



Olam Palm Gabon: Biodiversity Action Plan

March 2023

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Contents

Contents	3
Acronyms.....	5
Executive Summary.....	7
1 Introduction	8
1.1 Background	8
1.2 Purpose and scope of the BAP	10
1.3 Ecological context	12
1.4 National policy framework	13
1.5 Lender requirements.....	15
1.6 Corporate framework & policies.....	16
1.7 Stakeholder Engagement.....	16
1.8 Biodiversity and Social Advisory Panel	19
2 Habitat classification and biodiversity values.....	20
2.1 Natural and Modified Habitat.....	20
2.2 Critical Habitat.....	22
2.3 Risk-based prioritisation.....	23
2.4 Other PS6 Requirements	27
3 Summary of impacts	29
3.1 Direct and indirect impacts	29
3.2 Cumulative impacts.....	31
4 Mitigation Strategy	32
4.1 Application of the mitigation hierarchy	32
5 Residual impact assessment.....	40

5.1	Approach to assess impacts	40
5.2	Results and significance	41
6	Offset strategy for achieving NNL /NG	42
6.1	On-site actions	44
6.2	Off-site offset actions for NG	48
6.3	Off-site offset actions for NNL.....	49
6.4	Summary of offset approach and initial feasibility of achieving NNL/NG	50
7	Biodiversity Monitoring and Evaluation Plan	52
8	Resources and budget.....	53
9	Priority actions.....	54
10	References	58
Appendix 1	Key factors influencing OPG site selection and plantation development	
	64	
Appendix 2	Summary of Critical Habitat and risk-based prioritisation per plantation	
	70	

Acronyms

Acronym	Definition
AC	Action Category (Risk prioritisation)
ANPN	Agence Nationale des Parcs Nationaux du Gabon
ARRC	Avoid Reduce Restore Conservation Taskforce (part of the IUCN SSC primate specialist group, section on great apes and small apes)
BAP	Biodiversity Action Plan
BMEP	Biodiversity Monitoring and Evaluation Plan
BMP	Biodiversity Management Plan
CBD COP	Convention on Biological Diversity, Conference of the Parties
CBG	La Compagnie des Bois du Gabon
CH	Critical Habitat
CHA	Critical Habitat Assessment
CR	Critically Endangered (IUCN Red List)
EN	Endangered (IUCN Red List)
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GeFaCHE	Gestion de la Faune et des Conflits Homme-Eléphant
GHG	Greenhouse Gas
GN	Guidance Note
ha	Hectare
HCV	High conservation Value
IAS	Invasive Alien Species
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
JV	Joint Venture
km	Kilometre
LC	Least Concern (IUCN Red List)
MBG	Missouri Botanical Gardens

Acronym	Definition
AC	Action Category (Risk prioritisation)
MH	Modified Habitat
NG	Net Gain
NH	Natural Habitat
NNL	No Net Loss
NT	Near Threatened (IUCN Red List)
OPG	Olam Palm Gabon
PROLAB	Programme de Lutte Anti-Braconnage (WWF Programme)
PS6	Performance Standard 6
QH	Quality Hectare
RIA	Residual Impact Assessment
RSPO	Roundtable on Sustainable Palm Oil
SMART	Spatial Monitoring And Reporting Tool
TBC	The Biodiversity Consultancy Ltd
VU	Vulnerable (IUCN Red List)
WCS	Wildlife Conservation Society
WWF	World Wild Fund for Nature

Executive Summary

This document is the Biodiversity Action Plan (BAP) for Olam Palm Gabon (OPG). OPG manages six oil palm plantations across western Gabon (the Project), totalling approximately 202,000 ha, of which c.65,700 ha (30%) has been developed for the cultivation of oil palm¹. This BAP presents the Project's strategy to mitigate and manage biodiversity impacts to achieve No Net Loss (NNL) for Natural Habitat (NH) and Net Gain (NG) for impacted Critical Habitat (CH)-qualifying features. The BAP summarizes OPG's main impacts to biodiversity values, and the mitigation measures developed to address these following the mitigation hierarchy. The BAP includes quantification of residual impacts and the strategy to offset residual impacts.

Habitat was used as a proxy to evaluate OPG's residual biodiversity impacts, except for great apes and elephants, for which a separate assessment was conducted. While significant gains can be achieved by OPG in their own plantations, actions in existing OPG managed set-asides are not estimated to be sufficient to achieve NG for lowland terra firma forest, Central Chimpanzees, Western Gorillas or Forest Elephants, or NNL for savannah habitat. Offsite offset actions to support conservation within the wider landscape are therefore proposed to achieve NG for lowland terra firma forest, Great Apes and Forest Elephants, and NNL for savannah habitat. Specifically the offsite offsets will be implemented across 128,000 ha of the Sud Estuaire landscape (comprising the Eastern sector of Pongara National Park, Okala sustainable development permit and two forestry concessions), and across 27,000 ha of savannah adjacent to Mouila Lot 2. The feasibility of these offset actions is currently being assessed, the results of which will be used to update this BAP (expected mid 2023). The offset actions will need to provide clear demonstration to stakeholders of Olam's commitment to meeting the requirements of PS6, and its own Living Landscapes policy. Strong stakeholder support and partnerships will be vital to the successful implementation of these initiatives.

This BAP is a living document that will be reviewed regularly and updated as appropriate. To operationalise the actions from this BAP, the Project will:

- i. Update the existing Biodiversity Management and Monitoring Plans (BMPs and BMEP);
- ii. Develop and implement further biodiversity-specific plans, including a priority plant action plan; and great ape and elephant monitoring and management plan;
- iii. Undertake further detailed biodiversity studies to inform management activities including: assessment of habitat quality index and water availability for gallery forest to assess water scarcity arising from adjacent planting of oil palm and irrigation; creation of a ground-truthed habitat map clearly delineating swamp, mangrove, rivers, streams and gallery /terra firma forest buffers for all plantations;
- iv. Undertake detailed planning of offset actions with relevant stakeholders to develop biodiversity offset implementation plans.

¹ Approximately 64,000 ha has been developed by OPG, with 1,710 ha of pre-existing planted area in the Bindo concession (part of the Makouke plantation) developed by SIAT

1 Introduction

1.1 Background

OPG is a palm oil joint venture between Olam International Limited (“Olam”, 60%) and the Republic of Gabon (40%) established in 2011. OPG holds and manages six operational palm oil plantations² or ‘Lots’ (the Project) totalling approximately 202,000 ha, of which c. 62,000 ha has been cleared by OPG for planting and infrastructure, c. 8,000 ha cleared by AgroGabon in the 1980’s (1,710 ha of which remains operational), and c.65,700 ha³ (30%) has been developed for the cultivation of oil palm (Figure 1; Table 1). The Project thus comprises:

- Four greenfield palm oil plantations developed by OPG, namely Awala, Mouila Lot 1, Mouila Lot 2, Mouila Lot 3 and its extension.
- A greenfield plantation at Ndende developed by SOTRADER⁴ and subsequently transferred to OPG.
- The pre-existing plantation at Makouke Agro-complex (developed in 1981 by AgroGabon) that was acquired by OPG from SIAT (a Belgium-based palm/rubber company) in June 2016.

OPG has conducted ESIA’s and HCV assessments⁵ for all six plantations, and as of 2022 all of their six plantations are RSPO certified. All plantations are on a 49-year lease agreement from the Gabonese government with the exception of Makouke (which has a 38 year lease).

OPG is seeking financing from the IFC and therefore aims to align with the IFC Performance Standard requirements, including Performance Standard 6 (PS6) on biodiversity conservation and sustainable management of living natural resources (IFC 2012).

All six OPG plantations are in Critical Habitat (CH) ([Annex 1](#)). A Biodiversity Action Plan (BAP) is therefore required to align with International Finance Corporation PS6 paragraph 18⁶ (IFC 2012).

² In this report ‘plantation’ refers to groups of concessions which are managed as a single unit by OPG. OPG operates six plantations, consisting of nine concessions: Makouke plantation (Makouke, Bindo and Bene concessions); Awala plantation (one concession, Lot 8); Mouila Lot 1 (one concession); Mouila Lot 2 (one concession); Mouila Lot 3 (Lot 3 and Lot 3 extension concessions); and Ndende (one concession).

³ As noted in Footnote 1, OPGs planted areas cover 65,700 ha (of which 64,000 were planted by OPG and 1,710 by SIAT) but OPG have cleared a total of 61,720 ha of land (for planting and associated infrastructure, since all the Makouke plantation was already cleared by SIAT / AgroGabon), and so 61,720 ha is the area for which this BAP considers impacts (see Table 1 for both cleared and planted areas per plantation).

⁴ SOTRADER was a joint venture between the Republic of Gabon and Olam which attempted to set up a small-holder managed plantation.

⁵ An ESIA is an [Environmental and Social Impact Assessment](#) that is designed to assess and predict potential adverse social and environmental impacts and develop suitable mitigation measures. HCV refers to a [High Conservation Value](#), and is a globally applicable approach to identify, manage and monitor High Conservation Values (HCVs) in current or potential future development sites – there are 6 HCV categories that cover biological, ecological, social and cultural values (see Appendix 1.1.1 for details).

⁶ Paragraph 18 states “In such cases where a client is able to meet the requirements defined in paragraph 17, the Project’s mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve NG of those biodiversity values for which the critical habitat was designated.”

This BAP presents OPG's strategy for mitigating biodiversity impacts for the six palm oil plantations. The BAP also describes how OPG's mitigation strategy will achieve net gain (NG) for CH features and no net loss (NNL) for Natural Habitat (NH).

Figure 1. Location of OPG's six oil palm plantations (Lots) in Gabon

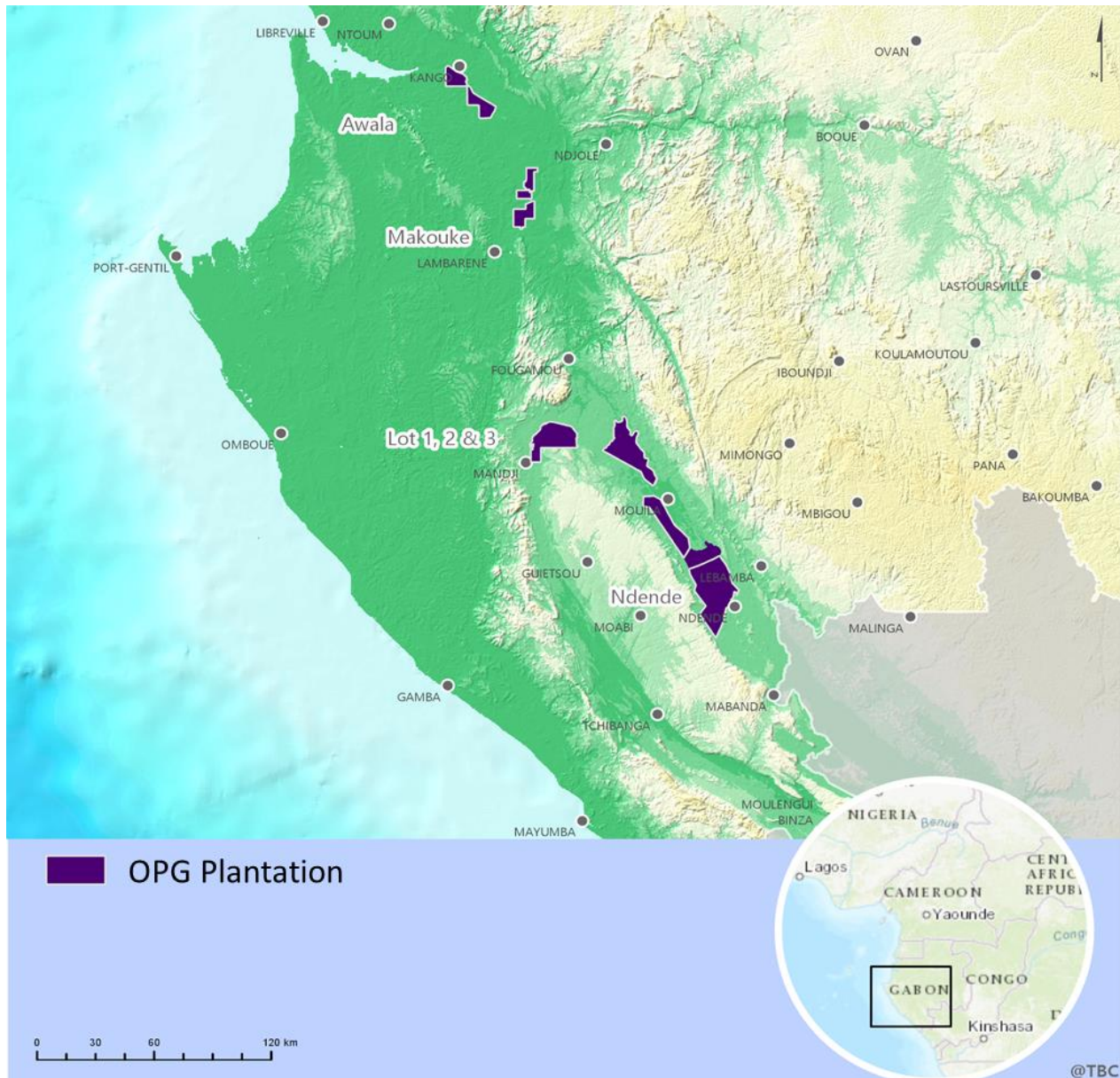


Table 1. Overview of OPG's six oil palm plantations

Name	Plantation size (ha) ⁷	Area of natural habitat cleared by OPG	Area of natural habitat cleared by SIAT / AgroGabon	Year planted ⁸	Area developed for Oil Palm by OPG (ha) ²
Awala	20,030	7,100	0	2011-2013	6,822
Makouke	18,613	0	8,243	2016-2018	6,533*
Mouila Lot 1	35,354	16,797	0	2012-2016	15,885
Mouila Lot 2	31,800	10,029	0	2014-2017	9,434
Mouila Lot 3	38,363	19,594	0	2015-2016	18,272
Ndende	58,401	8,200	0	2016-2017	7,500
TOTAL	202,561	61,720	8,243		64,446
*There is an additional 1,710 ha of planted area in the Makouke concession that was developed by SIAT and that remains operational					

1.2 Purpose and scope of the BAP

The BAP forms part of OPG's overarching biodiversity management framework and sets out the Project's mitigation strategy to avoid, minimise restore and compensate biodiversity impacts and to achieve NG for CH and NNL for NH. It is a living document that will be updated regularly as OPG obtains further inputs from stakeholders and the expert advisory panel⁹ (see [Section 1.8](#)), and as understanding increases of the status and ecology of priority biodiversity values, impacts to biodiversity and the effectiveness of mitigation measures.

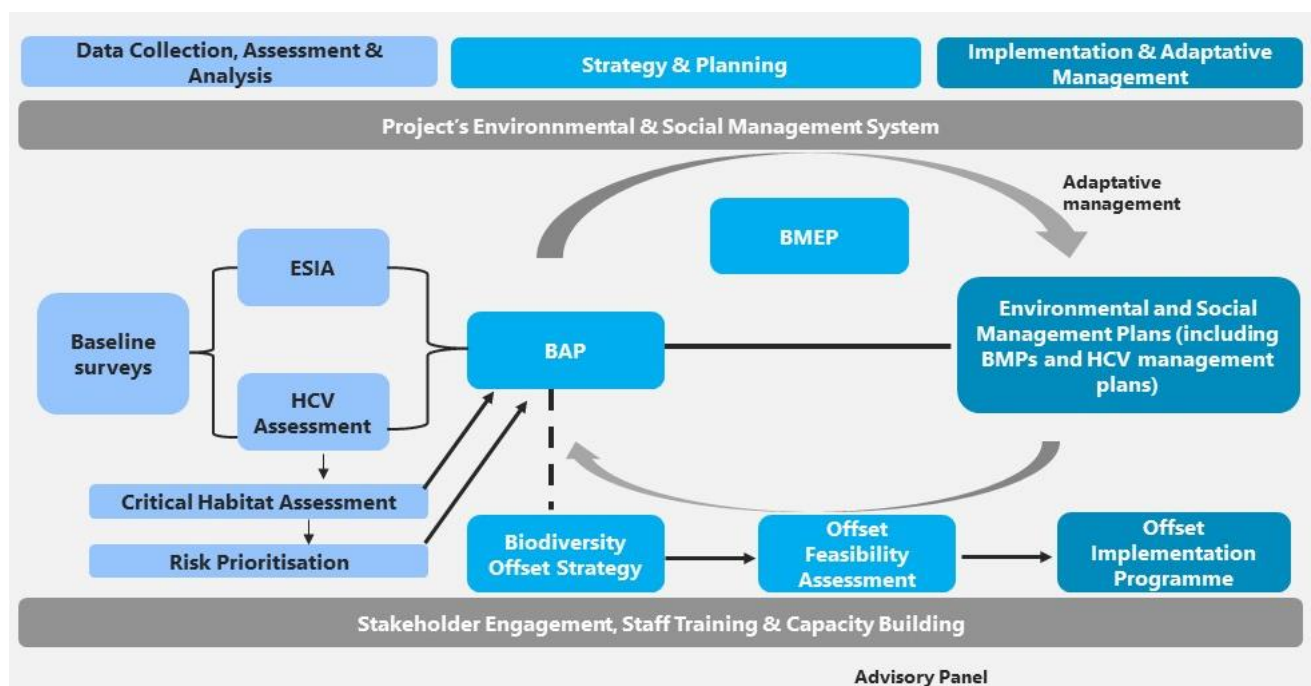
The BAP covers all six OPG plantations and is a tool that can be used to communicate and engage with stakeholders. The Project is in the process of establishing an Environmental and Social advisory panel, to provide technical support and guidance in the implementation of mitigation and monitoring throughout the lifetime of the Project.

⁷ These are plantation areas reported by OPG. GIS-derived estimates of plantation areas differ slightly.

⁸ Timing of land conversion from start of land preparation to end of planting. The exception is Makouke, for which land conversion occurred in the 1980's, this date therefore reflects planting only.

⁹ The Biodiversity and Social Advisory Panel will comprise representatives of the Government, conservation NGOs and researchers. Its aim is to support OPG in aligning with good mitigation practice by reviewing Project progress, raising concerns, recommending actions, and identifying additional work required to achieve OPG's objectives

Figure 2. OPG's biodiversity management framework



1.2.1 Structure and contents of the BAP

This BAP presents how OPG has implemented the mitigation hierarchy thus far, and the remaining steps towards achieving NG for impacted CH-qualifying biodiversity and NNL for NH. More precisely, the BAP is structured in the following way:

- **Section 1:** OPG and ecological context description, national and corporate policy framework, stakeholder engagement.
- **Section 2:** Habitat classification and biodiversity values (including results of the Critical Habitat Assessment and the Risk Based Prioritisation Assessment).
- **Sections 3 and 4:** Summary of OPG impacts and mitigation strategy.
- **Sections 5 and 6:** Assessment of residual impacts and approach to achieving NNL/NG.
- **Section 7:** Overview of the OPG's Biodiversity Monitoring and Evaluation Plan.
- **Sections 8 and 9:** Timeline, resources and priority actions needed to implement this BAP.

As part of BAP development several assessments were undertaken, and these are all included as Annexes to this BAP as follows:

- **Annex 1:** A Critical Habitat Assessment (CHA) to identify NH and CH-qualifying biodiversity associated with the Project as per the guidance notes of the IFC Performance Standard 6 (IFC 2019)
- **Annex 2:** A Risk Prioritisation report to identify priority biodiversity from the suite of CH-qualifying biodiversity to be the focus of mitigation and monitoring actions for the Project
- **Annex 3:** A Residual Impact Assessment (RIA) to quantify the residual direct and indirect impacts of the Project, (after the application of mitigation actions), and enable offset planning

In addition, five plantation specific Biodiversity Management Plans (BMPs) that contain details on how the proposed on-site mitigation actions will be implemented by OPG, and Biodiversity Monitoring and Evaluation Plan (BMEP) to ensure that measures included in the BMPs are effective and to enable adaptive management if necessary have been prepared¹⁰.

The BAP has also been informed by further information compiled through a review of literature on Gabonese ecology, and previous surveys (including High Conservation Value assessments) and targeted consultation with key national experts.

1.3 Ecological context

The OPG operations are located in Gabon, on the equator on the west coast of Central Africa. The fauna and flora of Gabon are amongst the richest in Africa in terms of botanical diversity and endemism (e.g., Reitsma, 1988; Sosef, 1994): for example, 22% of plants described in the flora of Gabon are endemic (Brenan, 1978), and the forests of Gabon have more plant species (estimated at 8000 species) than all the forests of West Africa combined (Nasi, 2001). The fauna is also rich, estimated at more than 190 mammal species, 600 species of birds, 70 species of reptiles and 100 species of amphibians (IUCN, 1996). Gabon also includes many species of high stakeholder interest such as Forest Elephant (*Loxodonta cyclotis*), Central Chimpanzee (*Pan troglodytes troglodytes*), Western Gorilla (*Gorilla gorilla gorilla*), Leatherback Turtle (*Dermochelys coriacea*) and Leopard (*Panthera pardus*). Gabon includes various ecological regions including the Atlantic Equatorial Coastal Forests, northern, southern and western savannah-forest mosaics, lowland terra firma and swamp forests, as well as important mangrove areas (Nasi, 2001). The OPG plantations traverse two of these eco-regions – Awala and Makouke are located within the northwest Congolian lowland forests eco-region, whilst Mouila Lots 1-3 and Ndende are found in the western Congolian forest-savannah mosaic (World Atlas, 2022).

The Awala plantation is located circa 80km southeast of the capital Libreville and circa 15km West of Pongara National Park, in an area of lowland terra firma habitat that contains some mangrove habitat. The Makouke plantation is located within the Bas-Ogooué landscape - a complex mosaic of dense, tropical forest overlapping with savannah, seasonally inundated swamps and other critical wetlands that supports exceptionally high levels of species richness and contains large blocks of unconverted, evergreen, lowland, moist forest. The Bas-Ogooué Ramsar Site is the most important hydrological system in Gabon and supports both exceptionally high levels of biodiversity and endemism, and the provision of a range of ecosystem services to communities. Understanding of the fauna and flora of forests and wetlands in this region is incomplete but conversations with experts indicate that a number of fish, amphibian and plant species recorded in this landscape are yet to be fully scientifically described; and the threat status for these species remains unknown (Laurent Chirio, Tariq Stévant & Ehoarn Bidault, pers. comm, 2021¹¹).

Mouila Lots 1, 2 and 3 and Ndende plantations are found within the Ngounié river basin, part of the western Congolian forest-savannah mosaic and also home to many threatened and endemic fish species, as well as

¹⁰ BMPs and BMEP will be revised during 2022 to align with this BAP.

¹¹ Laurent Chirio has conducted extensive research on amphibians and fish in the Bas Ogooué landscape and is a principal expert on these taxa in the Gabonese context. Tariq Stévant & Ehoarn Bidault of Missouri Botanical Gardens have conducted surveys across the Bas-Ogooué landscape over the past 10 years and are among the top seminal global experts on the region's flora.

restricted range and threatened plant species, some of which are yet to be fully scientifically described (ibid). Mouila Lots 1 and 2 are primarily composed of lowland terra firma forest with some savannah habitat, while Mouila Lot 3 and Ndende are located in a gallery-savannah mosaic.

1.4 National policy framework

This section provides a summary of key biodiversity-related national laws, policies and conventions most relevant to the BAP (Table 2). Additional details can be found in the plantation's respective ESIA and HCV assessment.

Table 2. Summary of the most relevant laws, policies, and conventions

Law/Regulation	Relevance to the BAP
National Strategy and Action Plan on Biological Diversity of Gabon (1999)	<p>Forms part of Gabon's ratification of the Convention on Biological Diversity. Aims to safeguard biodiversity by protecting genes, species, habitats and ecosystems. This includes the design of a viable and dynamic economy that takes into account biodiversity and guarantees the participation of communities in the conservation of Biodiversity.</p> <p>OPGs BAP and plantation-level Biodiversity Management Plans (BMPs) are broadly aligned with the aims of the National Strategy.</p>
Forest Code in the Gabonese Republic (2001)	<p>Defines a regulatory framework oriented towards the sustainable management of the forest in Gabon. This law considers the multifunctionality of forests and the different actors involved in its implementation. One specific mechanism recognized the management rights of local communities over the forests that they depend upon. OPG is aligned with this code and has provided access cards to all eligible local residents living in proximity to OPG set asides, so they may continue to hunt in these areas.</p> <p>The code is currently being updated, and the update will include a new paragraph about the rules pertaining to the eight wildlife corridors that are planned to link up Gabon's protected areas, since they will be a specific type of protected area with their own legislation. The 30 x 30 by 2030 ambitions to increase protected areas in Gabon to 30% of terrestrial and water areas will also be covered in this update. One of the proposed corridors goes through the set asides of Mouila Lot 1 and Lot 2, and so this may impact on the status and management requirements of these areas.</p>
Agricultural Code in the Gabonese Republic (2008)	<p>Defines the development rules of the agricultural and rural sector, enabling the State to promote a policy of investment aid by protecting the environment, particularly species and ecosystems, and improving farm structures, working and living conditions in rural areas, the development of forestry and the promotion of sustainable organic farming.</p>

Law/Regulation	Relevance to the BAP
Climate Law (2021) and the 2nd national investment framework (2021)	Gabon's commitment to reduce GHG emissions by 50% compared to baseline levels, to not convert high-value forest, and to implement natural climate solutions through investments into community forestry, forest management practices and protected areas systems. OPGs focus on low carbon and degraded forest habitat for palm development is aligned with this framework.
Law on the protection of the environment in the Gabonese Republic (2014)	Determines the general principles that must form the basis of a national policy for the protection and improvement of the environment, including: 1) preservation and sustainable use of natural resources, 2) the fight against pollution and nuisances, 3) the improvement and protection of the living environment, 4) the promotion of new values and income-generating activities related to the protection of the environment. OPGs BAP and plantation-level Biodiversity Management Plans (BMPs) are broadly aligned with these principles, in particular 1 and 2.
Decree requiring a fauna protection plan for forestry, agro-industrial, mining, and oil concessions (2018)	Specifies the requirements for the fauna protection plan required for all forestry, agro-industrial, mining, and oil concessions. This plan should be linked to the overall company's management plan and include a monitoring and evaluation plan. OPGs BAP and plantation-level Biodiversity Management Plans (BMPs) are effectively addressing this requirement
Gabon Vert Operational Strategy – One of three pillars that make up Gabon's National Development Strategy (2015)	Gabon Vert is a national strategy that aims to provide an integrated approach to sustainable development of Gabonese ecosystems, and applies to forest, aquatic and agropastoral ecosystems. The plan includes a targeted 425,000 tonnes of palm oil production per year by 2025. OPG is identified as having an important role to play both in Gabon's production ambitions – 425,000 tonnes of palm oil per year by 2025, as well as capacity building of circa 200 agricultural technicians per year.
Gabonese oil palm policy (2020)	The national oil palm policy identifies areas suitable for oil palm plantations to avoid major biodiversity impacts and provides guidance on plantation design to minimize impacts. The policy has been informed by multiple studies on high carbon stock and HCV habitat in Gabon (e.g., Austin <i>et al.</i> 2017; and Lyons-White <i>et al.</i> 2022), and OPG plantations followed the policy guidance (see Appendix 1)
Savannah Strategy (in development)	Gabon's national savannah strategy will outline the overarching approach to managing the country's savannah habitat. This strategy is still in development and botanical work in each type of savannah is required to inform the content, but no budget currently exists to complete this work. It is anticipated that the strategy will not be complete for at least 12 – 18 months.

Law/Regulation	Relevance to the BAP
	OPG has circa 44,000 ha of savannah habitat set aside within its plantations, and so the strategy may directly influence how OPG manages such areas.
30 x 30 targets Gabon (in development)	The 30 x 30 by 30 national strategy is being developed by Gabon as part of the upcoming CBD COP commitment. The commitment is expected to commit to ensuring 30% of terrestrial and 30% of aquatic (both freshwater and marine) habitats are protected by 2030. The planned corridors linking up national parks will be a core part of this commitment, and so will have relevance to OPG since 2 of their set asides form part of the proposed corridors. There may also be an opportunity for OPG to designate all of their set asides as legally protected areas. The technical baseline for these targets is expected later in 2022.

1.5 Lender requirements

IFC Performance Standard 6 (PS6) is the most widely used international biodiversity safeguard for development projects that seek alignment with leading biodiversity management practice. The objectives of PS6 are to protect and conserve biodiversity, maintain benefits from ecosystem services, and promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

The IFC PS6 states (Paragraph 14) that in areas of NH, the borrower will not significantly convert or degrade NH, unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the Project on modified habitat;*
- *Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and*
- *Any conversion or degradation is mitigated according to the mitigation hierarchy.*

In areas of CH (Paragraph 17) the borrower will not implement any activities unless:

- *No other viable alternatives within the region exist for development on modified or natural habitats that are not critical;*
- *The development does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;*
- *The development does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time;*
- *A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program*

Paragraph 20 of PS6 requires that if a project overlaps with a legally protected area, or Internationally Recognised Area (such as Ramsar site or Key Biodiversity Area) then the requirements of Paragraph 14 concerning NH apply, and certain additional conditions need to be met, specifically:

- *Demonstrate that the proposed development in such areas is legally permitted;*
- *Act in a manner consistent with any government recognized management plans for such areas;*

- Consult protected area sponsors and managers, Affected Communities, Indigenous Peoples and other stakeholders on the proposed project, as appropriate; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.

PS6 also requires that the risk of invasive alien species (IAS) is managed (Paragraph 21-23 of PS6, and GN 99-105).

A BAP is required for all developments located in CH and is recommended for developments that have the potential to significantly impact NH (IFC, 2019).

Gabon is a highly forested nation and opportunities for developing large-scale oil palm plantations on Modified Habitat are extremely limited. Any large-scale oil palm plantation in Gabon will therefore likely primarily include areas which meet the definition of NH under PS6. Important biodiversity values are also likely to be associated with NH, and thus some biodiversity impacts are an inevitable consequence of plantation development in the country. For example, the Critically Endangered Western Gorilla, Forest Elephant and Endangered Central Chimpanzee are widespread in Gabon and are currently found in most natural forest areas, including those under selective logging and those close to urban centres (IUCN, 2014). OPG's plantations do not overlap with priority landscapes for Western Gorilla and Central Chimpanzee (IUCN, 2014; Strindberg *et al.*, 2018) or Forest Elephants (AESG, 2016), but all three species are found throughout OPG plantations. A detailed overview of the key factors influencing OPG site selection and plantation development can be found in Appendix 1.

1.6 Corporate framework & policies

Olam is a member of [RSPO](#) and as of 2022 all of its plantations have been RSPO certified. RSPO certification is organised into three impact areas:

- **Prosperity:** Competitive, resilient and sustainable sector
- **People:** Sustainable livelihoods and poverty reduction
- **Planet:** Conserved, protected and enhanced ecosystems that provide for the next generation

The planet impact area of RSPO aims to protect the environment, conserve biodiversity and ensure sustainable management of natural resources. It achieves this through 12 criteria that vary from reducing fossil fuel use, pollution and erosion to using HCV and HCS assessments to ensure that land clearing does not cause deforestation.

Olam's internal '[Living Landscapes Policy](#)' commits to the elimination of unacceptable land management processes, which overlaps considerably with the RSPO principles and criteria.

1.7 Stakeholder Engagement

A summary of organisations and specialists consulted during the development this BAP is provided in Table 5.

Table 3. Organisations and specialists consulted between October 2021 and March 2022 during the development of the BAP

Organization	Name and title	Topics discussed & key information used to inform the BAP
WWF – International Conservation NGO	Pierre-Brice Maganga , Southern Program Coordinator Brave Nzamba , Wildlife Protection Officer Eugene Ndong Ndoutoume , Business and Biodiversity Coordinator Pauline Baas PROLAB lead	<ul style="list-style-type: none"> Status of 'PROLAB 2' (a project focused on monitoring the whole Gamba complex to reduce hunting) and possibility of partnership with OPG and opportunity to expand to incorporate Mouila Lots in the 2023 monitoring plans (La Compagnie des Bois du Gabon (CBG) will be included); Willingness to provide further training on SMART patrolling to OPGs biodiversity team
Missouri Botanical Gardens (MBG) – External botanical experts hired by the OPG	Tariq Stevart , Associate Curator Africa and Madagascar Department Ehoarn Bidault , Botanist	<ul style="list-style-type: none"> Support in identifying CH for plants in OPG plantations Comment on the suitability of existing botanical baselines, highlighting survey gaps; Informed priority management actions for threatened flora; Habitat classification expertise; Support in identifying ecologically suitable savannah offsets
Ministry of Water and Forests	Stephen Mouba Director General of the Environment and Nature Protection (DGEPN) Delphin Mapaga Adjoint general director of the Environment Michelle Ngwapaza Mendong Director General Adjoint Fauna and Protected Areas (DGAFAP)	<ul style="list-style-type: none"> Overview of the biodiversity context in Gabon, and national priorities (DGEPN & DGAFAP) Discussion of Offsets for OPG, and identification of other development projects in the vicinity of OPG plantations (DGEPN) Provision of national data on bushmeat hunting (DGAFAP)
Wildlife Conservation Society - International Conservation NGO	Alice Laguardia Senior Scientist Boo Maisels Conservation Scientist, Africa program	<ul style="list-style-type: none"> Status of nationwide elephant surveys and checking if any survey cells overlap with OPG plantations; Support and validation of approach to estimating residual impacts to apes and elephants; Expert input on protocol for ape baseline
Panthera - International Conservation NGO	Philipp Henschel , Regional Director for West and Central Africa Christopher Orbell , PhD student	<ul style="list-style-type: none"> Update on the status of establishing conservation corridors to maintain connectivity within the landscape (including OPG's plantations); Update on national ape monitoring activities, to align with OPG monitoring
IRET – Gabonese Institute of Tropical Ecology Research	Donald Iponga Director at IRET-CENAREST Raymonde Mboma Senior Scientist	<ul style="list-style-type: none"> Informed development of the Invasive Species Assessment ToR and will carry out the assessment Open to establish a research program on carbon stocks or bushmeat hunting with OPG and help identify appropriate students

Organization	Name and title	Topics discussed & key information used to inform the BAP
		<ul style="list-style-type: none"> • Provided research data on carbon stocks and bushmeat hunting in Gabon to inform NG approach
The Nature Conservancy / Duke University	Michelle Lee	<ul style="list-style-type: none"> • Discussion regarding progress on the Savannah Strategy and identification of the savannah offset option adjacent to Moukalaba Doudou protected area • Update on conservation corridors progress • Update on the 30 x 30 by 30 strategy for CBD COP commitment
ARRC Taskforce – part of the IUCN Section on Great Apes	Genevieve Campbell & Tatyana Humle	<ul style="list-style-type: none"> • Guidance and facilitation of ARRC review of ape monitoring protocol and BAP
Primate Experts University of Stirling	Liz Williamson Senior Research Fellow Kath Jeffery Research Fellow Robbie Whytock PhD student	<ul style="list-style-type: none"> • Provided expert opinion on likely impacts of OPGs operations on apes, • Support on estimating residual impacts to apes • Provided methodology for automated species identification and camera monitoring protocol for Lope – Waka programme • Provided data points for the national camera trapping grid approach
Borneo Futures Initiative – Consultancy Company, hired by the project	Erik Meijaard Managing Director Marc Ancrenaz Senior Associate	<ul style="list-style-type: none"> • Discussion regarding the ape management plan they have been hired to develop for OPG, and how to align this plan with the ape baseline ape monitoring planned by OPG • Informed the ape monitoring protocol
ANPN	Hubert Ella Ekogha Technical Director Jean Louis Atsima Adjoint Technical Director Guy-Philippe Sounguet, Conservateur Bas-Ogooue Ramsar Site Christian Rembeyo, Technical Director of Eaux et Forets, and Conservateur of Moukalaba Doudou Patrick Eveso Conservateur Pongara Stephanie Bourgeois Senior Scientist	<ul style="list-style-type: none"> • Update on historic and ongoing partnerships between OPG and ANPN in the Pongara, Moukalaba Doudou and Bas Ogooue Protected Areas, and potential for future support from OPG • Update on current threats, activities, priorities and ANPN capacity in these 3 protected areas (including provision of SMART reports on patrols and monitoring), and activities of other stakeholders; • Update on the management plan for RAMSAR site • Discussion of progress on wildlife corridors, and potential for OPG involvement • Discussion regarding the proposed offset savannah extension to Moukalaba Doudou • Discussion regarding the planned ANPN-OPG partnership to undertake elephant collaring and DNA survey in Mouila Lots 1,2,3 and Ndende • Input on habitat use by elephants and the role of savannah; as well as support and validation of approach to estimating residual impacts to elephants;

Organization	Name and title	Topics discussed & key information used to inform the BAP
Florida University, Tropical Conservation Institute	Matt Shirley , Program Coordinator / Crocodile expert	<ul style="list-style-type: none"> Status and distribution of Slender-Snouted and Nile Crocodiles in the vicinity of OPG plantations
Leibniz Institute for Evolution and Biodiversity Science	Mark-Oliver Rodel , Curator of Herpetology	<ul style="list-style-type: none"> Status and classification of the Ogowe River Frog

1.8 Biodiversity and Social Advisory Panel

OPG is in the process of assembling a Biodiversity and Social Advisory Panel that comprises representatives of the Government, conservation NGOs and researchers. The aim of the panel is to support OPG in aligning with good management practice (including IFC's PS) by reviewing Project progress, raising concerns, recommending actions, and identifying additional work required to achieve OPG's social and biodiversity objectives. Their mandate includes:

- Conducting independent reviews of OPG's social and biodiversity management and monitoring activities.
- Reviewing progress and recommend additional actions to achieve alignment with IFC PS requirements.
- Providing recommendations for improving social and biodiversity management and monitoring activities and related documentation (e.g., Biodiversity Action Plan, Biodiversity Management Plan, Biodiversity Monitoring and Evaluation Plan).
- Assisting OPG in identifying targets, thresholds and metrics to track progress towards achieving NG for CH.
- Providing expert advice based on recent relevant scientific evidence and literature.
- Providing expert advice on Gabonese and international policy and any contextual developments that could impact OPG's social and biodiversity management activities.
- Contributing to OPG's Annual Sustainability Report.
- Opining on social and biodiversity-related complaints received through the community grievance mechanism, RSPO grievance mechanism and/or CAO.

The panel will meet face-to-face (Covid restrictions permitting) at least once a year to review progress, raise issues and identify additional work required to achieve OPG's social biodiversity objectives. OPG, IFC and other lenders as appropriate will attend this meeting. Other specialists will be consulted on an as needed basis.

The first meeting of the panel was focused on validating the BAP and took place in September 2022, and the next meeting is planned for July 2023.

2 Habitat classification and biodiversity values

2.1 Natural and Modified Habitat

PS6 requires projects to classify the area within which they operate into three categories: Modified Habitat (MH), Natural Habitat (NH) and Critical Habitat (CH) based on the extent of human modification of the ecosystem and the presence of high biodiversity values (see Table 4).

Table 4. Summary of the PS6 scheme for classifying areas

		Human modification of the ecosystem	
		Not significant	Significant
High biodiversity values	Present	Critical Habitat	Critical Habitat
	Absent	Natural Habitat	Modified Habitat

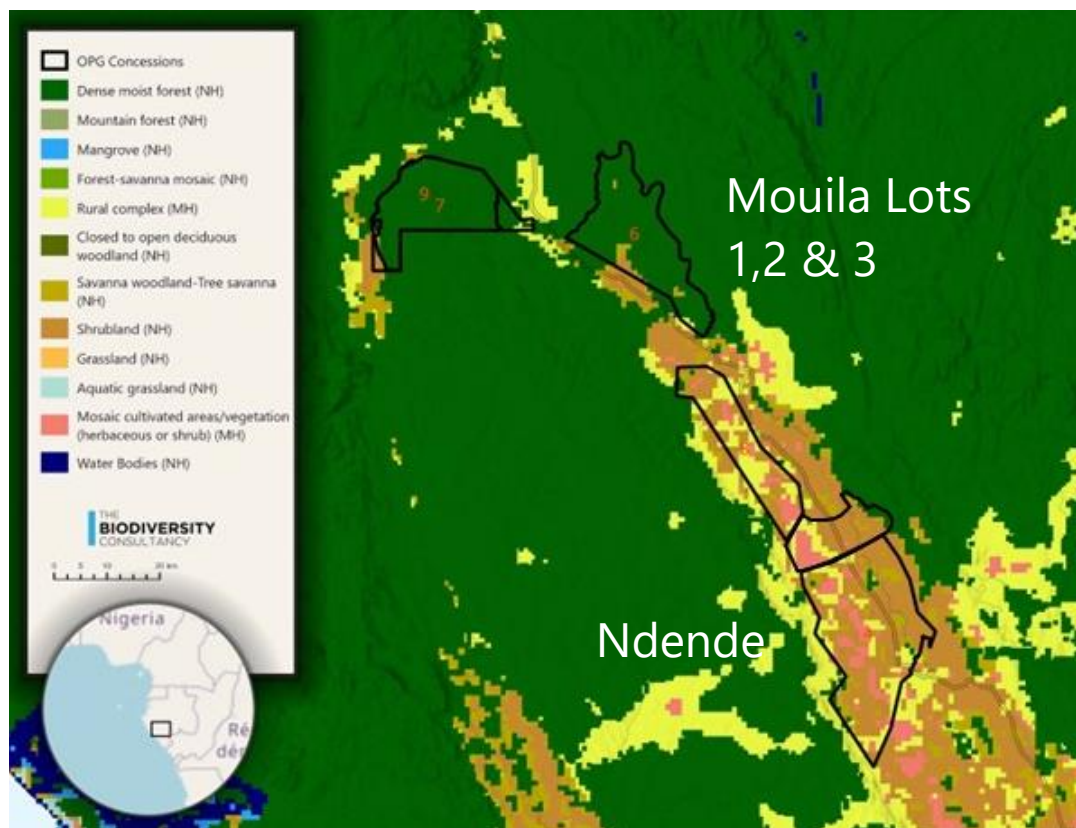
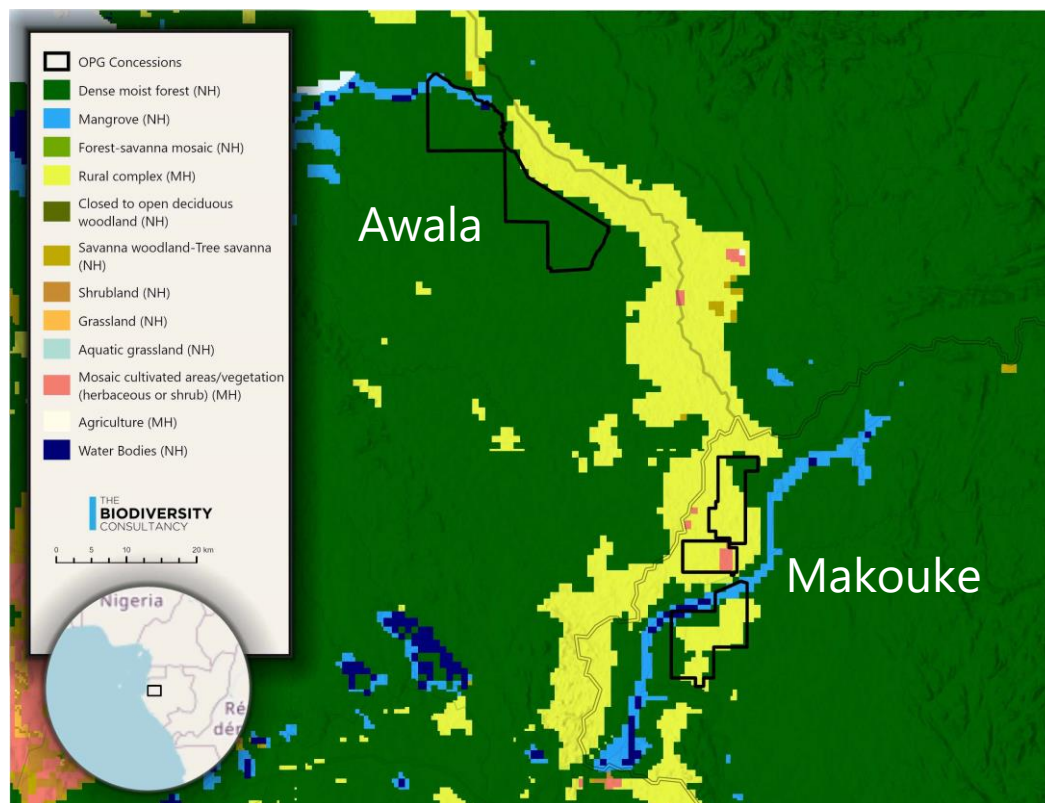
Note: No universal thresholds exist for identifying NH and MH

Monoculture plantations, agricultural and urban areas show “substantial modification” and would usually be classed as MH; whereas selectively logged forests, old fallow / re-growth, and regularly burned savannahs usually retain most of the original species and ecological processes and so would in most cases still be considered NH. Both NH and MH may contain globally important biodiversity values, thereby qualifying as CH (PS6 GN6, IFC 2019). In reality, sites will often be located within a mosaic of NH and MH, with varying levels of anthropogenic and/or natural disturbance (PS6 GN6, IFC 2019).

As part of the CHA (Annex 1), a habitat map covering all OPG plantations was created using the “Land Cover Africa” layer developed by Verhegghen *et al.* (2012) based on landsat data from 2004-2007 (Figures 3). This means that with the exception of Makouke¹², these data represent pre-conversion values. Descriptions of habitat types in OPG plantations were also informed by the HCV assessments conducted by ProForest (2011 – 2018).

¹²All natural habitat cleared by OPG is included in the assessment of Project impacts (i.e., precautionarily considered to be “in anticipation of project finance” per PS6). The clearance for Makouke is not included since this area was developed in 1981 by AgroGabon and acquired by OPG from SIAT (a Belgium-based palm/rubber company) in 2016, thus OPG are not considered responsible for the habitat clearance.

Figures 3a (showing Awala and Makouke) and Figure 3b (showing Mouila Lots 1-3 and Ndende). Habitat map of OPG's plantations based on layers developed in Verhegghen et al. (2012).



The six principal types of NH within the OPG plantations are: lowland terra firma forest (which will includes some swamp and seasonally inundated forest); gallery / riparian forest¹³; savannah formations (including shrubland); dolines; mangrove and water bodies (rivers and streams). Lowland terra firma forest and dolines also qualify as CH under Criterion 4.

Most areas in Awala, Mouila Lots 1, 2 and 3 and Ndende plantations had experienced some recent and on-going human influence prior to OPG's activities including selective logging, burning and hunting. However, the vast majority of savannah and forests that were present pre-conversion retained most of their original species and ecological functions and so are considered NH. Only a few areas (e.g., recent agricultural fallow, existing roads), making up a small proportion of the total of these plantations, are sufficiently degraded as to be considered MH.

In contrast, Makouke, which was established as a plantation in the 1980's, contains significant areas of MH. MH within the OPG plantations consists of agriculture, (defined as areas where >70% of land is taken by rainfed herbaceous crops); rural complex; cultivated and managed areas (that incorporate semi-deciduous woodland with closed shrubs and closed herbaceous layer); and mosaic cultivated areas/vegetation (defined as cultivated and managed terrestrial areas that incorporate closed to open shrubland and herbaceous closed to open vegetation).

2.2 Critical Habitat

The Project's CHA (Annex 1) confirmed that all six plantations are located in CH as they contain biodiversity values that meet IFC's criteria (IFC 2012). Two of the six NH were assessed as CH (dolines and lowland terra firma forest) and the remaining four are priority NH as they support CH-qualifying species:

- Lowland terra firma forest is used by Critically Endangered Western Lowland Gorilla and Forest Elephant and Endangered Central Chimpanzee, as well as several other CH-qualifying bird and mammal species, and also supports multiple endangered or restricted range species of plant;
- Gallery Forest supports multiple restricted range species of plant, alongside CH qualifying mammal species;
- Dolines in the savannah landscape represent CH as they are a regionally rare ecosystem;
- Freshwater bodies (rivers, streams and swamps) support multiple restricted range and migratory fish species as well as the Slender Snouted Crocodile (CR) and a restricted range frog species;
- Savannah supports Forest Elephant, Rosy Bee-Eater and African River Martin - both are migratory species of bird;
- Mangrove supports multiple fish species and is an important habitat for Red Capped Mangabey.

¹³ Expert consultation confirms there are two different types of gallery / riparian forest within OPG plantations – those that are associated with savannah ecosystems (specifically Mouila Lot 3 and Ndende); and those that are contiguous with terra firma forest blocks. The former is a unique ecosystem with a specific species composition that includes multiple rare plant species; the latter exhibits much greater heterogeneity and typically does not include rare plant species. To avoid confusion, from this point forward we will thus refer to gallery habitat associated with savannah (in Mouila Lot 3 and Ndende) as "gallery forest"; and gallery habitat associated with terra firma forest (in Awala, Makouke, Mouila Lot 1 and 2) as "riparian habitat".

The CHA in summary found:

Criteria 1-3: 20 species in the Awala plantation qualified as likely or possibly triggering CH, 46 species qualified in the Makouke plantation, and 89 species in the Mouila Lot 1,2,3 and Ndende plantations.

Criterion 4: Dolines and lowland terra firma forest triggered CH under Criterion 4 (highly threatened and/ or unique ecosystems)¹⁴.

Criterion 5: No features qualified under this criterion

Paragraph 20: The Makouke plantation overlaps with the Bas Ogooué Ramsar Site and therefore Paragraph 20 of PS6 is triggered for this component of the Project.

A full list of species that qualify for CH can be found in [Appendix 2](#).

2.3 Risk-based prioritisation

Although there are many CH-qualifying features, not all are equal priorities for further actions. There is variation in terms of the conservation status, ecology, level of scientific understanding, Project and non-Project influences and cumulative impacts. Therefore, to highlight the biodiversity that is a focus for BAP actions and monitoring, a prioritisation was undertaken based on the likelihood of a Project impact and the consequence of any impact ([Annex 2](#)).

The results of the risk-based prioritisation are summarised in Table 5 by plantation (Full details Table 1 and Table 4 of Annex 2). The biodiversity classed as highest priority for BAP actions (Action Category 1 (AC1)) includes three animal species/subspecies (Central Chimpanzee; Western Gorilla; Forest Elephant;) and one habitat (lowland terra firma forest). For all 4 of these AC1 features, OPG will implement specific avoidance, minimisation and compensation measures to ensure NG is achieved (see [Section 4](#)).

Dolines are a habitat type that qualifies for CH but OPG operations will not impact it as a 500m buffer around all dolines has been created where no planting occurs. A further four habitat types are all NH and important for supporting species that qualify for CH these include savannah, freshwater habitat, gallery/riparian forest and mangrove. Avoiding and minimising further impacts to NH is a focus for mitigation.

¹⁴ It is important to note that at the time of undertaking the CHA and developing this BAP, lowland terra firma forest was considered Critical Habitat under Criterion 4 (highly threatened or unique ecosystems) by expert botanists (MBG) with extensive local knowledge, based on a belief that this habitat has limited distribution along the coast of Gabon, and is characterised by a high proportion of endemic plants (Senterre 2005) and a zone of endemism (Bidault et al. 2014). However, more recently the same botanic experts confirmed that in fact they do not believe lowland terra firma forest in OPG concessions to be particularly rare or threatened, and consider it should instead be classed as Natural Habitat, meaning NNL, and not NG, would be required to align with PS6. Because this information only came to light very recently, this BAP refers to lowland terra firma forest as CH throughout, and the proposed offset actions will deliver NG for this habitat. However, given that lowland terra firma forest is home to several CH qualifying species for which NG is required (e.g., Red Capped Mangabey, Giant Ground Pangolin) the change in status from CH to NH does not actually change the NG requirement for lowland terra firma forest, and as a result the text and requirement for lowland terra firma forest throughout the BAP has not been changed.

While no plant species were identified as AC1 in this assessment, this may be because very few plant specimens have been collected within most OPG plantations. The ESIA's included some botanical inventories, but establishment of a more detailed inventory using additional expertise is required for the Project to understand the presence and distribution of threatened plants, particularly in the gallery forests of the Mouila and Ndende plantations. Thirty-four CH-qualifying plant species have been found within proximity to one or more plantations but are as yet not confirmed as present in the OPG operation area, and only with surveys can they either be confidently included or excluded as CH-qualifying, and subsequently assigned the correct Action Category.

Freshwater habitats were identified as requiring contingency planning (AC2) because although impacts are unlikely, if they do occur, they would be major and reduce the regional viability / function of many fish and aquatic plant species. OPG implement a system of buffer zones within each plantation between planted areas and waterways to ensure aquatic habitats remain unpolluted and undisturbed and monitoring of water quality is undertaken to verify. Furthermore, the irrigation approach being used by OPG is precautionary, will only occur for three months in the dry season (when fish are not breeding) and will include real time monitoring of flows, alongside appropriate grills and mesh to avoid injury to freshwater biodiversity from pumps. If buffers are not maintained, or if adverse impacts are observed through monitoring, AC2 freshwater species could be elevated to AC1.

Table 5. Summary of risk prioritisation results for species and habitats by plantation

Action Category	Mitigation and monitoring approach	Awala	Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende
AC1: High priority for habitat and / or species mitigation	Species or habitat-specific avoidance & minimization of direct and indirect impacts Robust monitoring of species to enable loss/gain accounting Demonstration of NG required	Mammal: Central Chimpanzee, Western Gorilla, Forest Elephant Habitat: Lowland terra firma forest	Mammal: Central Chimpanzee, Western Gorilla, Forest Elephant Habitat: Lowland terra firma forest	Mammal: Central Chimpanzee, Western Gorilla, Forest Elephant Habitat: Lowland terra firma forest	Mammal: Central Chimpanzee, Western Gorilla, Forest Elephant Habitat: Lowland terra firma forest	Mammal: Central Chimpanzee*, Western Gorilla*, Forest Elephant Habitat: Lowland terra firma forest	Mammal: Central Chimpanzee*, Western Gorilla*, Forest Elephant Habitat: Lowland terra firma forest
AC2: Contingency planning	Proactive avoidance of impacts & manage indirect impacts Proactively monitor existence/scale of impacts to ensure they remain negligible. If significant impacts observed, elevate to AC1 NG required	Fish: 3, Reptile: 1 Habitat: Gallery Forest, Mangrove, Freshwater	Fish: 7, Shrimp: 3, Reptile: 1, Amphibian: 1, Insect: 1 Habitat: Gallery Forest, Freshwater	Fish: 16, Reptile: 1 Habitat: Gallery Forest, Freshwater	Fish: 16, Reptile: 1, Plant: 1 Habitat: Gallery Forest, Freshwater	Fish: 16, Reptile: 1, Plant: 4 Habitat: Gallery Forest, Dolines, Freshwater	Fish: 16, Reptile: 1, Plant: 9 Habitat: Gallery Forest, Dolines, Freshwater
AC3: General mitigation measures	Implement good practice habitat-based mitigation measures Monitor scale of impact Verify presence in either onsite or offsite offsets NG assumed through habitat proxy	Mammal: 3, Bird: 2, Plant: 3	Mammal: 3, Bird: 2, Plant: 2 Habitat: Savannah	Mammal: 3, Bird: 2, Plant: 4 Habitat: Savannah	Mammal: 3, Bird: 2, Plant: 2 Habitat: Savannah	Mammal: 3, Bird: 2, Plant: 3 Habitat: Savannah	Mammal: 3, Bird: 2, Plant: 2 Habitat: Savannah

AC4: Remain aware	Implement good practice habitat-based mitigation measures Remain aware NG assumed through habitat proxy	Bird: 1, Fish: 8, Plant: 5	Bird: 1, Fish: 16, Plant: 9	Bird: 1, Fish: 32	Bird: 1, Fish: 32, Plant: 5	Bird: 1, Fish: 32, Plant: 6	Bird: 1, Fish: 32, Plant: 12
	* neither Central Chimpanzees or Western Gorillas are confirmed in Mouila Lot 3 or Ndende, but they are included here to be precautionary						

2.4 Other PS6 Requirements

2.4.1 Protected areas and Internationally Recognised Areas

As outlined in Section 1.5, Paragraph 20 of PS6 requires that if a project overlaps a legally protected area, or Internationally Recognised Area (such as Ramsar site or Key Biodiversity Area) then certain additional conditions need to be met.

The Makouke plantation is inside the boundaries of the Lower Ogooué Ramsar site and therefore Paragraph 20 of PS6 applies. However, the plantation and planting predate the designation of the Ramsar site (which occurred in 2009) and therefore the presence of the plantation is considered compatible with the Ramsar designation. Gabon became a Ramsar signatory in 1987 and so the government has a responsibility to ensure the 'wise use' of wetlands. However, at present, there are no specific legal requirements for Ramsar sites in Gabon, and no additional protected area management regulations apply to the site. A 2021-2025 management plan for the Bas Ogooué Ramsar site has been developed (DGEPN-ANPN 2021), and OPG has engaged with the process and attended relevant workshops. There are no specific requirements for the Project within the management plan, and a motion to remove the area covered by the Project from the Ramsar site has been submitted by the DGEPN, so that the Ramsar site only includes areas of high conservation value (G. P. Sounguet and M. Lee pers comm). The Project is therefore meeting the requirements of Paragraph 20, with the possible exception of the requirement to *"implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area"*. However, OPG is in dialogue with ANPN regarding providing logistical support to facilitate patrols (specifically, access to lodging, and also transportation to drop off and pick up from patrols) in the eastern portion of the Ramsar site.

No additional planting is planned by OPG within the Makouke plantation. The previous developers of Makouke (AgroGabon and SIAT) removed all riparian vegetation and planted along watercourses without observing buffers. OPG is establishing buffers along watercourses by allowing natural regeneration of riparian habitat, in order to avoid run-off and contamination into the waterways of the Ramsar site, and has reworked the connectivity to include two landscape corridors. Given that the Makouke plantation predates the Ramsar definition, that no additional impacts have been created by Olam since no planting has been done since acquisition from SIAT, and that riparian buffers have been introduced to reduce existing impacts, it is considered that OPG's contribution to conservation is proportionate to their impacts, and that logistical support to ANPN is sufficient to meet the requirements of Paragraph 20.

Awala and Mouila Lots 1, 2 and 3 do not overlap any currently designated protected areas or protected area buffer zones. The Awala plantation lies approximately 15 km from Pongara National Park but does not include any water catchments that drain directly into the protected area. Staff from the National Park participate in law enforcement patrols in HCV set-aside areas in the Awala plantation (See Section 6.1.1).

2.4.2 Invasive Alien Species

PS6 requires that the risk of invasive alien species (IAS) is managed (Paragraph 21-23 of PS6, and GN 99-105). To meet this requirement, OPG is undertaking an assessment of IAS risks and impacts and developing a management and monitoring plan to avoid spread into new areas and, as practicable, eradicate any existing plants from NH over which OPG has management control.

OPG have introduced three plant species as part of a cover crop programme – all are nitrogen fixing plants used for soil improvement and control erosion, and all species are used in all plantations:

1. *Mucuna bracteate*
2. *Pueraria javanica*
3. *Calopogonium mucunoides*

None of these species are listed on the [IUCN global invasive species](#) database, nor on the [Global Register of Introduced and Invasive Species](#), so risk of spread from these is likely low. There may also be additional invasive species present in the plantations that were present prior to OPG development (e.g., OPG has observed *Cassia cobanensis*, *Turnera subulata*, *Euphorbia heterophylla*, *Antigonon leptopus*, and *Celosia argentea* in villages around plantations). OPG has sub-contracted a botanist from the Institut du Recherche en Ecologie Tropicale (IRET) to assess the risk posed by the above alien species in all six plantations. The work combines desk-based research with fieldwork in two plantations - one within a forest ecosystem (Mouila Lot 2) and the second within a savannah ecosystem (Ndende) to assess how “contained” these species are and whether there is evidence of natural propagation (i.e., invasiveness) outside of the OPG directly planted areas. The work will also detail the presence of any other alien species in OPG plantations (for example, the invasive *Wassmania* sp. fire ant is known to be present) and provide an assessment of whether any identified species may pose a risk and whether further research is required. Any further mitigation required would then be developed and included into a future iteration of the plantation level BMPs.

2.4.3 Ecosystem Services management

PS6 requires projects to identify Priority Ecosystem Services (ES), which are either:

1. ES on which local communities depend which might be impacted by operations; or
2. ES on which the operations depend.

PS6 further requires that adverse impacts be avoided where possible, or management measures put in place to maintain “the value and functionality of priority services”.

HCV assessments investigated ES under HCVs 4 (services of nature), 5 (resources which meet the basic needs of people), and 6 (sites of cultural importance). The HCV assessments have therefore been used to identify potential priority ES (Table 6). Management of priority ES is primarily through establishing and restoring riparian buffers, maintaining access to ES for local communities, and the establishment of cultural set aside areas to protect sacred sites. Management actions to maintain priority ecosystem services are part of OPGs Social Contract management system which is made up of various Standard Operation Procedures (SOP) e.g., SOP for grievance, SOP for HCV 5, SOP for HCV 6 etc.

Table 6. Ecosystem services use by local communities (Type 1) and OPG (Type 2) in the OPG plantations.

	Awala	Makouke	Mouila 1	Mouila 2	Mouila 3	Ndende
<i>Type 1</i>						
Provisioning	<ul style="list-style-type: none"> • Wild food (fruits and nut) • Wild food (bushmeat) 	<ul style="list-style-type: none"> • Wild food (fruits and nut) • Wild food (bushmeat) 	<ul style="list-style-type: none"> • Wild food (fruits and nut) • Wild food (bushmeat) 	<ul style="list-style-type: none"> • Wild food (fruits and nut) • Wild food (bushmeat) 	<ul style="list-style-type: none"> • Wild food (fruits and nut) • Wild food (bushmeat) 	<ul style="list-style-type: none"> • Wild food (fruits and nut)

	Awala	Makouke	Mouila 1	Mouila 2	Mouila 3	Ndende
	<ul style="list-style-type: none"> • Timber • Water for domestic use • Fishing • Household building materials • Firewood (to be confirmed) 	<ul style="list-style-type: none"> • Timber • Water for domestic use • Fishing • Household building materials • Firewood • Medicinal plants 	<ul style="list-style-type: none"> • Timber • Water for domestic use • Fishing • Household building materials • Firewood • Medicinal plants 	<ul style="list-style-type: none"> • Timber • Water for domestic use • Water sources during drought • Fishing • Household building materials • Firewood • Medicinal plants 	<ul style="list-style-type: none"> • Timber • Water for domestic use • Water sources during drought • Fishing • Household building materials • Firewood • Medicinal plants 	<ul style="list-style-type: none"> • Wild food (bushmeat) • Water for domestic use • Water sources during drought • Fishing • Firewood • Medicinal plants
Cultural		<ul style="list-style-type: none"> • Sacred sites (old villages) • Sacred groves • Initiation sites 	<ul style="list-style-type: none"> • Sacred sites (old villages) • Sacred sites (cemeteries) • Sacred sites (other) 	<ul style="list-style-type: none"> • Sacred sites (old villages) • Sacred sites (cemeteries) • Sacred sites (other) 	<ul style="list-style-type: none"> • Sacred sites (cemeteries) • Sacred sites (other, e.g. lakes & caves) 	<ul style="list-style-type: none"> • Sacred sites (cemeteries) • Sacred sites (other, e.g. lakes, karst outcrops & caves)
Regulating	<ul style="list-style-type: none"> • Water flow & quality • Erosion control 	<ul style="list-style-type: none"> • Water flow & quality 	<ul style="list-style-type: none"> • Water flow & quality 	<ul style="list-style-type: none"> • Water flow & quality • Erosion control 	<ul style="list-style-type: none"> • Water flow & quality 	<ul style="list-style-type: none"> • Water flow & quality
Type 2						
Provisioning	<ul style="list-style-type: none"> • Water 	<ul style="list-style-type: none"> • Water 	<ul style="list-style-type: none"> • Water 	<ul style="list-style-type: none"> • Water 	<ul style="list-style-type: none"> • Water 	<ul style="list-style-type: none"> • Water
Regulating	<ul style="list-style-type: none"> • Water • Erosion control • Pollination 	<ul style="list-style-type: none"> • Water • Erosion control • Pollination 	<ul style="list-style-type: none"> • Water • Erosion control • Pollination 	<ul style="list-style-type: none"> • Water • Erosion control • Pollination 	<ul style="list-style-type: none"> • Water • Erosion control • Pollination 	<ul style="list-style-type: none"> • Water

3 Summary of impacts

3.1 Direct and indirect impacts

A summary of the direct and indirect impacts to biodiversity from the establishment and management of OPG's oil palm plantations is provided in Table 7 below. The most significant impact has been the clearance of lowland terra firma forest and savannah which has led to habitat loss for terrestrial biodiversity, as well as to fragmentation of the broader landscape.

Table 7. Main confirmed and potential impacts on biodiversity associated with OPG activities

Impact	Type and significance of Impact	Biodiversity features affected	Description
Habitat loss and fragmentation	Direct and Significant	Lowland terra firma forest (CH); Terrestrial biodiversity features	Lowland terra firma forest was cleared for planting and associated infrastructure, therefore significant impacts to this habitat and associated terrestrial species have been created. Elephant trenches bordering HCV areas have reduced connectivity between forested areas, but OPG has created an Elephant Mitigation

			Taskforce ¹⁵ that is working to restore all such areas. Trenches may also represent a threat to small and medium terrestrial fauna who may fall and become trapped, but OPG will confirm whether such an impact exists through monitoring (see Section 4.1).
		Savannah habitat (NH); Terrestrial biodiversity features	Savannah habitat was cleared for planting and associated infrastructure, therefore significant impacts to this habitat and associated terrestrial species have been created. Dolines (CH) associated with savannah habitat have not however been directly impacted by OPGs operations as they have been mapped and buffers created around them.
Habitat degradation	Direct; Significance unconfirmed but anticipated insignificant	Gallery Forest and associated biodiversity	In the savannah plantations of Mouila Lot 3 and Ndende, no gallery forest has been cleared and a 20 - 30m buffer between gallery forest edge and any planted area generally maintained (with some exceptions) to conserve the ecotone between habitats. However, stakeholder consultation has highlighted that water protection is a significant issue for gallery forest and that residual impacts may still occur (even when habitat is not cleared for planting) due to water stress from adjacent oil palm trees that may impact on habitat quality (T. Stévant pers comm). So far, none of the identified gallery forest plant species that may be restricted range (e.g., <i>Psychotria acutigemma subsp. couvreuriana</i> ; <i>Cassipourea</i> sp. Nov, and <i>Millettia le-testui</i>), have been found to grow directly adjacent to planted areas (they are located in undeveloped areas), but botanical inventory is required to support this preliminary finding. OPG will need to monitor gallery forest to assess whether water stress is leading to habitat degradation and undertake botanical inventory to confirm distribution of CH qualifying gallery forest plants, and whether any qualify for AC1. If water stress is detected, OPG will undertake adaptive management in areas where water stress is confirmed and where AC1 plant species occur, by increasing buffer size.
Disease transmission	Direct and Insignificant	Primates	There is potential for disease transmission from plantation workers (through faeces and saliva) due to increased proximity of humans with great apes, which are highly susceptible to human diseases. However, regular monitoring of set asides by the biodiversity team has found no evidence of such transmission (i.e., through discovery of an ape carcass). This impact will always be a risk for OPG, but existing management and the code of conduct for staff is minimizing this risk, and to date there is no evidence of an impact.
Increase in hunting, fishing and logging	Direct and Indirect, and Insignificant	Lowland terra firma forest (CH); all terrestrial and freshwater	Project development has led to population growth in nearby towns (Kango and Mouila) as well as within plantations (through housing of workers and their families) but not in villages surrounding plantations. In-migration increases demand for agricultural products, timber, meat and fish, thus

¹⁵ A committee dedicated to elephant mitigation effort was created in December 2017 and comprised of a mixed team from Operations, R&D and CR&S departments. In 2021 the committee was restructured as an Elephant Mitigation Task Force - coordinated by the SD department and supervised in each concession by the Environment division leader with two dedicated "patrollers" in each concession that are logistically dependent on the Operations team. Primary tasks of the patrollers are: check the condition of elephant trenches, barbed wire or other device installed to limit elephant intrusions, identify and record all intrusion points (entry or exit), census palms affected by elephant damage, and engage with the Operation team to support adjustments that guarantee connectivity between HCV and ensure an integrated landscape approach.

through in-migration		biodiversity features	impacting forest habitat and aquatic and terrestrial biodiversity. However, these impacts are not considered to be significant (see Annex 3 – Residual Impact Assessment) since forest loss does not appear to exceed what is occurring in other towns in Gabon. Furthermore, OPG staff patrol set asides to prevent illegal logging / farming / mining and reduce indirect impacts within their plantations.
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3.2 Cumulative impacts

No cumulative impact assessment or strategic environmental assessment has been prepared for this area, as OPG are currently the only large-scale development in the region. Logging concessions border all OPG plantations, with different intensity in their operations; some are no longer active, and others are in early stages of planning. Potential significant additional developments that, in the future, might lead to cumulative impacts include:

- Additional industrial agricultural development on the savannah, such as other oil palm plantations, and potential large-scale sugar cane plantations;
- Intensification of industrial timber harvesting;
- Mines and development of associated infrastructures (for example the Maboumine niobium and polymetallic mine is proposed on the Ngounié river north of Sindara, circa 30 km south of Makouke), particularly access routes (road, rail and water).

Cumulative impacts which could arise from these additional developments include:

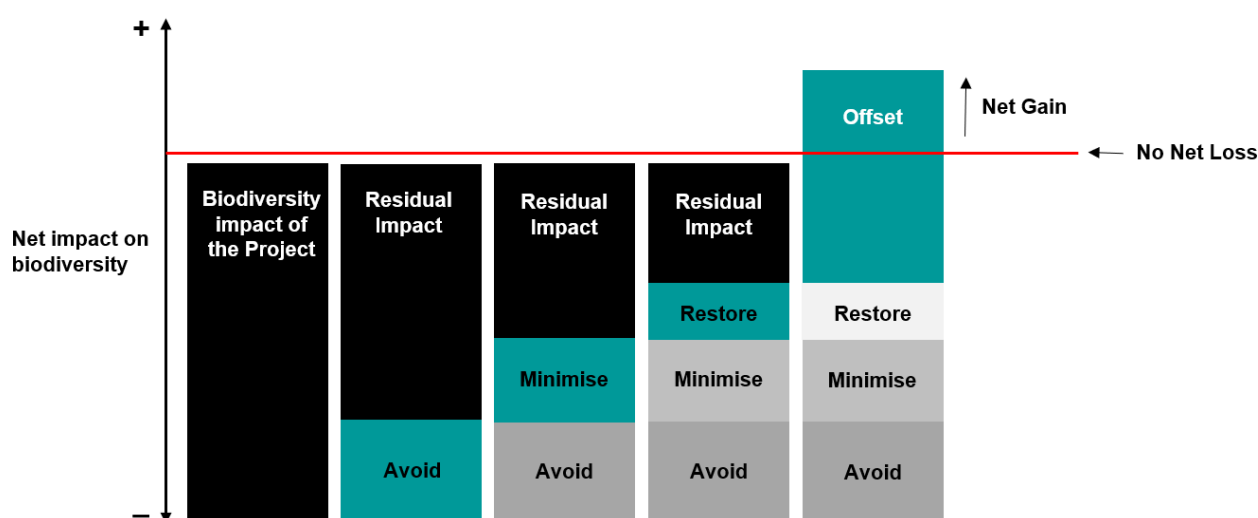
- Loss of savannah for additional oil palm or sugar plantations. Because many other projects are impacting savannah in Gabon (or will impact them), and because conversion of forest habitat is avoided where possible, savannahs will slowly become HCV 3 (rare, threatened, or endangered ecosystems, habitats or refugia) over time (T. Stévant pers. Comm.).
- Interruption of the forest-savannah ecotone. This is a dynamic environment where currently forest is probably expanding into savannah and it is a relatively rare dynamic in Gabon. This ecotone, and the species associated with it would be lost (T Stévant and Q, Meunier pers comm).
- Increase in fragmentation. For example, additional plantations running north-south may create a complete barrier for connectivity between elephant populations west and east of the Ngounie, which would reduce population connectivity and genetic diversity.

Overall, cumulative impacts to both savannah habitat integrity and forest habitat connectivity could be significant. However, if OPG both contributes to developing and implements recommendations of Gabon's National Savannah Strategy, cumulative impacts to savannah areas could be minimised. Similarly, the ANPN / World Bank 'GeFaCHE' project aims to create wildlife corridors between Gabon's protected areas, and Mouila Lots 1 and 2 have been earmarked as key stepping stones between Moukalaba-Doudou and Waka National Parks. Engagement with this process by OPG would reduce fragmentation and promote connectivity for large mammals.

4 Mitigation Strategy

OPG is seeking to align with IFC PS6 therefore is committed to implementing the mitigation hierarchy (Figure 4. The Mitigation Hierarchy) to avoid, minimise, restore and offset impacts (Aiama et al., 2015; CSBI and TBC, 2015; IFC, 2019, p. 6; World Bank Group, 2017). Avoidance entails ‘designing out’ an impact or risk (e.g., through relocating a project component, avoiding a harmful activity, employing alternative technology), preventing their expected impacts on biodiversity. Minimisation reduces the severity of impacts on biodiversity by controlling or limiting the source of that impact. Such actions reduce the likelihood or magnitude of biodiversity impacts, but do not completely prevent them. Development projects tend to focus on minimisation, but often impact reduction is less significant than anticipated, so it is better to focus on avoidance. Restoration seeks to recreate the original (pre-project) habitat type or to actively enhance the rate of recovery of degraded habitats. Where significant residual impacts remain, compensation actions to achieve an overall NNL for NH, where feasible, and NG for CH-qualifying features will need to be developed. NH and CH are present in all 6 OPG plantations, and all four steps of the mitigation hierarchy are in the process of being implemented by OPG. As OPG was previously aligning with the HCV approach, some mitigation actions have been undergoing implementation for some time. The HCV approach is somewhat aligned with PS6 in that it requires the identification, management and monitoring of HCVs, but it does not specifically require NNL for NH or NG for CH, and so further actions have been developed to fully align with PS6.

Figure 4. The Mitigation Hierarchy



4.1 Application of the mitigation hierarchy

OPG has avoided the most potentially significant direct impacts of its plantations through its site-selection process (see [Appendix 1](#)) and through the creation of set-asides in the higher quality areas of NH, which is strongly aligned with PS6’s focus on avoiding impacts to CH and NH in the first place. OPG worked in close collaboration with the relevant agencies in the government of Gabon to select plantation locations avoiding major biodiversity impacts, aligning with Gabon’s national oil palm policy (validated September 2020). Therefore, most plantations are located close to main national roads where habitat was already degraded. One exception is the Makouke plantation which is situated within the Lower Ogooué Ramsar site. However, as an existing plantation acquired by OPG, it pre-dates the creation of the Ramsar site. Table 8 provides an overview

of the mitigation actions already being implemented by OPG as well as those still in development / planning. Some of these BAP actions were operationalised through five detailed plantation level BMP's in 2019 (Mouila Lot 3 and Ndende share a BMP, but all other plantations have their own) that are being implemented by OPG, but these will require updating to reflect post-2019 changes to recommended on-site actions, as well as proposed off-site actions (see [Section 6](#)). Other existing actions come from the HCV assessments and ESIA.

Table 8. Summary of mitigation actions already being undertaken by OPG, and those planned for implementation

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
BMP 1	All	All terrestrial and freshwater biodiversity features	Hunting & fishing; habitat loss & fragmentation	Avoid	Creation and management of set aside areas: 1. Create HCV forest, savannah and riparian habitat set asides across the 6 plantations, with at least one large set aside contiguous with the wider landscape in each plantation, including boundary stones and ongoing patrolling. 2. Preserve riparian areas to control chemical run-off and soil erosion and prevent sedimentation in rivers 3. Create a ground-truthed habitat map clearly delineating swamp, mangrove, rivers, streams and gallery /terra firma forest buffers for all plantations to enable robust management and monitoring of all habitat features	1. Existing 2. Existing 3. Planned	1. n/a 2. ongoing 3. Apr -23	1. n/a 2. ongoing 3. Dec -23	1. HCV areas and riparian buffers are set aside 2. Evidence of implementation (photographs, aerial survey etc) 3. Habitat map is created and held by the centralised database	HCV Assistant / Chef D'Equipe	SD Manager	Annually
BMP 15	All	All species	Pollution	Avoid	Control of pesticides and fertilisers in set asides and riparian buffers: 1. Share geographic coordinates / maps of HCV and riparian limits with the operating teams and inform them they cannot use pesticides and fertilizers in such areas 2. Undertake annual training with plantation staff to remind them of plantation limits, and to raise awareness regarding the negative effects of pesticides and fertilizers on the environment	1. Existing 2. Existing 3. Existing	Ongoing	Ongoing	1. Location of HVC and riparian borders are known by operating staff 2. Operating staff are aware of the negative impacts that fertilizers and pesticides have on the environment 3. Water quality monitoring is undertaken, and	HCV Assistant / Chef D'Equipe	SD Manager	Annually

¹⁶ Taken from OPG's concession level BMP's

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
					3. undertake regular water quality monitoring up and downstream in all rivers crossing OPG operations				results assessed for significance			
n/a	All	All species	Habitat loss & fragmentation	Avoid	Community use and cultural zones: Set aside certain areas identified by villagers as of high importance for socio-economic (natural resource collection) or cultural reasons (e.g., old village sites, grave sites, and other sacred areas such as caves or lakes). Primary purpose is not biodiversity conservation but likely to have some biodiversity co-benefits	Existing	n/a	n/a	1. Community use and cultural zones are identified by local communities; community members know the location of community use and cultural zones and have unrestricted access to them	HCV Assistant / Chef D'Equipe	SD Manager	One off
BMP 2, 3, 4 & 10	All	All species	Hunting & fishing; habitat loss & fragmentation	Minimise	Control of illegal activities: 1. Undertake regular SMART patrols of the set asides (bringing in ANPN for Awala when needed), and camera trapping, to monitor wildlife populations and deter illegal hunting, logging and mining activities 2. Train security agents on illegal human activity detection; ensure severe sanctions for staff and sub-contractors breaking rules around hunting, fishing and logging 3. Identify all villages using HCV areas, provide outreach on which species are legal to hunt, and provide access cards	Existing	Ongoing	Ongoing	1. SMART data on observations of wildlife and illegal activities 2. Staff are suitably sanctioned for offences 3. Local residents have access cards and can enter HCV set asides to hunt within limits of national regulations on number and	HCV Assistant / Chef D'Equipe	SD Manager	1. Monthly 2. Ongoing 3. Ongoing

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
					to local individuals using the area to hunt				composition of species			
BMP 3	All	All terrestrial species	Hunting, habitat loss & fragmentation	Minimise	Enhance monitoring of CH-qualifying species (particularly apes and elephants): 1. Develop great ape management and monitoring plans to monitor and protect apes in set asides and planted areas, and manage human-wildlife conflict (in collaboration with Borneo Futures, TBC and the IUCN ARRC Taskforce) 2. Undertake biodiversity monitoring and include Forest Elephant in ape monitoring protocol ¹⁷ 3. Undertake elephant research in collaboration with ANPN (collaring, genetics and camera trapping) to understand movement patterns within and around plantations 4. Analyse results and adaptively manage mitigation to further reduce impacts	Planned	1. Mar-22 2. Jun-23 3. June-22 4. Ongoing	1. May-22 2. ongoing 3. Jun-25 4. Ongoing	1. Monitoring and management plans are complete, and reviewed by the ARRC taskforce 2. Monitoring (camera traps, recces, transects) are implemented and data is collected 3. Forest Elephants are collared and genetic survey implemented 4. Results are analysed and adaptive management implemented	HCV Assistant / Chef D'Equipe	SD Manager	Ongoing

¹⁷ The current BMP measure covers surveillance only (i.e., patrols) and does not include biodiversity monitoring and monitoring indicators do not include elephants

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
BMP 7	All	Terrestrial biodiversity	Human-wildlife conflict; habitat fragmentation; terrestrial fauna mortality	Minimise	Implement elephant management plan: 1. Create an elephant mitigation taskforce 2. Identify, restore and maintain corridors that permit elephants to move through plantations 3. Remove trenches that cross HCV patches in order to improve landscape connectivity 4. Develop code of conduct for elephant encounters by staff 5. Assess impact of elephant trenches on resident fauna ¹⁸ during daily patrols by elephant monitoring team	1- 5. Existing	1. n/a 2. n/a 3. n/a 4. n/a 5. ongoing	1. n/a 2. ongoing 3. Dec-22 4. n/a 5. ongoing	5. Monthly reports of faunal observations in trenches (both live and dead)	HCV Assistant / Chef D'Equipe	VP Sustainable Development / Biodiversity Manager	Ongoing
BMP 8 & 9	All	All terrestrial and freshwater biodiversity features	Hunting & fishing; habitat loss & fragmentation	Minimise	Raise awareness of biodiversity and rules regarding HCVs among staff and local population: 1. Organise one session every 2 months with staff, covering different topics in each session 2. Organise one session every 3 months with local residents, covering different topics in each session	Ongoing	Ongoing	Ongoing	Sessions are planned and implemented on a regular basis	HCV Assistant / Chef D'Equipe	SD Manager	1. bi-monthly 2. quarterly
BMP 11	All	Terrestrial and aquatic plants	Habitat loss & fragmentation	Minimise	Priority plants management: 1. Botanic inventory to identify and map priority plants within plantations 2. Development of a priority plant action plan that includes adaptive management based on findings of the study, and includes monitoring of lowland terra firma forest, savannah and	Planned	1. Jan-23 2. Oct-23	1. Sep-23 2. Dec-23	1. Botanic inventory is completed 2. Priority plants action plan is implemented	Expert sub-contractor with support from SD Managers	VP Sustainable Development / Biodiversity Manager	One off

¹⁸ Trenches pose a risk for elephants and other animals becoming trapped ([GIZ, 2019](#) and [WWF-World Bank 2008](#)), and the Project must demonstrate that this is not the case for trenches within their plantations.

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
					gallery forest, and possibly ex-situ conservation of most threatened plants							
n/a	Mouila Lot 3 & Ndende	Gallery forest and associated plant species	Habitat loss & fragmentation	Minimise	Enhance protection for gallery forest and associated plant species: 1. Undertake an assessment of habitat quality and water stress in gallery forest where priority plants have been identified (as part of botanic inventory) to assess if the buffer between the HCV and the planted area is large enough to maintain ecological integrity 2. If impacts are detected, implement further mitigation in areas where impact is confirmed, and priority (AC1 plants) are detected	Planned	May-23	Dec-23	1. Assessment report is complete and shared with VP sustainable development 2. Evidence of mitigation implementation if required	Expert sub-contractor with support from SD Managers	VP Sustainable Development / Biodiversity Manager	One off
BMP 13	All	All terrestrial and freshwater biodiversity features	Hunting & fishing; habitat loss & fragmentation	Minimise	Effective operationalisation of the BMPs: 1. Creation of a central database for all actions and activities (especially patrols, ape and elephant monitoring etc) to facilitate effective biodiversity management	Ongoing	Ongoing	Ongoing	1. Centralised database that is systematically and regularly updated	Biodiversity Manager	VP Sustainable Development	Monthly
BMP 18	All	All species	Invasive Species	Minimise	Alien species management: 1. Ensure that staff spray pesticide onto cover crops once they are no longer required, to prevent propagation outside of planted areas 2. Assess the threat posed by Invasive Alien Species (IAS) and develop a management plan for IAS based on findings	1. Existing 2. Planned	1. ongoing 2. Apr-22	1. ongoing 2. Dec-22	1. Cover crops are managed and restricted to planted areas 2. IAS assessment is complete and management plan is developed	HCV Assistant / Chef D'Equipe	SD Manager	1. As needed 2. One off
BMP 19	All	Terrestrial biodiversity	Collision between vehicles and wildlife	Minimise	Speed limits in plantations: 1. Speed limit of 40 km/h in all areas of plantations 2. Inform staff and place speed limit signs on roads	Existing	n/a	n/a	Speed limits within plantations are known and respected, and	CRS manager	VP Sustainable Development	As needed

BMP ID ¹⁶	Plantation	CH-qualifying features affected	Impact Addressed	Mitigation Hierarchy	Mitigation measure & details	Action status	Start	End	Performance Indicator	Implemented By	Overall Responsibility	Frequency
					3. Install speed bumps in strategic areas to limit speed				speed humps are installed			
n/a	All	Primates	Disease	Minimise	Disease control: 1. Control of disease transmission between staff and apes through implementation of a strict code of conduct 2. Vaccination of biodiversity team against Polio and Measles, and annual TB check	1. Existing 2. Planned	1. ongoing 2. Jul-23	1. ongoing 2. ongoing	1. Code of conduct is up to date, and plantation staff reminded of rules during awareness raising sessions 2. biodiversity team are vaccinated	HCV Assistant / Chef D'Equipe	SD Manager	Annually
BMP 20 & 21	Mouila Lot 1, 2, 3 & Ndende	All species and habitats	Bushfires	Minimise	Savannah fire management: 1. Develop a fire response programme 2. Understand the dynamics of savannah fire setting in the region (i.e., locations, causes, area affected etc)	Existing	n/a	n/a	1. A fire management team is established and has the necessary materials, and a strategic local contact identified in each village 2. Dynamics of fire setting understood, and informs management actions	SD Manager	VP Sustainable Development	As needed
n/a	Makouke	All terrestrial and freshwater biodiversity features	Habitat loss & fragmentation	Restore	Restoration of riparian buffers: 1. Support natural regeneration of riparian buffers through regular removal of non-native species (i.e., cover crops), and create two E-W corridors	Ongoing	Ongoing	Ongoing	1. Evidence of implementation (photographs, aerial survey etc)	Biodiversity Manager	VP Sustainable Development	As needed

In addition to these on-site management actions, OPG is working with ANPN and Eaux et Forêts to implement or support several measures that may have biodiversity benefits beyond their plantations:

- **Supporting the national assessment and mapping of forest carbon stocks:**
OPG and Olam Rubber Gabon have been sharing their carbon assessment (biomass map derived from LiDAR data), and hosted several national inventory plots, as well as conducted additional surveys in the North with Duke University to assess accuracy of several carbon calculation methods to refine overall carbon estimation national-wide, leading to several publications (Jong *et al.* 2020; Duke-OLAM 2020).
- **Supporting development of a conservation plan for the savannahs of south-western Gabon:**
OPG has funded numerous savannah studies in Gabon, including the region of Ndende, Mabanda and Mont Fouari (Boupaye *et al.* 2018), and the savannahs of Mouila Lot 3 and Ndende (Bidault *et al.* 2017) to understand the different savannah types and sub-types, identify where the boundaries of a proposed trans-boundary protected area should lie and explore to what extent such a protected area could compensate OPGs impacts. The most recent of these was conducted by MBG in February 2023.
- **Supporting studies and pilot initiatives aiming to reduce human-elephant conflict:**
OPG is financing a study with ANPN to attach radio collars to 15 elephants in the Mouila / Ndende landscape, perform genetic analyses and facial recognition to better understand how they use both planted areas and set asides and identify key corridors of connectivity. OPG is also investing in innovative elephant fences, such as trenches, sensor detectors and electrical barriers to deter elephant from palms without jeopardizing the landscape connectivity.

5 Residual impact assessment

A quantified residual impact assessment was undertaken to assess the significance of residual impacts from OPGs operations after avoidance, minimisation and rehabilitation mitigation (Annex 3). The assessment identifies offset targets to compensate for significant residual impacts on priority species (AC1 species) and habitats (CH and NH). It is not practical to quantify residual impacts to all biodiversity so the assessment focused on a sub-set of biodiversity features that were the outcomes of the risk-based prioritisation and these are considered appropriate proxies for wider biodiversity values. This approach focused on terra firma forest and savannah habitat and included species-specific impact assessment for Central Chimpanzee, Western Gorilla and Forest Elephant. For all features except great apes only direct impacts were quantified as indirect impacts were considered insignificant compared to direct impacts. For great apes, the indirect impacts of economic in-migration were also assessed. While all significant residual impacts for OPG's operations impact on terrestrial biodiversity features, NG is also required for CH-qualifying aquatic biodiversity even if it is not significantly impacted. NG approach for all CH-qualifying biodiversity features is discussed in Section 6.

5.1 Approach to assess impacts

As part of the Environmental and Social Impact Assessments (ESIA) for each plantation, biodiversity surveys based on recces were conducted and a kilometric index of abundance (KIA) for Central Chimpanzee, Western Gorilla and Forest Elephant estimated. These recces provided high level information on the presence / absence of these species, but they were insufficient to determine the

population size or distribution in OPG plantations. In the absence of pre-impact or current population estimates for these species, impact estimates were based on published information on average densities of the three species outside protected areas in Gabon. Only lowland terra firma forest was considered as suitable habitat for great apes, while both lowland terra firma forest and savannah were considered as suitable habitat for Forest Elephants.

For lowland terra firma forest and savannah a Quality Hectare (QH) metric was applied to OPG's impacts. A QH metric ensures that there is uniform accounting or exchange between losses (OPG impacts) and gains (offsets). QH is a widely used metric that combines measures of habitat extent (hectares) and habitat condition (quality), in recognition that even "Natural Habitat" is in different states of quality due to past land uses and pressures. A static baseline was used to assess impacts, this is precautionary as it assumes that populations and habitat integrity are stable.

For lowland terra firma forest, data on above-ground carbon stock was used as an indicator of lowland terra firma forest condition. Quality hectare scores were developed separately for Awala, Mouila Lot 1 and Mouila Lot 2 (no forest has been cleared in Makouke, Mouila Lot 3 or Ndende). Above-ground carbon (C) data came from two sources:

1. High-resolution, site-specific data prepared from LiDAR data which was collected for the purpose of the HCS+ study (HCS+ 2015)¹⁹ provided above-ground carbon data for Mouila Lots 1 and 2.
2. Nationally derived satellite data of a lower resolution were used to provide above-ground carbon data for Awala²⁰.

For savannah, there is no recognised and measured quality data for savannah habitat and therefore the quality measure for the savannah was expert-informed. Available data and expert opinion indicate that savannah plant, and bird communities are in a reasonably natural state (Boupoya *et al.* 2017.; Christy 2018; Walters *et al.* 2012)²¹, but low densities / absence of large mammals and intensive burning of some areas means that savannah cannot be considered 'pristine'. For the purposes of this assessment, it was therefore assumed an average quality of 80% for savannah habitat within OPG concessions.

5.2 Results and significance

Residual impacts for habitats and species are summarised in Table 9. To achieve NG OPG will implement offset measures that will generate a gain of more than 10,935 QH of lowland terra firma forest and equal to 27,647 QH of savannah habitat. For species, OPG will generate gains of more than

¹⁹ Data were provided to TBC by [Remote Sensing Solutions GMBH](#)

²⁰ National data were provided to TBC by ANPN

²¹ Human burning has likely been a feature of these savannahs for thousands of years and may be an important factor maintaining some areas as savannah rather than forest (Bidault *et al.* 2017). A 'natural' state for these savannahs therefore includes at least some burning by local people.

178 weaned apes. For elephants, precise impacts in terms of individuals affected are still being reviewed by external experts. Specifically, whether Forest Elephant density is the same in forest as in savannah, and whether to use one average density estimate across all concessions, or instead estimate impacts separately for each concession using different density estimates. The upper estimate of residual impacts to elephants is very unlikely to exceed 210 individuals and may well be significantly lower than this. For the purposes of the BAP and to provide assurance of offset feasibility, this upper estimate of 210 elephants is therefore applied, but is very likely to be lower in the final calculations. Gains will be delivered via a combination of onsite (i.e., the protection of OPG set asides) and offsite (e.g., support to protected areas and maintenance of ecological corridors) offset activities. The potential gains from these activities will be assessed as part of the offset feasibility study.

Table 9. Summary of the residual impact assessment and offset targets

Feature	Residual impact (in QH /individuals)	Offset target
Lowland terra firma forest	10,935 QH	Greater than 10,935 QH
Savannah	27,647 QH	Equal to 27,647 QH²²
Great Apes (Chimpanzee & Gorilla)	178 (range 106 – 247) individuals	Greater than 178 individuals
Forest Elephants	210 individuals ²³	Greater than 210 individuals

Once OPG has completed plant inventories in all the plantations, species-specific RIAs may be required for some plant species (e.g., *Psychotria acutigemma* subsp. *couvreuriana*, *Cassipourea* sp. nov, and *Millettia le-testui*). This will be evaluated once the data is available.

6 Offset strategy for achieving NNL /NG

The offset strategy sets out how OPG will develop, implement and monitor biodiversity offsets to achieve NG for CH-qualifying biodiversity and NNL for NH. The feasibility of the offset strategy will be detailed in full in the OFS (in development) and any updates summarised in the next version of the BAP.

Based on the residual impact assessment offsets are required for: (i) lowland terra firma forest (CH), (ii) savannah (NH), (iii) Central Chimpanzee, Western Gorilla and Forest Elephant (all CH-qualifying species). During a site visit by TBC in March 2022, several options to deliver OPG's offset were identified. These options were further refined over 2022 in discussion with stakeholders, and finalised in February 2023. The offset selection process has identified both on-site and off-site offset actions to create biodiversity gains. Developing multiple offsets will ensure that features identified as requiring NG or NNL are appropriately captured in offset activities, and on-the-ground implementation risks and

²² Savannah is classed as NH thus NNL is required, but it is important habitat for CH-qualifying species (e.g., Rosy Bee-Eater; African River Martin; Forest Elephant).

²³ As explained above, elephant impacts are still in discussion and this is an extremely high estimate, and the final estimate is likely to be lower than this. This figure is primarily being used to provide assurance of offset feasibility.

technical uncertainties are reduced. Preliminary forecasts of biodiversity gains based on the planned offset activities indicate that OPG can achieve an overall NG for lowland terra firma forest, savannah, Great Apes and Forest Elephant via the proposed actions.

As the Project progresses, the offset strategy will be further developed through field assessments, including extensive consultations with local stakeholders, into a full offset plan that will be used for implementation on the ground.

Establishing conservation programmes is challenging in any environment, and biodiversity offsets are no different. The offsets planned for OPG are complex and involve multiple conservation actions with several different stakeholders, in multiple sites over a long period of time. To mitigate risks during offset design and implementation the offset strategy proposes:

- The use of multiple offset sites and approaches to increase the likelihood of achieving NG />NNL outcomes for habitats and species.
- Alignment with national priorities for biodiversity conservation of target features to increase likelihood of stakeholder support and offset implementation.
- Establishment of clear governance and management mechanisms to oversee offset implementation.

Preliminary endorsement of the offset strategy from key government and NGO stakeholders in Gabon was achieved during the field visits in March 2022 and February 2023, and their input used to refine the strategy as part of the OFS.

In the development of offset measures, OPG has adopted a set of good practice principles (e.g., from World Bank Group 2017), to achieve>NNL/NH these include:

- **Ecological equivalence:** Biodiversity gains from offsets will be planned as "like-for-like or better".
- **Landscape context:** Offsets will be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services.
- **Net Gain:** Biodiversity offsets will be designed and implemented to achieve in-situ, measurable conservation outcomes that can reasonably be expected to result in a NG of biodiversity.
- **Additionality:** Conservation gains will be clearly attributable to the Project's actions and will demonstrably be above and beyond results that would have occurred if the offset had not taken place.
- **Precautionary approach:** Estimates of gains and losses will be conservative and include a margin of precaution proportional to the risks involved in offset delivery.
- **Long-term outcomes:** Offsets will use an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as the Project impacts. Securing long-term finance is essential to ensuring permanence of the offset.
- **Stakeholder participation:** Offsets will be based upon appropriate, extensive and transparent stakeholder consultation.

- **Transparency:** The design, implementation and monitored outcomes of biodiversity offsets will be transparent, and communicated in the public domain.

Establishing a robust offset governance, management and funding mechanism is key to generating and maintaining offset gains. Offset cost estimates will be part of the OFS.

6.1 On-site actions

OPG is seeking to achieve as much NG for CH-qualifying features as possible via on-site actions, since such actions:

- are in closer proximity to OPG's impacts (and thus offer a better like for like compensation);
- do not require external stakeholder engagement to be implemented; and
- success is largely under control of OPG.

OPG have set aside circa 102,000 hectares of HCV forest and savannah across the six plantations, equal to around 50% of the total area acquired by OPG. Each plantation includes at least one large set aside that is contiguous with the wider landscape. Ndende also includes 22,500 hectares of savannah habitat (split across two areas of the plantation) that is not currently designated as a set aside but has not been developed for oil palm. OPG has no plans to develop this savannah and will instead convert it into set aside areas (N.B. not designated HCV as no studies have been done) to contribute to their savannah offset. One of the two areas lies to the East of the Dola river and includes dolines and freshwater habitat, the second is in the far south of the Ndende plantation and includes gallery forest. Table 10 provides a summary of the total size of both forest and savannah set asides in each plantation, including the additional proposed Ndende savannah.

Table 10. Summary of size of forest and savannah set asides in each OPG plantation

Plantation	Awala	Mouila 1	Mouila 2	Mouila 3	Ndende	Makouke	TOTAL (ha)
Savannah set-asides (ha)	n/a	1,100	50	10,500	10,250	n/a	21,900
Lowland terra firma forest set aside (ha)	12,594	18,422	17,750	8,250	17,750	5,599	80,449
Additional Ndende savannah set aside					22,500		22,500

6.1.1 Status, threats and current actions in set asides

All set asides except the proposed additional Ndende set aside have been delimited through participatory mapping with local communities and HCV studies. They have been validated through the FPIC process. Local communities residing near set asides have been informed about access rights in these areas, with eligible individuals possessing access cards that allow them to hunt non-protected species with guns (but not snares) in the HCV areas. OPG undertakes regular SMART patrols (and in Awala bring in ANPN when needed) to deter illegal hunting, logging and mining activities, and uncontrolled fires. Whilst the effort applied to patrols has been variable over time, according to OPG,

hunting reduced by 30% in 2021 (6668 km walked) compared to 2020 (6313km walked) and patrolling effort has stabilised. Similarly, in 2021 a 40% decrease in illegal activities (mining and sawing) was recorded compared to 2020 (29 cases vs 49).

Gains could therefore be achieved in the set-asides through prevention of past (since Project implementation i.e., circa 2015) and future threats such as logging (i.e., averted loss) and regeneration of forest, improved fire management in savannah area, and recovery of protected species populations (i.e., restoration gains).

6.1.2 Modelling NG and NNL potential for on-site set asides

The approach used to model potential gains for habitats and species has been discussed with several expert stakeholders including the ARRC taskforce and OPG's expert panel, and is described in detail as part of the offset feasibility study (OFS). Currently, the potential for NG and NNL via on-site actions has been modelled with the following assumptions:

- For lowland terra firma forest, assuming that protection of set asides can deliver a 16% increase in forest quality hectares over the 49-year Project period (based on a high level assessment of carbon stocks in logged forest, and following Medjibe *et al.* 2011).
- For savannah, significant gains of 30%²⁴ via averted loss are considered feasible via protection of existing set asides, as savannah habitat is prioritised for development over forest habitat in Gabon due to carbon targets and other forest protection priorities (M. Lee, T. Stevart, P. Lowry pers comm). An additional 10% increase in savannah quality over the 49 year Project operations period is also considered feasible (so combined gains of 40% for savannah are applied).
- For great apes, potential for gains is based on averted loss through mitigating hunting and combines data of estimated tonnes of bushmeat harvested per year per km² in Gabon (Abernethy & Obiang, 2010) with average proportion of offtake that is apes in Gabon (Bowen-Jones & Pendry, 1999; Thibault & Blaney, 2003), controlling for sex ratios in both chimpanzees and gorillas.
- For elephants potential for gains is based on averted loss through mitigating hunting and conflict, using reported data of elephant killings in Lope and Minkebe National Parks from the Monitoring Illegal Killing of Elephants (MIKE) database.
- For other CH-qualifying terrestrial and aquatic biodiversity, gains are assumed through proxy protection of appropriate habitat in set asides.

²⁴ 30% is considered to be a very conservative estimate by regional experts (Missouri Botanical Gardens), and it is likely that a great deal more than this would be developed in the absence of OPG's protection. Stakeholder engagement during the OFS will assess whether stakeholders agree that a 40% or 50% gain via averted loss is a reasonable assumption. Recent botanic inventory has also identified that the Mouila and Ndende savannahs where the OPG set asides are located may be up to 10 times richer than savannah habitat in existing protected areas such as Lope and Plateau Bateke National Parks (T. Stevart pers comm) and that relative gains may be considerably greater than they would be for other savannahs. The OFS will thus also assess whether stakeholders agree that this increased potential for gains should be included in the NNL calculations.

Stakeholder input during the OFS is required to confirm that these are realistic scenarios. The modelled gains therefore provide an indication of whether NG is feasible. Preliminary estimates of required gains are provided in Table 11. The forest set asides in Mouila Lot 3 and Ndende were not considered for gains because they are primarily gallery forest and cannot be considered equivalent forest type to the areas cleared in the other plantations. Mouila Lot 1 and 2 were combined due to their geographic proximity (circa 6km at the closest point) and comparable habitat profile.

Table 11. Possible Quality Hectare (QH) gains at OPG plantations for lowland terra firma and savannah habitat assuming a 16% increase in forest quality, a 40% gain for savannah via combined averted loss and increased quality, and possible gains for Great Apes and Forest Elephants based on aversion of circa 1.5 great ape and 2.5 elephant deaths per year across all set-asides.

Feature	Losses (QH / individuals)	On-site offset (ha / individuals)	Q /individual change at T+49	QH / individuals gained at T+49	Deficit for achieving NNL / NG
Savannah	27,647	44,413 ²⁵	0.4	17,766	-9,882 QH
Lowland terra firma forest	10,935	54,365	0.16	8,698	-2,237 QH
Great Apes (Central Chimpanzee & Western Gorilla)	178 (range 106 – 247)	321 (range 190-446) ²⁶	2.5 per year	73	-105 individuals
Forest Elephant	151 (range 114-213)	424 (range 337 – 599)	1.5 per year	125	-85 individuals

6.1.3 NG and NNL position after on-site offsets

Comparing the modelled losses with the potential gains it appears that while 89% of gains for lowland terra firma forest can be realised via onsite actions, **NG for lowland terra firma forest in OPG set asides is not feasible, with an outstanding deficit of 2,237 QH that will need to be met via offsite actions.** This assessment of potential gains for lowland terra firma forest in OPG plantations only includes an estimation against direct impacts, since the Residual Impact Assessment confirmed that indirect impacts are insignificant compared to direct impacts.

Savannah ecosystems are classified as NH, meaning NNL if feasible sensu PS6. The analysis reveals that while 64% of gains for savannah Natural Habitat can be realised via onsite actions, **NNL of savannah is not feasible by only protecting the existing set-asides, with an outstanding deficit of 9,882 QH that will need to be met via offsite actions.** However, as stated in footnote 19, the estimate of gains via averted loss of 30% for savannah is considered to be very conservative, with 50% suggested as a probable realistic counter scenario in the absence of protection (T Stevart pers comm). In addition, the Mouila and Ndende savannahs where the OPG set asides are located are considered among the richest in Gabon and may be up to 10 times richer than savannah habitat in existing

²⁵ Note that this total includes the 22,500 ha of Ndende savannah that will be set aside for conservation

²⁶ Both ape and elephant onsite offsets are calculated using the same approach as in the RIA, average density per hectare multiplied by total hectares of set aside (80,449 ha of forest and 21,900 ha of savannah).

protected areas such as Lope and Plateau Bateke National Parks (MBG pers comm). Thus there is added value in protecting the OPG savannahs and relative gains may be considerably greater than they would be for other savannahs. Furthermore, given that currently very little savannah in Gabon is protected, OPG's existing protection represents a circa 3-fold increase in savannah protection for the country. Therefore, while the precautionary approach used above indicates that NNL via onsite action is not feasible, if stakeholders agree that gains via averted loss could be as high as 50%, or if it can be demonstrated that land use projects would otherwise have converted the savannahs, and taking into consideration the added value of OPG savannahs, then it will be considered that NNL could feasibly be achieved exclusively via onsite actions.

Comparing the modelled losses with the potential gains for Great Apes it appears that **NG for Great Apes in OPG set asides is not feasible**, with an outstanding deficit of 105 individuals that will need to be met via offsite actions. Similarly, **for Forest Elephants NG via actions in OPG set asides is not feasible**, with an outstanding deficit of 85 individuals that will need to be met via offsite actions.

For other CH-qualifying terrestrial and aquatic flora and fauna, general habitat-based mitigation measures in existing set asides are considered to be sufficient to generate NG.

6.1.4 Focus of the offset feasibility study for on-site set asides

The OFS will focus on exploring the technical, socio-political, institutional and financial feasibility of:

- achieving the majority of gains for lowland terra firma forest (and associated CH-qualifying species excluding great apes and elephants) via on-site actions, with a focus on whether OPG's current management actions (i.e., surveillance effort) are sufficient to generate significant gains, and whether the approach taken to quantify losses and gains is appropriate;
- achieving a 30% gain via averted loss and 10% increase of savannah quality in existing set asides via on-site management actions, with a focus on improved management of fires; and assessing whether the approach taken to quantify losses and gains is appropriate; and whether stakeholders agree that averted loss of 40% or even 50% would be a reasonable assumption (negating the requirement for an off-site offset for savannah habitat as all required gains could be achieved on-site).
- setting aside a further 22,500 ha of savannah habitat in Ndende (N.B. not designated HCV as no studies have been done) to contribute to the required savannah and other CH-qualifying biodiversity gains (especially dolines and freshwater habitat and associated species).
- generating the estimated required gains for apes (circa 73 individuals) and elephants (circa 125 individuals), with a focus on a) whether the approach taken to estimate potential gains is appropriate, and b) whether current management actions (i.e., surveillance effort) are sufficient to generate such gains;
- generating the estimated required gains for Rosy Bee-Eater and African River Martin through identification and enhancement of suitable nesting habitat in existing savannah set asides.
- assigning existing set asides (both lowland terra firma forest and savannah) as legally protected areas. In particular ascertaining whether OPG set asides could contribute to

Gabon's ambitions to have 30% of land and 30% of water as protected areas by 2030 as part of a CBD COP commitment;

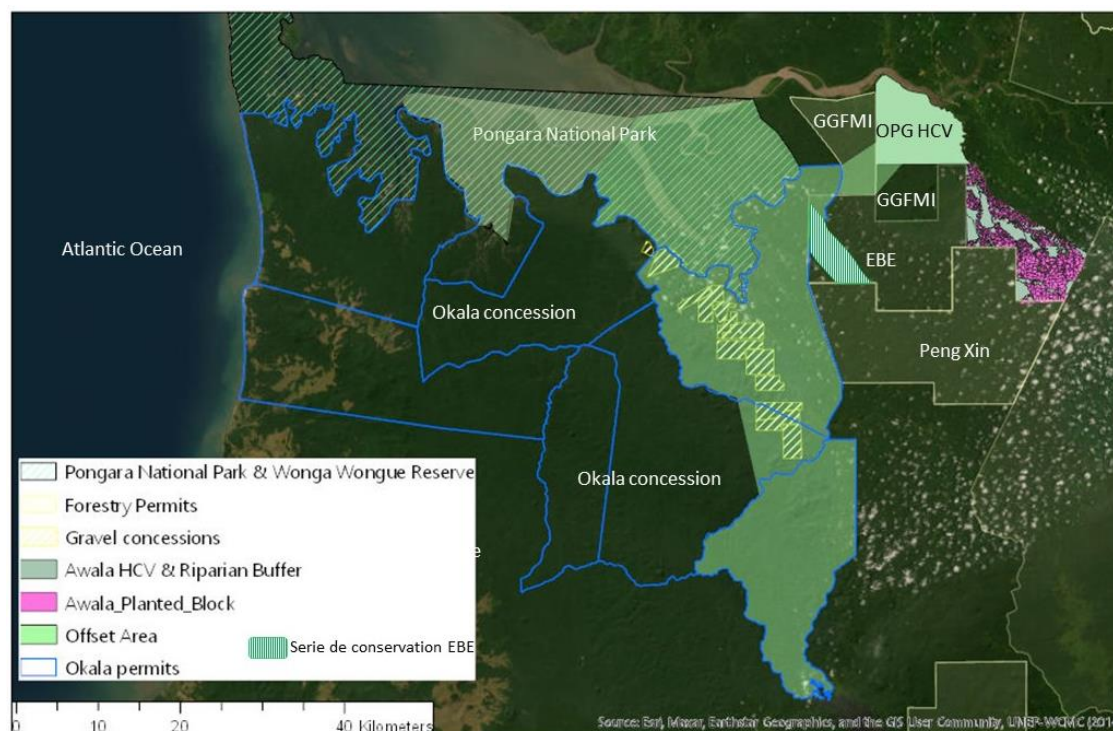
6.2 Off-site offset actions for NG

The primary off-site offset actions identified to achieve NG for lowland terra firma forest, Central Chimpanzees, Western Gorillas and Forest Elephants are to (i) provide support to national priorities for biodiversity conservation (i.e. protected area management); and (ii) improve connectivity between OPG set asides and protected areas in the wider forest landscape (with the understanding that any gains for Great Apes will occur in forested habitat and thus generate further gains for forest associated species). This latter approach is recommended because for most wide-ranging forest dependent species, improving landscape connectivity increases the chances of survival of their population over the long-term by maintaining dispersal corridors and thus their genetic variability. The gain mechanisms for off-site actions are thus:

- Averted loss through enhanced protection of national priority areas for Great Apes and Forest Elephants;
- Increased gene flow and capacity for maintaining large communities (particularly beneficial for wide ranging forest species such as Great Apes and Forest Elephants), leading to enhanced conservation value of OPG's set-asides.

The Sud-Estuaire landscape has been identified as the most appropriate location to support and implement the above offset activities in order to achieve NG. The Sud-Estuaire landscape is an area of over 500,000 ha, located within the departments of Komo Ocean and Komo just South of Gabon's capital city, Libreville (see Figure 5 below). The habitat in the landscape comprises a mixture of lowland terra firma forest, mangrove, savannah, swamp forest and coastal forest, but is primarily lowland terra firma forest that has undergone varying levels of logging over past decades. The proposed landscape for the off-site offset includes a nationally protected area (Pongara National Park), the Okala sustainable development concession, and two logging concessions (GGFMI and EBE), with potential connectivity for biodiversity between these areas and OPG's HCV area in the Awala concession. Directly to the south of the landscape lies the Wonga Wongue Presidential Reserve, which is an area of 500,000 ha managed by the Presidential Army of Gabon. To the West lies the Atlantic Ocean, and to the East are several other logging concessions.

Figure 5. Proposed offset area in the Sud Estuaire landscape, and different land uses within



Primary offset actions would be to implement biomonitoring and anti-poaching activities across a 128,000 ha area within this landscape, and to support communities within the landscape in sustainable development activities. Anti-poaching operations would be led by ANPN, and take place in Pongara National Park, Okala, both logging concessions and the Awala set aside. Okala would be the implementing partner and would lead on the biomonitoring (using camera traps) across their own concession, as well as within Pongara and the two logging concessions. Both biomonitoring and patrols would be undertaken using mixed teams of ANPN/ Okala staff, to promote collaboration and build capacity on both sides (in Awala mixed teams would also include OPG staff). The OFS will focus on exploring the technical, socio-political, institutional and financial feasibility of generating the required gains for Great Apes (circa 105 individuals) Forest Elephants (circa 85 individuals), and lowland terra firma forest (2,237 QH) with a focus on a) whether the approach taken to estimate potential gains is appropriate, and b) whether existing management actions (i.e., education; patrol effort) are sufficient to generate such gains.

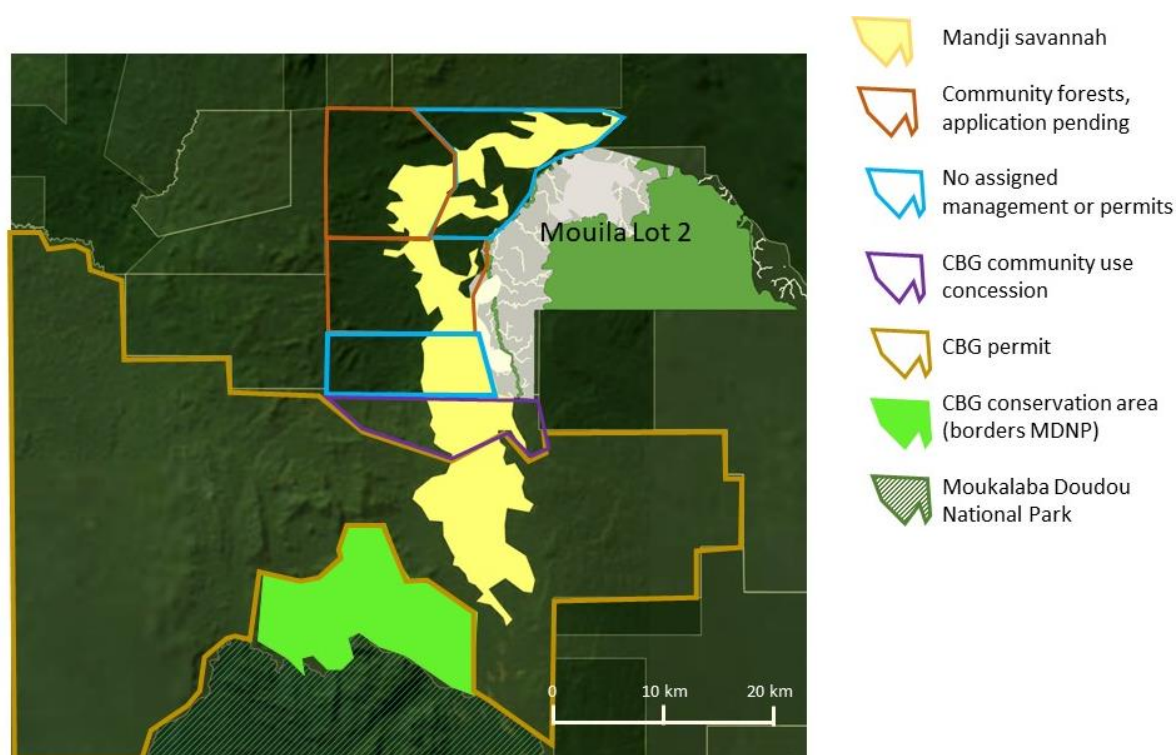
6.3 Off-site offset actions for NNL

The primary offsite offset action identified to achieve NNL for savannah habitat (as well as gains for savannah-associated CH-qualifying features) is to support the management of a 28,000 ha area of savannah directly adjacent to Mouila Lot 2, known as the Mandji savannah (see Figure 6). According to the Centre National d'Affectation de Terre (CNAT), this savannah is currently a combination of community savannah, CBG forestry permit and unallocated savannah (i.e., no permits or community allocations on this land). If OPG were to acquire some or all of this land, and applying the same assumptions as with on-site set asides (that gains equivalent to a total of 40% over the 49-year concession period, via a combination of averted loss and natural restoration is feasible), gains of 10,800 QH for savannah habitat could be achieved, which exceeds NNL requirements by 918 QH.

Relevant stakeholders have been encouraging in suggesting that if Olam were to express an interest in this area this would be met with positivity by both the CNAT and CBG (P. Bongolo, M. Lee pers comm).

The ideal approach would be to share management of the savannah with local residents. Primary actions would be understand the dynamics of savannah fire setting (i.e., locations, causes, area affected etc), and to undertake community engagement and co-design and implement a savannah management plan with local residents, including a fire management and a fire response program.

Figure 6. Map showing location of Mandji savannah adjacent to Mouila Lot 2, and different land use allocations



The OFS will focus on exploring the technical, socio-political, institutional and financial feasibility of generating gains for savannah habitat via support to the Mandji savannah, and assessing whether the approach taken to quantify losses and gains is appropriate.

6.4 Summary of offset approach and initial feasibility of achieving NNL/NG

Table 12 below provides an overview of OG's planned strategy for both on-site and offsite offsets, highlighting which CH and NH features are the focus, and a high level overview of the approach.

Table 12. Overview of OPGs offset strategy

Type	On-site offsets	Off-site offsets	
	HCV set asides	"Sud-Estuaire" landscape (128,000 ha total offset area)	Mandji savannah (27,000 ha)
Target biodiversity	<p>Critical Habitat (lowland terra firma forest)</p> <p>Natural Habitat (savannah)</p> <p>Central Chimpanzee</p> <p>Western Gorilla</p> <p>Forest Elephant</p> <p>Rosy Bee Eater</p> <p>African River Martin</p> <p>NG for other terrestrial and aquatic CH values will be achieved via actions targeting the above features</p>	<p>Critical Habitat (lowland terra firma forest)</p> <p>Central Chimpanzee</p> <p>Western Gorilla</p> <p>Forest Elephant</p> <p>Rosy Bee Eater</p> <p>NG for other terrestrial and aquatic CH values will be achieved via actions targeting the above features</p>	<p>Natural Habitat (savannah)</p>
Approach	<ul style="list-style-type: none"> Site-based conservation management of existing HCVs – comprising 80,449 ha of forest habitat and 21,900 ha of savannah habitat Set aside of an additional 22,500 ha of undeveloped savannah habitat (that includes dolines and rivers/ streams) 	<ul style="list-style-type: none"> Provide support to ANPN for protected area management (patrols, sensibilisation) and support to Okala to implement remote biomonitoring throughout the 128,000 ha landscape (comprising 50,000 ha Pongara, 70,000 ha in Okala, 5,094 ha in EBE and 3,000 ha GGfMI) Engage with GGfMI and EBE to create a corridor where patrols and monitoring are implemented, and ensure alignment with NG approach 	<ul style="list-style-type: none"> Acquire circa 40% of the savannah and bring under OPG management / designate as set aside. Undertake community engagement in circa 60% and co-design and implement a savannah management plan with local residents, including fire management and fire response program
Location	All OPG Plantations	Sud Estuaire landscape, comprising sectors of Pongara National Park, Okala sustainable development	Mandji savannah (adjacent to and directly bordering Mouila Lot 2)

		concession, EBE and GGFM forest concession	
Net Gain Mechanism	Conservation management activities to avert loss of forest and savannah habitat and terrestrial and aquatic biodiversity, and enable restoration of degraded habitat	Conservation management activities to avert loss of forest habitat and terrestrial and aquatic biodiversity, and enable restoration of degraded habitat	Conservation management activities to avert loss of savannah habitat, and enable restoration of degraded habitat

Technically all the proposed measures are highly feasible. They can be implemented using well tried and tested methods in Gabon. Appropriate partners are available in country to support implementation, and the government support for the actions should be strong as long as they are an integral partner in the development and implementation of offsets. Implementation of the proposed on-site and off-site mitigation will require strong senior support from OPG and Olam International. Development and implementation is dependent on enhanced capacity and resources for biodiversity conservation within OPG. The dedicated OPG-wide Biodiversity Manager will provide the required oversight and strategy.

A more in-depth assessment of potential gains, as well as the social, institutional, financial, technical and political feasibility of proposed on-site and off-site initiatives will be conducted as part of the OFS. Stakeholder engagement will be vital during this process to ensure support and facilitate possible collaboration for the successful implementation of these initiatives.

7 Biodiversity Monitoring and Evaluation Plan

7.1.1 Overview

In 2019, an overarching Biodiversity Monitoring and Evaluation Plan (BMEP) and plantation-specific Biodiversity Management Plans (BMPs) were developed. These provide details of OPG's overall approach to transparent biodiversity monitoring and evaluation within its six plantations and evaluate the overall implementation of the plantation-level Biodiversity Management Plans (BMPs). A BMEP helps a project monitor the effectiveness of its mitigation activities, and is considered best practice, as stated in the Roundtable on Sustainable Palm Oil (RSPO, 2018) and in the International Finance Corporation (IFC, 2012b) standards. The BMEP serves to ensure that measures included in the BMPs are effective and to enable adaptive management if necessary. The BMEP and plantation level BMPs will need to be updated to reflect the updated BAP and inclusion of offsite offset actions.

7.1.2 Approach

The monitoring and evaluation program is based on the Pressure-State-Response framework. This framework identifies indicators to track three aspects of biodiversity management:

- Threats to biodiversity (monitored by Pressure indicators);

- Mitigation measures to minimise those pressures (monitored by Response indicators or Key Performance Indicators); and
- The overall status of priority biodiversity features (monitored by State indicators).

This conceptual approach highlights the link between OPG actions, its impacts and the status of priority features, and thus facilitates an adaptive management approach. Indicators and thresholds set by OPG should be reviewed by the advisory panel before finalizing the BMEP.

7.1.3 Implementation

Implementation of the BMEP has begun. Further training of the in-country teams will be provided in March 2022 to support implementation of the BMEP and the accompanying site-level BMPs. This training will explain to the teams how to use these documents and the rationale for the different indicators. Additional training will also be required to ensure proper data collection and analysis, which may entail collaboration with external partners, for example with WWF to provide further training on SMART.

7.1.4 Evaluation frequency

Indicators and adaptive management thresholds should be reviewed and updated (if necessary) yearly as new information is made available. External evaluation by the advisory panel should also be planned annually. The frequency of monitoring proposed in this document can be adapted on the basis of the results obtained during the first round of evaluations.

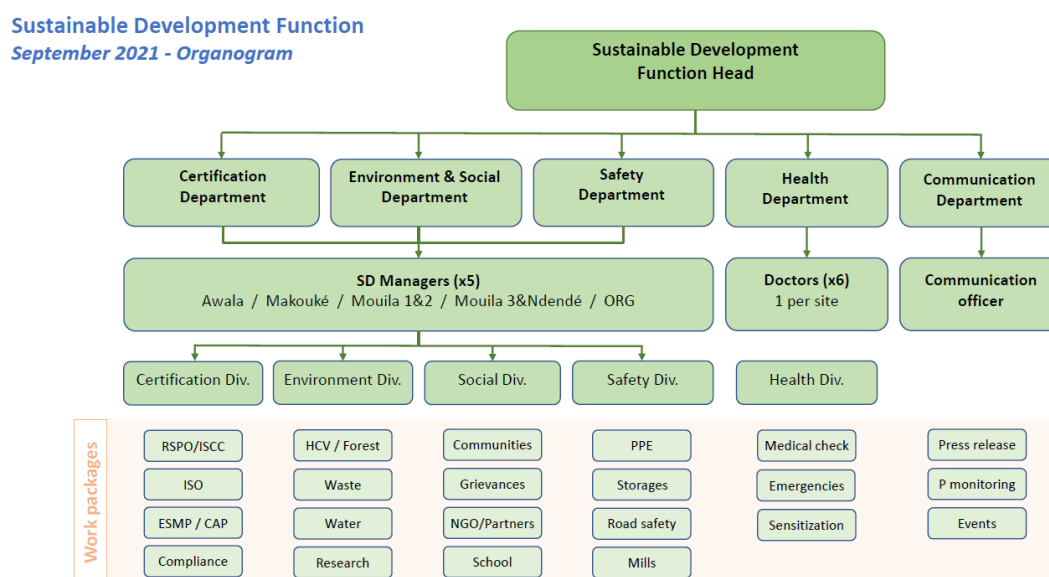
7.1.5 Reporting

OPG will report to IFC on all activities, in all plantations, through a Sustainability Report that will be publicly disclosed (using GRI/ G-4 Guidelines), and that evaluates performance against the indicators set out in the BMEP. This report should also be provided to the independent advisory panel for review and discussion at annual meetings. This would enable input from the advisory panel on any adaptive management decisions required. Data from SMART patrols can also be shared on an annual basis. This will increase transparency in OPG's activities.

8 Resources and budget

Financial resources and senior management support for all the actions outlined and included in the monitoring and management plans will be required in the long-term to ensure successful implementation. The budget will be finalised once all actions have been agreed with IFC and OPG, but additional resources will need to be acquired by the Project to implement the management plans, notably each HCV team should have sufficient material to conduct monitoring activities (e.g., camera-traps, batteries, GPS, decameter, computers). The Biodiversity Manager should work with the SD managers to develop yearly workplans and determine if additional HCV assistants would be required to implement all actions included in the BMPs and BMEP. Preliminary estimates of resources required for implementing the off-site offset actions will be developed as part of the OFS (in development).

Figure 7. Organigram of personnel in charge of implementing the BAP and other biodiversity-related management plans



9 Priority actions

Table 13 lists the actions that need to be achieved throughout 2022 and 2023 to implement this BAP.

Table 13. Actions required to implement this BAP

No.	Action	Timeline for completion	KPI
1. Management and resources			
1.1	Staff training and capacity building	March 2022	Staff have received training and are implementing the management and monitoring plans
1.2	Hire a Biodiversity Manager	July 2022	A Biodiversity Manager is appointed
1.3	Create a ground-truthed habitat map clearly delineating swamp, mangrove, rivers, streams, gallery and terra firma forest buffers and savannah for all plantations	Dec 2022	Ground-truthed habitat map is completed
1.4	Create a central database for all actions and activities (especially data from patrols,	Dec 2022	A central database has been developed and all data is held within

No.	Action	Timeline for completion	KPI
	monitoring, G.I.S etc) to facilitate effective biodiversity management		
2. Stakeholder engagement			
2.1	IUCN ARRC Taskforce review of BAP, ape monitoring protocol and Offset Feasibility Study	June 2022	IUCN ARRC Taskforce have reviewed documents and published their response on their website
2.2	Convene first meeting of advisory panel	Aug 2022	First meeting completed and biodiversity-related documents (BAP, OFS, ape monitoring protocol) reviewed by the panel
2.3	Annual meetings of advisory panel	Mar 2023 – end of Project	Meetings complete per agreed schedule
2.4	Provide support to the development of the National savannah strategy	Ongoing	Savannah strategy is completed (by Gabonese government) and management of OPG savannahs (circa 44,000 ha) in terms of permitted activities, responsibilities and contribution to savannah conservation in Gabon are incorporated
2.5	Further engage with ANPN regarding support to facilitate patrols in the eastern section of the Ramsar site, and ensure OPG meets the requirements of Paragraph 20 of PS6	Dec 2022	Signed agreement (MoU) between OPG and ANPN regarding OPG logistical support to facilitate ecoguard patrols in eastern section of Makouke
3. Further biodiversity surveys			
3.1	Complete invasive alien species assessment	July 2022	IAS assessment is completed and shared with CR&S manager IAS management measures identified, if required, budget and resources assigned, and measures implemented
3.2	Detailed botanic inventory and mapping of threatened species in each plantation	Oct 2022	Botanic inventories have been completed and shared with CR&S manager

No.	Action	Timeline for completion	KPI
3.3	Implement great ape and elephant monitoring protocol	Dec 2022	Baseline surveys (transects and camera trapping) are complete
3.4	Assess habitat quality in HCV areas containing gallery forest and associated AC1 species to assess if buffer between HCV and planted area is large enough to maintain ecological integrity	Dec 2022	Habitat quality assessment is complete and shared with CR&S manager
4. Biodiversity management			
4.1	Ensure elephant taskforce include assessment of fauna in trenches during daily monitoring of elephant tracks / intrusion points	Begin April 2022 and ongoing	Trenches are monitored on a weekly basis and any faunal observations shared with CR&S manager
4.2	Complete offset feasibility scoping study	March 2023	Feasibility study complete with input from stakeholders
4.3	Undertake any necessary adaptive management based on findings of IAS survey (Action 3.1)	Aug 2022 and ongoing	Adaptive management for IAS is implemented
4.4	Update the existing Biodiversity Management and Monitoring Plans for each plantation, and ensure that all monitoring and evaluation indicators are implemented and captured	Dec 2022	KPIs are met for all mitigation measures included in the BMPs; the monitoring and evaluation plan is implemented and allows adaptive management
4.5	Review and update the BMEP	Dec 2022	The BMEP is updated
4.6	Restore riparian buffers in the Makouke plantation through planting of ecologically appropriate plant species	Dec 2022	Riparian buffer restoration in Makouke is complete
4.7	Undertake any necessary adaptive management based on findings of gallery forest habitat quality surveys (Action 3.4)	Jan 2023 and ongoing	Adaptive management for gallery forest is implemented
4.8	Develop a Priority Plants Action Plan with relevant specialists	Jan 2023	Priority Plants Action Plan has been shared with the plantation's CR&S

No.	Action	Timeline for completion	KPI
			Manager; and adaptive management ²⁷ based on findings of study taken place
4.9	Annual monitoring of great apes and elephants	Annually – end of project	Camera trapping every 12 months, line transects every 5 years
4.10	Prepare offset implementation plan	March 2023	Plan complete and being implemented

²⁷ Adaptive management may include experimental seed collection and propagation trials for ex-situ conservation

10 References

- Abernethy, K.A., Coad, L., Taylor, G., Lee, M.E. & Maisels, F. (2013) Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences* 368: 20120303.
- Abernethy, K.A. & Obiang A.M. (2010). *Bushmeat in Gabon*. Technical Report. DOI: 10.13140/RG.2.2.28730.18881
- ANPN & TNC (2014) Atlas d'Eau Douce du Gabon et du Bassin de l'Ogooué - brouillon. Agence National des Parcs Nationaux (ANPN) and The Nature Conservancy (TNC), Libreville, Gabon.
- AESG (2016) African Elephant Specialist Group – Elephant Database: (africanelephantdatabase.org). Accessed Dec 2021.
- Aiama, D., Bennun, L.A., Bos, G., Edwards, S.N., Krueger, L., Savy, C., Semroc, B., Sneary, M., 2015. No net loss and net positive impact approaches to biodiversity. IUCN Report, Gland, Switzerland.
- Austin, K.G., Lee, M.E., Clark, C *et al.* 2017. [An assessment of high carbon stock and high conservation value approaches to sustainable oil palm cultivation in Gabon.](#) *Environmental Research Letters*. **12** 014005
- Bezangoye, A., Maisels, F., 2010. Great ape and human impact monitoring in the Lopé-Waka Exceptional Priority Area, Gabon. Part 1 : Lope National Park. GACF Agreement: 98210-8-G529 . Final performance report to USFWS, p. 62. WCS
- Beaune, D., Bretagnolle, F., Bollache, L., Hohmann, G., Surbeck, M. & Fruth, B. (2013) Seed dispersal strategies and the threat of defaunation in a Congo forest. *Biodiversity and Conservation* 22: 225–238.
- Bidault, E., Boupoya, A., Walters, G.M. & Stévant, T. (2017) Botanical inventory and management of savannahs in the Olam concessions (Ndendé & Mouila). Missouri Botanical Garden, Libreville, Gabon.
- Blanc, J. (2008) *Loxodonta africana*. *IUCN Red List of Threatened Species. Version 2015.2*. <http://www.iucnredlist.org/details/12392/0>
- Boupoya, A., Bidault, E. & Stévant, T. (2017) La végétation du bas Ogooué. pp. 172–197 in: Vande weghe, J., Stévant, T. (Eds.) *Le delta de l'Ogooué*. ANPN, Libreville, Gabon.
- Bowen-Jones, E. & Pendry, S. (1999) The threat to primates and other mammals from the bushmeat trade in Africa, and how this threat could be diminished. *Oryx*, 33:233-246
- Brenan, J.P.M. 1978. Some aspects of the phytogeography of tropical Africa. *Annals of Missouri Botanical Garden* 65: 437-478

- Brown, E., Dudley, N., Lindhe, A., Muhtaman, D.R., Stewart, C. & Synnott, T. (2013) Common guidance for the Identification of High Conservation Values. *HCV Resource Network*.
- Burton, M.E.H., Poulsen, J.R., Lee, M.E., Medjibe, V.P., Stewart, C.G., Venkataraman, A. & White, L.J.T. (2017) Reducing Carbon Emissions from Forest Conversion for Oil Palm Agriculture in Gabon: Carbon stocks in an oil palm concession. *Conservation Letters* 10:297–307.
- CSBI, TBC, 2015. A cross-sector guide to implementing the Mitigation Hierarchy. Cross-Sector Biodiversity Initiative.
- Duke-OLAM (2020) Comparison of carbon stock census methods for validation of aerial-borne LiDAR surveys in degraded tropical landscapes. Report by Duke University, Olam Palm Gabon, Agence Nationale des Parcs Nationaux (ANPN), and L'Institut de Recherche en Ecologie Tropicale (IRET)
- Eggert, L.S., Buij, R., Lee, M.E., Campbell, P., Dallmeier, F., Fleischer, R.C., Alonso, A. & Maldonado, J.E. (2014) Using Genetic Profiles of African Forest Elephants to Infer Population Structure, Movements, and Habitat Use in a Conservation and Development Landscape in Gabon. *Conservation Biology* 28:107–118.
- ERM (2015) Addendum à l'Etude d'Impact Social et Environnemental (EISE) pour le Projet GAC d'exportation de Bauxite en Guinée.
- Groves, C.P., Cotterill, F.P.D., Gippoliti, S., Robovský, J., Roos, C., Taylor, P.J. & Zinner, D. (2017) Species definitions and conservation: a review and case studies from African mammals. *Conservation Genetics* 18:1247–1256.
- HCS+ (2015) The High Carbon Stock Science Study: Independent Report from the Technical Committee.
- IFC, 2012. Performance Standards on Environmental and Social Sustainability - 2012 version. International Finance Corporation, Washington DC, USA.
- IFC (2019) Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, Washington DC, USA.
- IUCN. 1996. L'atlas pour la conservation des forêts tropicales d'Afrique. Editions Jean-Pierre de Monza, Paris.
- IUCN, 2014. Plan d'action régional pour la conservation des gorilles de plaine de l'Ouest et des chimpanzés d'Afrique centrale 2015–2025. Groupe de spécialistes des primates de la CSE/UICN, Gland, Switzerland.
- Jong, Y.W., Beirne, C., Meunier, Q., Biyogo, A.P.M., Mbele, A.E., Stewart, C. & Poulsen, J.R (2020) Expected carbon emissions from a rubber plantation in Central Africa. *Forest Ecology & Management*, 480, 118668.
- Keith, D.A., Rodríguez, J.P., Rodríguez-Clark, K.M., Nicholson, E., Aapala, K., Alonso, A., Asmussen, M., Bachman, S., Basset, A., Barrow, E.G., Benson, J.S., Bishop, M.J., Bonifacio, R., Brooks, T.M., Burgman, M.A., Comer, P., Comín, F.A., Essl, F., Faber-Langendoen, D., Fairweather, P.G., Holdaway, R.J., Jennings, M., Kingsford, R.T., Lester, R.E., Nally, R.M., McCarthy, M.A., Moat, J., Oliveira-Miranda, M.A., Pisanu, P., Poulin, B., Regan, T.J., Riecken, U., Spalding,

- M.D. & Zambrano-Martínez, S. (2013) Scientific Foundations for an IUCN Red List of Ecosystems. *PLoS ONE* 8: e62111.
- Lachenaud, O., Stévant, T., Ikabanga, D., Ngagnia Ndjabounda, E.C. & Walters, G.M. (2013) Les forêts littorales de la région de Libreville (Gabon) et leur importance pour la conservation: description d'un nouveau *Psychotria* (Rubiaceae) endémique. *Plant Ecology and Evolution* 146:68–74.
- Laguardia, A., Bourgeois, S., Strindberg, S., Gobush, K.S., Abitsi, G., Bikang Bi Ateime, H.G., Ebouta, F., Fay, J.M., Gopalaswamy, A.M., Maisels, F., Simira Banga Daouda, E.L.F., White, L.J.T. & Stokes, E.J. (2021) Nationwide abundance and distribution of African forest elephants across Gabon using non-invasive SNP genotyping. *Global Ecology and Conservation*, e01894, <https://doi.org/10.1016/j.gecco.2021.e01894>.
- Lewis, S.L., Lopez-Gonzalez, G., Sonké, B., Affum-Baffoe, K., Baker, T.R., Ojo, L.O., Phillips, O.L., Reitsma, J.M., White, L. & Comiskey, J.A. (2009) Increasing carbon storage in intact African tropical forests. *Nature* 457:1003.
- Lyons-White, J., Yobo, M.K., Ewers, R.M., & Knight, A.T (2022) [Understanding zero deforestation and the High Carbon Stock Approach in a highly forested tropical country](#). *Land Use Policy*, 112, 105770.
- Maisels, F., Pambou Makaya, Q. & Onononga, J.R. (2007) Confirmation of the Presence of the Red-capped Mangabey (*Cercocebus torquatus*) in Mayumba National Park, Southern Gabon, and Conkouati-Douli National Park, Southern Republic of Congo. *Primate Conservation* 22:111–115.
- Maisels, F., Oates, J.F., Linder, J., Ikemeh, R., Imong, I. & Etiendem, D. (2019) *Cercocebus torquatus*. *The IUCN Red List of Threatened Species*. 2019. <https://www.iucnredlist.org/species/4201/17955626>
- Maisels, F., Strindberg, S., Blake, et al. (2013) Devastating Decline of Forest Elephants in Central Africa. *PLoS ONE* 8: e59469–e59469.
- Medjibe, V.P., Putz, F.E., Starkey, M.P., Ndouna, A.A. & Memiaghe, H.R. (2011) Impacts of selective logging on above-ground forest biomass in the Monts de Cristal in Gabon. *Forest Ecology and Management* 262:1799–1806.
- Meijaard, E., Garcia-Ulloa, J., Sheil, D., Wich, S., Carlson, K.M., Juffe-Bignoli, D. & Brooks, T. (2018) Oil palm and biodiversity. A situation analysis by the IUCN Oil Palm Task Force. IUCN Oil Palm Task Force, Gland, Switzerland. <https://doi.org/10.2305/IUCN.CH.2018.11.en>
- Nasi, R. (2001) Biodiversity Planning Support Programme Integration of Biodiversity into National Forest Planning Programmes: The Case of Gabon. Paper prepared for an international workshop on "Integration of Biodiversity in National Forestry Planning Programme", CIFOR, UNEP and GEF.
- Palkopoulou, E., Lipson, M., Mallick, S., Nielsen, S., Rohland, N., Baleka, S., Karpinski, E., Ivancevic, A.M., To, T.-H., Kortschak, R.D., Raison, J.M., Qu, Z., Chin, T.-J., Alt, K.W., Claesson, S., Dalén, L., MacPhee, R.D.E., Meller, H., Roca, A.L., Ryder, O.A., Heiman, D., Young, S., Breen, M., Williams, C., Aken, B.L., Ruffier, M., Karlsson, E., Johnson, J., Di Palma, F., Alfoldi, J., Adelson, D.L., Mailund, T., Munch, K., Lindblad-Toh, K., Hofreiter, M., Poinar, H.

- & Reich, D. (2018) A comprehensive genomic history of extinct and living elephants. *Proceedings of the National Academy of Sciences*.
- Poulsen, J.R., Koerner, S.E., Moore, S., Medjibe, V.P., Blake, S., Clark, C.J., Akou, M.E., Fay, M., Meier, A., Okouyi, J., Rosin, C. & White, L.J.T. (2017) Poaching empties critical Central African wilderness of forest elephants. *Current Biology* 27: R134–R135.
- Proforest (2012) HCV Assessment Olam Palm, Gabon: Mouila Lot 1. Proforest, Oxford, UK.
- Proforest (2013) HCV Assessment Olam Palm Gabon: Mouila Lot 2. Proforest, Oxford, UK.
- Proforest (2015) HCV Assessment Summary - Mouila Lot 3, Ngounié, Gabon.
- Proforest (2016) High Conservation Value assessment for RSPO NPP compliance SOTRADER, Ndendé Gabon (Public Summary). ProForest, Oxford, U.K.
- Proforest (2017) Public summary: High Conservation Value Assessment for RSPO NPP Compliance Olam Palm Gabon, Mouila Lot 3 Extension, Ngounié Province, Gabon. Proforest, Oxford, UK.
- Proforest (2018a) High Conservation Value assessment for RSPO NPP compliance OLAM Palm Gabon at Bindo Bifoun (Makouké) - DRAFT. Proforest, Oxford, UK.
- Proforest (2018b) HCSA assessment for Bindo Bifoun concession, Gabon. Draft (HCSA Assessment). Proforest Ltd., Oxford, U.K.
- Proforest & TEREA (2011) HCV assessment for Olam Palm, Gabon: Awala. Proforest and TEREA, Oxford, UK and Libreville, Gabon.
- Reitsma, J.M. 1988. Végétation Forestière du Gabon. Forest Vegetation of Gabon. Tropenbos Technical Series 1. The Tropenbos Foundation, Wageningen. République Gabonaise (2012) Plan Stratégique Gabon Emergent: Vision 2025 et orientations stratégiques 2011-2016. Présidence de la République, Libreville, Gabon.
- République Gabonaise (2017) Cadre d'investissement du Gabon pour l'Initiative pour la forêt de l'Afrique Centrale (CAFI): planification de l'utilisation des terres et surveillance forestière pour promouvoir des stratégies de développement durable et écologique pour le Gabon. Libreville, Gabon.
- Rosoman, G., Sheun, S., Opal, C., Anderson, P. & Trapshah, R. (2017) The HCS Approach Toolkit. HCS Approach Steering Group, Singapore.
- RSPO, 2018. Principles and Criteria for the Production of Sustainable Palm Oil. Roundtable on Sustainable Palm Oil, Kuala Lumpur, Malaysia. Saura, S., Bertzky, B., Bastin, L., Battistella, L., Mandrici, A., Dubois, G., 2018. Protected area connectivity: Shortfalls in global targets and country-level priorities. *Biol. Conserv.* 219, 53–67. <https://doi.org/10.1016/j.biocon.2017.12.020>
- Scholtz, O., Arrowwood, H. & Vande weghe, J.P. (2017) Les mammifères. pp. 304–315 in: Vande weghe, J., Stévant, T. (Eds.) *Le delta de l'Ogooué*. ANPN, Libreville, Gabon.

- Schuttler, S.G., Blake, S. & Eggert, L.S. (2012) Movement Patterns and Spatial Relationships Among African Forest Elephants. *Biotropica* 44: 445–448.
- Senterre, B. (2005) Recherches méthodologiques pour la typologie de la végétation et la phytogéographie des forêts denses d'Afrique tropicale. Université Libre de Bruxelles, Bruxelles.
- Sosef, M.S.M. 1994. Refuge Begonias: taxonomy, phylogeny and historical biogeography of Begonia sect. Loasibegonia and sect. Scutobegonia in relation to glacial rain forest refuges in Africa. Wageningen Agric. Univ. Papers.
- Stévant, T. & Vande weghe, J. (2017) La conservation. pp. 316–323 in: Vande weghe, J.P., Stévant, T. (Eds.) *Le delta de l'Ogooué*. ANPN, Libreville, Gabon.
- Stewart, C.G. (2016) Industrial Agriculture and Apes: The Experience of Olam International in Gabon in: *State of the Apes: Industrial Agriculture and Ape Conservation*. Cambridge University Press, Cambridge.
- Strindberg, S., Maisels, F., Williamson, E.A. et al. 2018. Guns, germs, and trees determine density and distribution of gorillas and chimpanzees in Western Equatorial Africa. *Sci. Adv.* 4, eaar2964. <https://doi.org/10.1126/sciadv.aar2964>
- TBC (2014) Rio Tinto Simandou Project Critical Habitat Assessment: IFC Performance Standard 6. Rio Tinto, London, UK.
http://www.riotinto.com/documents/RT_Simandou_Critical_Habitat_Assessment.pdf
- TBC (2015) CBG mine expansion project: Critical and Natural Habitat Assessment. The Biodiversity Consultancy Ltd, Cambridge, UK.
- TBC (2018) HCV and IFC PS6: why do the different approaches matter to industry? The Biodiversity Consultancy Ltd, Cambridge, U.K.
- Thibault, M. & Blaney, S. (2003) The oil industry as an underlying factor in the bushmeat crisis in Central Africa. *Conservation Biology*, 17:1807-1813.
- Turkalo, A.K., Wrege, P.H. & Wittemyer, G. (2017) Slow intrinsic growth rate in forest elephants indicates recovery from poaching will require decades. *Journal of Applied Ecology* 54: 153–159.
- Vande weghe, J. & Stévant, T. (2017) *Le delta de l'Ogooué*. ANPN, Libreville, Gabon.
- Viennois, G., Stévant, T., Vande weghe, J., Saatchi, S.S., Schill, S., Aldous, A., Paiz, M.-C., Boupoya, A. & Barbier, N. (2017) Cartographie de la végétation. pp. 198–221 in: Vande weghe, J.P., Stévant, T. (Eds.) *Le delta de l'Ogooué*. ANPN, Libreville, Gabon.
- Walters, G., Ngagnia Ndjabounda, E., Ikabanga, D., Biteau, J.P., Hymas, O., White, L.J.T., Ndong Obiang, A.-M., Ndong Ondo, P., Jeffery, K.J., Lachenaud, O. & Stévant, T. (2016) Peri-urban conservation in the Mondah forest of Libreville, Gabon: Red List assessments of endemic plant species, and avoiding protected area downsizing. *Oryx* 50: 419–430.

Walters, G.M., Parmentier, I. & Stévant, T. (2012) Diversity and conservation value of Gabon's savanna and inselberg open vegetation: an initial gap analysis. *Plant Ecology and Evolution* 145: 46–54.

White, L.J.T., Rogers, M.E., Tutin, C.E.G., Williamson, E.A. & Fernandez, M. (1995) Herbaceous vegetation in different forest types in the Lope Reserve, Gabon: implications for keystone food availability. *African Journal of Ecology* 33: 124–141.

Wilkinson, C.L., Yeo, D.C.J., Tan, H.H., Fikri, A.H. & Ewers, R.M. (2018) Land-use change is associated with a significant loss of freshwater fish species and functional richness in Sabah, Malaysia. *Biological Conservation* 222: 164–171.

World Atlas (2022) [Ecological Regions of Gabon](#). Accessed 30 March 2022.

WRI (2000) A first look at logging in Gabon. Global Forest Watch, World Resources Institute, Washington DC, USA.

World Bank Group, 2017. The World Bank Environmental and Social Framework.

Appendix 1 Key factors influencing OPG site selection and plantation development

From a biodiversity perspective, the development of OPG's plantations to date has been driven principally by 1) Olam International's commitment to seeking certification by the Roundtable on Sustainable Palm Oil (RSPO) and 2) on-going engagement with Government of Gabon and other biodiversity conservation stakeholders.

RSPO certification

Olam is a member of RSPO and in line with [Olam's global palm oil policy](#), OPG committed to ensuring that all of its plantations would be RSPO certified by 2021. Plantations were evaluated against the 2013 RSPO Principles and Criteria. RSPO requires that 1) plantation developers identify High Conservation Values through systematic HCV assessments and 2) implement programmes to maintain and enhance the identified HCVs. RSPO certification has been achieved for all plantations, although Ndende was only recently assessed and official certification is still pending. New Planting Procedure (NPP) documentation has been completed for all plantations.

High Conservation Value assessments

RSPO's approach to biodiversity is based on the High Conservation Value approach (Brown *et al.* 2013). This approach defines 6 types of high conservation value, which must be identified using a systematic High Conservation Value Assessment:

- 1) Species Diversity - Concentrations of biological diversity including endemic species, and rare, threatened or endangered species (RTE), that are significant at global, regional or national levels.
- 2) Landscape level ecosystems - Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.
- 3) Ecosystems and habitats - Rare, threatened, or endangered ecosystems (RTE), habitats or refugia.
- 4) Ecosystem services - Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
- 5) Community needs - Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.
- 6) Cultural values - Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic

or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

HCV assessments have been completed for Awala (Proforest & TERE 2011), the three original Mouila plantations (Proforest 2012, 2013, 2015), Mouila Lot 3 extension (Proforest 2017), Bindo-Bifoun plantation (Proforest 2018a), Ndende (Proforest 2016), and the Makouke-Bindo plantation (OPG, 2020).

RSPO compensation liability

Since 2005, RSPO has required that HCV assessments take place before clearance and new plantings. However, RSPO acknowledges that some clearance might have taken place since that date. RSPO has developed a "Remediation and Compensation Procedure (RaCP) in order to provide a mechanism for the restoration of cleared HCV areas and, if applicable, the compensation of lost conservation values²⁸.

The [RSPO RaCP Tracker](#) website shows that OPG has no compensation liability for any plantations. HCV assessments have been completed, and the new planting procedure followed. The RSPO site also confirms that there is no inherited compensation liability for the Makouke plantation which was purchased from SIAT.

Government and stakeholder engagement in site selection

OPG has worked in close collaboration with the relevant agencies in the government of Gabon regarding the selection of plantations, and decisions over what areas are suitable for oil palm plantations, informed in large part by the HCV assessment process. This has included the Ministry of Water and Forest, and the National Parks Agency (ANPN). The Gabonese government has developed a national oil palm policy (République Gabonaise, 2020) to identify areas suitable for oil palm plantations, and to provide guidance on plantation design (for example thresholds for High Conservation Values and High Carbon Stock). The policy was developed along-side and informed by OPG's site selection process.

Outcomes of site selection

In 2010 OPG was granted several concessions (Lots 8, 9 and 11) between Kango and Lambaréné, including the Awala concession (Lot 8). An initial HCV assessment resulted in OPG excluding Lots 9 and 11 from development since they supported multiple HCV triggers, especially: falling within the Lower Ogooué Ramsar site (both Lots 9 and 11) and forming part of an Intact Forest Landscape (Lot 11), potential presence of concentrations of rare and threatened species, and supporting watersheds of significant importance to local communities (Proforest & TERE 2011).

²⁸ <https://www.rspo.org/certification/remediation-and-compensation>

Lots 9 and 11 were therefore not developed and so were returned to the government of Gabon. Only the Awala concession (Lot 8) was retained for plantation development.

From 2012, OPG was directed by the Republic of Gabon to focus on the Mouila-Ndende savannah area for further plantation development. The focus on this area was supported by a multi-criterion analysis involving many conservation stakeholders, that considered potential impacts on species of conservation significance, impacts on above-ground carbon stocks, and on communities as well as suitability for oil palm. These savannahs were considered through this process to represent the optimal location within Gabon, in large part due to lower impacts on biodiversity and carbon, and greater benefits for communities. This orientation is set out in Gabon's strategic plan (République Gabonaise, 2012), with details of the criteria included and stakeholders consulted included in the national oil palm policy (République Gabonaise, 2020).

In addition, international stakeholders, including palm oil critics, have encouraged OPG to prioritise developing oil palm on savannah areas over forest areas. Within the plantations, OPG has targeted the planted areas on land which is not considered important for the maintenance of High Conservation Values and has relatively low levels of above-ground carbon (either areas which have been repeatedly logged or are natural savannah).

The outcome of these processes has therefore been that the bulk of OPG's plantations are located in the Mouila-Ndende savannah area, avoiding many potential biodiversity impacts prior to plantation development.

On-going processes informing plantation development

High Carbon Stock (HCS)

In aligning with Gabonese national policy, OPG has endeavoured to develop the oil palm plantations in a manner which minimises greenhouse gas emissions, and where possible is a net sequester of carbon dioxide. OPG has not been required to avoid conversion of High Carbon Stock (HCS) forest as part of RSPO certification as it is not included in the 2013 Principles and Criteria against which all of the plantations were evaluated.

OPG has voluntarily committed to only convert forest which is considered low carbon stock in a Gabonese context. Approximately 23 million hectares, or 89% of Gabon's land area is forested, and in Gabon even degraded or regenerating forest can have appreciable carbon stocks: 87% of Gabon's land area has forest with over 75 t C/ha and 80% over 118 t C/ha (Austin *et al.* 2017).

Olam International released a '[Living Landscapes policy](#)' in April 2018. This applies to any new planting in Gabon and commits to "*no conversion or degradation of other natural habitats with high levels of organic carbon such as High Carbon Stock (HCS) forests.*"

OPG participated as a case study in the development of the HCS+ methodology by the HCS Science Study (HCS+ 2015). This method was developed in parallel and separate to the HCS Approach proposed by Greenpeace, The Forest Trust and others. The HCS+ method was proposed as a tool to identify low carbon areas, to minimise greenhouse gas emissions during

clearance. The HCS+ methodology proposed a threshold for clearance based solely on above-ground carbon (75 t C / ha), whereas the HCS Approach considers other factors such as forest structure and age (Rosoman *et al.* 2017).

The HCS Approach and HCS Science Study converged in 2016 with the creation of single HCS Approach (HCSA), and a [toolkit](#) was launched in 2017. The HCSA method “stratifies the vegetation in an area of land into six different classes using analyses of satellite data and ground survey measurements. These six classes are: High Density Forest, Medium Density Forest, Low Density Forest, Young Regenerating Forest, Scrub, and Cleared/ Open Land. The first four classes are considered potential High Carbon Stock forests²⁹.

The HCSA is now being adopted widely by oil palm producers and consumers as the most suitable approach for applying no deforestation commitments. HCSA has been included as the required approach in the 2018 revision of the RSPO Principles & Criteria.

This method is appropriate for fragmented, heavily degraded landscapes, such as those found in South-east Asia. The HCSA steering group, and RSPO acknowledge that this approach is challenging to apply in “High Forest Cover Landscapes” (HFCLs) such as those in Gabon. The HCSA steering group has set up a task force to develop an approach which is suitable in this context and launched a dedicated HCSA Africa steering group in May 2018³⁰. However, a [June 2018 statement from the HCSA](#) steering group reiterated that the existing HCSA will apply to all areas, including HFCLs. The statement acknowledges that the large-scale plantation development model is not compatible with HFCLs but that *“For a strictly limited number of existing “legacy cases” of plantations in HFCLs that meet eligibility criteria and agree to enter into a due diligence process, this may include limited conversion subject to specific thresholds and procedures, via an agreed legacy case review process.”* In these cases (which could potentially include OPG plantations) *“the HFCL Working Group will focus on assisting communities, companies, and their partners working in these existing plantations within HFCLs to prioritise conservation outcomes.”* In [November 2018](#) the HCSA steering group agreed to collaborate with RSPO to develop appropriate solutions to this challenge.

The Gabonese national oil palm policy (République Gabonaise, 2020) has proposed a carbon threshold based on a national analysis of aboveground forest carbon stocks. The policy states that conversion of areas with up to 118 t C/ha can be acceptable (subject to detailed assessment), as this corresponds to the upper 95% confidence interval of carbon stocks of secondary forests in Gabon (Austin *et al.* 2017).

Therefore, there are currently three possible thresholds which may apply to palm oil plantations in Gabon:

²⁹ <http://highcarbonstock.org/the-high-carbon-stock-approach/>

³⁰ <http://highcarbonstock.org/high-carbon-stock-approach-to-launch-africa-steering-group/>

- The standard HCSA method of the threshold between 'scrub' and 'young, regenerating forest';
- The HCS+ threshold of 75 t C/ha; or
- The 2020 Gabon national policy threshold of 118 t C/ha.

OPG operations in Awala and the Mouila Lots, and initial development of the Makouke plantation predate the Gabon national policy but OPG operations have informed development of this policy. The Gabonese government National Palm Policy will consider use of a higher threshold and thus additional clearance may be permissible in Gabon.

African Palm Oil Initiative (APOI)

The [African Palm Oil Initiative](#), is a programme of the Tropical Forest Alliance (TFA) 2020, the goal of which is to *"help transition the palm oil sector in West and Central Africa to become a sustainable driver of long-term, low-carbon development in a way that is socially beneficial and protects the tropical forests of the region"*. Gabon is one of ten signatory countries, while Olam is a TFA 2020 partner. OPG has participated in all APOI meetings and submitted several contributions, including a proposal with WWF and the ROG to the initiative on jurisdictional approaches in Gabon. Gabon is in the 'Development phase' for APOI and hosted a workshop to identify key issues for sustainable palm oil in Gabon in August 2017. Olam is on the secretariat of the Gabon platform and participated in the workshop which produced a workplan, based around 9 principles. Of these, principle 2 commits to the preservation of HCV and HCS areas, which will be supported through the finalisation of a national HCV map, and national criteria and indicators for HCS in Gabon. Through the APOI platform, OPG has contributed to the writing and validation of the national interpretation of the 2018 RSPO principles and criteria.

Central African Forests Initiative (CAFI)

[CAFI](#) is a collaborative partnership involving the governments of Cameroon, Central African Republic, Republic of Congo, the Democratic Republic of the Congo, Equatorial Guinea and Gabon, together with donors from Europe and South Korea. The partnership aims to support national forest planning to mitigate climate change, reduce poverty and contribute to sustainable development. Gabon's involvement with CAFI includes the elaboration, adoption and implementation of a National Land Use Plan (French acronym: PNAT) and a National System for Monitoring Natural Resources and Forests (French acronym: SNORF). As a close collaborator with the government of Gabon OPG is supporting Gabon to meet these commitments, including preserving HCS and HCV forests.

IUCN Oil Palm Task Force

The [IUCN Oil Palm Task Force](#) was established in 2017 in response to Resolution 61 of the 2016 IUCN World Conservation Congress. [Resolution WCC-2016-Res-061](#) on *"Mitigating the impacts of oil palm expansion and operations on biodiversity"* called for the creation of a task force to undertake a situation analysis on oil palm and biodiversity conservation in the context of sustainable development. Olam was invited to join the Task Force and was the only oil palm company involved in the development of the situation analysis. OPG's Quentin Meunier

contributed to the report and is co-author of Chapter 4 on “The Future of Oil Palm” (Meijaard *et al.* 2018).

Appendix 2 Summary of Critical Habitat and risk-based prioritisation per plantation

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
Mammals										
<i>Pan troglodytes troglodytes</i>	Central chimpanzee	EN	Confirmed	Confirmed	Confirmed	Confirmed	Unlikely	Unlikely	Likely CH (C1a) – Awala, Makouke, Mouila Lot 1 and Lot 2	1
<i>Gorilla gorilla gorilla</i>	Western lowland gorilla	CR	Confirmed	Confirmed	Confirmed	Confirmed	Unlikely	Unlikely	Likely CH (C1a) – A wala, Makouke, Mouila Lot 1 and Lot 2	1
<i>Loxodonta cyclotis</i>	African Forest Elephant	CR	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed	Likely CH (C1a) – All plantations	1
<i>Cercocebus torquatus</i>	Red capped mangabey	EN	Confirmed	Probable	Probable	Probable	Probable	Probable	Likely CH (C1a) – Awala; Possible CH (C1a) – Makouke, Mouila Lots 1-3, Ndende	3
<i>Smutsia gigantea</i>	Giant Ground Pangolin	EN	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C1a) – Makouke, Mouila Lots 1-3, Ndende	3
<i>Phataginus tricuspis</i>	White-bellied Pangolin	EN	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C1a) – Mouila Lots 1-3, Ndende	3
Birds										
<i>Merops malimbicus</i>	Rosy Bee- eater	LC	Probable	Probable	Probable	Probable	Confirmed	Confirmed	Possibly CH (C3a) – Mouila Lot 3 & Ndende	3
<i>Psittacus erithacus</i>	African Grey Parrot	EN	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C1a) – Mouila Lots 1-3, Ndende	3

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Pseudochelidon eurystomina</i>	African river martin	DD	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
Reptiles & Amphibians										
<i>Phrynobatrachus ogoensis</i>	Ogowe river Frog	DD	-	Probable	-	-	-	-	Likely CH (C2a) – Makouke	2
<i>Mecistops cataphractus</i>	Slender snouted crocodile	CR	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C1a) All plantations	2
Fish & Shrimp										
<i>Aphyosemion hera</i>	Hera killifish	DD	-	Confirmed	-	-	-	-	Confirmed CH (C2a) – Makouke	2
<i>Aphyosemion hofmanni</i>	Hofmanns killifish	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Possibly CH (C2a) –Mouila Lots 1-3, Ndende	2
<i>Aphyosemion citrineipinnis</i>	Killifish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Aphyosemion exigoideum</i>	Killifish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Aphyosemion ocellatum</i>	Killifish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Likely CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Aphyosemion primigenium</i>	Killifish sp.	VU	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C1b & C2a) –Mouila Lots 1-3, Ndende	2
<i>Aphyosemion joergenscheeli</i>	Killifish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Aphyosemion wuendschi</i>	Killifish sp.	DD	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Epiplatys huberi</i>	Killifish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Alestes macrophthalmus</i>	Torpedo Robber	LC	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – All plantations combined	4
<i>Bryconalestes bartoni</i>	Mouila tetra	EN	-	Confirmed	-	-	-	-	Confirmed CH (C1a, C2a) – Mouila Lots 1-3, Ndende	2
<i>Bryconalestes tholloni</i>	Tetra sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Bryconalestes kingsleyae</i>	Tetra sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – AoA 3	4
<i>Caridina gabonensis</i>	Vampire shrimp	DD	-	Confirmed	-	-	-	-	Confirmed CH (C2a) – Makouke	2
<i>Caridina lineorostris</i>	Freshwater shrimp sp.	DD	-	Confirmed	-	-	-	-	Confirmed CH (C2a) – Makouke	2
<i>Chrysichthys dageti</i>	Catfish sp.	VU	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a, Possibly C1b) – Mouila Lots 1-3, Ndende	2
<i>Chrysichthys nigrodigitatus</i>	Bagrid catfish	LC	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – All plantations combined	4
<i>Chromidotilapia melaniae</i>	Ray finned fish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Chromidotilapia nana</i>	Ray finned fish sp.	DD	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Clarias longior</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Clarias jaensis</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Clarias gabonensis</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Clariallabes longicauda</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Clariallabes brevibarbis</i>	Catfish sp.	DD	-	Probable	-	-	-	-	Likely CH (C3a) – Makouke	4
<i>Distichodus hypostomatus</i>	Wet spot fish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Distichodus notospilus</i>	Wet spot fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Enteromius prionacanthus</i>	Ray finned fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Fontitrygon ukpam</i>	Thorny freshwater stingray	EN	-	Probable	-	-	-	-	Possibly CH (C1a) – Makouke	2
<i>Hepsetus lineata</i>	African pike sp.	LC	-	Confirmed	Probable	Probable	Probable	Probable	Confirmed CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Labeobarbus axelrodi</i>	Cyprinid barbus fish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Labeobarbus batesii</i>	Cyprinid barbus fish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Labeobarbus caudovittatus</i>	Cyprinid barbus fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Mouila Lots 1-3, Ndende	4

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Labeobarbus compinieii</i>	Cyprinid barbus fish sp.	LC	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – All plantations	4
<i>Labeobarbus malacanthus</i>	Cyprinid barbus fish sp.	LC	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – All plantations	4
<i>Labeobarbus progenys</i>	Cyprinid barbus fish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Labeobarbus sandersi</i>	Cyprinid barbus fish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Labeobarbus steindachneri</i>	Cyprinid barbus fish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Labeobarbus tornieri</i>	Cyprinid barbus fish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Makouke, Mouila Lots 1-3, Ndende	4
<i>Labeobarbus weneri</i>	Cyprinid barbus fish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Labeo camerunensis</i>	Barbus fish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Labeo batesii</i>	Barbus fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Microsynodontis notata</i>	Upside down catfish	DD	Probable	-	-	-	-	-	Likely CH (C2a) – Awala	2
<i>Microsynodontis vigilis</i>	Upside down catfish	DD	-	Confirmed	-	-	-	-	Confirmed CH (C2a) – Makouke	2
<i>Neolebias gossei</i>	Salmier fish sp.	LC	-	Probable	-	-	-	-	Possibly CH (C2a) – Makouke	2

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Neurogomphus angustisigna</i>	Siphontail dragonfly sp.	DD	-	Probable	-	-	-	-	Possibly CH (C2a) – Makouke	2
<i>Notoglanidium bouchangai</i>	Catfish sp.	LC	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Possibly CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Opsaridium ubangiense</i>	Ray finned fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Odaxothrissa ansorgii</i>	Ansorge's fangtooth pellonuline	LC	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C3a) – All plantations	4
<i>Parailia occidentalis</i>	Dusky glass catfish	LC	Probable	Probable	-	-	-	-	Likely CH (C3a) – Awala; Makouke	4
<i>Pellonula vorax</i>	Big toothed pellonula	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Periophthalmus barbarus</i>	Atlantic mudskipper	LC	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C3) – Mouila Lots 1-3, Ndende	4
<i>Petrocephalus simus</i>	Mormyrids	LC	Probable	Probable	Probable	Probable	Probable	Probable	Possibly CH (C3a) – All plantations combined	4
<i>Phractura stiansny</i>	Loach catfish sp.	DD	-	-	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Plataplochilus miltotaenia</i>	Red striped lampeye	VU	Probable	Probable	-	-	-	-	Likely CH (C1b) – Awala; Makouke	2

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Plataplochilus chalcopyrus</i>	Flame lampeye	EN	Probable	Probable	Probable	Probable	Probable	Probable	Likely CH (C1a) – All plantations (C2a for Makouke)	2
<i>Potamalpheops haugi</i>	Freshwater shrimp sp.	EN	-	Confirmed	-	-	-	-	Confirmed CH (C1a) – Makouke	2
<i>Schilbe multitaeniatus</i>	Catfish sp.	LC	-	Probable	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Makouke; Mouila Lots 1-3, Ndende	4
<i>Schilbe laticeps</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Schilbe grenfelli</i>	Catfish sp.	LC	-	-	Probable	Probable	Probable	Probable	Possibly CH (C3a) – Mouila Lots 1-3, Ndende	4
<i>Synodontis acanthoperca</i>	Scissortail synodontis	DD	-	-	Probable	Probable	Probable	Probable	Possibly CH (C2a) – Mouila Lots 1-3, Ndende	2
<i>Xenocharax crassus</i>	Distichodontidae fish sp.	LC	-	-	Probable	Probable	Probable	Probable	Likely CH (C3a) – Mouila Lots 1-3, Ndende	4
Plants										
<i>Psychotria acutigemma</i> subsp. <i>couvreuriana</i>		EN	-	-	-	-	-	Confirmed	Confirmed CH (C1a & C2a)	2
<i>Ledermanniella pygmaea</i>		EN	-	-	-	-	Probable	Probable	Possibly CH (C1a & C2a)	2

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Justicia tigrina</i> (<i>Champluviera nuda</i>)		VU	Probable	Probable	-	-	-	-	Confirmed CH (C1b and C2a) – AoA 2	4
<i>Cassipourea</i> sp. nov.		CR	-	-	-	-	-	Confirmed	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Inversodicraea annithomae</i>		EN	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Ledermanniella</i> aff. <i>pygmaea</i> sp. nov. 2		EN	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Inversodicraea paulsitae</i>		VU	-	-	-	-	-	Probable	Confirmed CH (C1b and C2a) – AoA 3	4
<i>Ledermanniella</i> sp. nov. 1 stamen		EN	-	-	-	-	Probable	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Inversodicraea gabonensis</i>		EN	-	-	-	-	Probable	Probable	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Ledermanniella letestui</i>		EN	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Dactyladenia pierrei</i>		CR	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Eugenia ogoouensis</i>		VU	Probable	Probable	-	-	-	-	Confirmed CH (C2a) – AoA 2	4
<i>Tapura le-testui</i>		EN	-	-	-	Probable	Probable	Probable	Confirmed CH (C1a and C2a) – AoA 3	4

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Anthonotha pellegrinii</i>		EN	-	-	-	-	Probable	Probable	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Cynometra nyangensis</i>		EN	-	-	-	Probable	Probable	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Croton tchibangensis</i>		EN	-	-	-	-	-	Confirmed	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Loesenera walkeri</i>		VU	-	-	Confirmed	Confirmed	Probable	Confirmed	Confirmed CH (C1b and C2a) – AoA 3	3
<i>Cynometra letestui</i>		EN	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Synsepalum nyangense</i>		EN	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	4
<i>Calpocalyx brevifolius</i>		VU	-	-	-	-	Probable	Probable	Confirmed CH (C1b and C2a) – AoA 3	4
<i>Dactyladenia librevillensis</i>		VU	-	Probable	-	-	-	-	Confirmed CH (C1b and C2a) – AoA 2 & AoA 3	4
<i>Oddoniodendron normandii</i>		VU	Probable	Probable	-	-	-	-	Confirmed CH (C1b and C2a) – AoA 1 & AoA 2	4
<i>Rothmannia jollyana</i>		VU	-	-	-	Probable	Probable	-	Confirmed CH (C1b and C2a) – AoA 3	4
<i>Crotalaria tchibangensis</i>		CR(PE)	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	2

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Gilbertiodendron barbulatum</i>		CR	-	-	-	Probable	Probable	-	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Gilbertiodendron limosum</i>		EN	-	-	-	Probable	-	-	Confirmed CH (C1a) – AoA 3	4
<i>Crateranthus congolensis</i>		EN	-	-	Confirmed	Probable	Probable	-	Confirmed CH (C1a) – AoA 3	3
<i>Millettia le-testui</i>		CR	-	-	-	-	-	Probable	Confirmed CH (C1a and C2a) – AoA 3	2
<i>Anthonotha stipulacea</i>		LC	Confirmed	Probable	Confirmed	-	-	-	Confirmed CH (C2a) – AoA 1, AoA 2 and AoA 3	3
<i>Tarenna ogoouensis</i>		EN	Confirmed	-	-	-	-	-	Confirmed CH (C1a and C2a) – AoA 1	3
<i>Diospyros subargentea</i>		VU	Probable	Probable	-	-	-	-	Confirmed CH (C2a) – AoA 1 & AOA 2	3
<i>Diospyros cleistantha</i>		VU	-	Probable	-	-	Probable	Confirmed	Confirmed CH (C1b and C2a) – AoA 2 & AoA 3	3
<i>Dactyladenia jongkindii</i>		VU	-	Probable	-	-	-	-	Confirmed CH (C2a) –AOA 2	4
<i>Pseudohydrosme gabunensis</i>		EN	Probable	-	-	-	-	-	Possibly CH (C1a & C2a) – AoA 1	4
<i>Combretum exellii</i>		VU	-	Confirmed	-	-	-	-	Possibly CH (C1a & C2a) – AoA 2	4
<i>Diospyros rabiensis</i>		VU	-	Probable	-	-	-	-	Possibly CH (C1a & C2a) – AoA 2	4

Scientific name	Common name	IUCN Red List status	Presence in Awala	Presence in Makouke	Mouila Lot 1	Mouila Lot 2	Mouila Lot 3	Ndende	Qualification as CH under IFC PS6 Criteria	Action Category (AC)
<i>Beilschmiedia calcitranthera</i>		EN	-	-	-	Probable	Probable	-	Possibly CH (C1a & C2a) – AoA 3	4
<i>Beilschmiedia cinnamomea</i>		EN	-	-	-	-	-	Probable	Possibly CH (C1a & C2a) – AoA 3	4
<i>Cnestis macrophylla</i>		EN	-	Probable	-	-	-	-	Possibly CH (C1a & C2a) – AoA 2	4
<i>Guibourtia tessmannii</i>		EN	Confirmed	-	Probable	-	-	-	Possibly CH (C1a) – AoA 1 & AoA 3	3
<i>Autranella congolensis</i>		EN	-	-	-	-	-	Probable	Possibly CH (C1a) – AoA 3	4
		Notes: Red List status: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated. PE = Potentially Extinct. For plants Red List status was assessed by MBG (for approach used see Appendix 3 of Annex 1) since many species have not yet been assessed on the IUCN Red List. Presence in study area: Confirmed = presence confirmed through field surveys; Probable = presence unconfirmed but considered possible given the overlap between study area and species range and/or suitability of habitats and/or expert opinion Qualification: Likely = Presence of the species in the plantation is confirmed or likely, and if found it will meet CH criteria; Possible = species has the potential to meet CH criteria but there is not enough evidence based on available information. This could either be because the species is confirmed in the area but it is uncertain if it meets the threshold for CH; or it could be that species presence in the area is unconfirmed, but if found it has the potential to meet CH criteria.								

