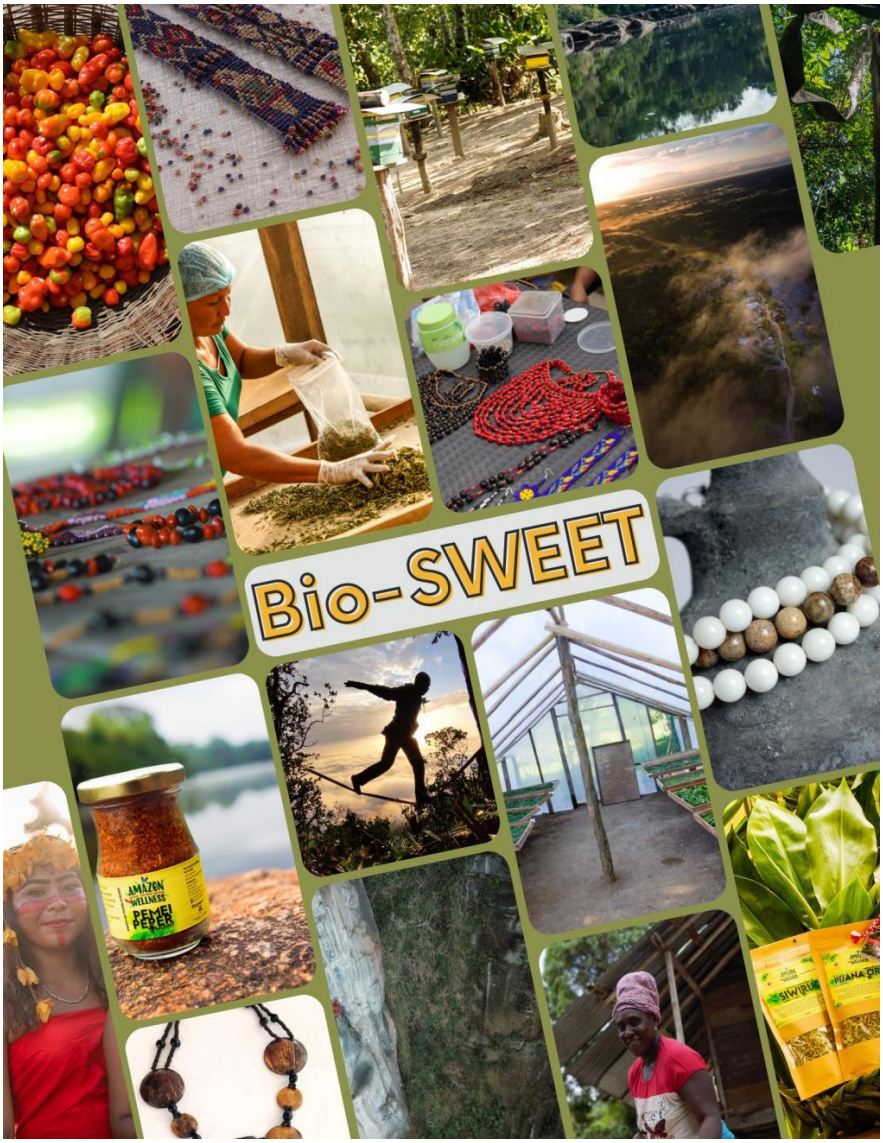

BIODIVERSITY ACTION PLAN (BAP) INCLUDING CRITICAL HABITATS ASSESSMENT FOR THE PROJECT 'RURAL ELECTRIFICATION WITH RENEWABLE ENGERGY, POTABLE WATER, AND TELECOMMUNICATIONS IN SURINAME'

ABSTRACT

This document contains the Biodiversity Action Plan (BAP) including the Critical Habitats assessment performed through this consultancy

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Paramaribo, 1 July 2024

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LIST of ABBREVIATIONS

BAP	**Biodiversity Action Plan**
GoS	**Government of Suriname**
UNDP	**United Nations Development Programme**
CI	**Conservation International Suriname**
ACT	**Amazon Conservation Team Guianas**
MUMA	**Multiple Used Management Area**
CBT	**Community based Tourism**
ESIA	**Environmental and Social Impact Assessment**
FPIC	**Free, Prior, Informed Consent**
NGO	**Non-Governmental Organization**
IUCN	**International Union for Conservation of Nature**
ITP	**Indigenous and Tribal People**
RAP	**Rapid Assessment Program**
IP	**Indigenous People**
HFLD	**High Forested, Low Deforested Countries**

INTRODUCTION

Context

This project aims to provide renewable energy, clean water, and telecommunications support to ten (10) Indigenous villages in southern Suriname. The interventions will focus on the villages and their immediate surroundings for energy provision, while clean water coverage will be fairly consistent across the area. However, the expansion of telecommunications infrastructure, including the construction of additional towers, will require accessing and potentially impacting natural forest areas. In South Suriname biodiversity and ecological data collection has been limited to concise project initiatives. Due to the vast area, the financial and human resources for scientific research are challenging. In almost all biological rapid assessment new species were recorded. From previous scientific work important ecosystems were also identified and ecosystem services described. Safeguarding biodiversity and ecosystem services is therefore evident for this project. On 1 July, 2024 this rapport was last screened for updates.

Purpose

This document analysis the Biodiversity-related safeguard requirements as designed by the bank. It also discusses the critical habitat. In general, precautionary approach to environmental impacts will be followed, as well as mitigations where necessary.

It presents an initial Biodiversity Action Plan (BAP), which may change over time and adapted with populated data/information during the project implementation phase:

- an overview of the impacts on prioritize biodiversity and critical habitats;
- an overview of mitigation design;
- a summary of the residual impacts from the Project on critical natural habitats;
- identification of potential delivery partners, and likely key stakeholders;
- indicative monitoring plan;
- identification of key roles and responsibilities for delivering the actions set out in the BAP.

Project Design

As the BAP is a "living plan", it will be regularly updated over the course of the Project. The current version of the BAP is based on the assessment of 2022/2023. An update will be performed once the project is under execution. This can also facilitate possible changes in designs or locations based on field adaptations. The analysis is based on literature review, and the ongoing Life Plan (holistic indigenous planning) process in south Suriname. Local and western minds come together to draft a hybrid plan addressing local needs and ambitions within the framework of administrative guidance. Biodiversity and Ecosystems conservation, sustainable use and monitoring are important.

Geographic Scope

The geographic scope of ancestral Trio and Wayana lands (10 villages) refers to the specific territories inhabited by the Trio and Wayana indigenous peoples in Suriname, entailing approximately 7.0 ha. These lands are primarily located in the southern part of Suriname, in the interior rainforest region near the borders with Brazil, extending in the directions of Guyana and French Guyana.

BIODIVERSITY AND ECOSYSTEMS AND CRITICAL HABITATS

General

Studies conducted during the 90s and 2000s to determine environmental and social impact for potential bauxite mining in West Suriname, led to interesting results. Kabalebo area and Arapahu were classified as ***critical habitat***. Rapid Biological Assessment central south Suriname (Upper Palumeu, Koetari, Sipaliwini river and Sipaliwini Nature reserve) show that the scarce populated areas have a high biodiversity, with a great need for research. Little data was systematically collected and references with historic scientific collections.
Civil Society in collaboration with the GoS have nationwide a jaguar conservation program under implementation, which includes data collection on wildlife. The aim is to determine a jaguar corridor to protect the species even better and recommend legislation revision.
A study in 2015 emphasized the need to protect the headwaters of the Corantijn and Marowijne river to ensure that the ecosystems remain intact and the entire river system with a south – north pattern has enough freshwater flow. A national repository and consistency of research protocols is the next step ahead, in order to align all initiative with the inclusion of ITPs.

Southeast Suriname

Ecological and Biological Importance Southeastern Suriname supports exceptionally rich biodiversity, making it a high priority region for conservation. This region was highlighted in the Guiana Shield Priority Setting Workshop held by CI, IUCN and UNDP in April 2002 (Huber, Foster 2002) as one of the highest ranked areas for biodiversity conservation (Conservation International 2011). The area is contiguous with the Tumucumaque Indigenous Reserve (3,071,070 million ha), the Tumucumaque National Park (3,877,393 ha) in Brazil and the Parque Amazonien de Guyane (2 million ha) in French Guiana. Consequently, ensuring the protection of this area is crucial for maintaining connectivity between this much larger network of protected areas spanning three separate countries.
This type of large-scale ecological connectivity is essential for maintaining broad ecosystem services such as regional climate regulation, and healthy and genetically diverse populations of wide-ranging species, such as jaguar and migratory fish.
The contiguous network of protected areas also allows species to persist in the face of climate change by providing corridors for redistribution, especially from the lowlands into the mountains. South Suriname includes at least 16 land cover types identified through remote sensing of Landsat satellite imagery combined with field observations. These land cover types include, for example, flooded forest, mixed dryland rainforest, granite forest, shrub forest, savannahs and wetlands (see Bánki and Aguirre 2011 for more details). The 2012 RAP survey revealed that the area of the Upper Palumeu River around the Grensgebergte and Kasikasima mountains contains a wealth of biological diversity.

Due to its extensive forest, remote location, and pristine nature, the area contains species not commonly seen in other parts of Suriname or elsewhere in the Neotropics, such as large cracid birds (guans, curassows) and macaws, jaguar, puma, and eight species of primates. These species are more heavily hunted in other parts of the Guiana Shield, but are thriving in the undisturbed refuge of Southeastern Suriname.
Protecting the headwaters of Southeastern Suriname will be important for safeguarding clean freshwater for local communities and the entire country.

The fish of the rivers of Southeastern Suriname are a critical source of protein to the indigenous and Maroon people living along the Tapanahony, the Palumeu and Suriname rivers. Fish are a common and highly valued food source. Large and medium-sized fish species that are routinely eaten have local names. Large fishes like Anyumara (Hoplias aimara) and Kwimata (Prochilodus and Semaprochilodus) are popular food fishes and are also most vulnerable to overfishing. While not eaten, **many of the small fish species are** highly valued in the aquarium hobby and could play a beneficial economic role in the development of the area if fisheries for these species are strictly regulated. A variety of economically and locally important fish species are migratory, and spawn near the headwaters or in the upstream flooded forests of Suriname's rivers. Since the mountains of Southeastern Suriname support many of these headwaters and flooded forest habitats, it is likely that they play an important role in sustaining spawning grounds for migratory fishes. Several species encountered during the 2012 RAP survey, such as Prochilodus, Semaprochilodus, and Pseudoplatystoma tigrinum, are likely to migrate there to spawn. Consequently, conserving the forests and rivers of Southeastern Suriname is essential to ensure food security for Suriname's tribal and indigenous people locally, as well as to protect the migratory species that people throughout Suriname depend upon.

Sipaliwini Savanne

The Sipaliwini Savanna Area in Southern Suriname is part of a nature reserve of 100,000 ha, situated at 2°00'N and 56°00'W. The Sipaliwini Savanna itself covers an area 630 sq. km. and is the smaller part of a large savanna complex situated on both sides of the frontier between Suriname and Brazil. This frontier is formed by the relatively flat watershed between the West Paru River, a tributary of the Amazon River, and the Sipaliwini River which belongs to the basin of the Corantijn River, one of the main Guiana streams. The Sipaliwini Savanna is divided in two parts: The Great Sipaliwini Savanna in the East and the Little Sipaliwini Savanna to the South West. Within the forest belt west of the Sipaliwini Savanna are some smaller, isolated savannas, a small white sand savanna complex among them (Norde, R.* & Oldenburger, F.H.F.,1975).
This landscape is unique for Suriname, with distinct vegetation and species, for which in-depth studies will only reveal more details.

West Suriname

The West Suriname area- south west of the Kabalebo is bauxite reserves which is connected to the Trio ancestral lands have shown a high biodiversity of different species. During the Biodiversity assessments conducted during the exploration phase of the Bauxite mining initiatives, it became evident that the species occurrences were higher than average sightings in other areas of Suriname (SRK, studies).

THREATS, CHALLENGES AND OPPORTUNITIES

Threats

Main threats are mining, logging, infrastructure projects like roads and projected dams that invariably lead to more extractive activities, and the loss of indigenous culture and self-esteem to economic and cultural pressures. Governments, international development banks, and foreign companies are the primary actors, but even some members of indigenous communities are participating. The small-scale gold mining in south east Suriname is de main driver for deforestation, biodiversity loss, irreversible changes to ecosystems, contamination of water systems (heavy metals), and high levels of sedimentation, impacting on the health of terrestrial and aquatic species and humans.
Mercury poisoning causes irreversible nerve damage, brain damage, and birth defects. If this practice continues to scale, it could unleash an unprecedented public health crisis.
In addition to these detrimental impacts, a lively trade exists in plant and animal species, including protected and seasonal protected species. Development project bringing "outsiders" to the south, often leads influencing the threat levels. Opportunities are recognized, which not necessarily are in the interest of the local circumstances. Logging in the project area is not relevant, due to the south boundary established by the Forest Management Agency, SBB, to remain in the delineated productive zone (approx. northern half of Suriname, (www.gonini.org). The productive forests encompasses concessions and community forests totaling 2.7 m ha of forest lands (SBB, 2024).
When it comes to monitoring these activities or enforcing the laws of existing protected areas and ancestral indigenous lands, governments lack the necessary funding, capacity, or political will to do so. Safety issues occur, when monitoring and enforcement are considered.

Challenges

Traditional medicinal knowledge and practices are integral to the cultural, physical and spiritual well-being of indigenous peoples in Amazonia and elsewhere. However, this specialized, dynamic cultural knowledge is highly threatened due to a breakdown of transmitting it across generations. Elders, shamans and healers—the holders of this knowledge—find that fewer and fewer youths are interested in apprenticeships, and the accumulated knowledge and wisdom is often lost when they pass away. Currently, a successful executed project in 3 IP villages led to the 4th generation actively transfer knowledge.

A mainly forest dependent community is bound to suffer from the impact of these ill practices. Opportunities to gain a reasonable income by indigenous and tribal communities are marginal resulting in youth getting engaged in the mining and logging sector, but also part of the trade in wildlife.
In combination with little awareness raising and weak enforcement, monitoring of economic activities from authorities, forest loss, biodiversity loss and unnecessary tension occur between entrepreneurs, communities and authorities.

Climate Change impacting on the communities with severe rains and some time back droughts, damaging goods and services in the villages, the farms and immediate surroundings. Food security sovereignty are annually impacted.
In central and south Suriname, Kwamalasamutu average 800, and all other smaller ones between 100 and 400.

Previous experience shows that all Indigenous Peoples villages in south Suriname long for income generation projects and initiatives. These, currently more known as bio economy, refer to development of sustainable economic systems, which entail utilizing goods and services from local natural and biological resources (activities related to the invention, development, production, and use of biological products and processes). These systems are promoted for 20+ years by ACT and embedded in the local cultural context. Basically, the products developed were based on local knowledge and resources, which over time gradually were adapted to amongst others demands and available technology.

Opportunities

Suriname has been rebranded as a country with 93% forest cover, making it the most forested country on Earth with a negative carbon emission. This places Suriname in the category of ***High Forested, Low Deforested Countries*** (HFLD). However, despite its significant forest cover and potential for sustainable development, limited international funding has been directed towards conservation efforts. Suriname is rich in biodiversity and offers opportunities for biodiversity swaps, carbon credits, and other climate and biodiversity-related economic deals. One of the main obstacles to accessing funding is the lack of recognition for Indigenous Peoples and Tribal Peoples (ITP) rights.

Given the fact that little is known on genetic resources and interactions between species and their habitat: **Research and Development** programs in south Suriname region has great potential to explore. This could address topics like: a mekka for new species, but also related to climate change, water management, and even restoration of species in over-harvested areas, contaminated regions. The value of potential medicinal plants has another specialized approach to further explore.

Most opportunities remain unexplored, due to not complying with the basic legislative framework to respect and protect the Indigenous Peoples. Ensuring that Traditional Knowledge is protected, that revenues will be shared in a just manner, local decision-making process is integrating in the regional and national system, and throughout the process FPIC is adhered to (are some of the minimal processes to comply with).

Currently, forest governance in Suriname is centralized under the government. At the local level, village councils collaborate closely with community rangers (approximately 45 in 8 Indigenous villages) to gather data, address challenges, and explore opportunities.

Local rangers collect data, including biodiversity assessments, while more complex projects such as biomass measurement require collaboration between government agencies and rangers to calculate carbon stored in different forest types. Forest inventories, both for timber and non-timber products, are conducted by community monitors or rangers to create opportunities for livelihoods and bio-economic projects. Additionally, research institutes support rangers in monitoring programs when developing value chains for promising products. Close monitoring and interventions are necessary to prevent forest degradation as demand for certain products increases.

The 10 Indigenous villages of south Suriname have been expressing their interest to integrate in the monetary economy through added value of the resources they have been using, marketing and for which markets exist. These resources entail non-timber forest products and ecotourism. In order to develop sustainable value chains of these opportunities, understanding the biological cycles, the regeneration and the boundaries of irreversible impacts are important. To manage resource pressure at a natural reviving scheme, it is preferred that as demand increases, more villages should be engaged, leading to a strategy for sustainable resource management in villages and adjacent forests.

TRADITIONAL KNOWLEDGE

Trios and Wayanas have a close relation with the environment and thus the forest. That everything is connected is recognized in the daily life of the locals. Knowing the seasons is linked to indicator species, but having a resource map produced based on their knowledge and validated with western tools, show clearly that biodiversity impact and occurrence of species and habitats should be discussed closely with the communities. In the next phases more, in-depth sessions will be necessary in relation to building towers in the forest and further upscaling or developing of the Bio-economy component. The Energy and Water project may not directly need the traditional knowledge regarding biodiversity, because the project activities are mainly in or close to the villages.

LEGISLATIVE FRAMEWORK

Suriname recognizes the importance of monitoring and enforcement of legislation to effectively manage protected areas and reduce poaching, illegal wildlife trade and the introduction of invasive alien species. Although the boundary for the Game act exists and with the game calendar (hunting) regulates the northern zone of Suriname for enforcement, protected species are not allowed to be traded from the south. It is recognized and respected that the Indigenous Peoples need to hunt and fish species for subsistence, however when commercially engaged beyond the so-called boundary, this becomes breaching the legislation.
The uncertainty and extent of climate change impacts on biodiversity, something that a carbon-negative country such as Suriname contributes very little to, is not yet extensively studied in Suriname. Projected increases in temperature, including of the ocean, extreme rainfall events and unpredictable seasonality present potential threats to ecosystems and the social-economic systems depending on them. This uncertainty underlines the importance of incorporating management actions that ensure the resilience of ecosystems (e.g. wetlands) and managed natural systems (e.g. agroforestry farms), as healthy ecosystems have the best chances of adapting to shocks and disturbances due to climate change. The UNCBD (United Nations Convention on Biological Diversity) refers to *in-situ* and *ex-situ* conservation. With in-situ conservation the focus is on ecosystems and natural habitats and the maintenance and recovery of species populations in their natural surroundings.

Legislation

All of the components that are important for reducing pressures on biodiversity and for enhancing benefits from ecosystem services will require a solid legal basis for modern times and complex problems. Suriname recognizes the need to update or reformulate its biodiversity related legislation, such as the Nature Conservation Act, the Mining Act and legislation related to fisheries. A key priority is also the adoption of new legislation which has thus far been lacking, such as on water resource management and climate change. This includes the further legislative and policy elaboration of the Environmental Framework Act. In all of the above, collective Rights of the IP will have to be incorporated as soon as the act is approved.

The Legislative Framework for the National Biodiversity Action Plan is built on the following acts:

i) The Nature Conservation Legislation (1954-Protected Areas designated and the management of those), predominantly keeping both levels' responsibility at the central Government. Although coordination between stakeholders is key in a MUMA (-IUCN category 6, the interpretation is not consistent and thus is the GOS once again in the lead. There is a draft act underway, which acknowledges the importance of inclusion of private lands and ICA (Indigenous designated and Managed lands). The challenge is that ITPs have no collective rights nor inclusion in land tenure system. Because this process is ongoing for decades, ITPS have used and managed their ancestral lands by themselves. Organically mapping their territories and managing with community rangers to prevent intrusion of their livelihoods was the aim. Currently about 45 community rangers in central and south Suriname are trained and well equipped to monitor the immediate lands within 5-10 kilometers from their village. With the support of drones, and satellite images these can be extended. The most common breach rangers encounter is the illegal harvesting and exporting of species (birds, followed by reptiles and amphibians). Locals are recruited by formal and registered catchers. The legal system allows an exported to have x number of catchers to reach the quota per species. These catchers often penetrate other villages to collect in their environment.

Often locals don't know where the specimens go. In Sipaliwini Nature Reserve (100,000 ha) the twa-twa songbird (Sporophila crassirostris or Oryzoborus crassirostris) was overharvested, due to its demand. The species need to be closely monitored and revived.

ii) The Mining and Logging acts allow the business to encroach on the ITP ancestral lands mainly because of the centralized licensing policies. These are threats to the biodiversity and human settlements. The forest depended community is suffering from the impact of deforestation, degradation and social eruptions due to the quick transformation of human and ecological habitat. Map depicts a larger area which represented the field situation early 2022. Both land use activities result in expansion of the road network, which allows for unregulated intrusion and poaching of the south. With a local corps of rangers alone, given the safety issues, patrolling is not sufficient for ecosystem and biodiversity loss.

iii) The Environmental Framework act allows for preventive, mitigation and creative measures to enforce and to ensure that the quest from Suriname to gain economic prosperity for all remain a sustainable process. The authority to monitor and execute is in the making.

iv) Tourism act is recently approved in Parliament and provides opportunities for a more coordinated and environmental and social sound development of the industry. Given the opportunities CBT (Community based Tourism) – conducting ESIAs remain important.

Fair and equitable benefit sharing

The UNCBD includes as one of its three main objectives the fair and equitable sharing of benefits arising from the utilization of genetic resources (Figure 1). With Suriname's ecosystems still largely intact, its biodiversity holds genetic resources that could be useful for human wellbeing, such as medicines, cosmetics, and resilience in e.g. agricultural practices. This provides potentially new alternative sectors for social-economic development in Suriname, however, only under conditions where the access to genetic resources is facilitated through proper regulations and the benefits resulting from their use are shared in an equitable way between the parties using the resources and those providing them.

The latter refers to the government, which has the sovereign right over natural resources within their jurisdiction, and, often in the case of Suriname, indigenous and tribal peoples, who own the traditional knowledge associated with local ecology that is often needed to facilitate access to the genetic resources. Benefits from the utilization of genetic resources can be monetary, based on e.g. royalty payments or intellectual property rights, or non-monetary, as is the case with furthering research, training, education and technology transfer.

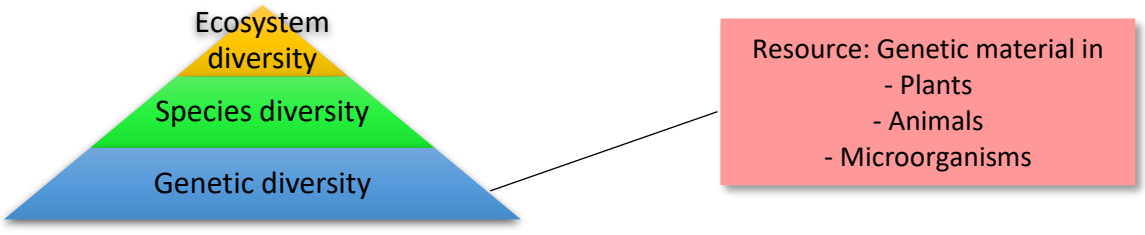
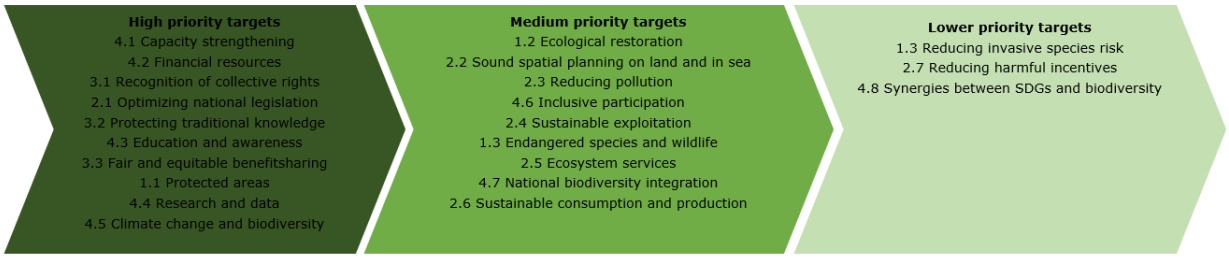


Figure 1 Genetic resources

This pathway aims to ensure that national systems and legislation are in place to regulate access to and facilitate fair and equitable benefit sharing from the use of genetic resources and associated traditional knowledge. Effective national systems, regulations and mechanisms for access to and benefit sharing from the use of genetic resources can contribute to the conservation and sustainable use of biodiversity and enhancing equitable development opportunities.
Suriname's intact ecosystems are located in remote areas that often overlap with living territories of indigenous and tribal communities. Given the notion that access to and the sharing of benefits from the utilization of genetic resources can potentially result in social, economic and environmental benefits, it is recognized that rights-based mechanisms based on principles of Free Prior and Informed Consent (FPIC) are an essential condition for achieving Suriname's envisioned green development path.

Indigenous and tribal communities in Suriname have lifestyles that are closely and traditionally dependent on biodiversity and ecosystem services. Despite the increasing influence of market economies and globalization in their communities, the traditional ecological knowledge developed over centuries, the traditional practices and innovations are currently still present to more or less extent. Efforts to preserve traditional knowledge are important for cultural continuity and for its relevance to the conservation and sustainable use of biodiversity and its components. Hence, where applicable, accessing and using genetic resources, including associated traditional knowledge, can only be done with the involvement and approval of the holders of such knowledge and with the sharing of arising benefits on mutually agreed terms. One of the key priorities for Suriname in that regard is the legal recognition of collective rights of indigenous and tribal communities, including land rights. Important components of this collective Rights ITP act is fair and equitable sharing of benefits from the use of genetic resources and related traditional knowledge, include principles of free, prior and informed consent (FPIC), the right to self-determination, participation and traditional governance structures, and benefit sharing. Indigenous and tribal organizations in Suriname have a track record of supporting communities in demarcating their traditional territories, formulating community development plans and lobbying for collective rights and basic social-economic needs in remote areas. Their participation in effectively achieving the targets under this pathway is crucial. This includes when it comes to aspects relevant for achieving other NBSAP targets, such as strengthening capacities of indigenous and tribal communities for territorial management and to be able to protect their traditional knowledge.
Another key priority is setting up the legal provisions, assigning responsibilities and developing transparent mechanisms to enable access to and fair and equitable benefit sharing from the use of genetic resources and associated traditional knowledge. Currently, such mechanisms do not exist in Suriname. The rich biodiversity, in particular species and genetic diversity, in Suriname present **opportunities for developing alternative economic industries based on sustainable use of biodiversity (e.g. natural cosmetics, traditional medicines, food and nutrition**). Aside from indigenous and tribal communities, there traditional uses of genetic resources can also be found in other cultures in Suriname, such as with persons of Javanese and Indian descendance. Although there are small-medium enterprises in Suriname in e.g. the local cosmetics industry, there is still much space to develop these and new industries in a regulated and systematic way. Commercial and non-commercial industries (e.g. university research) can potentially benefit from legal provisions for intellectual property rights, to access genetic resources, to administer access and benefit sharing contracts in an equitable manner and regulate the development of industries based on derivatives from genetic resources. An important starting point for Suriname will be to update or develop new legislation by incorporating provisions from the Nagoya Protocol on Access to genetic resources and the fair and equitable Sharing of benefits arising from their utilization.



Perceived prioritization of strategic targets by rights- and stakeholders during the NBS technical workshop

Figure 2 Perceived prioritization of strategic target by rights- and stakeholders during the NBS technical workshop

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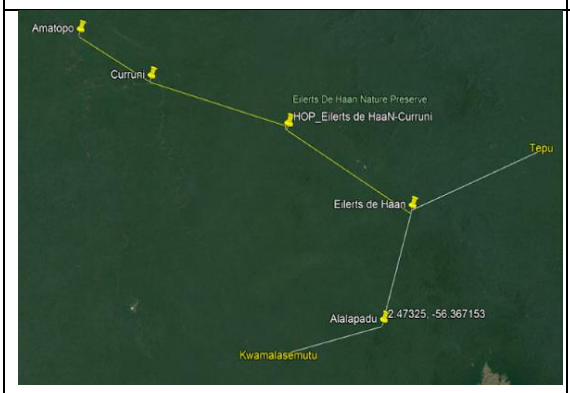
RESULTS

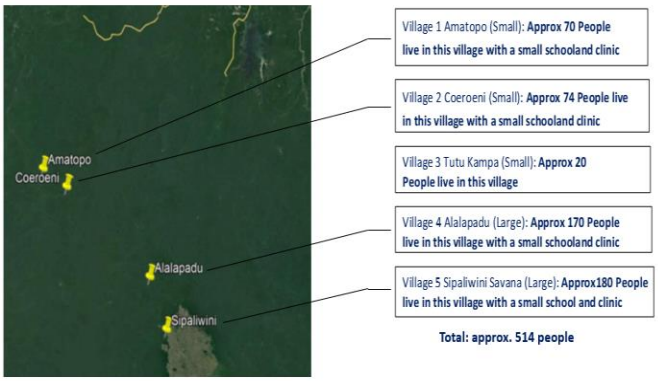
Project vs Biodiversity Safeguards

The solar energy and water plans have a small-scale approach and are limited to the village or just outside, where inventories are required and can be monitored by the local Rangers.

When it comes to operation further away from the village (maps below), a more detailed biodiversity/habitat assessment may be required. Prior to transportation and execution of the construction of towers, the data should be at hand, in order to design a monitoring program.
Analysis of tributaries of the main river systems in Suriname, led to the watershed of the Tapanahony and the Sipaliwini river, determining the importance of Paru savannah and the Area south of Kabalebo are the critical habitats (maps below).



Map1: Projection of towers in the forest



Map 2: Projection of towers in the forest

This project will have to provide evidence of monitoring and restoring the deforestation required to store and construct towers. The following map (Figure 4) is showing the deforestation rate over the last couple of years.

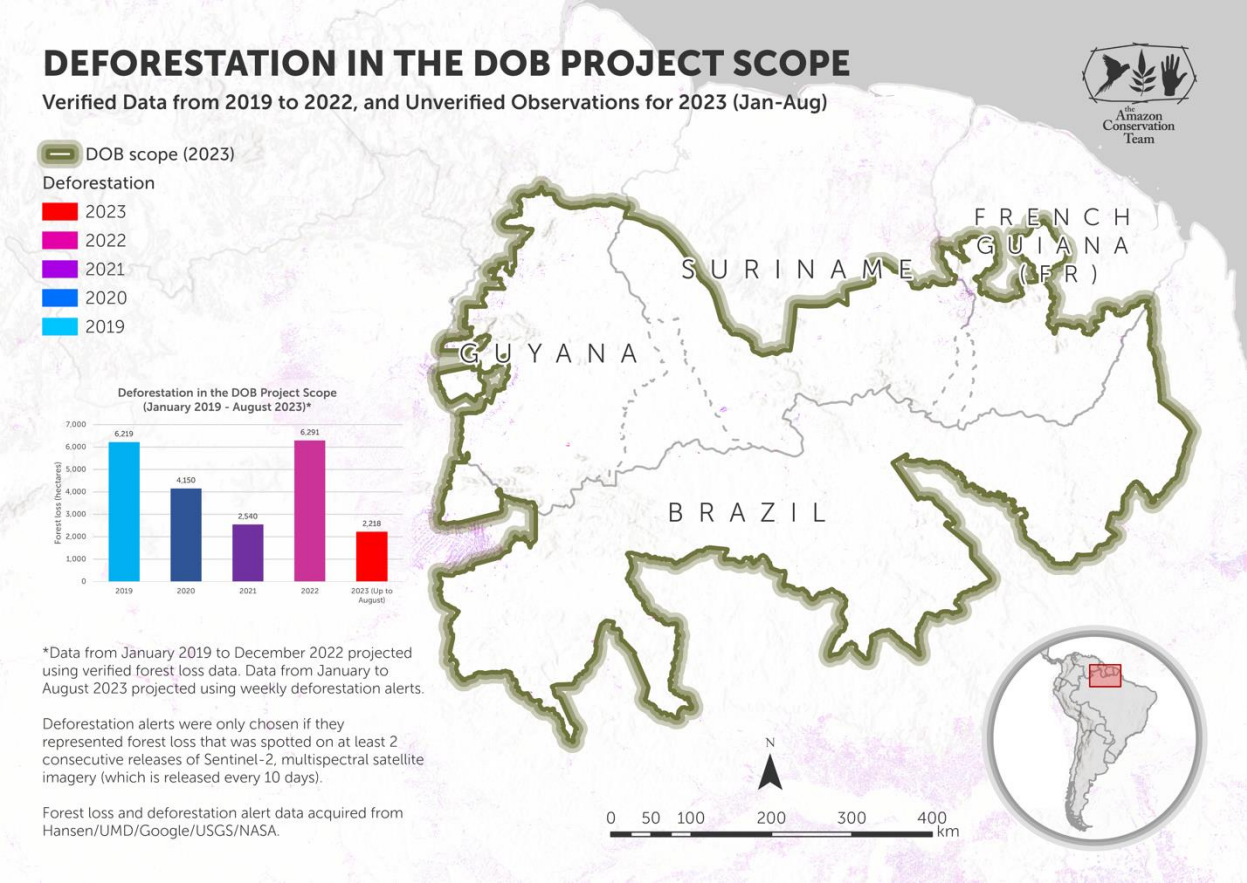


Figure 3 Deforestation map

Indigenous and tribal peoples that have inhabited and protected the nearly 90% forested country since time have largely been ignored by the decision-makers in the capital and have not been offered the rights to manage their lands. Those groups located in the forestry belt and the extension of it, do have access to community forests to be utilized for sustainable development of those communities. Although this concept is embedded in the system for nearly 7 decades, first starting with simple logging regulated in HKV (Houtkap vergunning in the 1950s)- transforming to community forest in the 2000s to expand the logging options with other goods and services, the community forest governance has not significantly improved. In the south of Suriname, where Indigenous Peoples live, this is not applicable. No Community forest was issued, customary law allows Indigenous Peoples to use the non-timber forest products. Legislation to regulate NTFPs are not yet in place.

Figure 4 Indigenous communities in South-Suriname

Strengthening of Governance

Indigenous groups are equipped to advocate and negotiate for collective rights recognition and practice sustainable land management. Leadership is individually and collectively being strengthened, whilst internal governance is providing more transparency through improved participation. Communities, from which Kwamalasamutu set the example, by articulating their goals for the future in culture, education, traditional medicine, authority, territory, and sustainable land management in a detailed document known as a *Life Plan*, which will become the guiding force for their development. Leaders, including youth representatives, are learning to actively push for and participate in political conversations regarding land rights, conservation of headwaters, and *Life Plans*.

Communities are trained and equipped in mapping, zoning, and monitoring land use. Sustainable livelihood options are identified and fostered, providing an economic development path that has a low carbon profile and protects biodiversity. Traditional culture is currently promoted through story maps that record oral histories, ethno-education programs, and *Shamans and Apprentices* programs that train traditional healers Exchanges among the geographically separate communities within each indigenous/tribal group, as well as between the three Guianas is promoted.

No Ethno-bio economy without bio diversity

Supporting climate change adaptation and mitigation in the Amazon basin through innovative bio-businesses that seek to conserve the Amazon ecosystems and biodiversity, boost climate resilience, and improve local livelihoods in the Amazon countries is crucial. Starting to elevate this in Suriname, and especially in south Suriname is a great pilot for the country, and demonstrating carbon emission as well as reaching Sustainable Development Goals (SDG) goals.

These bio-businesses could be structured under different bio-economy value chains that prioritize natural capital and deliver climate benefits, including sustainable agroforestry, non-timber natural forest products, growing native species timber, and community-led nature tourism.

Conditions for Ethno-Bio-economy models:

When developing these models, the basic need for energy, and guaranteed 24x7 safe water, but moreover dedicated communication and safe and affordable transportation are felt to be challenging. The chicken and egg situation are reckoned in sustaining initial investments. Financial contributions by household should not be left to the mercy of the GoS. That is a hard lesson learnt by NGOs in Suriname.
Bio-economy models can bring longevity to these in-depth investments.
Human resources to manage, expand and introduce technology, is another reality to address for a smooth development of small enterprises. Poor education, limited skills and trust are components to focus on, prior or simultaneously when developing these initiatives.

Indigenous communities in the next 4 years with local businesses.
There is a great need for income-generating activities in the villages mentioned in this document.

Capacity building

In the process of developing Bio-Economics, the bottom up approach led to build upon knowledge and products known to the Indigenous Peoples. Technical and feasibility studies are as important as ESIAs. Sudden increase of income can lead to power struggles in the community, gender imbalance and disruption of relation between men and females.
With tailor made programs – capacity of locals is improved, e.g. quality and efficiency, organization and management. In the different phases of the product development, consistency, reliability and monitoring of the sustainability are key. In all value chains being developed, benefit sharing models and transmission of knowledge and marketing are important elements. Creating, promoting and supporting full ownership with a gradually face out of the NGOs role is the ultimate strategy.

Protecting the ecosystem means protecting the people

In fostering bio-economics by integrating conservation, sustainable resource management, traditional knowledge, and community empowerment to promote economic opportunities while preserving the rich biodiversity and cultural heritage of the Amazon rainforest, the following approach is reckoned:

1. Sustainable Resource Management:

This involves helping communities develop sustainable harvesting techniques for forest products, such as nuts, fruits, and medicinal plants. By supporting sustainable resource management, ACT contributes to the economic viability of ITP communities while preserving the biodiversity and ecosystem services of the Amazon.

2. Traditional Knowledge and Innovation:

Indigenous communities possess valuable traditional knowledge about the Amazon rainforest's resources and their sustainable use. The documentation and preservation of this knowledge can foster innovation and the development of bio-based products and processes.

This involves supporting community-led initiatives for sustainable agriculture, traditional medicine research and development (R&D), and the production of value-added products derived from forest resources.

3. Market Access and Fair Trade:

This involves providing technical support, training, and assistance in establishing sustainable supply chains. By connecting ITP producers with fair trade and environmentally conscious buyers, as an NGO we help create economic opportunities that align with conservation goals. This step is a lengthy and tedious one.

4. Ecotourism and Community-Based Enterprises:

Development of community-based ecotourism initiatives that showcase the Amazon's natural and cultural heritage, is the next big step to undertake. By promoting responsible and sustainable tourism practices, ACT can help generate income for indigenous communities while raising awareness about the importance of conserving the rainforest.

5. Policy Advocacy and Collaboration:

Engaging in policy advocacy at local, national, and international levels to promote sustainable practices, indigenous rights, and conservation policies. By collaborating with governments, NGOs, and stakeholders, ACT contributes to the development of policies and frameworks that recognize the economic value of the Amazon rainforest and support sustainable bioeconomic initiatives.

In order to answer the social and environmental research questions and perform a SCA (Sociocultural Analysis) and IPP (Indigenous Peoples Plan), the following process was considered.

This Biodiversity Action Plan (BAP) should be reviewed alongside the assessment conducted for the Project, which collectively outline the Project's anticipated impacts and approach to biodiversity management, including:

- Environmental and Social Impact Assessment
- Critical Habitat Assessment
- Cumulative Effects Analysis

The roles and responsibilities for implementing this Biodiversity Action Plan are as follows:

- The Operations Manager ensures that all parties comply with the requirements outlined in this BAP and approves adequate resources for its implementation.
- The Manager of Environment, Health, and Safety leads reporting requirements and subsequent revisions of the BAP. They also communicate the plan's requirements to all relevant personnel and contractors and coordinate the completion of outlined programs.
- All staff and contractors must undertake all activities in accordance with the requirements of this plan.
- Engage local community monitors in BAP execution. These rangers should be well-equipped and trained in research/data collection protocols to support the BAP. This will increase community ownership, enhance on-the-ground capacity, and reduce the need for specialists to travel for data collection that locals could perform.

Having a dedicated team for BAP implementation allows EBS to earn and adapt the project, improve future project designs, and demonstrate its commitment and determination to prevent, reduce, and mitigate impacts. The list of En/CR species (appendix I) will have to be socialized with local rangers to ensure that awareness raising is correctly addressed and protocols are implemented accordingly.

Table 1 Proposed Biodiversity Action Plan (addressing Critical Habitat) for south Suriname pertaining the 10 IP villages

Village	Energy	Water	Telecommunication
Kwamalasamutu	No specific baseline is required, as the locations identified for the PV arrays and power houses already exist. Existing grids will be utilized for connecting the solar energy systems. Based on past occurrences, it is crucial to closely monitor geckos within the battery houses containing inverters. These creatures have been known to cause damage and even electrocution. Therefore, installations should include closed cases with tight sealing to prevent such incidents.	Improvements and expansions are planned for Kwamalasamutu, Sipaliwini, Tepu, and Kawemhakan. A new system will be constructed in the remaining six villages. The following steps will be taken: - Mapping and determining the ecosystem and species in and around the water source from which water will be extracted for processing and distribution as potable water (baseline). - Monitoring a selected number of (a)biotic indicators to assess the integrity of the water source and adjacent areas (to be determined). - Conducting potable water quality monitoring (selected parameters) on a quarterly basis. Measurements will be taken locally and/or samples will be sent to laboratories in Paramaribo. Monitoring will occur at the source, key distribution points, and selected taps (to be determined). - Implementing awareness-raising initiatives as part of the action plan to ensure effective and efficient water supply and usage. Despite the local abundance, potable water remains scarce. - Advocating for the adoption of nature-based solutions for water	
Sipaliwini Alalapadu Curuni Amatopo	Considering the small scale of the operation and the limited population, no significant impact is anticipated, and therefore, no special biodiversity actions are deemed necessary. However, based on past experiences, it is essential to closely monitor geckos within the battery houses containing inverters. These creatures have previously been electrocuted and have caused damage. To mitigate this risk, installations should incorporate closed cases with tight sealing.		In the proposed scenario, the plan includes: • The installation of additional towers between these villages. • Zoning of the projected critical habitat around Amotopo/Curuni and Luci is planned, where a tower could potentially be located (anticipated for year 0, following the completion of designs). • Conducting a baseline assessment of fauna and flora within the critical habitat using methods such as camera traps and compiling a plant list. This assessment will occur at the construction site and its buffer zone

		protection, wastewater treatment, and sewage management. This includes safeguarding protected open waters and wells.	(scheduled after the detailed design of the construction site, also expected in year 0). Narrative accounts from interviews will complement this data collection process. • Select a range of species, including mammals, amphibians, birds, and reptiles, to monitor periodically and assess their response to construction activities at the site. Monitoring will occur annually. • Determine the rate of restoration of the initial vegetation following the construction, with assessments conducted after one year and two years. • Compare the collected data with the baseline information to evaluate any changes or impacts. • Compile a checklist of observed bird species and compare it with the baseline data of fauna and flora. • Share the collected data with the Ministry of Regional Development (ROS) and Environment (ROM) and EBS (the project implementer) to facilitate policy revisions if necessary and inform local interventions.
Tepu	Expansion on existing system. Based on previous experiences, the gecko should be closely *monitored* in the battery houses		Utilize the checklist developed for other villages to monitor the selected species in the

	with inverters. These species have been electrocuted and caused damaged. The installation should ensure closed cases with tight sealing.		villages where towers have already been installed and where no further construction work is planned. Share the collected data with the Ministry of Regional Development and Environment (ROM) and EBS (the project implementer) to inform potential policy revisions and local interventions.
Apetina Palumeu Kawemhakan Kumakapan	Given the small scale of the operation (small population), no substantial impact expected. No special biodiversity actions required. Based on previous experiences, the gecko should be closely *monitored* in the battery houses with inverters. These species have been electrocuted and caused damaged. The installation should ensure closed cases with tight sealing.		
SPECIES MONITORING	SPECIAL EMPHASIS on EN/CR species (Appendix as guidance with option to expand the list). From here selected species can be monitored: avian, terrestrial and aquatic		
PARTNERS	University of Suriname and foreign parties, GOS agencies, NGOs, together with IP organizations and village level structures (commissions rangers)- reporting to Village council, district commissioners' office following the hierarchy up.		

The Biodiversity Action Plan (BAP) outlines the following implementation actions:

- Implement the agreed-upon mitigation actions during both construction and operation phases, including the ability to shut down operations on demand if necessary.
- Evaluate the effectiveness of these actions during the operation phase. A detailed Fatality Monitoring Program document is necessary to demonstrate how this evaluation will be conducted.
- Assess the status of the Project for each identified species compared to the baseline. If the commitment to conservation actions for any species is not being met, additional support will be necessary. Once the Project is operational, the BAP must be updated annually.

BUDGET

Actions to achieve net gains for biodiversity values for which critical habitats are designated by the Critical Habitat Assessment, including budget and staffing requirement:

Critical Habitat Assessment	BASELINE		MONITOROING		POST PROJECT	
	Yr1	Yr2	Yr3	Yr4		
Assessment						
Sipaliwini -Paru Savanne	x					
Upper Palumeu River	x					
LuciRiver	x					
Null measurements: Satellite imagery; Water quality						
Vegetation						
Inventory in the field (Protcol tbd)	x					
Description of landscape habitat/forest type						
Species collection (with licenses)						
Identification of species (lab)	x	x				
Fauna						
Inventory in the field (Protcol tbd)- mammals/fish/amphibians/avians/reptiles	x					
Description of landscape habitat/enviornment (rivers/creekks)	x					
Species collection (with licenses)	**x**					
Identification of species (lab)	x	x				
	Estimates in USD					
Monitoring						
Satellite images (annual- forestcover loss or land conversion)-lab		1x	1x	1x	1x	
Restoration of cleared area for the project (drone)		1x	1x	1x	1x	
Placement of Camera traps/ recordings in the canopy		4x	4x	4x	4x	
Measurements of Waterquality parameters		4x	4x	4x	4x	
Capacity building						
Training -Refreshment courses	4x	4x	4x	4x	4x	
Monitoring expenses						
Station construction or upgrading (Alalapadu, Curuni, Amotopo, Sipaliwini, Tepu)	25000	25000	15000	15000	10000	
Equipment	5000.00	4500.00	3500.00	3000.00		
Fuel & Lubricants	20000.00	15000.00	15000.00	15000.00	15000.00	
Airtransportation	60000.00	50000.00	45000.00	35000.00	30000.00	
Food	25000.00	25000.00	15000.00	15000.00	12500.00	
Fees Researchers+ GO agencies	100000.00	75000.00	50000.00	40000.00	45000.00	
Fees Rangers	30000.00	32000.00	35000.00	375000.00	40000.00	
Fee Supervisors ACT	25000.00	27500.00	28000.00	29000.00	30000.00	
Telecom	2000	1750	1750	1500	1500	
Subtotal	292000	255750	208250	528500	184000	
Overhead 10%	29200	25575	20825	52850	18400	
OVERALL TOTAL	321200	281325	229075	581350	202400	**1615350**

APPENDIX I: BAP: En/CR species from south Suriname

Species Name	Scientific Name	Group	Comments
Aniba rosaeodora	Aniba rosaeodora	Plants	Probably recorded in the Tapanahony River watershed. May become economically interesting, if number of trees spotted- increases- High value for the Parfum industry. If Harvesting of branches and leaves for the industry occurs, harvesting plans and monitoring should be discussed.
Aniba percoriacea	Aniba percoriacea	Plants	Probably recorded in the Tapanahony River watershed. May become economically interesting, if number of trees spotted- increases- High value for the Parfum industry. If Harvesting of branches and leaves for the industry occurs, harvesting plans and monitoring should be discussed.
Asterophorum mennegae	Asterophorum mennegae	Plants	Suriname
Bigeye Tuna	Thunnus obesus	Fishes	Africa, American Samoa, Asia, Australia, Central America, Europe, Middle East, North America - Including United States (Hawaii), Oceanic, South America
Blue-cheeked Amazon	Amazona dufresniana	Birds	High demand for wildlife trade
Brazil-nut Tree	Bertholletia excelsa	Plants	Zuid Suriname: In great abundance in Alalalapadu area, less in Curuni, Corantynriver and the border with Brasil (new small settlement). High value for its oils/ edible nuts. Close monitoring for seed disperses and regeneration. Felling is prohibited.
Bush Dog	Speothos venaticus	Mammals	Spotted on camera traps in south Suriname, rare species to capture. Population size and the interrelation with other species is interesting to determine. Not seen in the intermediate surroundings of the villages
Copaifera epunctata	Copaifera epunctata	Plants	South Suriname, high medicinal properties, high in value
Corythophora labriculata	Corythophora labriculata	Plants	Suriname
Cougar	Puma concolor	Mammals	North and Central America
Couratari guianensis	Couratari guianensis	Plants	Suriname
Couratari sandwithii	Couratari sandwithii	Plants	Suriname, Venezuela
Duguetia schulzii	Duguetia schulzii	Plants	Suriname

Eschweilera boltenii	Eschweilera boltenii	Plants	Suriname
Giant Anteater	Myrmecophaga tridactyla	Mammals	In South Suriname is a delicacy for Indigenous People
Giant Armadillo	Priodontes maximus	Mammals	In South Suriname is a delicacy for Indigenous People
Guiana Spider Monkey	Ateles paniscus	Mammals	Delicacy for Indigenous Peoples in south Suriname
Guianan Crested Eagle	Morphnus guianensis	Birds	Spotted in south Suriname
Harpy Eagle	Harpia harpyja	Birds	Cultural use in headdresses – Indigenous Peoples in south Suriname
Inga leptingoides	Inga leptingoides	Plants	Not clear if this is endangered in Suriname
Inga calanthoides	Inga calanthoides	Plants	Not clear if this is endangered in Suriname
Jaguar 	Panthera onca	Mammals	Data collection started in 2014 in different villages and transects of 1km close and further from populated sites to determine occurrences and in the future population size
Little Spotted Cat	Leopardus tigrinus	Mammals	Data collection started in 2014 in different villages and transects of 1km close and further from populated sites to determine occurrences and in the future population size
Macrolobium stenopetalum	Macrolobium stenopetalum	Plants	South Suriname
Macrolobium amplexans	Macrolobium amplexans	Plants	South Suriname
Margay 	Leopardus wiedii	Mammals	Data collection started in 2014 in different villages and transects of 1km close and further from populated sites to determine occurrences and in the future population size
Marila saramaccana	Marila saramaccana	Plants	Suriname
Mezilaurus itauba	Mezilaurus itauba	Plants	Bolivia, Brazil, Ecuador, French Guiana, Peru, Suriname

Ocelot	Leopardus pardalis	Mammals	Data collection started in 2014 in different villages and transects of 1km close and further from populated sites to determine occurrences and in the future population size
Olive-sided Flycatcher	Contopus cooperi	Birds	Recorded many times in south Suriname
Pebas Stubfoot Toad	Atelopus spumarius	Amphibians	Probably recorded
Persea julianae	Persea julianae	Plants	Suriname
Poecilanthe ovalifolia	Poecilanthe ovalifolia	Plants	Suriname
Rufous-sided Pygmy-tyrant	Euscarthmus rufomarginatus	Birds	In the utmost south of Suriname- near brasil and Sipaliwini savanna, this species was recorded
Sloanea gracilis	Sloanea gracilis	Plants	Suriname
Sloanea acutiflora	Sloanea acutiflora	Plants	Suriname
South American Tapir	Tapirus terrestris	Mammals	Key species for ecosystem balance. Delicacy for locals.
Spectral Bat	Vampyrum spectrum	Mammals	Encounters are seldom in south Suriname
Styrax tafelbergensis	Styrax tafelbergensis	Plants	Suriname
Syagrus stratincola	Syagrus stratincola	Plants	Palm species in Suriname
Tracaja	Podocnemis unifilis	Reptiles	South America (Orinoco R. and Amazon R. basins), brought to Suriname by people living in the south of Suriname
Virola surinamensis	Virola surinamensis	Plants	Dispersed in the swampy areas in south Suriname
Vouacapoua americana	Vouacapoua americana	Plants	Hardwood tree, used for housing in the Indigenous villages

White-lipped Peccary	Tayassu pecari	Mammals	Delicacy for IPs
White faced Saki	Pithecia Pithecia	Mammals	Seen in the rain forests of Venezuela, Brazil, British-Guyana, French-Guyana and Suriname. They have a limited area range, which makes this Saki monkey even more special to meet in person. Under pressure in the immediate surroundings of villages
Cock-of-the-rock	Rupicola	Bird	South Suriname, wildlife trafficking – makes it difficult for the population the remain stable.