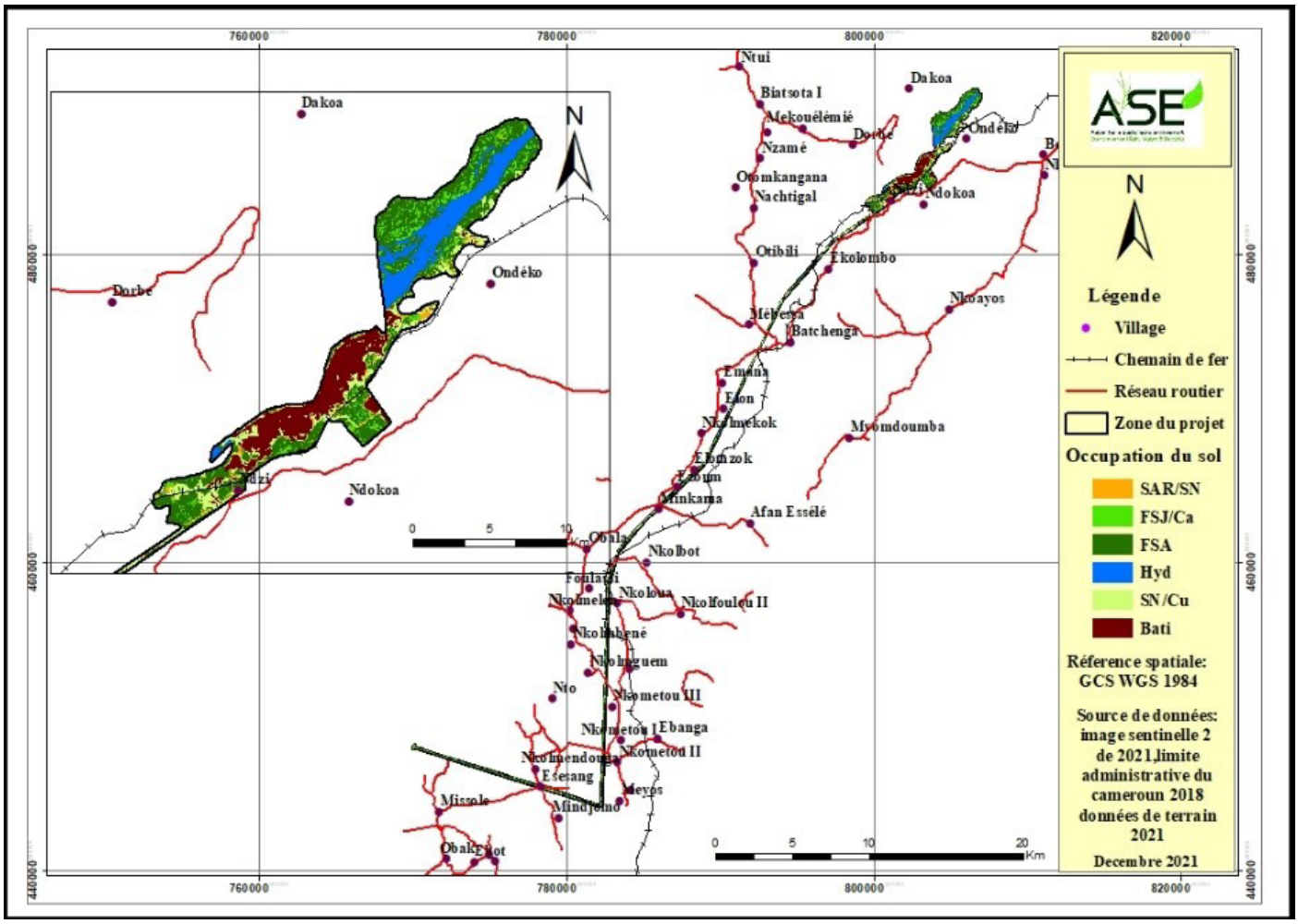
Six (06) land use classes were identified: savannah/shrubland (SAR/SN), hydrography, secondary forest/young cocoa (YSF /Ca), secondary forest/mature (FSA), built-up areas and cultivated areas (SN/Cu) based on field checks.

Land use map of the Nachtigal dam construction site in 2015 (overall accuracy 86.46%).



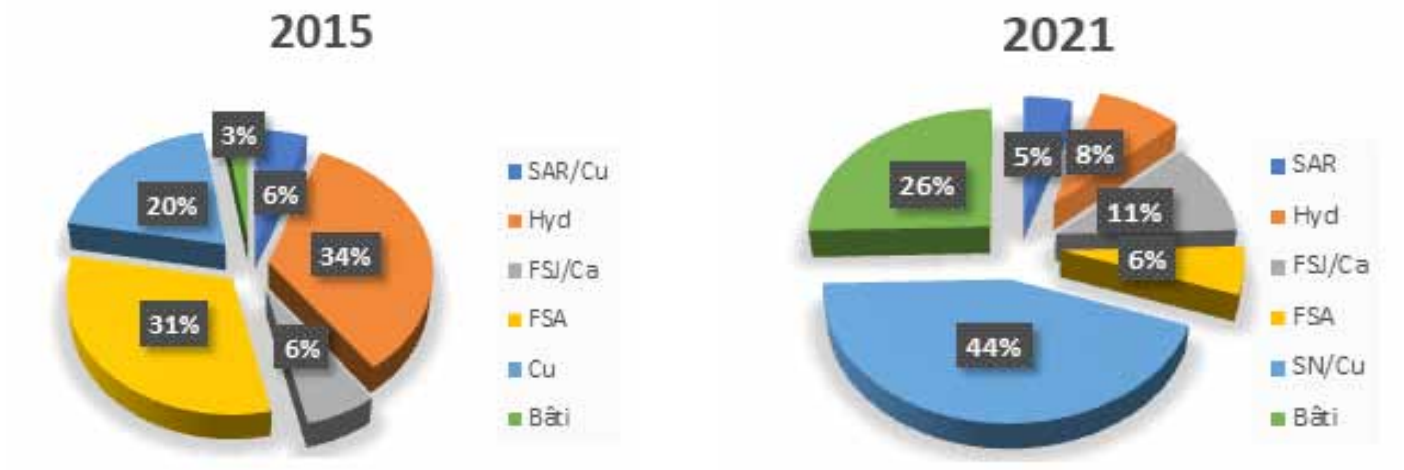
Source: Landsat image January 2015

Land cover map of the Nachtigal dam construction site in December 2021 (overall accuracy 83.02%).



Source: Sentinel image 2 February 2021

Land use distribution of the project area between 2015 and 2021.



Before the beginning of the dam construction works, the land use of the area in 2015 showed a mosaic structure in which mature secondary forest represented about 500 ha, i.e. 31%, 529 ha of hydrography, i.e. 34%, 100 ha of young secondary forest/cacao and 39 ha of buildings. The forest landscape is rich and diverse in wildlife and woody species, notably Ricinodendron heudelotii (ndjansang), Nauclea diderrichii (bilinga), Entandrophragma cylindricum (sapelli), Cola acuminata, Pycnanthus angolensis (ilomba), etc. (the list of species is appended).

In 2021 the change in the landscape within the project area is drastic: the coverage of mature secondary forest is 6%, that is, a surface area of 90 ha, with a considerable decrease in the extent of the hydrographic network, which covers 8%, that is, 126 ha, with an extension of the built-up area to 383 ha, representing 26%, and cultivated areas and bare soil of 662 ha, that is, 44%. In the last7 years, more than 400ha of mature forest have been lost, as well as 400ha of river system. Several areas were converted to other uses during the construction of the dam. Some rivers, tributaries or streams have been drained for various installations in the dam site (photo 1). Mature forests have been flooded, plantations and young forests have been cleared for the installation of living bases, camp sites, loans, etc. Many cocoa plantations have been cleared for the construction of the transmission line. Furthermore, cocoa cultivation is dominant in this area and the expansion of the sector has led to the involvement of many young people in the area who do not hesitate to open new cocoa plantations or extend their plantations.

Drainage of the Sanaga River in Ndokoa village, © ASE, December 2021.

Negative environmental impacts of the dam

These impacts are those faced by communities on the ground. The communities of Ndji, Ndokoa, Nachtigal, Nkolevodo, Ondodo, Wamkoa, Pamnassi, Nalassi, Olembé and Mebassa villages mentioned several such impacts that they have been experiencing since the construction of the dam.

Meeting with the communities of Ndji, Nkolevodo and Mebassa, © ASE December 2021.

Loss of terrestrial flora.

Approximately 400 ha of the large Ndokoa forest, located in the Upper Sanaga region, was completely cleared to accommodate the dam structure itself. This forest served as an important ecosystem service to the local communities:
- **Pharmacy**: several plant species found in the forest were used as analgesics and to also treat diseases such as malaria, gynaecological problems, typhoid, snake bites, etc. «Today, some women go as far as Koteng, on the other bank of the Sanaga River, to collect the resource,» says a traditional health practitioner in the area;

- As a **windbreak**, these forests mitigate the force of the violent winds particularly during the dry season. Currently, these violent winds are a great challenge in the dam zone and are being experienced in communities such as Sa'a (Nkolevodo, Womkoua, Nkolbogo III, etc.), which are about 15 km from the dam plant. Consequently, when these winds blow, several damages are recorded, such as Crop damage (e.g., cocoa, cassava, banana, etc.), damaged roofs, the quick spread of respiratory diseases such as influenza, etc.
- As a **source of income**, the forests provided an economic function for the local people. With its rich biodiversity, both woody and faunal, the forest was full of several species such as: Evoul, used to build dugout canoes, Ayous, Fraké, used for the production of boards, Pachiloba, Bété, Elon, iroko, Bubinga, Atui, usedl for construction, rattan, ojon leaves, Raphia, etc. In addition, raffia was used to make mats and raffia wine, as well as rattan. People also collected NTFPs, such as Djansang, eru leaves (okok), wild mango (ndo'o), wild pepper, bitter cola, rush leaves, etc., in this forest and in the dam area in general.

Migration of insects from the Sanaga River to the villages.

Du fait des travaux au niveau du fleuve et à cause du déboisement, les insectes présents dans les forêts aux abords de la Sanaga migrent déjà vers les villages riverains et même jusqu'au niveau de ceux de la COPAL. Ces insectes détruisent les cultures et les plantations. Idem pour les chauves-souris qui se sont déportées du côté de la COPAL et détruisent les fruits, safoutiers sur les arbres.

More than 600 thousand tCO2e emitted.

The area is increasingly experiencing a rise in average temperature. People have been complaining for the last 5 years about the increasing heat they experience during the day and night. The great forest of Ndjiand Ndokoa, which has been devastated, served, among other things, to regulate in the area by providing a microclimate through the phenomenon of evapo-transpiration related to photosynthesis and plant respiration, which humidifies and cools the air. There is also a seasonal disruption in the area, with an increased scarcity of rainfall around Batchenga, yet in Obala there is an abundance of rain. In the past, the rainy season started from August 15, but for the last three years or so, the rains have been coming late, towards the end of August, and ending before October. The streams dry up during the period when they should normally be full of water. It is important to note that Nachtigal site has a Guinean equatorial climate, with two rainy seasons (mid-August to late October and mid-March to mid-June) and two dry seasons (November to mid-March and mid-June to mid-August)[4].

[4] Environmental and social impact assessment of the Nachtigal Dam, 2011, section: description of the initial environment of the area

Dewatering of water-courses.

Works in the dam structure area itself required the dewatering of some of the upstream streams or watercourses flowing through it. This somehow contributes to the increasing water scarcity issue in the area. According to the Chief of Olembe, «three years ago, market gardeners in the village of Olembe used to get water from the AVOTARI River to irrigate their fields in the dry season, which allowed them to produce in the off-season, but today this is no longer possible. The picture below shows the current state of this river.

Drying of the AVOTARI River, © ASE December 2021

Environmental compensation measures for the loss of forest cover recommended in the ESMP

As compensation measures for the loss of forest cover, the NHPC has planned in its ESMP, to support the Coopérative des Paysans et. Agriculteurs de la Lékié[5] (COPAL), located 15 kilometres from the construction site of the Nachtigal Dam. The activities developed within the framework of this support as well as the progress of implementation are below. It should be noted that these activities are part of the first phase of that support from 2019 to 2022. The COPAL Community Forest, created in 2000 with a surface area of 5,000 ha, had timber exploita-

[5] COPAL is a community forest of more than 4800 ha, created in 2004. The main objective of this forest is the sustainable production of wood and non-wood products, but it is not currently operational. The appointed manager of this forest is Mr. Pierre Abe. It is located in 09 villages of the Lékié Division, namely Womkoa, Nkolbogo 3, Ondodo 2, Ondodo 1, Nkolevodo, Biyaga, Pamenassi, Nalassi and Nachtigal.

tion as its main activity, which began in 2007. But the resources were immediately overexploited, and it drifted into illegal practices, even if these have never been very profitable. For the last ten years or so, the community forest has existed on paper but not really been used.

Forest cover compensation measures and level of implementation in December 2021.

Impacts related to the construction of the dam	Compensatory measures	Level of implementation in December 2021
Loss of forest cover	Writing of a new simple management plan and conservation of a COPAL forest	- Review of the Cooperative's statutes in accordance with the OHADA Uniform Act on the Law of Cooperative Societies of 2010; - Socio-economic study; - Multi-resource inventory; - Identification and delimitation of 500 hectares of the COPAL community forest to be conserved; - Creation of a committee of 18 people for the supervision of the conserved part of the forest
	Support to artisanal wood harvesters for legal activity outside the community forest	-Identifiying 10 artisanal wood harvesters
	Intensifying the exploitation of cocoa farms to limit their extension	-Training of cocoa farmers on sustainable practices; -Establishment of cocoa nurseries with 100,000 plants in the villages of Nkolbo3, Ondodo and Nachtigal (photo 5 and 6)
	Supporting reforestation	-Establishment of a nursery of 5000 trees in Nkolbogo 3 consisting of Fraké, Bitter cola, Ndjansang, Dousié

• Existing challenges for compliance with the ESMP

« **May the NHPC at least implement what it has stated** «, this is the statement of a member of the COPAL community Forest group.
Considering the state of progress in the implementation of compensation measures, it is likely that while the construction of the dam is more than 50% complete, no more than 40% of the environmental compensation activities agreed upon in a collaborative manner with the NHPC and COPAL have been carried out, even though the project is scheduled to end in 2023.
90% of CF member communities interviewed by ASE have expressed dissatisfaction with various aspects of the project, such as:
- the non-respect of the implementation schedule of the activities;
- the low involvement of communities in the implementation and follow-up of compensation activities (the only activity entrusted to the communities is the monitoring of 500 ha of forest); this has led to;
- the delay in implementing the nursery in Ondodo and in all the sites in general because they do not yet have the quota planned for each site;
- the lack of support for cocoa farmers in terms of inputs within COPAL;
- the lack of resources for the supervisory committee of the 500 ha block to be conserved in the COPAL community forest;
- the distribution of cocoa plants and trees remains unclear. People are wondering who the real beneficiaries will be, as this number seems to be largely insufficient. They also wonder if the seedlings be distributed without compensation.

Nkolbogo nursery, © ASE, December 2021

Ondondo nursery, © ASE December 2021

Based on the complaints from the communities, it is feared that this conservation is just an illusion or a dream sold to local people. As a matter of fact, if the agreements are not respected, it would be difficult for local people to respect their conservation commitments, given that CF is a survival resource for them.

Furthermore, it is noted that no compensation measures have been taken for the communities living near the power plant and the transmission line (Ndji, Mebassa, Olembe, Nachtigal, Ndokoa, etc.), yet they have lost more than 420 ha of their land, which constituted a source of livelihood for them. And above all, they are now directly ex-

posed to the violent winds that were previously mitigated by their forest.
In addition to these measures, the project should comply with the forestry regulations in force, which stipulate «3 trees planted for one tree felled». Considering all this, the measures taken by the NHPC are not sufficient and effective to compensate or mitigate the GHG emissions generated and the loss of forest cover.

Recommendations

NHPC should
- Publish all relevant information on the loss of forest cover and the level of implementation of offsets for transparency purposes;
- Implement compensation activities at COPAL in accordance with the terms of reference;
- Support local communities located around the dam site and the transmission line in the reforestation of lost woody and non-woody areas;
- Provide the supervisory committee of the 500 ha COPAL forest with the appropriate and adapted equipment necessary to carry out their mission;
- Develop and implement an upstream reforestation plan to mitigate the impact of high winds with strong community involvement;
- Train and support women in the implementation of zero deforestation farming techniques (manioc and cocoa);
- Build agricultural boreholes to enable farmers to grow vegetables in the off-season.

Donors should
- Undertake regular field missions to follow up the implementation of compensation for the loss of terrestrial flora;
- Inquire about the perception of the communities on the level of implementation of the compensation activities.

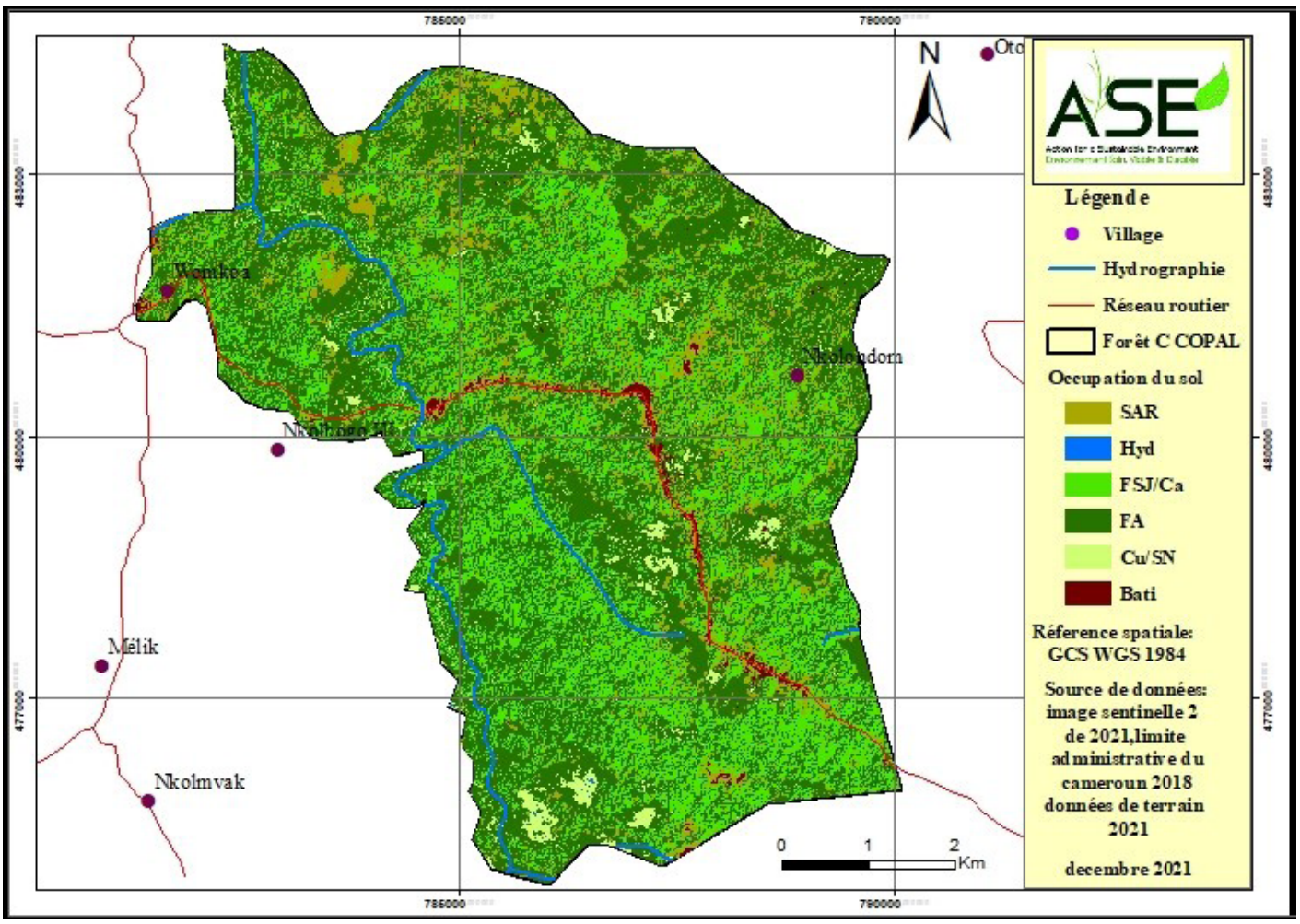
Civil society organizations should
- Strengthen their commitment to the implementation of major projects with zero deforestation;
- Develop the capacity of communities to be fully active in defending their rights and interests in the implementation of overarching projects.

Appendixes

Some plant species lost in the construction of the Nachtigal Dam between 2018 and 2021.

Woody species		
Pilot names	**Scientific names**	**Families**
Ayous	Triplochitonscleroxylon	Sterculiaceae
Bete	Mansoniaaltissima	Sterculiaceae
Bilinga	Nauclea diderrichii	Rubiaceae
Dabema	Piptadeniastrumafricanum	Fabaceae
Dabema	Peptandeniantrum africanum	
White doussie	Afzeliapachyloba	Fabaceae
Emien	Alstonia boonei	Apocynaceae
Essessang	Ricinodendron heudelotii	Euphorbiaceae
Eyong	Eribroma oblongum	Sterculiaceae
Fraké	Terminalia superba	Combretaceae
Cheese tree	Ceiba pentadra	Bombacaceae
Ilomba	Pycnanthus angolensis	Myristicaceae
Iroko	Miliciaexcelsa	Moraceae
Kola tree	Cola acuminata	Sterculiacées
Lotofa	Sterculia rhinopetala	Sterculiaceae
Padouk	Ptérocapus soyauxii	
Sapelli	Entandrophragma cylindricum	
Tali	Erythropleum ivorensis	
Teak	Tectona grandis	

Map of the COPAL Community Forest in December 2021.



Areas of COPAL occupancy classes in December 2021.

Abbreviation	Designations	Surface areas (Ha)
SAR	Wooded savannah	678.44
Hyd	Hydrography	2.39
YSF /Ca	Young Secondary forest/ Cocoa	1420.18
MF	Mature forest	2459.07
Cu/SN	Crop/Bare soil	240.98
Building	Building	48.5
TOTAL		**4849.56**

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