IWOKRAMA INTERNATIONAL CENTRE FOR RAIN FOREST CONSERVATION AND DEVELOPMENT

Public Summary: Forest Management and Monitoring

August 2017

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The Iwokrama Forest has been certified for Forest Management in accordance with the requirements of the Forest Stewardship Council™ A.C. using the Woodmark Adapted Standard for Guyana (v2.4; 2014)

Public Summary: Forest Management and Monitoring

Revised August 2017

What is Iwokrama?

The Iwokrama International Centre for Rain Forest Conservation and Development (*Iwokrama*) is an organisation created through the Iwokrama International Centre for Rain Forest Conservation and Development Act, Act No 7 of 1996, and an Agreement between the Government of Guyana and the Commonwealth signed in November 1995.

The Government and people of Guyana have "gifted" the 371,000 hectare[1] (nearly one million acres) Iwokrama Forest to show how tropical forests can be conserved and sustainably used for ecological, social and economic benefits to local, national and international communities. The Iwokrama International Centre is responsible for the management and conservation of the Iwokrama Forest.

The mission of Iwokrama is,

> *"To promote the conservation and the sustainable and equitable use of tropical rain forests in a manner that will lead to lasting ecological, economic and social benefits to the people of Guyana and to the world in general, by undertaking research, training, and the development and dissemination of technologies."*

Site Location

The Iwokrama Forest is located at the centre of the Guiana Shield. To the west of the forest is the Pakaraima Mountain Range that extends through western Guyana and eastern Venezuela and to the east are the inselberg and highland formations scattered through central-east Guyana, Suriname and French Guiana. There are also savannahs to the southwest and northeast of the Iwokrama Forest in Guyana, as well as in south-western Suriname.

Figure 1: Site Location

[1]GIS mapping shows the actual size of the Iwokrama Forest to be 371, 681 hectares

Table 1: Key Milestones in the History of the Iwokrama Centre

Year	Milestone
1989	• Guyana offered nearly one million acres (371,000 hectares) of intact rain forest to the international community through the Kuala Lumpur Commonwealth Heads of Government Meeting, Malaysia.
1993	• US$3M secured from Global Environment Facility for legal establishment, demarcation and research and institutional development
1994	• First Field Station built, led by Macushi leader, Robert Frederick Allicock who became Iwokrama's first Field Station Manager
1995	• Iwokrama Agreement signed by President of Guyana H.E. Dr Cheddi Jagan MP and the Commonwealth Secretary General H.E. Chief Emeka Anyaoku
1996	• Iwokrama Act passed unanimously by the Parliament of Guyana • Iwokrama supported the development of the North Rupununi District Development Board (NRDDB)
1997	• First Tourists visited the Iwokrama Field Station
1998	• US$10M secured from the International Tropical Timber Organization (ITTO), British Department for International Development (DFID), the Canadian International Development Agency (CIDA) and the European Commission to support the Centre • 11 Community based wildlife clubs formed in Apoteri, Fair View, Annai Central, Rewa, Yakarinta, Massara, Toka, Surama, Wowetta, Kwatamang, and Aranaputa in response to a community-led request to grow capacity in natural resource management.
2000	• HRH Prince Charles, Prince of Wales became Patron of Iwokrama
2001	• Forest zoned into Sustainable Utilization Area (SUA) and Wilderness Preserve (WP) after extensive consultations with community representatives • International Wildlife Workshop hosted to address issues and lessons learnt impacting community members and resources, south to south and south to north. • First Wildlife Conservation Festival hosted in Annai. Two hundred and forty five children from all over the country show an appreciation for and celebrate Guyana's rich wildlife. • Initiation of Citizen Science monitoring project with 14 communities of the North Rupununi.
2002	• An Amerindian representative of the local North Rupununi communities appointed for the first time to Iwokrama's International Board of Trustees. • State of the art Canopy Walkway installed in the Iwokrama Forest

	• Supported development and programming of Radio Paiwomak: 97.1 FM, the first community radio station in Guyana.
2003	• Programme restructured to meet shortfall in global realignment in donor support focus, leading to 40% reduction in operational costs. • Iwokrama develops first draft manual on Intellectual Property Rights • Iwokrama completes first management level inventory of the Sustainable Use Area
2004	• Turtle Mountain Satellite Camp opened • A new entomopathogenic species discovered *Stilbella iwokramensis (Ascomycotina, Hypocreales*) - a new beetle pathogen species distinguished from other fungi of the genus Stilbella.
2005	• Collaborative Management Agreement signed with Local Communities for management of the Iwokrama Forest. • HRH Prince Charles, Prince of Wales renews patronage of Iwokrama International Centre
2006	• Fair View Village received land title to 21, 950 hectares of the Iwokrama Forest; chose to remain within the boundaries of the Forest. Special collaborative management and benefit-sharing agreements signed. • 111 persons from across Guyana trained as rangers, tour guides, protected area management and collaborative management. • Airstrip built in Fair View Village within the Iwokrama Forest
2007	• First phase of model low impact sustainable timber harvesting operation started in the Iwokrama Forest
2008	• Iwokrama Forest received Forest Stewardship Council™ (FSC™) Certification for Forest Management • Innovative Ecosystem Service Agreement signed with private sector company of the United Kingdom – the first in Guyana • First in-land fisheries management system (the Arapaima Management Plan) developed with the communities of the North Rupununi for Guyana. Formally gazetted by the Ministry of Agriculture • Iwokrama launched innovative inclusive governance arrangement for its Canopy Walkway with shareholder participation by local communities and local and international private sector operators. • Iwokrama designated Regional Focal Point Organization as part of an EU-funded project to establish a forestry research network in 12 countries spanning the Africa Caribbean and Pacific region.

	• Iwokrama received funding from the Gordon and Betty Moore Foundation in the United States to support national initiatives and build awareness on climate change, REDD+ and natural resources management • Iwokrama establishes network of Permanent Sample Plots (PSPs)
2009	• Iwokrama Science Committee formed, International Resident Scientist recruited. • State of the art climate and hydrology monitoring equipment installed in the Iwokrama Forest and its surroundings. • Iwokrama produced the only known Volume and Decay study on tropical forests. • Iwokrama played major role in developing the community manual on Climate Change and the Role for Forests which includes the contributions from communities, NGOs and Government (accessible online and in 6 languages). • Ground breaking agreement for climate and forest partnership between Government of Guyana and Kingdom of Norway signed by President H.E. Bharrat Jagdeo and Norwegian Minister of International Development and the Environment Erik Solheim in the Iwokrama Forest. • Iwokrama sponsored only non-governmental public forum on Guyana's Low Carbon Development Strategy (LCDS) as a 3-part series. • Iwokrama trained over 400 community, private and public sector representatives on climate change and the role of forests. • Iwokrama's brainchild, the Wildlife Festival included in the national calendar of tourism events. • Iwokrama sub-contracted by the Centre for International forestry research (CIFOR) to define the state of Forest Law, Enforcement and Governance including the role and level of illegal logging in Guyana • Visitor numbers surpassed 1,000 for the first time • Iwokrama International Centre presented its Sustainable Forest Management programme to the World Forestry Congress in Buenos Aires, Argentina • Two new species discovered – Crabwood: *Carapa akuri* –belonging to the family Meliaceae, considered endemic to Central Guyana – a new genus and species of lungless caecilian: *Microcaecilia iwokramae* (Synonym *Caecilita iwokramae*)
2010	• HRH Prince Charles, Prince of Wales renewed his patronage of the Centre for an additional five years.

	• First results of the Iwokrama climate monitoring programme presented at the Commonwealth Forestry Congress in Scotland
2011	• Iwokrama in partnership with the Global Canopy Programme and the NRDDB launched innovative community Monitoring, Reporting and Verification (MRV) system – the first in Guyana • 10th Wildlife Festival held- growth in conservation leadership seen as a measure of success and commitment
2012	• Iwokrama won the Community Benefit Award from the Caribbean Tourism Organisation/TravelMole Sustainable Tourism Awards • A new species of lizard was discovered - *Gonatodes timidus* • Comprehensive management level inventory completed in Wilderness Preserve.
2013	• Agreement signed with a development Bank to support the second phase of its low impact model timber operation in the Iwokrama Forest. • Iwokrama led successful lobby in Suriname for Guyana to host the 2016 International Congress on the Biodiversity of the Guiana Shield. • Iwokrama launched its corporate sponsorship scheme. • New species of poison dart frog discovered in the Iwokrama Forest: *Allobates amissibilis* (in Latin"*that may be lost*"). • Government of Guyana injected US$900,000 over the period July 2012 – July 2013. • Three indigenous persons complete Master Degrees in heritage education at Newcastle University supported under the "Encompass" heritage preservation project
2014	• Agreement signed with a private sector company to conduct sawmilling operations in the Iwokrama Forest • Iwokrama hosted Biodiversity Corridors Workshop in collaboration with United Nations Development Programme, World Wildlife Fund and Convention of Biological Diversity at the Iwokrama River Lodge • Government of Guyana injected an additional US$600,000 to support core activities • Funding received for Forest Stewardship Council™ (FSC™) Certification from the German Government under the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) implemented Caribbean Aqua-Terrestrial Solutions Programme • Iwokrama launched new tourism dedicated website – www.iwokramariverlodge.com • First Indigenous Film Festival held in Georgetown, Guyana, COBRA Project, partnership Iwokrama, NRDDB and Royal Holloway University, UK.

	• Travelling Exhibition in collaboration with Ministry of Culture, Encompass Project, partnership Iwokrama with NRDDB and Newcastle University, UK
2015	• Iwokrama River Lodge awarded the TripAdvisor 2015 Certificate of Excellence • Second Phase of its sustainable timber harvesting and sawmilling operations in partnership with Farfan and Mendes Ltd. • Iwokrama and Rupununi Communities rescued and relocated twenty-seven (27) Arapaima (*Arapaima gigas)*
2016	• Iwokrama celebrated the 20th Anniversary of the passage of the Iwokrama Act • Iwokrama reviewed and renewed Memorandum of Understanding and the Collaborative Management Agreement with the North Rupununi District Development Board • Iwokrama showcased model forestry operations in UK at Commonwealth Secretariat in February • His Excellency Brigadier David Granger, MSS. President of the Cooperative Republic of Guyana launched National Tree Day at Iwokrama River Lodge on October 1st • Iwokrama Forest achieved FSC™ Certification (FSC™ Licence Code: FSC™ C131490) for Forest Management on October 14th • UK Environment Agency lifts procurement ban in October on Guyana's Greenheart by approving FSC™ Certified wood from the Iwokrama Forest • Key visits to the Iwokrama Forest: – His Excellency Brigadier David Granger, MSS. President of the Cooperative Republic of Guyana (June) – Hon. Moses V Nagamootoo, MP, 1st Vice President and Prime Minister of the Cooperative Republic of Guyana (July) – Rt. Honourable Baroness Patricia Scotland QC. Secretary General of the Commonwealth of Nations (July) – Hon. David Patterson MP , Minister of Public Infrastructure (September) – Hon. Raphael Trotman MP, GC, Minister of Natural Resources (September) – HRH Prince Henry of Wales (December) • Iwokrama received – EPA's Green Award for Environmental Leadership (June) – Guyana Tourism Authority's Award People's Choice for Responsible Tourism (September)

	• Iwokrama hosted final year University of Guyana forestry students for Sustainable Forest Management course • Iwokrama rolls out its climate change training programme in 4 high schools • Airstrip in the Iwokrama Forest extended to 4200 feet and completely resurfaced • Iwokrama forges Memorandum Of Understanding with Tropical managed Forests Observatory • Botany training provided for Iwokrama Staffers, representatives from the Protected Areas Commissions and Guyana Society for Biodiversity and Ecosystems

Area Description and Land Use

The Iwokrama Forest Area is generally well drained by creeks which flow into two major river systems – the Essequibo and Siparuni Rivers. The flat to undulating terrain varies in elevation between 50 and 1000m and consists largely of small sand and loam plateaus, terraces and mildly inclined valleys dissected by a few waterways. The soils of the Kurupukari Sandy Plains and Terraces landform are composed principally of quartzite sand with varying amounts of clay and loam.

The Iwokrama Forest (371,681 hectares) has been zoned into two distinct areas: the Wilderness Preserve (WP- 187,175 ha) and the Sustainable Utilization Area (SUA- 184,506 ha). The WP has been set aside as a biodiversity reserve, wherein all activity will be severely restricted. The SUA is available for multiple uses including Iwokrama's sustainable businesses:

- Sustainable Timber Harvesting,
- Sustainable Tourism,
- Training and Learning Services

The SUA has been further divided into five compartments for forest management planning purposes (Map 2). Fair View's titled area lies within the Essequibo compartment of which, approximately 15,400 hectares are dedicated for sustainable forest management (Map 3).Current harvesting is rotated between the Essequibo and Kurupukari Compartments.

The Net Operable Area (NOA) is the area selected for timber harvesting purposes. The NOA is located in the sustainable use area and excludes non-commercial forest types, which are mostly located in two major land areas: the Pakatau Hills area in the north-west and the Maipa Mountains area in the far south.

The other excluded areas are: special use reserves; river and stream buffers; road buffers; slopes greater than 40%; and small, isolated inaccessible areas. The NOA accounts for only 29% of the entire Iwokrama Forest.

Biodiversity of Iwokrama and North Rupununi Area

The Iwokrama Forest and the neighbouring North Rupununi wetlands are an extraordinary ecosystem which include a range of habitats - more than 200 lakes, 1,000 metre tall mountains, lowland tropical rain forests, palm forests, seasonally flooded forests and savannahs.

The Iwokrama Forest and North Rupununi Wetlands also contain the largest number of fish and bat species in the world for an area of its size.

Faunal diversity: 30% of which is classified as rare and endangered.

- + 130 species of mammals

- + 500 species of birds
- ~ 150 species of reptiles and amphibians
- + 420 species of fish
- + 86 species of bats

Floral diversity: There are 9 distinct forest types in the Iwokrama Forest.

- The largest forest type covers 54% of the forest - mixed greenheart forest.
- About 16% of the forest is mora, manicole, crabwood and trysil forest
- 15% of the forest is mixed low stature forest
- 7% of the forest is manicole, kokerite and soft wallaba palm forest
- the remainder: wallaba, dakama, muri scrub and liana forest make up the remaining 7%.

Botanical surveys of the Iwokrama Forest have found over 1,250 species of plants. However, the total number expected for the area is likely to exceed 2,000 species with additional work in highland areas.

The People

Populations South of the Iwokrama Forest:

There are over 7,000 people in the 20 villages linked to the Iwokrama Forest. About 91% of this population is ethnic Amerindian: 77% Makushi, 11% Wapishana, and 3% Arawak. Five percent of households are self-described as 'Mixed,' (Head of Household is half Coastlander/half Amerindian) and 3% of households as 'Coastlander,' (African or East Indian descent).

Populations North West of the Iwokrama Forest:

The majority of Amerindian communities in Region 8 are Patamona, and two communities Itabac and Kanapang are Makushi. These are located to the northwest of the Forest, in upland savannah areas,about a week's walk north from the Siparuni River, the north-western boundary of the Iwokrama Forest. The entire population of Region 8 is under 10,000 persons, (Ministry of Indigenous Peoples' Affairs, 2016). About one-third of this total is located at distances of a week's walk to the Iwokrama border at the Siparuni River.

Socio-Economic Context

The Iwokrama Act of 1996 provides for the protection of indigenous rights, traditional access and participation of associated communities in its activities. Iwokrama currently partners and works with the 20 communities within and south of the Iwokrama Forest through the umbrella organisation – the North Rupununi District Development Board (NRDDB).

Fair View Village, the only village within the boundaries of the Iwokrama Forest, has legal ownership through title of 21,950 hectares of the Forest since 2006. The community has opted to remain as part of the Iwokrama Forest and a collaborative management agreement was signed with Iwokrama International Centre in 2006. The other communities lying south of the reserve (See Map 1) in the North Rupununi are mostly located in the savannah area. These communities maintain traditional access to the resources of the Iwokrama Forest. The population of the20 communities is now over 7000 with Fair View having more than 320persons. In the North Rupununi, health care is very basic; most of the villages are equipped with health centres and community health workers. There is also a doctor at Annai.

Communities are governed and administered by Village Councils, District Councils, Regional Democratic Councils, and regional representatives of Ministries of Indigenous Peoples' Affairs, Agriculture and Health.

Iwokrama's relationship with local communities is based on equal partnerships rather than the more traditional relationships–patron-client or senior partner-junior partner. Iwokrama benefits from the knowledge, skills and support of local communities and in return, the communities are partners/shareholders in the management and conservation of the Iwokrama Forest.

While the Guyanese people, in general, are recognized as the legal owners of the Iwokrama Forest, the indigenous peoples who live in, and around, the Iwokrama Forest maintain a claim of ancestral domain and land rights.

Association with Iwokrama

Local people benefit from the Iwokrama Forest though legally maintained rights to use forest resources. The local people also represent a major human resource base from which the Iwokrama Centre draws for the management of the Iwokrama Forest.

Iwokrama has a strong partnership through the North Rupununi District Development Board (NRDDB) with the 20 communities and involves people in management planning and development activities.[2]There is also a community representative on the Iwokrama International Board of Trustees (IBOT).

A collaborative management agreement with the NRDDB sets out guidelines on how the Iwokrama Forest should be managed between the Iwokrama Centre and the communities. A separate collaborative management agreement was signed with Fair View Village because of their status as titled land holders within the Iwokrama Forest.

Sustainable Business Development and Iwokrama

To properly fulfil its mission of ecosystem conservation, *Iwokrama* must address the issues that affect

[2] The NRDDB is an umbrella organisation that represents the interest of the communities in the North Rupununi.

conservation and wise use of tropical rain forests. To do so, *Iwokrama* is developing model forest-based businesses that

- are sustainable and profit-making
- include private sector and local communities
- are compliant with national laws and regulations
- produce and market low-impact and high-value products and services
- use environmental best practice methods
- are repeatable

Iwokrama will have achieved its mission when investors and local people can work together to achieve a single set of objectives which guarantees long term enhancement of livelihoods of people through the conservation and sustainable development of natural resources.

Sustainable Forestry at Iwokrama

In January 2014, the Iwokrama International Centre signed a five-year agreement with Farfan and Mendes Limited (FML) to develop Phase II of its sustainable timber harvesting operation. Iwokrama is using the results of the research and experience it acquired in Phase I of its operations in areas such as forest dynamics, inventories, community engagement and forest certification to improve operations and forest management in Phase II.

Iwokrama and FML will harvest a maximum of 1,800 ha per year (less than 0.5% of the Iwokrama Forest) under a very selective harvesting system so only a few stems per ha will be removed and no large gaps are created in the forest canopy. The operation will employ best practices in forestry including a strict "no-log export" policy and the employment of Reduced Impact Logging (RIL) and Directional Felling (DF) techniques.

Farfan and Mendes Ltd (FML) has been in business in Guyana for 50 years supporting the local timber industry, bringing many new technologies and practices to the local industry, including the introduction of chainsaws and chainsaw milling to Guyana in 1967 and band-mill technology in the early 1970's. The company is the agent for Woodmizer mills and Stihl chainsaws and equipment amongst other products.

Farfan and Mendes Ltd is working with McVantage Guyana Ltd who are providing technical and financial support to FML for harvesting and sawmilling activities.

An Environmental Impact Assessment (EIA) for the Sustainable Timber Operations was prepared in accordance with the Environmental Protection Act of 1996. The Environmental Protection Agency (EPA) of Guyana issued an Environmental Permit for Timber Harvesting and Sawmilling in 2007, which was revised in 2008 and renewed in 2015.

Management Objectives

The general objective of the timber operation is

> "*The Company will be a global sustainable model for timber harvesting and wood processing, demonstrating innovative governance models (including communities and the private & public sectors) and operations that are environmentally, socially, culturally and economically sustainable. The Project will aim to be certified by FSC™ Standards for sustainable forest management*."

The specific forest management objectives of the timber operation are to

- Continue to develop and refine the sustainable forest management model with global applications using local knowledge and lessons learned
- Achieve economic self-sufficiency which will contribute to Iwokrama's continued research and development activities for the sustainable multiple use of tropical rainforests
- Ensure the long-term growth and productivity of the Iwokrama Forest beyond the first cutting cycle by implementing a silvicultural regime such that a continuous flow of desired forest products and services is achieved
- Ensure no undue reduction of the inherent values to future productivity of the forest
- Reduce the undesirable effects on the physical and social environments.
- Evaluate the productivity and efficiency of the forest management enterprise and update plans accordingly."

In Phase II, the sustainable timber harvesting operation will process logs into rough sawn lumber and squares in the forest. These products will be trucked to FML's reprocessing operations in Coverden where they will be converted to kiln dried and dressed sawn wood and other high value products for the local and export markets.

It shall also:

- test models of governance, planning, harvesting and management; this includes economic, social and environmental assessment of the process
- acquire practical experience in establishing, managing and operating a certified timber operation

Inventory Design

Iwokrama carried out a management level inventory of the NOA in April and May 2003, with the assistance and collaboration of the Guyana Forestry Commission. Pre-harvest inventories or 100% enumerations, are carried out on each annual cutting area to determine precisely the volumes by species and size classes that will be felled.

Management Regime

IIC has opted for a 60 year felling cycle and an annual allowable cut of 20 m3/ha. This allows an annual harvest area of about 1,800 ha and an annual harvest volume of 36,000 m3. The GFC's current yield regulation procedure will limit IIC to an average harvest of 16 m3/ha or about 29,000 m3/year.

Silviculture System

The silvicultural system applied on the Net Operable Area (NOA) of the Iwokrama Forest is a natural regeneration system. This is a simple system consisting of selecting only a few trees at a time for removal, allowing natural regeneration to fill in the gaps created, and maintaining standing volumes of all tree species. It may also be called "*selective cutting*" or "*selection system*". It falls within the "*polycyclic systems*" of forest management and regeneration, as it contains trees in different stages of their growth cycles.

Infrastructure Development

Iwokrama developed a permanent base camp off the Linden-Lethem road about 8 km south of the Kurupukari Crossing. It provides housing, offices and equipment maintenance and storage facilities. Over the first 10 to 15 year period, the Linden-Lethem road will serve as the primary logging road. Secondary and feeder road development into the forest could extend up to 13km/year this period.

Employment and Training

There are over 7000 people living in 20 communities associated with Iwokrama, 19 of which lie south of the Iwokrama Forest in Region 9. Approximately 90% of them are Amerindian. This potential labour base is readily accessible via the north-south road connector to Lethem. Preferential employment is given to residents of local communities.

The operation is practicing Reduced Impact Logging (RIL) and, to that end, all personnel involved with the harvesting operation will receive adequate training in RIL procedures.

Some of the specific training opportunities already provided and/or planned for the near future by Iwokrama, are:

- Ranger training, with emphasis on patrolling/monitoring and research;
- Tour Guide Training in the specific skills required for ecotourism development;
- Collaborative and Protected Area Management Training.

Iwokrama Monitoring

Part of Iwokrama's mandate is to ensure that there is a system in place to track the health of the forest – to keep activities in check. To do so, Iwokrama monitors its operations within the forest, along the rivers and road corridors and in communities that we partner with, particularly Fair View Village, which lies within the Iwokrama forest boundaries. These monitoring activities are implemented by a team of trained rangers who use specially developed biophysical and social monitoring frameworks to measure these impacts.

The Iwokrama Forest is bordered by the Essequibo and Siparuni River and the Burro Burro River runs through the Forest. However, while providing a livelihood for local Amerindians, these rivers also expose the Forest to illegal activities, particularly illegal fishing and hunting. The rivers are open to public access twenty-four hours a day and are not as easily monitored as the road.

Despite some challenges and the fact that Iwokrama has had to prioritize core areas of monitoring over the past years, strategic partnering with researchers have provided support to Iwokrama's Monitoring Programme and the results have been very encouraging especially as it relates to the Iwokrama timber operation. Data from research/monitoring has been synthesized and presented in several peer review publications and environmental reports.

Biophysical Monitoring

- ***Rainfall***

Rainfall data was collected at three sites (Field Station (FS), Mill Site (MS), and Corkwood) within the Iwokrama Forest during the year 2016.

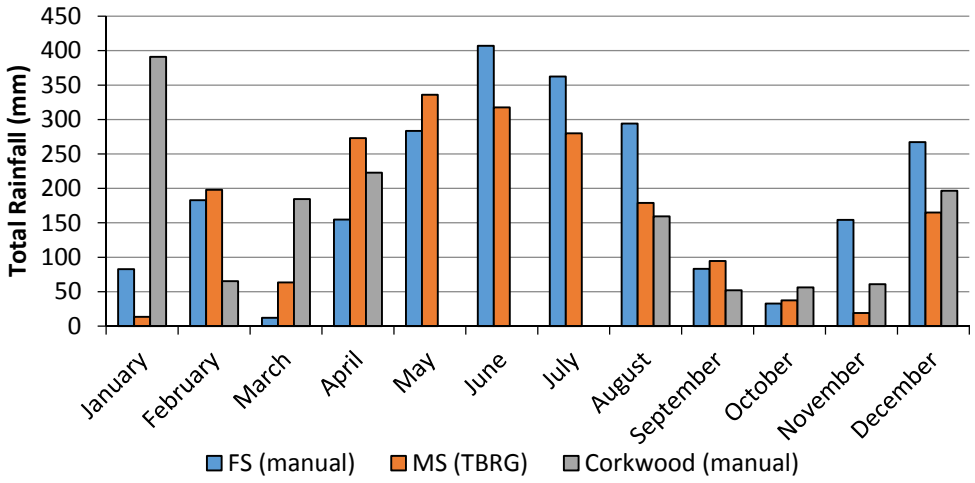


Figure2: Total monthly rainfall for the Iwokrama Field Station (FS), Iwokrama Mill Site (MS), and Ranger Station 2 (Corkwood) for the year 2016

As the graph suggests, rainfall within Iwokrama is very dynamic throughout the year; also generally rainfall at Corkwood tends to show a different trend and is more linked to the Rupununi rainfall pattern.

- ***Water Quality***

Water quality measurements are taken along the three main rivers within and around the Iwokrama Forest. Samples are taken from seven points: Five sites are located along the Essequibo River and one each in the Burro Burro and Siparuni Rivers. Water quality samples are also collected in creeks that are in proximity to Iwokrama's forestry operations. This is done with the intent of assessing the impact of Iwokrama's forestry operations on the quality of water in creeks within the forest.

Parameters such as dissolved oxygen, electrical conductivity, and temperature were monitored in 2016 and were found to be within natural environmental limits.

- ***Fauna***

Faunal surveys were done during road and river patrols. On average, three patrols were conducted each month during the year 2016 and general wildlife observations were made for selected species along the 72 km main public road that runs through Iwokrama.

- *Road Patrols*

Seven species on the target list were observed during 2016: Grey-winged trumpeters (*Psophia crepitans*), Black Currasow (*Crax alector)* Jaguars (*Panthera onca)*, Red Rumped Agouti (*Dasyprocta leporine*), Red Brocket deer (*Mazama gouazoubira)* and Anaconda (*Eunectes murinus)*. The three mostfrequently observed species were the Black Currasow, the Grey-winged Trumpeter and the Red-rumped agouti.

- *Bird Transects*

There are six bird transects distributed along the road corridor, with at least one in each forest type dissected by the road corridor. These transects are observed for all birds heard and seen. Data collected shows that the diversity of birds along the road is noticeably higher in Mixed Greenheart and Mora Forest.

- *Borrow Pits*

There are six borrow pits adjacent to the road corridor that were selected for wildlife observations because they are greater than one hectare and were not easily visible from the road. These conditions make them ideal for large elusive animals such as the Jaguar (*Pantera onca*) and Tapir (*Tapirus terrestris*) to use comfortably without being disturbed by road users. Predominant species observed during borrow pit inspections were the Red-rumped agouti (*Dasyprocta leporine*), Red-brocket deer (*Mazama americana*), and the Tapir (*Tapirus terrestris*).

- *Bird Transects on the River*

Monitoring is done at seven bird transects – five along the Essequibo River and one each on the Burro Burro and Siparuni Rivers. These transects are also observed for birds heard and seen. In 2016, Anhingas (*Anhinga anhinga)* and Cormorants (*Phalacrocorax brasilianus)* were primarily observed upstream of the

Essequibo River while White-winged (*Tachycineta albiventer)* and White-banded swallows (*Atticora fasciata)* were predominant within the Burro Burro and Siparuni Rivers.

Forest Impact Monitoring

This type of faunal monitoring done specifically to address impacts of timber harvesting was developed with staff in 2009 in collaboration international researchers. This monitoring focuses on key bio-indicator species. Data from this research/monitoring has been synthesised and presented in a peer review publication.

Synthesis and applications. (Extract from paper)
'*Our study demonstrates the relatively benign effect of reduced impact logging (RIL) on birds, bats and large mammals in a neo-tropical forest context, and therefore, we propose that forest managers should improve timber extraction techniques more widely. If RIL is extensively adopted, forestry concessions could represent sizeable and important additions to the global conservation estate – over 4 million km2*.'

Reference: Bicknell, J.E., Struebig, M.J., Davies, Z.G. (2015). **Reconciling timber extraction with biodiversity conservation in tropical forests using reduced-impact logging.** *Journal of Applied Ecology*. 52, 379-388.

Other research supporting monitoring

Iwokrama continues to partner with Operation Wallacea and Surama Village to implement faunal surveys that follow our Forest Impact monitoring methodology, within the Iwokrama Forest and Surama Village. Volunteers from Universities primarily from the UK, Canada, the USA, and the University of Guyana join the scientists to learn about methods in research relating to faunal surveys. This exercise ensures that long term monitoring data is collected for Iwokrama and Surama which can be used to observe if any changes are happening within these areas. A number of other research projects are also supporting Iwokrama's Monitoring Programme including two camera trapping studies.

Social Monitoring

Surveys and interviews conducted in the village provided information on livelihoods[3]. Information collected revealed that the main sources of employment are Iwokrama, McVantage-Guyana and private tourism companies mainly Adventure Guianas. Many households also rely on subsistence farming for resources. Less commonly, households primarily relied on the revenue made by local shops, gold-mining, self-employment doing odd-jobs in and out of the community, Community Monitoring, Reporting, and Verification (CMRV) work and teaching at the local Primary School.

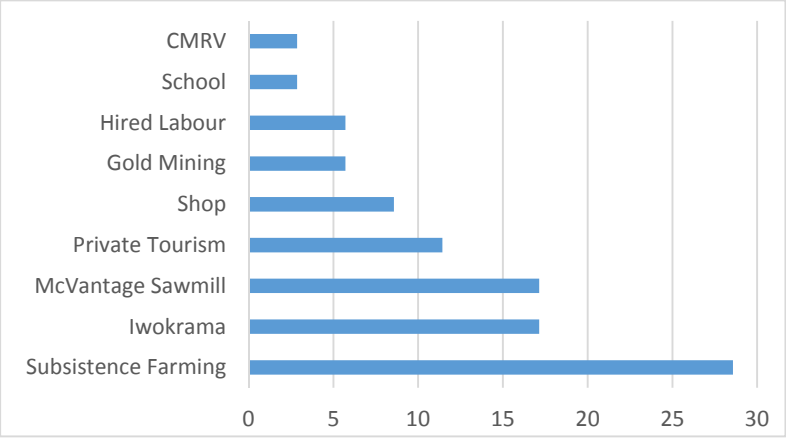


Figure 4: Livelihood analysis of activities or resources that contribute most to meeting the basic needs of households.

Most households surveyed also reported that they make use of the forest resources by hunting and fishing. The households that hunt mostly stated that they do so only occasionally and typically hunt labba and agouti, sometimes deer, and rarely peccary. Nearly all households with farms grow cassava, but many also grow banana, plantain, bora, eddoes and sweet potatoes.

High Conservation Value Forests

An HCV is a biological, ecological, social or cultural value of outstanding significance or critical importance. The Iwokrama Forest contains several attributes that can be described as HCVs as defined by the Forest Stewardship Council™ International Generic Indicators (FSC-STD-60-004 V1-0 EN September 2015).

The Iwokrama Forest contains several qualities which can be considered as indicators of high conservation value e.g.

- Threatened or Endangered Species,

[3]Respondents to the interviews included 19 males and 20 females between the ages of 19-66 and with an average age of 41.

- Possible Endemic Species,
- Key Ecosystems and Habitats,
- Critical Ecosystem Services and
- Sites of potential cultural, archaeological value or historical significance.

Many of these attributes are in reserve areas of the forest, either in the Wilderness Preserve (WP) or in reserved areas of the Sustainable Utilization Area (SUA). Iwokrama's detailed, comprehensive and participatory zoning exercise has divided the Iwokrama Forest into two zones: the 50.4% Wilderness Preserve (WP) and the 49.6% Sustainable Use Area (SUA). This zonation is particularly relevant for the protection of species in the forest, since the most effective method of species protection and biodiversity conservation is the protection of habitats.

Iwokrama continues to manage the forest, paying special attention to the special characteristics; which are indicators of high conservation value; through regular forest monitoring. Monitoring for conservation values include but are not limited to Forest Inventories, forest impact monitoring and bio-physical and social monitoring.

Iwokrama's Forest Certification Process

To validate its use of best practice methods in its operations, *Iwokrama* has once again received certification for forest management from the Forest Stewardship Council™ (FSC™). FSC™ is the most prestigious international forest certification scheme.

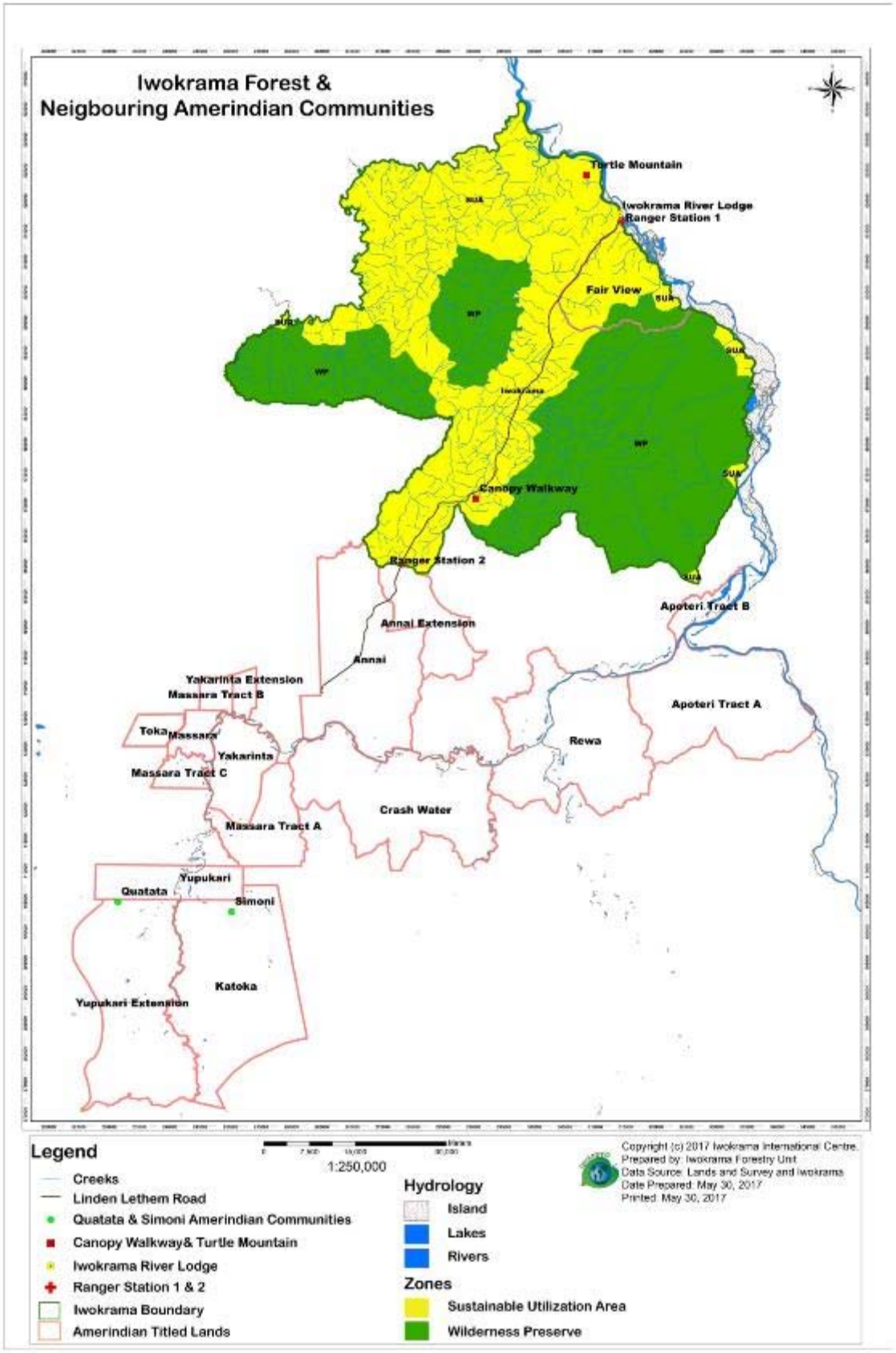
The Iwokrama Forest is now the only area in Guyana that has been certified for meeting international best practices for Forest Management. Iwokrama received similar recognition by the international auditors in 2008 and maintained these credentials throughout the first phase of its timber harvesting operations.

Key to compliance with FSC™ guidelines is that forest managers must follow all national rules, laws and guidelines including the GFC's comprehensive Codes of Practice.

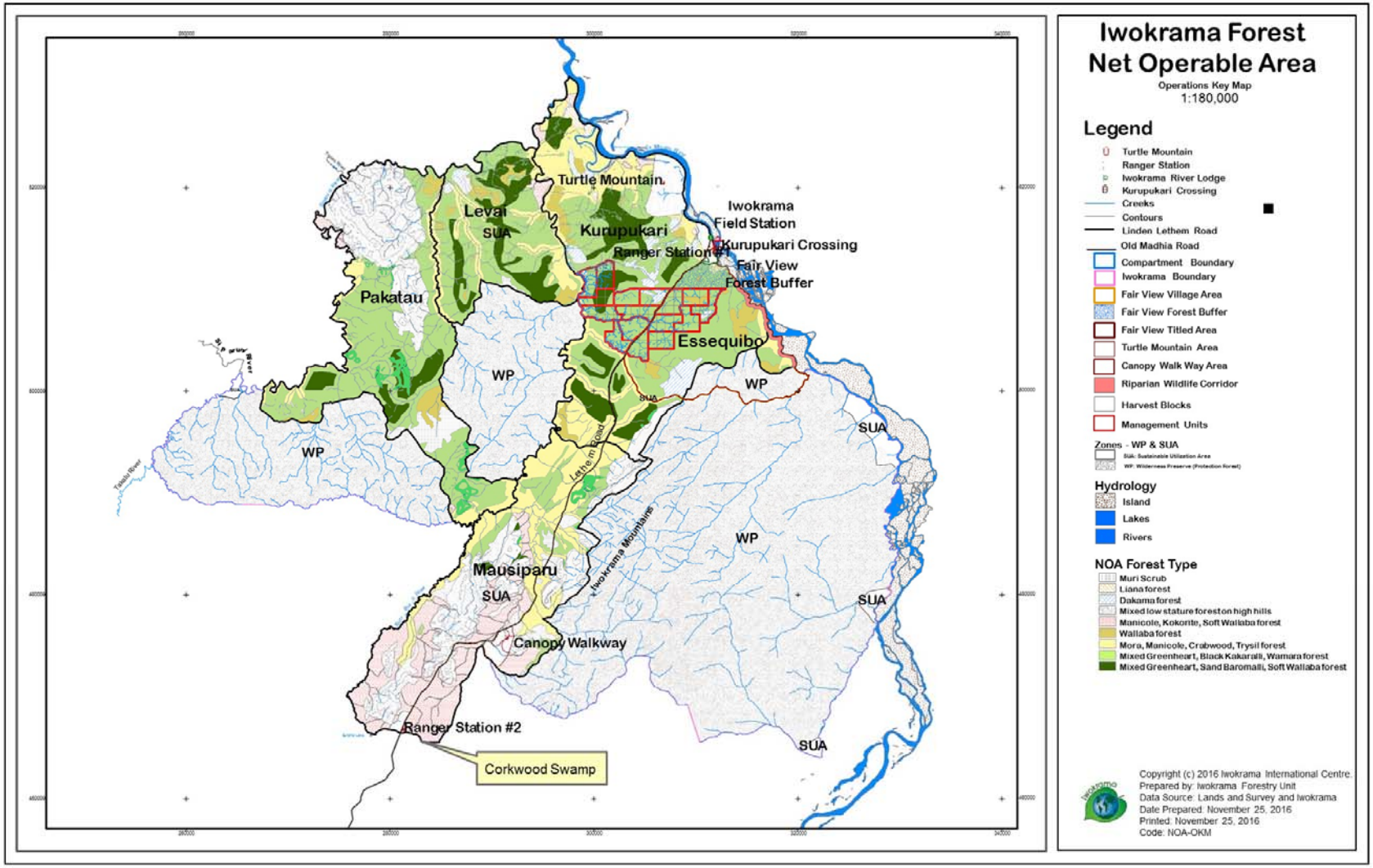
Maps attached

1. Iwokrama Forest and Neighbouring Communities
2. Iwokrama Forest Net Operable Area
3. Five Year Harvest Plan

MAP 1: IWOKRAMA FOREST AND NEIGHBOURING COMMUNITIES



MAP 2: IWOKRAMA FOREST NET OPERABLE AREA



MAP 3: IWOKRAMA 5 YEAR HARVEST PLAN