





BIODEV2030  
GUYANA  
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INCEPTION  
REPORT  
03/09/2021



PROJECT		Analysis of drivers of biodiversity loss and impacting economic sectors in Guyana	
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# 1 Context, stakes, and objectives

## 1.1 International context

Ecosystems and the services provided are the building blocks of every form of life on earth. They are critical for human and animal existence, through the provision of clean air, freshwater, healthy soils, food, energy and medicines for example, but also necessary for the functioning and the regulation of every micro-bio-interaction and macro-interaction (climate, pollination and pests being part of it). Therefore, healthy ecosystems not only ensure quality of life on earth but also insurance against any disequilibrium that could impede the survival of human-being and their ability to pursue essential economic activities as agriculture for instance. Biodiversity is fundamental for all ecosystem functions, goods and services and plays a critical role in the preservation of natural capital.

Since 2010, the global trend towards fewer species, less abundant populations, and degraded ecosystems, has placed approximately 1 million animal and plant species under threat. Ecosystem's health is deteriorating rapidly, eroding livelihoods, food security, health, and quality of life worldwide. For this reason, mitigating these impacts while still ensuring human needs are the main goal of our future and requires a shift in the production and consumption habits of materials and products. To do so, it is important to understand our production and consumption "footprint" help account for all aspects of pressure on ecosystems and addressing these impacts, bringing them within safe boundaries by 2030.

The Global Biodiversity Outlook (GBO) 5 further highlights biodiversity decline at an unprecedented rate, and the pressures driving this decline are intensifying. It underlined that none of the Aichi Biodiversity Targets will be fully met, threatening the achievement of the Sustainable Development Goals (SDG) as a result. The global crisis in 2020 brought to the forefront a greater connection between ecosystem degradation, biodiversity loss/decline and climate change – essentially the planets' health and human health and well-being. The Living Planet Report (LPR) highlights that 60% of emerging infectious diseases such as Covid-19, originated from animals and more than half of these are from wild animals due to increased interactions or encroachment in wildlife habitats.

Overall, implementation of actions to conserve nature and manage it more sustainably has progressed but not sufficiently to stem the direct and indirect drivers of nature's deterioration. Stopping biodiversity decline and preserving ecosystems are urgently needed, especially to achieve the SDG's. The GBO further highlights that despite the failure to meet the goals of the Strategic Plan for Biodiversity 2011-2020, it is not too late to slow, halt and eventually reverse current trends in the decline of biodiversity, especially at the country level.

## 1.2 Project context

In the context of biodiversity loss, the French Development Agency (AFD) launched the BIODEV2030 initiative, coordinated by Expertise France, World Wildlife Fund (WWF) and the International Union for Conservation of Nature (IUCN). BioDev2030 is an experimental approach to be tested and implemented in 16 pilot countries representative of various socio-economic, environmental, and geographical contexts. The great idea of the project is to empower governments of each selected country, together with the private sector and the civil society, to jointly identify and implement transformational changes in economic sectors, which are strategic for national development and significantly important to maintain biodiversity at the country level. The outcome of BIODEV2030 is expected to be concretized into private sector's engagements for each country, to be presented at the 15<sup>th</sup> COP for biodiversity. Guyana have been selected as part of those pilot countries.

Guyana's biodiversity provides an important basis for climate regulation, poverty reduction, provisioning of freshwater, economic growth, and development in agriculture, forestry and fisheries, payment for forest climate services, and community-based economies, particularly in hinterland communities. Loss of biodiversity and any disruption in the provision of ecosystem services would negatively impact the economy and particularly the quality of life of Guyanese. Climate change, deforestation and land degradation have recently received greater recognition as current and future drivers of environmental change and threats to Guyana's biodiversity. These pressures have been increasing over the past decade.

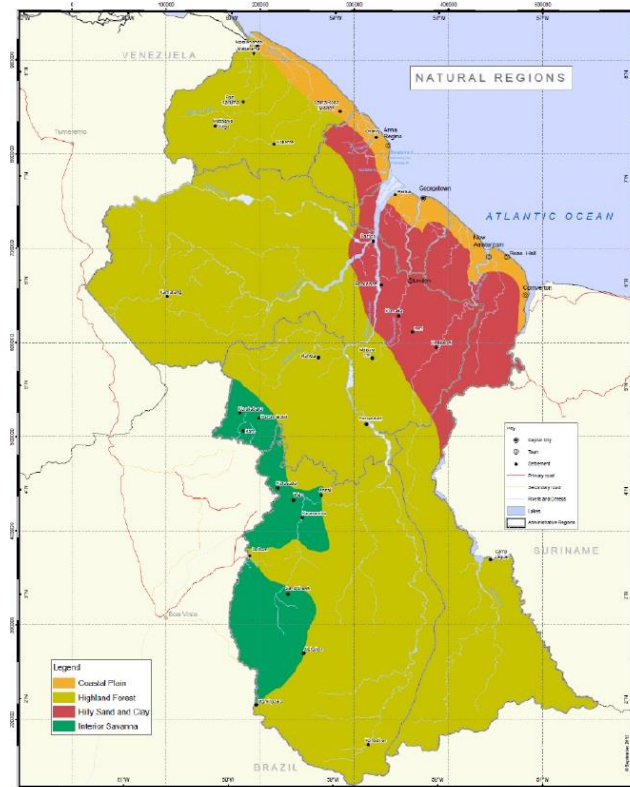


Figure 1: Guyana's natural regions (HTSPE Ltd Consortium with Astrium Geo-Information Services and SRKngineering *et al.*, 2012)

### Terrestrial environmental profile

Located in the neotropical biogeographical territory of north-eastern South America, Guyana belongs to the Guiana Shield region which forms part of the Amazon Biome. The Guiana Shield is an ancient granitic dome that protrudes from the lowland basin and separates the Orinoco and Amazon watersheds. The Environmental Report (Environmental Protection Agency Guyana, 2016) mapped four separate Natural Regions (Figure 1: Guyana's natural regions (HTSPE Ltd Consortium with Astrium Geo-Information Services and SRKngineering *et al.*, 2012)) as follows:

- (1) the coastal plain
- (2) the highland forest
- (3) the hilly sand and clay region
- (4) the interior savannas

Those regions host Guyana's major ecosystems: forest, freshwater, wetland, savannah, coastal, and marine, which support a diverse array of species, several of which are globally threatened or endangered.

Representing more than 80% of Guyana's land cover, forests are the most extensive land cover of the country, and its land area is suitable for forestry, agriculture, mining and other important social and economic activities. The Guyana Forestry Commission (GFC) was formed in 1979 and has a legal mandate to manage and control the utilization of the State Forest Estate in following sustainable forest management principles and guidelines captured in the Forest Act of 2009. In 2016, the GFC identified the following 6 anthropogenic drivers of forest change: forestry, agriculture, mining, infrastructure, fires, settlements.

### *Marine environmental profile*

The length of continental coastline is 459 km. To 200 nautical miles, the exclusive economic zone (EEZ) extends to 138,240 km<sup>2</sup>. The highly productive seas off the Guianas have muddy nutrient rich waters fed by the Amazon and the North flowing rivers of the region. The resulting fisheries represent a substantial and very valuable source of food, employment, income, recreation, and foreign exchange for our countries. There is also a wealth of other marine life including significant estuarine dolphin populations, manta rays, whales, whale sharks, and four species of marine turtles. Green and leatherback turtles' nest in very large stable numbers on Guianas beaches, making the Guianas a critically important marine turtle nesting area for these species.

In 2004, the GDP of fisheries rise to 157 million G\$ and the value of fisheries exports was 54.2 million US\$ (FAO, 2005). The fishery sector is of critical importance to the economy and to social well-being in Guyana. Indeed, the economic contribution of fisheries has grown dramatically in recent years, and its importance is evident in five areas. More than 12 000 livelihoods depend directly on fishery, and many more benefit indirectly from fishing-related occupations, such as boat building, gear supply and repair.

Fish is the major source of animal protein in Guyana. It is estimated that per caput annual consumption of fish rose from 9 to 27 kg between 1980 and 1988 and was about 45 kg in 2003. Guyana's marine fishing activities are directed at exploiting its shrimp resources using shrimp trawlers, and its ground-fish resources using wooden vessels and a variety of gear by artisanal fishermen. It is accepted that, of the shrimp resources, the prawn has been overexploited, while there is concern that the seabob (a smaller shrimp) and sharks are showing signs of overexploitation. At the same time, some deep slope species and pelagic species are underexploited (FAO, 2005).

An overview of the fisheries sector in Guyana (Geer, 2004) indicated that some fish stocks were being exploited at or above sustainable levels. Stock assessments of bangamary and butterfish indicated that the long-term sustainability of these stocks were under threat. Production statistics also showed that annual shrimp production had been falling. The analysis indicated that there was full exploitation of the southern pink shrimp (*Penaeus notalias*), the southern brown shrimp (*Penaeus subtilis*), and overexploitation of the red spotted shrimp, (*Penaeus brasileinsis*). Seabob trawlers were staying longer at sea and the average size of this small crustacean appears to be declining.

### *Economical profile*

Second smallest country in South America after Suriname, Guyana has a population of 787,000 and a GDP of USD 6.8bn in 2020, which makes it the third-poorest nation in South America, just ahead of Bolivia and Paraguay. After an average growth of 3.9% over the period 2012-2018, driven mainly by increased gold mining production, Guyana's GDP growth reached 5.3% in 2019. In 2020, Guyana count among the few countries to have recorded a growth, and the only one to achieve a double-digit growth rate of 26.2%, although it was well below the IMF's pre-pandemic forecast (growth for 2020 was initially expected to be 85.6%). This great percentage can be explained by the exploitation of the first oil wells (operated notably by Exxon Mobil), following the discovery of large deposits on the Guyanese continental shelf in 2015.

Currently, the country has attractive perspectives for investors in mining, hydroelectric power, and agriculture (Coface, 2021), and abundant offshore oil and gas reserves to be developed from 2020.

### *Population profile*

Guyana's population remains mainly rural, with 73% of the population living in rural areas, and coastal as 90% of Guyana's population live on flat coastal plains. The country's urban population has slightly decreased since the last census, both in absolute numbers and in the percentage of the total population. The indigenous peoples of Guyana are the Amerindians; their presence in the country dates to around a hundred and fifty years (CADPI, 2012). Amerindians have a rich and diverse cultural heritage and are located predominantly in the hinterland regions. The Amerindian Act 2006 grants Amerindians legal titles to the lands they occupy. Amerindians, therefore, have ownership of approximately 3 316 000 hectares (GFC et al., 2015) or over 15% of the country's total land area.

### *Political suitability*

Aiming to secure its ecosystems and people, Guyana has ratified several conventions, including United Nations Convention on Biological Diversity (UNCBD), developed multiple strategies and action plans including the National Biodiversity Strategy and Action Plan 2012-2020, and implemented many initiatives over the years.

## 1.3 Objectives of the consultancy

In that context, WWF-Guyana requires Biotope's consultancy to lead the selection process of priority sectors for Biodev2030 in Guyana (phase 1), to run an in-depth analysis of 2 identified priority economic sectors and to support the creation of at least one clear voluntary commitment for each sector (Phase 2).

The present inception report is part of the Phase 0, dedicated to the framing, specifically the methodological and governance aspects between the team of consultants and WWF Guianas, and other elements relating to the timetable and expected results of the study, and the Phase 1 dedicated to the diagnosis of pressures and threats on biodiversity and drivers of its decline or loss at the national level, with a focus on contributions from economic sectors. An underlying objective is to understand how does nature influence Guyana's economic sectors, and the impact of the sectors on biodiversity.

The phase 1, holds the following specific objectives:

- (1) **To execute a diagnostic analysis of pressure-threats on biodiversity and drivers of its decline** in Guyana and the underlying cause of biodiversity loss across at least five selected economic sectors, using globally recognised/approved scientific methodologies and tools, to robustly identify and measure the impacts from different economic sectors
- (2) **To profile each key economic sector** impacting biodiversity and estimate (as much as could be possible) the value of ecosystem services associated with these sectors
- (3) **To develop and use a priority ranking methodology** to select and prioritize two key economic sectors for in-depth analysis, based on national/sector context, degree of impact on biodiversity and the sector capacity for change
- (4) **To facilitate a multistakeholder engagement** process throughout the assessment

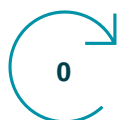
The consultancy will contribute to the larger objective of increasing the involvement of stakeholders, including the private sector, in maintaining biodiversity and ecosystem services, which is both a key part of Guyana's international and national commitments and the state of mind adopted by Member States of the UNCBD in 2018 during the preparation of the post-2020 Global Biodiversity Framework. This framework encourages participation of all stakeholders to ensure acceptance of stakeholders, especially for implementation activities. The process underscores thorough knowledge generated from scientific research and relevant data systems, inclusive of natural, social sciences – local, traditional, and indigenous knowledge and good practices/lessons from the implementation of the convention.

## 1.4 Detailed planning of activities

	August				September				October			
	S32	S33	S34	S35	S36	S37	S38	S39	S40	S41	S42	S43
<b>Scoping mission</b>												
Task 0: Contract scoping and signature												
Deliverable 1: Inception report providing details on the scientific methods and assessment tools to be used					<b>D1</b>							
Meeting with project counterparts (videoconferencing)												
<b>STUDY 1: National synthesis Assessment: Diagnosis of Ecological Footprint of Key Economic Sectors</b>												
Task 1: Undertake a review of existing reports and literature on scientific knowledge/data on biodiversity pressures/threats and drivers of decline in Guyana												
Deliverable 2: Report structure with contents for the overall National Synthesis Report on the diagnosis							<b>D2</b>					
Task 2: Identify gaps in national information on biodiversity pressure/threats and drivers of loss and global data sets												
Task 3: Develop and use robust scientific method(s) and tool(s) to identify and analyse the drivers /pressures on biodiversity loss in Guyana												
Task 4: Profile each of the selected economic sectors by defining and analyzing the contributions of the sector to GDP and sector footprint on biodiversity loss												
Task 5: Outline the ecosystem services used as inputs into each of the selected economic sectors and provide estimates each of the sector												
Task 6: Outline the key areas of ecosystem degradation and biodiversity loss resulting from the sectors's activities and provide estimates of the biodiversity degradation and loss resulting from the sectors												
Task 7: Identify any existing national and sectoral initiatives/mechanisms/abatement measures implemented across the economic sectors to address ecosystem degradation and reduce biodiversity decline within a transition to a nature positive future												
Deliverable 3: First draft complete report									<b>D3</b>			
Task 8: Develop a prioritization methodology based on national and sector context to rate the identified economic sectors based on the degree of impact on biodiversity loss and sectors capacity for change												
Task 9: Use the prioritization methodology to identify 2 key economic sectors for further analysis and in-depth study												
Deliverable 4: Priorization process and results report											<b>D4</b>	
Task 10: Organise meetings, discussions and stakeholder sessions with national and sector stakeholders (videoconferencing)												
Deliverable 5: Copies of presentations delivered and summary of engagement on methods and tools used and results/key findings and prioritization method												<b>D5</b>
Task 11: Complete the draft and final reports of the assessment; prepare and deliver presentations to national and sector stakeholders and members of the working group												
Deliverable 6: Final National Synthesis report for Guyana												<b>D6</b>

## 2 Methodology to reach objectives

In line with what have been previously defined, in the terms of reference and above, this section dedicated to the methodology will present the different step of the scoping phase, which is Phase 0, and the methodology for Phase 1 which consist of **undertaking a scientific qualitative diagnosis of pressures and threats on biodiversity (1) to identify the drivers of its decline or its loss at the national level (2), with a focus on the contributions of each sector (3).**



### Phase 0: Scoping phase

DELIVERABLE  
Inception Report

**Time work schedule:** 7 weeks

The aim of this phase will be to frame the study, specifically the methodological and governance aspects between the team of consultants and WWF Guianas, and other elements relating to the timetable and expected results of the study.

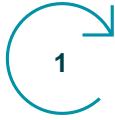
As a result of this **Inception Report (D1)** planned to be delivered on the **3rd of September**, the working group members and WWF-Guyana will get acquainted with the methodology. Biotope, WWF-Guyana and the working group will then get together for a **scoping meeting** on the **9th of September** to discuss the Inception Report.

Four steps will need to be carried out :

- Presentation of the consulting team and the proposed approach to ensure that the objectives and issues of the study are shared
- Confirmation and, if needed, adjustment of the objectives, the project methodology, the missions to be carried out and the implementation schedule.
- Agreement on the sectors to be assessed in the National Synthesis Study.
- Pre-identification of available and valuable documents to be collected, and key stakeholders to be contacted.

WWF will reach out to the Project Working Group Members to understand their availability to meet, and organize the meeting.

A **launching meeting** with wider stakeholder groups across all the sectors is planned to happen on the **23<sup>rd</sup> of September**. This meeting will launch the project in Guyana and bring together stakeholders in one place. It is expected that Biotope will have specific agenda items, to gather information needed from stakeholders. Biotope will need to contribute to framing the agenda for this meeting and specific objectives for items. WWF-Guyana will oversee the organisation of the meeting, which is expected to have a maximum running time of 3 hours.



## Phase 1: National Synthesis Assessment

### DELIVERABLE

Report Structure  
First draft complete report  
Copies of Presentations  
Final National Synthesis Report

**Time work schedule: 9 weeks**

### Global Framework

For this study, the chosen methodology will strongly condition the results as there isn't a single way to assess the impact of economic sectors on biodiversity. The stakes are complex as the subject holds the following conceptual hurdles:

- Biodiversity is an overall systemic and dynamic concept that hitherto cannot be catch as an all. By definition, the most complex/diverse/dynamic biodiversity is, the strongest it stays.
- Biodiversity loss is the result of the cumulative effect of economic sector's activity, that can hardly be considered separately.
- Economic sectors' impact nature is different and can't be compared on a simple "impact criteria".
- Economic sectors impact different ecosystems, each holding different stakes and levels of protection, each being more or less vulnerable, each being more or less important for the maintaining of global biodiversity.
- Economic sectors dependency from biodiversity, development perspective, ability to reverse their impacts, and influence are key criteria to be considered to select strategic actors that could trigger a transforming change

To bypass those conceptual hurdles, Biotope has chosen to set aside any silo analysis, and suggest following a **multicriteria method, by cluster of evidence**, to progressively remove unsuitable sectors and finally select the sectors that have the highest recurrence according to a dozen of criteria.

Three key range of criteria will be used to answer the objective of Phase 1, which is **to undertake a scientific qualitative diagnosis of pressures and threats on biodiversity (1) to identify the drivers of its decline or its loss at the national level (2), with a focus on the contributions of each sector (3)**. The two firsts' ranges (IMPACT + REVERSIBILITY) are belonging to first-order criteria, the last one (WILL) belonging to second-order criteria.

This frame will help to ass the sector's impact on biodiversity considering their actual and future intensity (IMPACT), the sector's ability to mitigate those impacts (REVERSIBILITY) which will both lead to an assessment of the impact's intensity, and the possibility to take them into account; and the sector's will to commit toward voluntary commitment (WILL), as an anticipation for Phase 2.

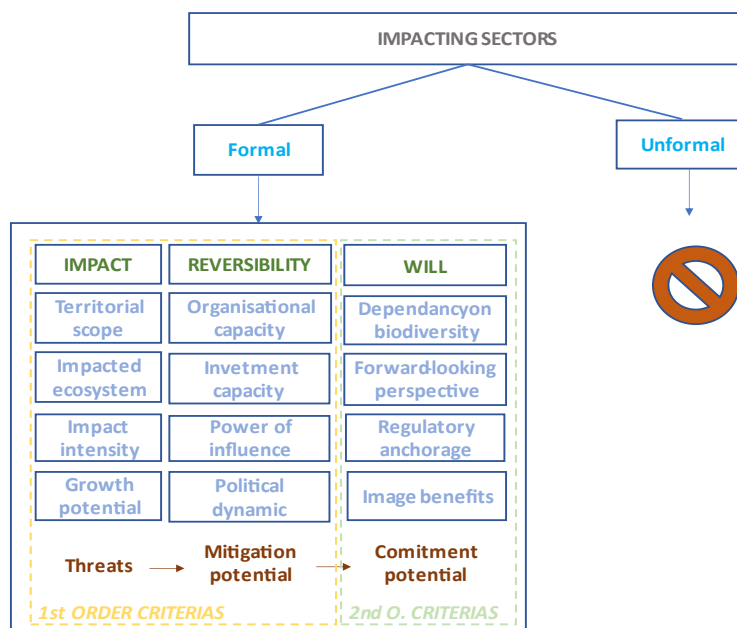


Figure 2: The three key range of criteria taken into account to select and prioritise sectors impacting biodiversity that are able to make voluntary commitments in Gabon

The section **IMPACT** relates to the **ecosystem entry**. The consultants will go deeper into the comprehension of each ecosystem in Guyana, their multi-scale value, their level of protection, their importance for global biodiversity, before identifying the direct and indirect pressures that are currently threatening them or could in the future become threats. Those threat will be related to economic sectors.

The section **REVERSIBILITY** relates to the **sectors entry**. The consultants will first draft the profile of each economic sectors, past current and future, and value their ability to mitigate their impact, by assessing their organisational capacities, investment capacities, power influence and sectorial political frame.

At that point, a third stage will be taken: the prioritization. The consultants will propose a multi-criteria prioritization, including "ecosystem criteria's" and "biodiversity metrics criteria's". From now, a dozen of criteria will be suggested, but this number and types of criteria will depend on the available data and documentation which will be made available in Guyana for this study (further details in the next sub-section "Tasks to be accomplished").

The section **WILL** relates to the **prospective entry**. The consultants will give a first estimation of the commitment capacity of each sector to prefigure the work that will be done for the 2 selected sectors in Phase 2.

### Tasks to be accomplished

The Phase 1 is composed of 11 tasks and 5 deliverables.

- ✓ **Task 1: Review of existing reports and literature on scientific knowledge/data on biodiversity pressures/threats and drivers of decline in Guyana**

The review will be done at early stage by Biotope. It is expected that WWF-Guyana and the working group contribute to supply Biotope with any appropriate document (both scientific and politic), analysis and actionable data at the beginning and throughout the study. A shared file (database) has already been created to gather bibliographic elements. Biotope will use several spreadsheets to centralize key elements on ecosystems, sectors, and metrics to make the analysed data clear and operational so that they can be easily used during the analysis.

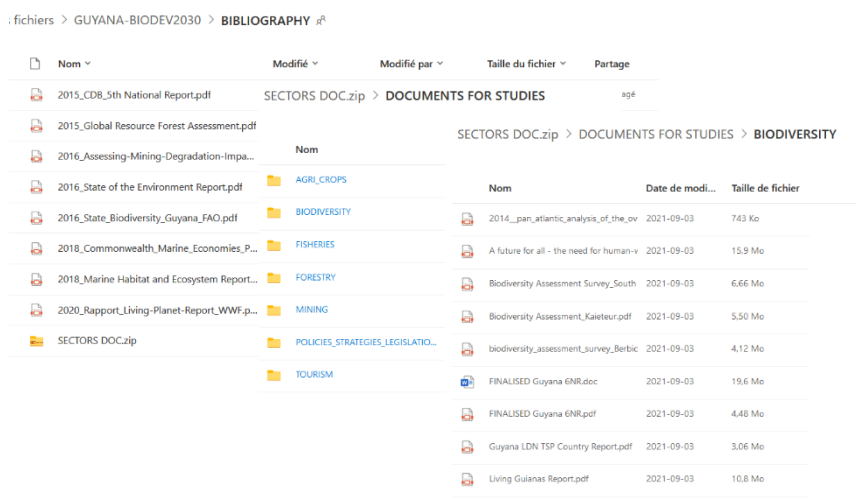


Figure 3: Organisation of the bibliography folder

The review will particularly pay attention to the specificity of Guyana's ecosystems, their biodiversity and their level of protection in order to **identify key biodiversity staked in Guyana**; the drivers of biodiversity decline or loss, the threat/pressures, the economic sectors' activity and their development perspectives to **retrace the causal chains that lead to biodiversity degradations**; the short term and long-term consequences of their activities on the ecosystems impacted, the extent and intensity of their impact, the ecosystem services at stakes **to identify key responsible sectors and to enhance the analysis with a prospective vision**.

To do so, international and national databases have been pre-identified, and will need to be complete further on.

Type of database	Type of data
International	<ul style="list-style-type: none"> <li>IUCN Global Ecosystem Typology</li> <li>IUCN Red list</li> <li>GBIF</li> <li>Aquamaps</li> <li>Biodiversity intactness</li> <li>Amphibian and mammalian richness and threat levels</li> <li>UNFCCC (Climate change) website</li> <li>Key Biodiversity Areas (KBA)</li> <li>Alliance for Zero, Extinction (AZE)</li> <li>Endemic</li> <li>Bird Areas (EBA)</li> <li>Biodiversity Hotspots</li> <li>Protected Areas (WDPA)</li> <li>Critical habitat layer</li> <li>Land cover (ESA)</li> <li>Global Forest Watch (GFW)</li> <li>Mangroves, Ramsar areas, Wetlands</li> <li>Living Planet Reports</li> </ul>
National	<ul style="list-style-type: none"> <li>Guyana National Land Use Plan (2013)</li> <li>Guyana's fifth National Report to the Convention on Biological Diversity (2015)</li> <li>Global Forest Resources Assessment (2015)</li> <li>State of the Environment Report (2016)</li> <li>The State of Guyana's Biodiversity for Food and Agriculture (2016)</li> <li>NBSAP (National Biodiversity Strategy and Action Plan)</li> <li>CBD website (National Report)</li> <li>Allocation maps</li> <li>MRV report</li> <li>GGMC (Geology and Mining Commission)</li> <li>Environmental Protection Act ; Protected Areas Act Forest Act ; Amerindian Act ; Guyana Constitution</li> <li>Low Carbon Development Strategy</li> </ul>

Table 1: Biodiversity related reports and databases

This review will also help identifying a potential expert (national and international) that could be mobilized throughout the study to get more precise insights.

In addition, a press analysis will be done (specialised medias and common Guyanese medias) and a questionnaire will be sent to the working group, to NGOs, researchers, and other stakeholders that WWF-Guyana considers relevant. Those steps will together form a whole, as one criterion, called “social entry” criterion.

At the end of this review, the **Report structure (D2)** will be sent, with the expected date of the 3rd week of September, few days after the Launching meeting. This deliverable will present the content that will be used for the overall National Synthesis Report on the diagnosis.

✓ **Task 2: Identify gaps in national information on biodiversity pressure/threats and drivers of loss and global data sets**

This task is the first step of the analysis. Documentation will be read and sort out, key information will be isolated, and if possible, crossed with other sources, before being gathered to serve the objectives of the study. Gaps in national information (missing elements) will be pointed out, to inform the readers on potential analysis gaps associated with the study. Nevertheless, efforts will be done to avoid any analysis bias due to those gaps, by focusing on stronger key elements and data.

A list of the apparently missing element will be proposed.

✓ **Task 3: Develop and use robust scientific method(s) and tool(s) to identify and analyse the drivers /pressures on biodiversity loss in Guyana**

Conceptual maps will be created to formalize the drivers of erosion. It will be based on analysis tools that Biotope has already identified in the scientific literature (Diaz et al. 2019; Geist et al., 2002; Liang et al., 2016; Hansen et al., 2020).

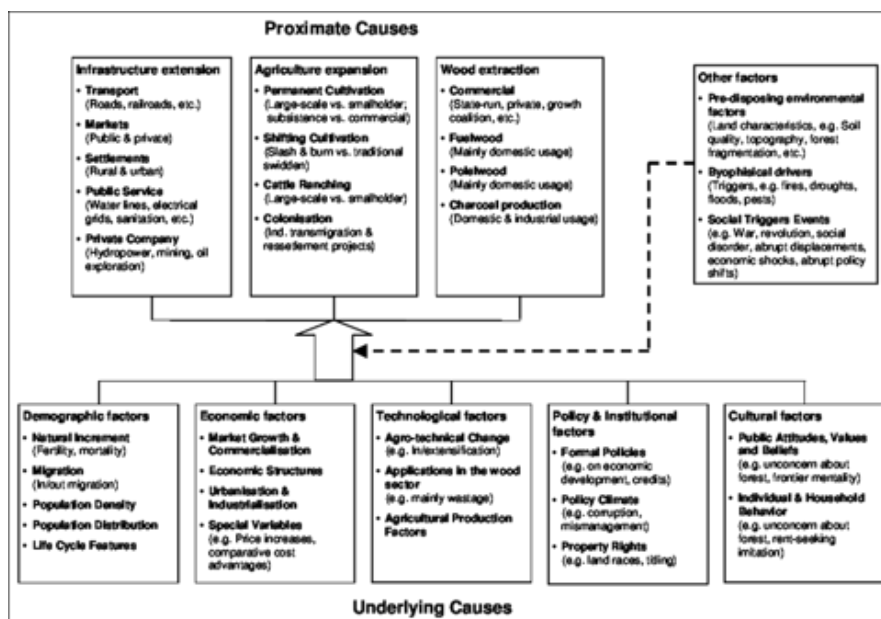


Figure 4: Analytical models from Geist et Lambin’s article, 2002.

The first step will consist in selecting roughly 5 characteristic ecosystems in Guyana, describe its **characteristics**, its **value**, based on the IUCN Global Ecosystem Typology 2.0, and its **level of protection**, based on national and international regulations on ecosystem protection. **Ecosystem services rendered** by those ecosystems will be listed (preparing the Task 5) as well as key ecosystem **assets for both national biodiversity and international biodiversity**. The conservation status of the species, reflected by both the IUCN’s Red List and national assessment, will be studied during that step as well as the number, area and conservation status of the protected areas of the country.

The second step will consist in selecting the existing threat in Guyana, according to the threat list of IUCN STAR metric, based on the literature review and expert assessment. The Species Threat Abatement and Recovery (STAR) metric measures the contribution that investments can make to reducing species extinction risk. It can help national and subnational governments, cities, civil society, the finance industry, investors and companies in targeting their investments and activities to achieve conservation outcomes and contribute to global policy aims. If any STAR assessment has been done for Guyana, it will be needed.

<b>1 Residential&amp;commercial dvpt</b>	<b>5 Biological resource use</b>	7.2.1 Abstraction of surface water (domestic use)	9.2.2 Seepage from mining
1.1 Housing & urban areas	5.1 Hunting & collecting terrestrial animals	7.2.2 Abstraction of surface water (commercial use)	9.2.3 Type Unknown/Unrecorded
1.2 Commercial & industrial areas	5.1.1 Intentional use	7.2.3 Abstraction of surface water (agricultural use)	9.3 Agricultural & forestry effluents
1.3 Tourism & recreation areas	5.1.2 Unintentional effects	7.2.4 Abstraction of surface water (unknown use)	9.3.1 Nutrient loads
	5.1.3 Persecution/control	7.2.5 Abstraction of ground water (domestic use)	9.3.2 Soil erosion, sedimentation
<b>2 Agriculture &amp; aquaculture</b>	5.1.4 Motivation Unknown/Unrecorded	7.2.6 Abstraction of ground water (commercial use)	9.3.3 Herbicides & pesticides
2.1 Annual & perennial non-timber crops	5.2 Gathering terrestrial plants	7.2.7 Abstraction of ground water (agricultural use)	9.3.4 Type Unknown/Unrecorded
2.1.1 Shifting agriculture	5.2.1 Intentional use	7.2.8 Abstraction of ground water (unknown use)	9.4 Garbage & solid waste
2.1.2 Small-holder farming	5.2.2 Unintentional effects	7.2.9 Small dams	9.5 Air-borne pollutants
2.1.3 Agro-industry farming	5.2.3 Persecution/control	7.2.10 Large dams	9.5.1 Acid rain
2.1.4 Scale Unknown/Unrecorded	5.2.4 Motivation Unknown/Unrecorded	7.2.11 Dams (size unknown)	9.5.2 Smog
2.2 Wood & pulp plantations	5.3 Logging & wood harvesting	7.3 Other ecosystem modifications	9.5.3 Ozone
2.2.1 Small-holder plantations	5.3.1 Intentional use: subsistence/small scale		9.5.4 Type Unknown/Unrecorded
2.2.2 Agro-industry plantations	5.3.2 Intentional use: large scale	<b>8 Invasiv species, genes &amp; diseases</b>	9.6 Excess energy
2.2.3 Scale Unknown/Unrecorded	5.3.3 Unintentional effects: subsistence/small scale	8.1 Invasive non-native/alien species/diseases	9.6.1 Light pollution
2.3 Livestock farming & ranching	5.3.4 Unintentional effects: large scale	8.1.1 Unspecified species	9.6.2 Thermal pollution
2.3.1 Nomadic grazing	5.3.5 Motivation Unknown/Unrecorded	8.1.2 Named species	9.6.3 Noise pollution
2.3.2 Small-holder grazing	5.4 Fishing & harvesting aquatic resources	8.2 Problematic native species/diseases	9.6.4 Type Unknown/Unrecorded
2.3.3 Agro-industry grazing	5.4.1 Intentional use: subsistence/small scale	8.2.1 Unspecified species	
2.3.4 Scale Unknown/Unrecorded	5.4.2 Intentional use: large scale	8.2.2 Named species	<b>10 Geological events</b>
2.4 Marine & freshwater aquaculture	5.4.3 Unintentional effects: subsistence/small scale	8.3 Introduced genetic material	10.1 Volcanoes
2.4.1 Subsistence/artisanal aquaculture	5.4.4 Unintentional effects: large scale	8.4 Problematic species/diseases of unknown origin	10.2 Earthquakes/tsunamis
2.4.2 Industrial aquaculture	5.4.5 Persecution/control	8.4.1 Unspecified species	10.3 Avalanches/landslides
2.4.3 Scale Unknown/Unrecorded	5.4.6 Motivation Unknown/Unrecorded	8.4.2 Named species	
		8.5 Viral/prion-induced diseases	<b>11 Climate change</b>
<b>3 Energy production &amp; mining</b>	<b>6 Human intrusions &amp; disturbance</b>	8.5.1 Unspecified "species" (disease)	11.1 Habitat shifting & alteration
3.1 Oil & gas drilling	6.1 Recreational activities	8.5.2 Named "species" (disease)	11.2 Droughts
3.2 Mining & quarrying	6.2 War, civil unrest & military exercises	8.6 Diseases of unknown cause	11.3 Temperature extremes
3.3 Renewable energy	6.3 Work & other activities		11.4 Storms & flooding
		<b>9 Pollution</b>	11.5 Other impacts
<b>4 Transportation&amp;service corridors</b>	<b>7 Natural system modifications</b>	9.1 Domestic & urban waste water	
4.1 Roads & railroads	7.1 Fire & fire suppression	9.1.1 Sewage	<b>12 Other options</b>
4.2 Utility & service lines	7.1.1 Increase in fire frequency/intensity	9.1.2 Run-off	12.1 Other threat
4.3 Shipping lanes	7.1.2 Suppression in fire frequency/intensity	9.1.3 Type Unknown/Unrecorded	
4.4 Flight paths	7.1.3 Trend Unknown/Unrecorded	9.2 Industrial & military effluents	
	7.2 Dams & water management/use	9.2.1 Oil spills	

Figure 5: List of threats on biodiversity according to STAR metric

- ✓ **Task 4: Profile each of the selected economic sectors by defining and analyzing the contributions of the sector to GDP and sector footprint on biodiversity loss, together with**
- ✓ **Task 5: Outline the ecosystem services used as inputs into each of the selected economic sectors and provide estimates each of the sector**

A summary sheet will be created for each sector and be divided in four sections:

- (1) **General data** both quantitative, including contribution to GDP, greenhouse gases emission (if available) etc., and qualitative, as past development, development perspectives, effective and potential triggers of change in the development trajectories.
  - (2) **Regulatory framework** and any other relevant political- legal relative information enhancing the state of rights given at national level for the development of each sector
  - (3) **Stakeholders** and influent actors for each sector, including private companies, political institutions, financial institutions, NGOs, unions, international institutions.
  - (4) **Impact**, including direct and indirect spatial influence of the sectors and their location in relation to natural habitats and the extent of occurrence of threatened species; volumes collected for certain species or resources, and the location of the samples in relation to natural habitats and the extent of occurrence of threatened species; categorization of direct and indirect cause variables and other factors of biodiversity loss; ecosystem services inputs.
- ✓ **Task 6: Outline the key areas of ecosystem degradation and biodiversity loss resulting from the sectors' activities and provide estimates of the biodiversity degradation and loss resulting from the sectors drivers of biodiversity loss to strategic economic sectors using a conceptual model showing dynamic actor-resource interactions.**
  - ✓ **Task 7: Identify any existing national and sectoral initiatives/mechanisms/abatement measures implemented across the economic sectors to address ecosystem degradation and reduce biodiversity decline within a transition to a nature positive future**

Several working groups, gathering consultants and to the extent possible some external experts, will be settled to draw and create the following conceptual maps and schemes for each selected ecosystem:

- (1) Threats pre-selected will be placed on a **threat/mitigation potential axis** to identify the current and future most impactful threat on each ecosystem. A second scheme based on the level of global threat/protection will highlight the most vulnerable ecosystems and the related impacting sectors.

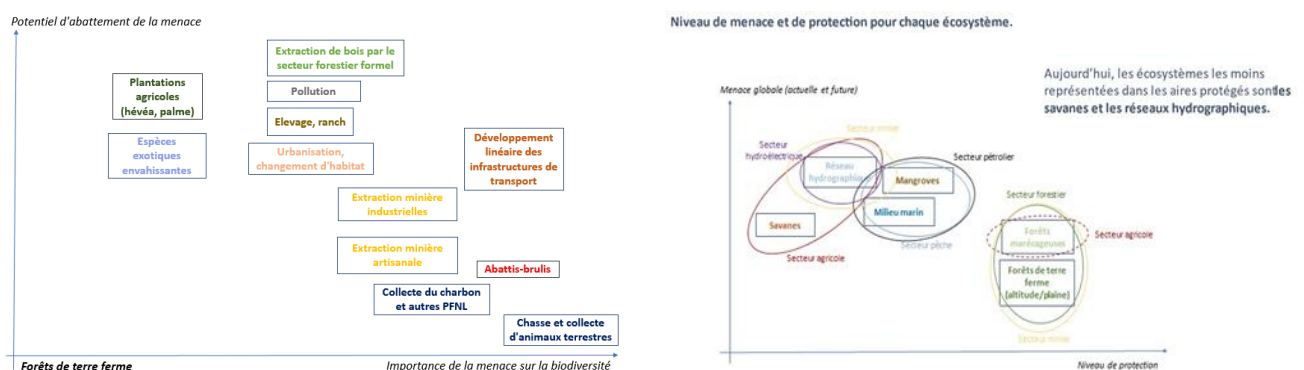


Figure 6: Threat/mitigation potential axis used for terrestrial forest ecosystems for BIODEV2030 study in Gabon (left); Level of threat/protection axis for all ecosystems for BIODEV2030 study in Gabon.

- (2) A **conceptual cause-consequence model** (pressure – state – impact) will be developed to link drivers of biodiversity loss to the country's economic sectors. It will illustrate causal chains leading to biodiversity degradation or loss.

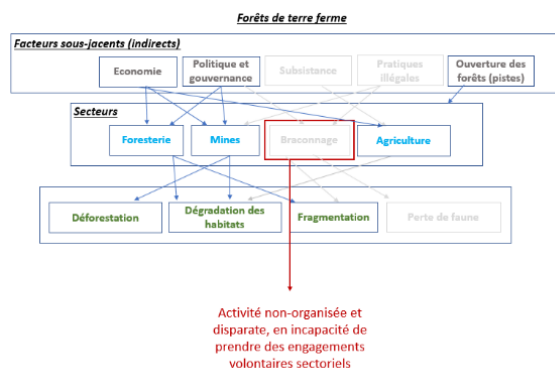


Figure 7: Scheme of causal chains leading to biodiversity degradation or loss for terrestrial forest ecosystems for BIODDEV2030 study in Gabon

- (3) Based on this static assessment, additional input will be used to value the risks of biodiversity loss according to factors of change for the strategic sectors (land conversion, overexploitation of natural resources, climate change) to make it dynamic. **The dynamic causal diagram** will be used to display elements of a system and their interactions according to a dynamic logic (modelling method frequently applied to natural ecosystems, economic systems and their relationships).
- (4) A **final review** will be done for each ecosystem, to gather their characteristics, ecosystem services, value for biodiversity, current drivers of decline, positive potential drivers of change, negative potential drivers of change and current political responses.

Once those tasks will be achieved, a **First draft complete report (D3)**, will be proposed, at the expected date of the 1<sup>st</sup> week of October.

- ✓ **Task 8: Develop a prioritization methodology based on national and sector context to rate the identified economic sectors based on the degree of impact on biodiversity loss and sectors capacity for change**
- ✓ **Task 9: Use the prioritization methodology to identify 2 key economic sectors for further analysis and in-depth study**
- ✓ **Task 10: Organise meetings, discussions, and stakeholder sessions with national and sector stakeholders (videoconferencing)**

The team of consultants will study all available data on indicators and metrics and their evolution as factors of change for the last decade, from the interpretation and classification of satellite images and historical changes in key factors (land conversion, overexploitation of natural resources).

Some metrics or indicators will then be selected to score the different sectors, depending on the data available for each metric or indicator in the country, among which there might be (non-exhaustive):

- The number of ecosystems impacted weighted by their level of protection
- The number of ecosystems impacted weighted by their value for global biodiversity
- The impact on priority habitat
- The impact in priority species (including STAR metric)
- The impact on protected areas network
- The impact on ecosystem services
- The capacity to engage positive factor of change
- A social entry

During the study, other criterion could be added according to the data collected. Consultants could produce a risk GIS map, based on biodiversity databases and quantified impacts of sectors. The above metrics have the advantage of being suitable for cartographic representations, which may facilitate the consultations and discussions of outcomes of the study. The maps could be useful tool to represent most impacting sectors based on these indicators.

All along the prioritization process, consultation meetings will be held with strategic economic sectors, to get empirical insights. To do so, 16 stakeholders meeting have been planned by WWF-Guyana, and Biotope is allowed to attend additional meetings on its own side. No fieldwork is planned for Biotope team, but the local consultant could physically attend the meetings. Those consultations will aim to better catch:

- The stakeholders involved in biodiversity management: interests/expectations; powers/influences; willingness to commit to reducing biodiversity loss; obstacle to consider biodiversity
- The stakeholders prospective plan for the development of their activity
- The level of organization of the sector, and opportunities to create voluntary agreement
- Additional data that private stakeholders might have

A **stakeholder map** will be developed to identify the economic sectors with high impacts on biodiversity and with a high willingness and capacity to change. At the middle stage of those tasks, Biotope will require a **bilateral meeting with WWF-Guyana** to confirm the range of criteria to be used to prioritize the sectors and to do a mid-term review of consultations, and contacts needed to complete it.

<p>Pondération multicritères.</p> <p><u>Scores</u></p> <p>Mines: 16 Agriculture: 15 Foresterie: 14 Hydroélectricité: 7 Pétrole: 7 Infrastructures portuaires: 6 Infrastructures liées à l'urbanisation: 1</p>	<p><u>Habitats prioritaires (national)</u></p> <ul style="list-style-type: none"> <li>✓ Agriculture +++</li> <li>✓ Mines +++</li> <li>✓ Hydroélectricité +++</li> <li>✓ Foresterie ++</li> </ul> <p><u>Habitats prioritaires (international)</u></p> <p><u>Exceptionnalité écologique</u></p> <ul style="list-style-type: none"> <li>✓ Foresterie +++</li> <li>✓ Mines +++</li> <li>✓ Agriculture +</li> </ul> <p><u>Littoral</u></p> <ul style="list-style-type: none"> <li>✓ Infrastructure portuaire et de transport +++</li> <li>✓ Pétrole ++</li> <li>✓ Pêche +</li> </ul> <p><u>Climat</u></p> <ul style="list-style-type: none"> <li>✓ Agriculture +++</li> <li>✓ Pétrole ++</li> <li>✓ Hydroélectricité ++</li> </ul> <p><u>Changements globaux</u></p> <ul style="list-style-type: none"> <li>✓ Infrastructures de transport +++</li> <li>✓ Pétrole ++</li> <li>✓ Pêche ++</li> <li>✓ Agriculture ++</li> <li>✓ Mines ++</li> </ul>	<p><u>Espèces prioritaires</u></p> <ul style="list-style-type: none"> <li>✓ Agriculture +++</li> <li>✓ Foresterie +++</li> <li>✓ Hydroélectricité ++</li> <li>✓ Pétrole +</li> </ul> <p><u>Zones protégées</u></p> <ul style="list-style-type: none"> <li>✓ Pêche artisanale +++</li> <li>✓ Foresterie +++</li> <li>✓ Mines +++</li> <li>✓ Urbanisation et traitement des déchets</li> </ul> <p><u>Services écosystémiques</u></p> <ul style="list-style-type: none"> <li>✓ Mines ++</li> <li>✓ Foresterie ++</li> </ul> <p><u>Social</u></p> <ul style="list-style-type: none"> <li>✓ Mines +++</li> <li>✓ Agriculture +++</li> <li>✓ Foresterie ++</li> </ul>
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Figure 8: Example of the multicriteria ponderation that have been done for Biodev2030 in Gabon

Every sector will finally be study through each criterion and a **ponderation score based on sector's recurrence** will be done, with the aim of highlighting strategic economic sectors that have the most impact on Guyana's biodiversity decline. Once done, a **Priorization process and results report (D4)** will be delivered, at the expected date of the 3<sup>rd</sup> week of October.

**Copies of presentations (D5)** and summary of engagement on methods and tools used and results/key findings and priorization method is expected to be delivered the last week of october.

- ✓ **Task 11: Complete the draft and final reports of the assessment; prepare and deliver presentations to national and sector stakeholders and members of the working group**

A presentation meeting will be organized by WWF-Guyana. Biotope, WWF-Guyana, the working group members and stakeholder groups across all the sectors will attend the meeting.

The aim will be to present the results of the study, and engage discussion to answer questions, and select the 2 key strategic impacting sectors to work with for the second phase.

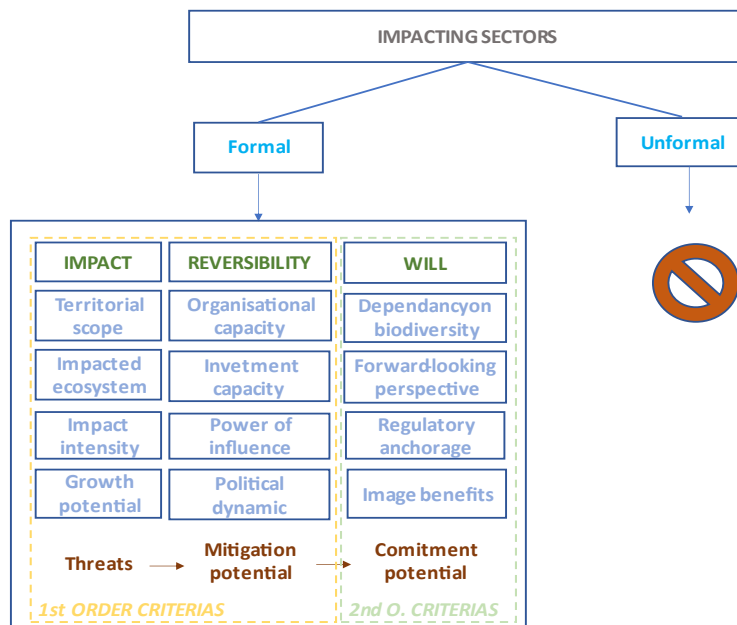
At the end of the meeting, the report will be completed. The **Final National Synthesis report for Guyana (D6)** will then be delivered.

### 3 Preidentification of impacting sectors

During meetings with key stakeholder groups and the working group the following sectors have been pre-selected:

- Forestry
- Mining
- Agriculture (crops, rice and fisheries)
- Infrastructures
- Tourism
- Oil&Gas
- Pharmaceutical & Manufacturing.

This section aims to do a quick review of those proposed sectors to be sure that they can match to the study. The following figure, previously presented (Figure 2) will drive the thinking.



#### 3.1 Forestry

**In terms of impacts,** forestry is a degradation driver. Most of Guyana's forest cover (87%) has been designated as production forest, with 84.6% being publicly owned by the State and the remaining 15.4% either declared as indigenous lands or privately owned. Forestry sector cause ecological damage whether done sustainably or unsustainably, and this can be easily seen through remote sensing and map analysis. The impact of forestry on biodiversity is both direct (tree extraction, habitat loss, cumulated canopy cover loss, effect of logging activities on residual trees, ground clearance, noise disturbance, disturbance of fauna) and indirect (road constructions, introduction of invasive species, opening of forest to other impacting activities). Forestry can be particularly detrimental to high-value species such as *Chlorocardium rodiei* (Greenheart) which is endemic to Guyana, *Peltogyne venosa* (Purpleheart), *Hymenea courbaril* (Locust) and *Diploptropis purpurea* (Tatabu), which is an obvious pressure on the resource, and to ecological continuity, by creating felling gaps, which break ecological corridors.

Moreover, Guyana's forests have a specific value as it is large and diverse with 36% of rainforest, 35% of montane forest, 15% swamp and marshes, 7% dry evergreen forests, 6% seasonal forest, and 1% mangrove forest

(International Tropical Timber Organization), which is an asset for national and global biodiversity to consider in the analysis. Aside from the timber industry, Guyana's forests are also key to tourism development, biodiversity conservation, wildlife management, bioprospecting, soil fertility and nutrient cycling, and other ecosystem services such as water provisioning and carbon sequestration. Indeed, extracting forest resources has accumulated adverse effects.

**In terms of reversibility**, forestry sector is majority legal and organised since Guyana has been at the forefront of REDD+ development since 2006. Guyana is also a partner country of both the UN-REDD Programme and the World Bank's Forest Carbon Partnership Facility (UNFCCC 2017, FCPF 2017, The REDD desk, 2016). In late 2009, Guyana signed a five-year bilateral performance-based REDD+ agreement with Norway worth \$250M to facilitate REDD+ readiness and low-carbon projects and showed interest in extending the collaboration (Government of Norway 2016, Joint Concept Note 2015, The REDD desk, 2016; Overmann, et al. 2019).

Key stakeholders have also already been identified.

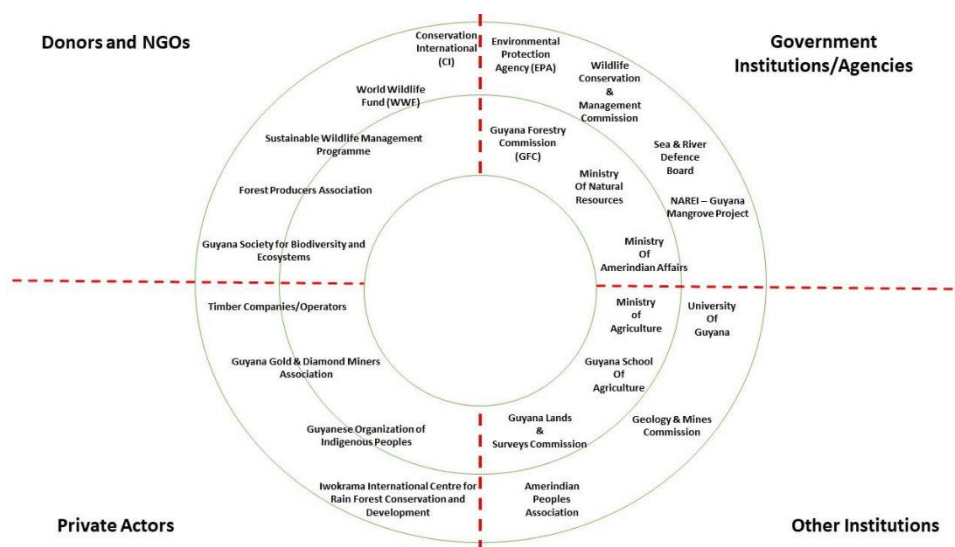


Figure 9: Key stakeholders across the Forest Sector. Source: National Context Analysis, WWF Guiana.

Policy initiatives are also underway, among which we can count the national low carbon development strategy, the protection of land and inland waters, the Green State Development Strategy: Vision 2040 and initiatives to develop agroforestry (Revised National Forest Policy, 2018)

**Forestry is a sector confirmed by Biotope to work with.**

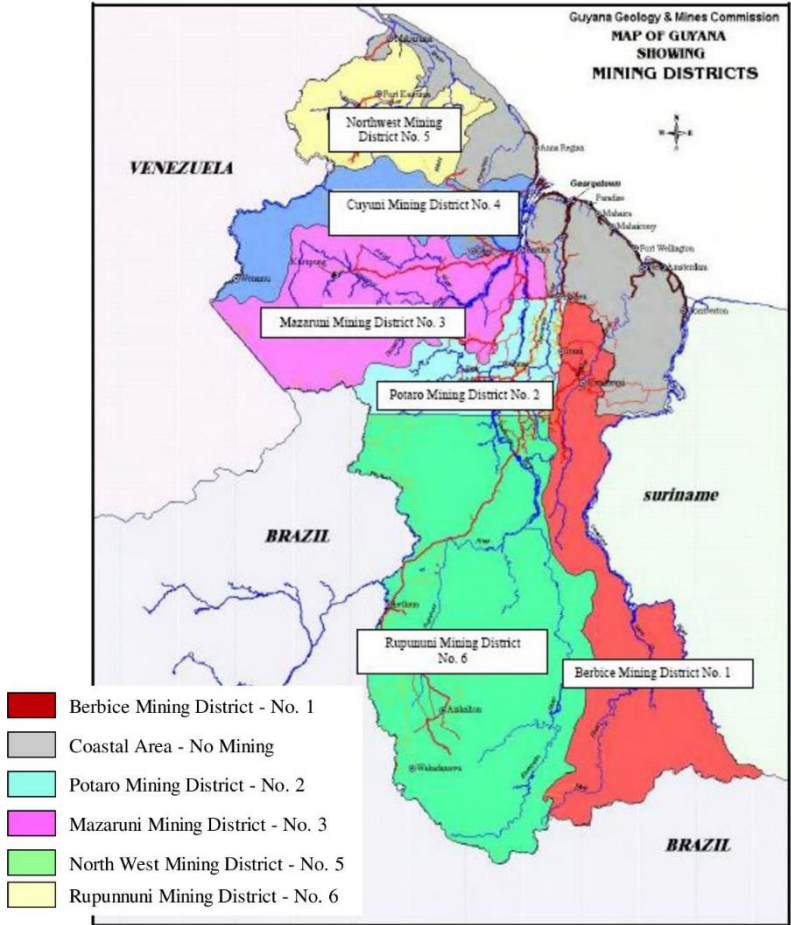
### 3.2 Mines

**In terms of impacts**, mining is a longstanding and deep-rooted activity (more than 100 years), also driver of biodiversity erosion. In 2017, forest degradation was estimated at 4,764 ha, and mining (with associated road infrastructure) accounted for 81% of degradation followed by shifting agriculture at 11%, settlements at 6%, and agriculture at 2% (CBD 6<sup>th</sup> National Report). Bauxite mine clearing in Guyana involves the removal of forest cover to allow stripping to be carried out which result in direct destruction of the ecosystem (flora, fauna). The greatest signs of environmental degradation were found to be in the bauxite and gold mining industries (CBD 6<sup>th</sup> National Report), and apart from resource degradation, the mining sector is responsible of resource contamination with water pollution from mercury, cyanide and other chemical. As an example, in august 1995, Cambior's tailings dam broke and leaked 4,2 million cubic meter of cyanide containing slurry into Essequibo River, and 80 km of the river were declared an environmental disaster.

**In terms of reversibility**, mining is an appropriate sector to work with because of its longevity and power of influence (strategic position). The activity exists since the pre-colonial era and has contributed to growth and

expansion of transport services, telecommunications, and distribution of goods and services to remote locations, which makes it a strategic actor.

Currently, we distinguish mining operation occurring at three scales: large scale operation, whereby a minimum volume of 1000m<sup>3</sup> of material is excavated or processes and aggregate for 24 hours; medium-scale operation where the volume range for materials excavated or processed in a day is 200m<sup>3</sup> to 1000m<sup>3</sup>; and small-scale operations (where the volume range for materials excavated or processed in a day is 20m<sup>3</sup> to 200m<sup>3</sup>) (Thom, 2020). There are six mining districts in Guyana demarcated as the (1) Berbice Mining District, (2) Potaro Mining District, (3) Mazaruni Mining district, (4) Cuyuni Mining District, (5) Northwest Mining District, and the (6) Rupununi Mining District, which will also serve the first part of the analyse, focused on impacts on ecosystems. We also identified that Toroparu Mine is also a copper/silver project that is developing.



Source: GGMC. Figure 10: Demarcation of mining districts

Key stakeholders have also already been identified, and more specifically, two state mines (Berbice Mining Company, Linden Mining Company), some private companies (Omai Gold Mine, Golden Star Resources, Aura Gold Mine), and a potential Russian company, Nordgold, that could acquire a 100% participation in a gold mining project.

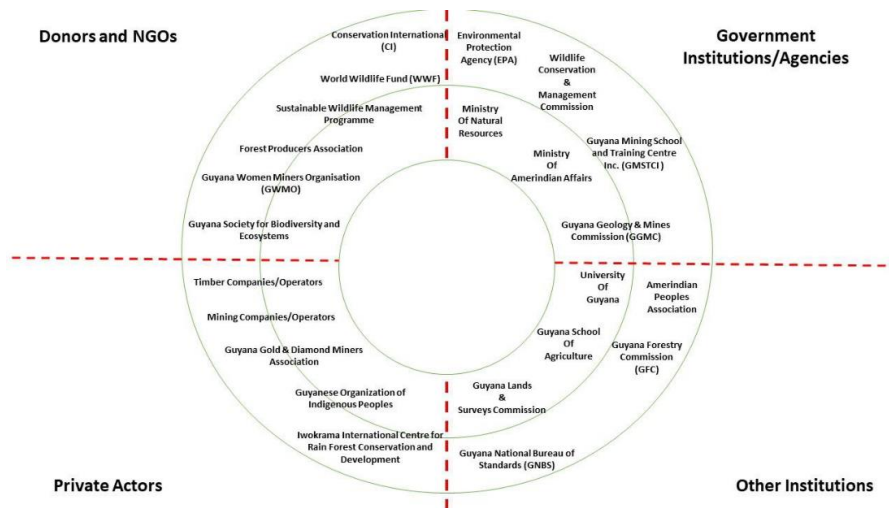


Figure 11: Stakeholders map for mining sector

Policy initiatives are also underway. The Guyana Geology and Mines Commission (GGMC) has integrated activities for addressing mine restoration (on-going efforts to expand the scope of reclamation and restoration to waterways impacted by mining) and the project "Strengthening the Enabling Framework for Biodiversity Mainstreaming and Mercury Reduction in Small and Medium-scale Gold Mining Operations" was submitted and approved by the GEF. Five other project proposals have also been submitted and approved by the GEF:

- A Gold/ Supply Chain Approach to Eliminating Mercury in Guyana's ASGM Sector: El Dorado Gold Jewellery Made in Guyana. The goal of the project was to assist Guyana with converting to mercury-free mining by 2025 by directly involving business enterprises to lead the shift in the development of a mercury-free ASGM supply chain and downstream El Dorado brand jewellery.
- Minamata Initial Assessment for Guyana. The goal was to undertake a Initial Mercury Assessment to identify the national mercury challenges and the extent to which legal, policy and regulatory framework will enable Guyana to implement future obligations under the Minamata Convention
- Strengthening Technical Capacities to Mainstream and Monitor Rio Convention Implementation through Policy Coordination. The goal of this project was to strengthen technical capacities for mainstreaming and monitoring achievement of Rio Convention objectives through policy coordination
- Strengthening the Enabling Framework for Biodiversity Mainstreaming and Mercury Reduction in Small and Medium-scale Gold Mining Operations. The goal of the project was to Strengthen the regulatory framework and institutional capacity for the management of small and medium-scale gold mining and promote greater adoption of environmentally friendly mining techniques in Guyana in order to protect globally significant biodiversity, reduce mercury contamination, enhance local livelihoods and human health.
- Strengthening the Enabling Framework for Biodiversity Mainstreaming and Mercury Reduction in Small and Medium-scale Gold Mining Operations.

**Mines is a sector confirmed by Biotope to work with.**

### 3.3 Agriculture

**In terms of impacts,** agriculture is a driver of degradation. In 2016, the GFC identified 6 anthropogenic drivers of forest change (CBD 6<sup>th</sup> National Report), among which 3 are directly or indirectly linked to agriculture activity :

- Forest, especially clearance activities for roads and log landings
- Mining, especially primarily ground excavation associated with small, medium and large-scale mining
- Agriculture, directly linked
- Fire, indirectly linked with slash-and-burn agriculture
- Settlements, such as new housing developments, indirectly linked to sedentary human settlements due to agricultural activities

In fact, Guyana agriculture is the main activity on non-forest land (8,4%), with 2,1% of arable land, 0,1% of permanent crops, 6,2% of permanent pasture, and by essence, agriculture creates direct impact on biodiversity by exploiting land and resources. Resource degradation can be overfishing leading to the depletion of stocks especially breeding stocks of commercial species, deforestation of mangrove swamps, resulting in the loss of habitats for juveniles of important marine species and an increase in the danger of flooding in coastal areas, the over-harvesting of inland forests with a consequential loss of habitats and a reduction of species diversity, soil erosion with the attendant decrease in the water-holding capacity of watersheds thus rendering the affected area susceptible to episodes of flooding and siltation and indirect impact created by agricultural wastes, and potential introduction of alien species.

Agriculture is also rated as the third largest driver of deforestation. Deforestation as a result of agricultural activity peaked in 2014 at 817 ha (GoG, 2015a; Guyana Forestry Commission, 2018) (Figure 4-5), and creates many human-wildlife conflicts (mostly with the Chapuchin Monkey and the Red Rump Agouti), due to habitats loss. A recent assessment has shown that there is a correlation between agriculture and mangrove deforestation and degradation ( $R^2 = 0.9821$ ) (Conservation International, 2018). In many cases, mangroves are cleared for the sake of agricultural activities. Unregulated, unmonitored, and unsustainable agricultural activities in the crystalline plateau of Guyana can also put ground water resources on the coastal plain at risk of being contaminated, and apart from surface water pollution, soil biota is also negatively affected by the overuse of agrochemicals.

Agriculture has also been found to be a major source of methane and nitrous oxide which are both greenhouse gases with higher global warming potentials than carbon dioxide. Rice cultivation alone accounts for 82% of Guyana's total methane emissions and 94% of Guyana's total nitrous oxide emissions. Another major source of methane emissions is livestock production predominantly due to enteric fermentation and the prescribed burning of savannahs which are done as part of land preparation for cultivation in some instances. In seeking to improve the productivity in the agriculture sector of Guyana in the past, decisions were taken to import and incorporate various exotic species as Antelope grass (*Echinochloa pyramidalis*), Gold tilapia (*Oreochromis aureus*), Mozambique Tilapia (*Oreochromis mossambicus*) and Nile Tilapia (*Oreochromis niloticus*), Small Indian Mongoose (*Herpestes javanicus*).

**In terms of reversibility**, agriculture is to be considered, as the sector implies more than 33% of employment, 40% of export earnings and around 11% of the national budget. Moreover, there is currently a paradigm shift in agricultural production away from the traditionally grown crops (rice and sugarcane) to a more diversified agricultural sector that encompasses the traditionally grown crops with non-traditionally grown crops (cereal grains, legumes, root provisions, spices, fruits, and vegetables) (Guyana Ministry of Agriculture, 2013; Moonilall, et al. 2020).

Nevertheless, even if the sector is officially divided into five subsectors at national level, namely the traditional agriculture (rice and sugar industry), fisheries, livestock (included apiculture) and the non-traditional crop industry. Biotope do recommend working with traditional industry, non-traditional industry, and fisheries, separately because those activities impact different ecosystems and does not deal with the same actors (farmers are not sharing the same preoccupations are fishermen). Agriculture is a challenging sector because a lot of different actors, acting at different scales, are linked to agriculture activities. At national level, there is 11 subsector agencies (Figure 12), at the local level, there is the neighbourhood democratic councils, village councils and various community groups to be considered (Figure 13).

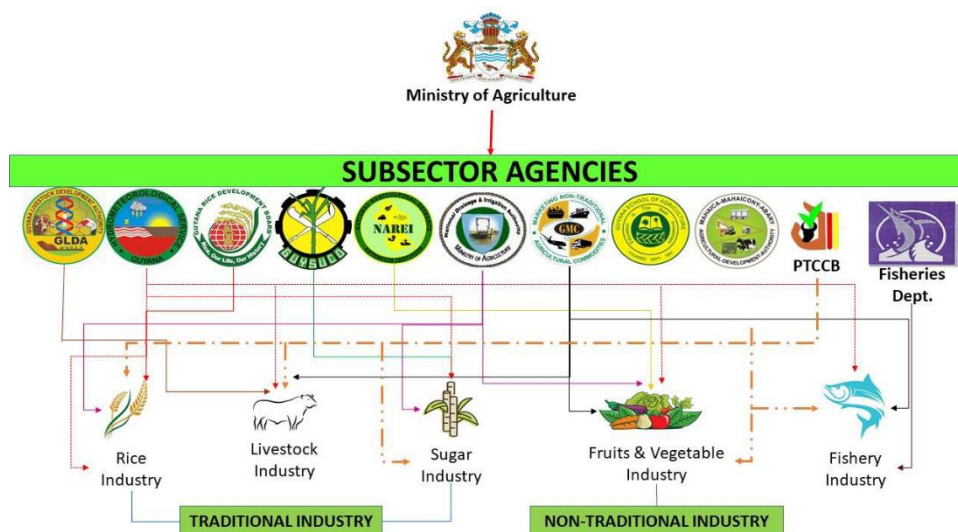


Figure 12: National arrangements for agricultural sector

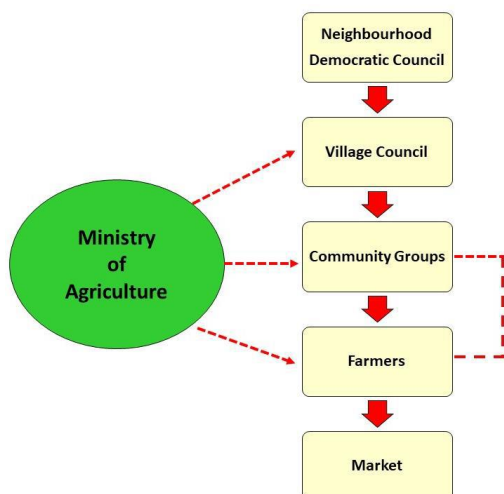


Figure 13: Community arrangement structure for agriculture sector

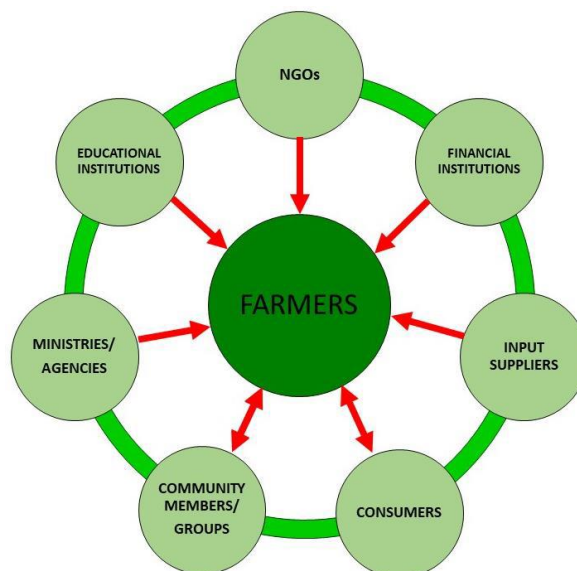


Figure 14: Types of actors for agriculture sector

Political initiatives are also distinct and wide. Whether there is a promotion of sustainable development of inland fishing through the development of guidelines for responsible recreational fishing and ornamental fish collection and handling on one side, there is a great number of biodiversity mainstreaming strategies within the sector (Letter of Agreement with UNDP, February 2021) on the other side:

- put legislation in place to mandate farmers to use more local cultivars
- implementation of integrated land use management policies
- integration of integrated biodiversity objectives into legislation e.g ecosystem-based management in both inland and marine fisheries
- strengthening monitoring and evaluation in the agricultural sector
- establishment of national standards and protocols that recognize the role of biodiversity in the value chain of selected products and services
- the principal areas of work were distributed between the Government and the private sector, in view of the Government's role in promoting sustainable agriculture and protocols for the incorporation of sustainability practices and standards, joined by the private sector's work in achieving compliance with market standards and protocols and voluntary certifications.
- encouraging agencies to do more research and improvement of local cultivars
- reforming environmentally harmful agricultural subsidies
- implementation of information and voluntary approaches
- linking small scale producers of native varieties directly to various markets

Along with 8 recommendations related to the UNCBD.

**Biotope recommend distinguishing fisheries from livestock and crop and rice industry and suggest having a discussion on agricultural actors and their engagement capacity to precise how to work with this sector. In fact, on this project, we can hardly work with small agricultural farmers or pastors that are not organized enough to take any sectoral voluntary commitments.**

### 3.4 Infrastructures

In major cases, infrastructure can be linked to urbanization, transportation, or energies. Even if urbanization is an obvious driver of erosion, it is not relevant to select it for this study, as it is a matter of land-use planning, which is linked to national political orientations. Moreover, it is hardly possible to take it as an organized whole. Construction companies are diverse, and different from sanitation companies and other services companies linked to the

urbanization process. Transportation is also a great driver, but often linked to the development of other activities, mostly mining and forestry, that are already picked to be studied.

**Thus, in Guyana context, Biotope recommend focusing on infrastructures linked to energies, and particularly renewable energies.** Since the early 2000s, Guyana has committed to transitioning its economy to a green economy and there are plans to establish several hydro dams. A Low Carbon Development Strategy (LCDS) was initiated in 2009 which incorporates a transition to low carbon industries through renewable energy sources, and a memorandum of understanding with the gov to plans to develop a hydropower plant at the Kumarau Falls on the Kurupung River.

In terms of impacts, species, waters, and ecological corridors can largely be impacted. A work will need to be done to identify the actors and seize their organization.

### 3.5 Tourism

In 2019, Guyana has been named the n°1 best ecotourism destination in the world at the Internationale Tourismus-Börse Berlin (ITB) and the 'Best in Sustainable Tourism' at the Latin American Travel Association (LATA) Achievement Awards, which took place during 'Experience Latin America', Europe's largest travel conference focused on the Latin America region.

In terms of impact, the tourism sector has a positive impact, especially as a post covid recovery process. In fact, a range of conservation initiatives can be seen in Guyana (Arapaima Conservation & research initiative, the South Rupununi Conservation Society, the Iwokrama Forest Reserve) and future commitments in relation to UNCBD are already signed (development of database systems and networks on biodiversity, promotion of nature-based products, plans for restructuring and reorienting the Zoological Parks, Public Education and Awareness etc.)

Tourism won't be seized in its potential of reversibility but in its potential to be a lever of changer. Tourism can also involve other sectors in their commitment, as agriculture or fisheries, which is relevant on this study. The sector seems to be structured enough to help incorporating sustainability in Guyana's legislation. A work will need to be done to reference the actors.

**Tourism is a sector confirmed by Biotope to work with.**

### 3.6 Oil and Gas

Currently, oil and gas represent the main emerging risk since an oil field was discovered in 2015 on 200km of coastline by ExxonMobil (13 potential wells). In 1999, Exxon Mobil and Shell signed an agreement with the Guyanese government for offshore exploration. In May 2015, the Liza-1 exploration well, drilling in 5,719 ft of water, encountered 295 ft of high-quality oil-bearing sandstone upon reaching 17,825 ft, TVD. Exxon Mobil estimated that the reservoir contained recoverable reserves between 800 MMboe and 1.4 Bboe. At a 2025 horizon, there is a will to extract 750000 barrels per day, to be fully exported, and since 2019, gas field are exploited.

In terms of impact, oil extraction can create void corridors, due to seismic extractive activity. Offshore oil activity also a cause of pollution (oil and chemical spills, atmospheric, acoustic, visual) that hinders the growth and development of plant enzyme functional groups, slows cell productivity and root growth, overloads metabolic pathways for pollutant transformation and detoxification (e.g., mangroves), blockage of waterways and as regard climate, it is the source of fugitive methane emissions. There are also disaster risks due to oil spill.

In terms of reversibility, the sector will probably strong enough to invest in biodiversity. From now, the main company is the China National Offshore Corporation. The sector isn't really structured, as the activity is quite new, but as an emerging activity, it is an opportunity to engage the country in a sustainable oil extraction.

**Oil&Gas is a sector confirmed by Biotope to work with.**

### 3.7 Pharmaceutical & Manufacturing

**Biotope requires a discussion on the selection of this sector** to understand better what the working group understand through it. Pharmaceutical industry can either be seen as a threat for genetic resources, with resources plundering for medical research targets, and in that sense a work can be done on the application of the Nagoya Protocol, or as a source of pollution. During the meeting, we will require a better explanation of this sector's structure and how the working group perceives its impact on the environment.

### 3.8 Banking sector

**Biotope would like to suggest including the banking sector in the study.** Even if this sector doesn't have direct impact on biodiversity, it can positively impact it.

In Guyana, a special foundation, known tentatively as the Guyana Rainforest Foundation, was to be established with a mandate to mobilise funding from international NGOs, corporations, and bilateral governmental donors. The proposed Guyana Rainforest Foundation would have also sought to promote ecotourism, the medicinal uses of the forest, and other income-generating activities, which do not entail the felling of trees for commercial purposes. It would also promote international agreements on carbon offset for industrial pollution in developed countries.

## 4 Next steps

A meeting is planned on the 9<sup>th</sup> of September. That meeting will be divided into the 4 following phases:

(1) Presentation of the team and the methodology for the Phase 1

(2) Question/answers on the methodology

(3) Discussion on the sectors' pre-selection

- Agreement on the forestry, mining, oil & gas, tourism sector to be confirmed on both sides
- Taking fisheries as a sole sector to be confirmed
- Find an agreement on the scope chosen to study the agriculture sector (traditional/industrial; crops/pastures; farmers/companies)
- Taking renewable infrastructure as the sole sector, in the "infrastructure category"
- Reconsidering (or not) the choice of pharmaceutical and manufacturing sector
- Considering the study of banking sector

(4) Discussion on the resources needed and on the current political commitments in each sector.

The working group can start to gather information on actors in each sector, and current political dynamic (commitment, initiatives, project) for each sector.