



IWOKRAMA INTERNATIONAL CENTRE FOR RAIN
FOREST CONSERVATION AND DEVELOPMENT

High Conservation
Values in the
Iwokrama Forest

October 2018

INTRODUCTION

For the purpose of forest certification, the Iwokrama Forest in its entirety can be considered a High Conservation Value (HCV) Forest.

A HCV is a biological, ecological, social or cultural value of outstanding significance or critical importance. (Common Guidance for the Identification of High Conservation Values, Oct 2013). A more detailed definition of High Conservation Values is presented in Box 1 below.

In the context of the Iwokrama International Centre for Rain Forest Conservation and Development (*Iwokrama*) *‘the definition of the Iwokrama Forest as a HCV Forest has to be understood as a reflection of certain objective facts but, also, as a management decision. And, very importantly, this definition has to be also understood in the light of the certification process.’*

Iwokrama has a long history of management planning, which includes processes that have led to the development of the Centre’s own principles and criteria for management which included an extensive and very participatory zoning process.



The mark of
responsible forestry

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

Zoning of the Iwokrama Forest

The Swaminathan Report (1990) originally recommended that the Iwokrama Forest should be divided into two equal sized zones in order to accommodate both of Iwokrama's main objectives – conservation and sustainable use. (Zoning of the Iwokrama Forest, Dec 2000)

Section 7 (1) of The Iwokrama Act, Act No. 7 of 1996 states that: *“The Centre shall demarcate and allocate portions of the Programme Site into the following areas and shall by notice publish such demarcation in the Gazette - (a) areas for the establishment and maintenance of the Rain Forest Wilderness Preserve; (b) areas for the sustainable utilisation of the multiple resources of the tropical rain forest.”*

The Sustainable Utilisation Area (SUA) allows the Centre to demonstrate that forest resources - both timber and non-timber products - can be used effectively, providing benefits to all stakeholders whilst ensuring important ecological services and acceptable levels of biological diversity are maintained. The Wilderness Preserve (WP) was selected to be representative of the Iwokrama Forest as a whole – with the aim of protecting existing biological diversity and to ensure that the key ecological processes that maintain the diversity remain intact. It is also intended to act as a control site for monitoring activities in the SUA.

Key requirements of the zoning process were that it be transparent and defensible and that it considered the opinions of Iwokrama's stakeholders who included:

- Communities within and neighbouring the reserve
- National partners
- International partners

Steps in the Zoning Process

- Data review, gathering and analysis
- Development of a zoning allocation decision model (several scenarios were created)
- Consultation and final selection of the model

Relevant documents on the zoning process

- *Zoning of the Iwokrama Forest Working Paper - Dec 2000*
- *Policy and Planning Brief – Zoning of the Iwokrama Forest - June 2001*
- *Workshop Reports on the Zoning of the Iwokrama Forest – Annai (March 2000), Bina Hill Institute (Jan 2001), Fair View (Jan 2001)*

The zoning exercise defined 50.4% of the Forest as Wilderness Preserve. With the subsequent zoning of the Net Operable Area within the SUA, a total 70.8% of the Iwokrama Forest was exempted from the identified pressure of timber harvesting. This is particularly relevant for achieving species protection in the Forest, as the most effective and efficient mechanism for protecting species and conserving biodiversity is to prevent the destruction or degradation of habitats.

Box 1: High Conservation Value Forests

A High Conservation Value Forest is one that possess one or more of the following attributes:

HCV 1 – Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

HCV 2 – Landscape-level ecosystems and mosaics. Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HCV 3 – Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.

HCV 4 – Critical ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

HCV 5 – Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities or Indigenous Peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or Indigenous Peoples.

HCV 6 – Cultural values. Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or Indigenous Peoples, identified through engagement with these local communities or Indigenous Peoples.

Source: Forest Stewardship Council® International Generic Indicators (FSC-STD-01-004 V1-0 EN).

An HCV is a biological, ecological, social or cultural value of outstanding significance or critical importance.

This document attempts

- to identify the HCVs in the Iwokrama Forest,
- to link these values with Iwokrama's exhaustive, participatory and internationally recognized management planning and monitoring processes and
- to identify methods for the management and conservation of these values.

HCV 1 – Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

The ProForest Toolkit defines HCV 1 –Globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia) and further subdivides this into four elements.

Iwokrama will continue to use these four elements, to make identification and classification of the HCVs in the Iwokrama Forest simpler.

HCV 1.1 Protected Areas: Present

The Iwokrama Forest, one of five legally established protected areas in Guyana, is governed by the Iwokrama International Centre for Rain Forest Conservation and Development Act, Act No 7 of 1996 (The Iwokrama Act). The other areas are governed under the Protected Areas Act, Act No 14 of 2011.

The Forest is zoned into two spatially equal zones: a Sustainable Use Area (SUA) and a Wilderness Preserve (WP). The SUA is available for multiple resource use to yield benefits to present generations while maintaining the potential to meet the needs of future generations. The SUA is managed by the Iwokrama International Centre and its local community partners, particularly Fair View Village who have legal title to 21,950.82 ha of the Iwokrama Forest¹. The WP serves as a biodiversity reserve and reference area for studying the impacts of human activity through comparison with use in the SUA, and to maintain a pool of genetic resources in an intact state. Activity in the WP is severely limited and currently includes only low-impact research.

This model of landscape zonation ensures that concentrations of biological diversity, including endemic, rare, threatened or endangered species, are protected because their habitats are protected in the Wilderness Preserve. The WP is also intended to serve as a control site for monitoring the impacts of anthropogenic activities within the SUA. (See Figure 1).

¹Fair View Village obtained title for its Village Lands in 2006. Its titled lands consist of approximately 21,950.82 hectares. It is the only Amerindian territory located within the Iwokrama Forest and as such has special rights-holder relations with the Iwokrama International Centre.

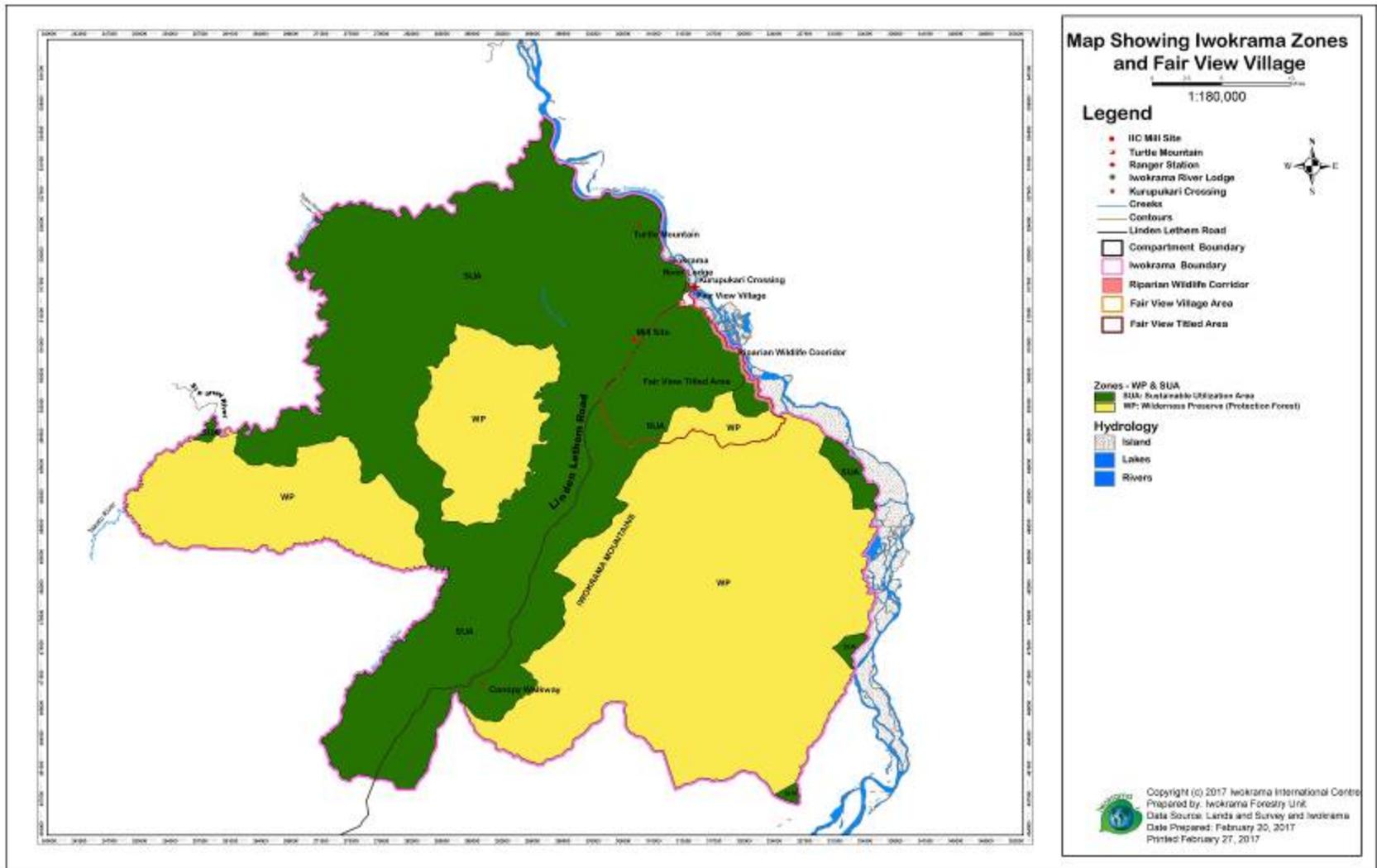


Figure 1: Map of the Iwokrama Forest showing the Sustainable Use Area and Wilderness Preserve.

The subsequent zoning of the Net Operable Area within the SUA has resulted in just over 70% of the entire Iwokrama Forest being excluded from sustainable timber harvesting activities. The Net Operable Area (NOA) is the area selected for timber harvesting purposes 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. (See Figure 2).

HCV 1.2 Threatened and endangered species: Present

The Iwokrama Forest is home to several globally threatened and endangered faunal species (**though none of them are recognized as being threatened or endangered in Guyana**).

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 dominant forest type covers 33% of the forest - mixed greenheart, black kakaralli and wamara forest.
- Around 20% of the forest is mixed greenheart, sand baromalli and soft wallaba 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 of the forest is less than 5% each of wallaba, dakama, muri scrub and liana forest.

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.

While the forests of Guyana are not home to any internationally endangered or rare tree species, the Iwokrama Forest is home to several suspected endemics including Greenheart (*Chlorocardium rodiei*) and Wamara (*Swartzia leiocalycina*). However, extensive research is needed to adequately determine endemism of biodiversity within the Iwokrama Forest.

Additionally, Forget *et al*, 2009 has established that a new species of Crabwood (*Carapa akuri*) exists in Guyana and occurs within the Iwokrama Forest. This new species was discovered during field work in the forest and is morphologically very close to *C. surinamensis* (referenced in Guyana as *C procera*) especially, as both have 5-and 4-merous flowers.

The Wilderness Preserve ensures protection of several habitats that exist within the Iwokrama Forest which by extension cover the protection of threatened and endangered species. Furthermore, as mentioned earlier just over 70% of the entire forest have been excluded from harvesting activities.

HCV 1.3 Endemic species: Probably present

The Iwokrama Forest is home to several suspected endemics, however extensive research is needed to adequately determine endemism of biodiversity within the Iwokrama Forest.

Clarke et al's 2001 Study² suggests that the Iwokrama Forest is one of very few areas in Guyana that has stands of Greenheart (*Chlorocardium rodiei*) that are not allocated as a timber concession.³

Clarke et al also makes reference to the presence of Wamara (*Swartzia leiocalycina*) in the Iwokrama Forest and states that the forest has 312 plant species which have not been recorded in the other florulas of the Guiana Shield Region – this suggests that the forest can be considered to have a concentration of endemic species.

Forget *et al*, 2009 has also established that a new species of Crabwood (*Carapa akuri*) exists in Guyana and occurs within the Iwokrama Forest. This new species was discovered during field work in the Iwokrama Forest and is morphologically very close to *C. surinamensis* (referenced in Guyana as *C procera*) especially, as both have 5-and 4-merous flowers.

New research has also discovered new faunal species, thought to be endemic to the Iwokrama Forest, more specifically the Iwokrama Mountains; an area that can be described as an “*area of endemism*.”

²Clarke et al, 2001 – Plant Diversity of the Iwokrama Forest, Guyana

³Inventory conducted in the Wilderness Preserve shows 18.5m³/ha of Greenheart across all forest types for the Essequibo and Burro-Burro Blocks.

- a new entomopathogenic species (new beetle pathogen species distinguished from other fungi of the genus *Stilbella*) – *Stilbella iwokramensis* (Ascomycotina, Hypocreales) in 2004
- one amphibian: the caecilian – a legless amphibian – *Caecilita iwokramae* in 2009
- one reptile: a lizard – *Gonatodes timidus* in 2012
- a second amphibian: a frog – *Allobatesa missibilis* (in Latin “that may be lost”) in 2013.
- a new species of broad-nosed bat -*Platyrrhinus* Saussure (Chiroptera: Phyllostomidae: Stenodermatinae) from the Guianan Shield (endemic to the Guiana shield) in 2014

It is important to note that the Iwokrama Mountains, which can be considered an “*area of endemism*” are found in the Wilderness Preserve and are therefore protected.

The Wilderness Preserve provides for the protection of endemic species since it includes representative samples of all forest types. However, more research is needed to determine actual status, if endemic or not, of the new species discovered in the Iwokrama Forest.

HCV 1.4 Critical temporal use: Presence not known

There is insufficient data available to support the idea that Iwokrama presents a critical temporal resource e.g. for migrating species.

HCV 2 – Landscape-level ecosystems and mosaics. Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

There is currently no agreed-upon national definition or interpretation of what constitutes a “*large, landscape level forest*” in Guyana.

However, ProForest's Good Practice Guidelines for High Conservation Value Assessments - A practical guide for practitioners and auditors suggests that three indicators should be considered to assess the presence of this value.

- Size – usually tens of thousands of hectares but this may vary by location or ecosystem type.
- Level of Fragmentation – some amount of fragmentation is inevitable in a landscape level forest. There may be multiple natural habitat types within a landscape.
- Naturalness – considers species and habitat composition and the degree of absence of exotic species.

The Wilderness Preserve can be considered a large landscape level block of forest because its total area is 187,174.5 ha, comprised of three areas of size 127,059.2; 25,330.1 and 34,785.2 ha. It serves as a biodiversity reserve and helps to maintain a pool of genetic resources in an intact state. This ensures that concentrations of biological diversity including endemic, rare, threatened or endangered species are protected because their habitats are protected in the Wilderness Preserve.

Additionally, Guyana has a total area of 214,970 km², of which nearly 75% is covered with natural vegetation. Of this area, approximately four-fifths is classified as State Forests (Guyana Forestry Commission). The Iwokrama Forest is bordered by State Forests under the jurisdiction of the Guyana Forestry Commission – a forest management unit may also be considered HCV 2, if it is part of a larger forest area that is described as large landscape level forest. (See Figure 3)

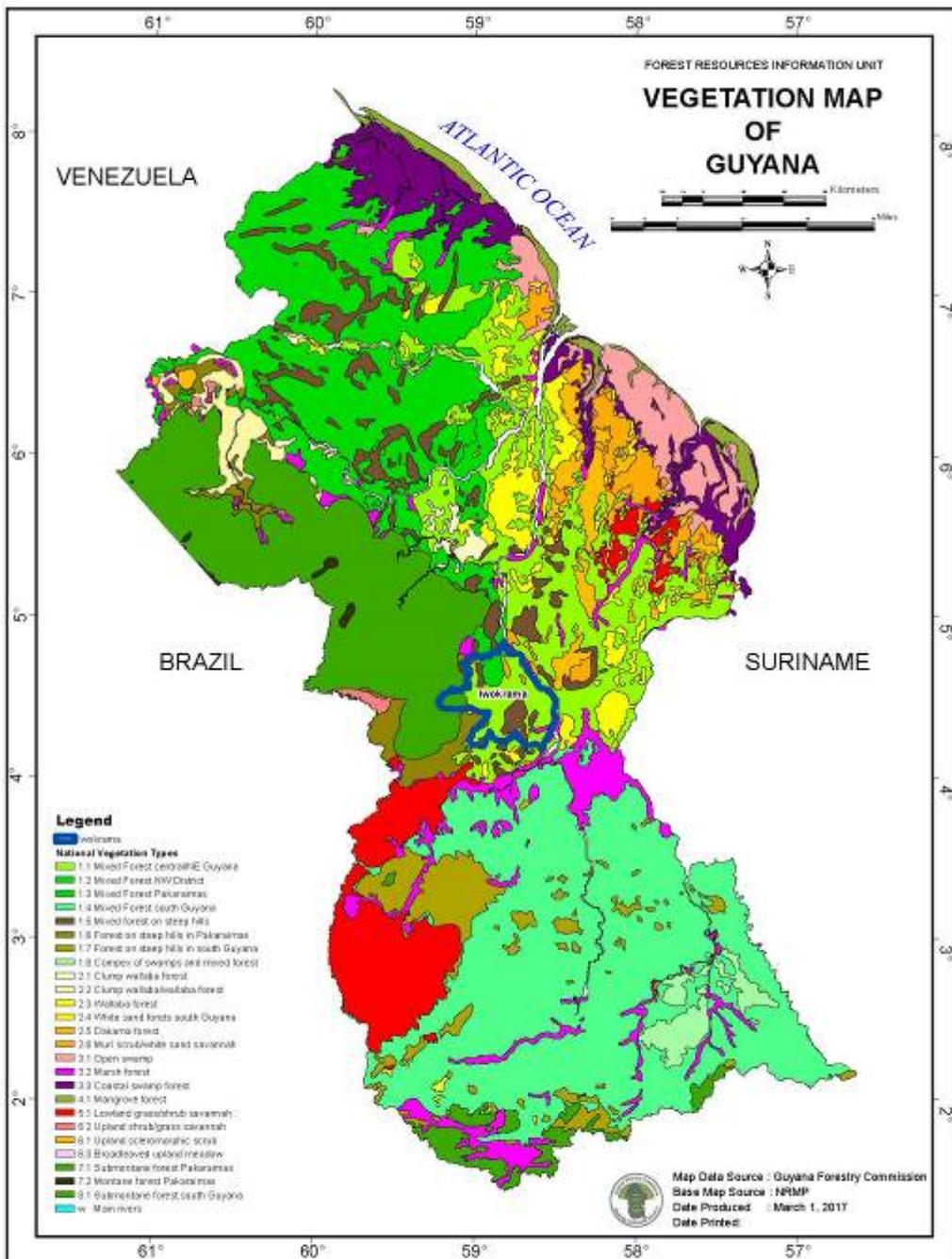


Figure 3: Vegetation Map of Guyana showing the outline of the Iwokrama Forest

An intact forest landscape (IFL) can be defined as

“a territory within today’s global extent of forest cover which contains forest and non-forest ecosystems minimally influenced by human economic activity, with an area of at least 500 km² (50,000 ha) and a minimal width of 10 km (measured as the diameter of a circle that is entirely inscribed within the boundaries of the territory).”

Source: Intact Forests / Global Forest Watch. Glossary definition as provided on Intact Forest website. 2006-2014

The Global Forest Watch method of identifying IFLs has designated the entire Iwokrama Forest and a large portion of Guyana’s forests as an IFL (See Figures 4 and 5).

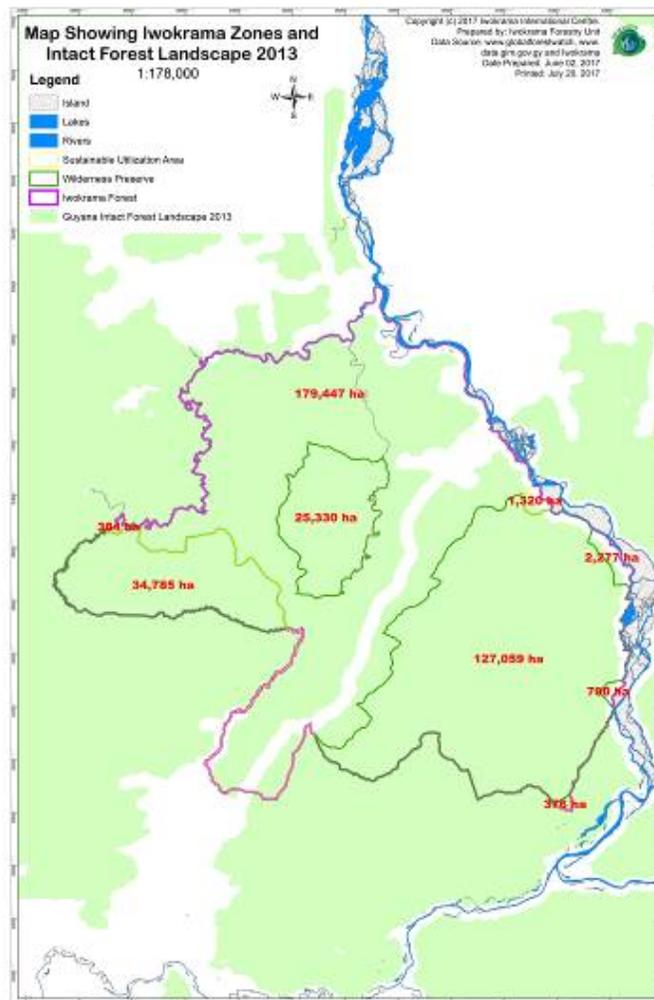


Figure 4: Map showing Iwokrama Zones and Intact Forest Landscapes 2013

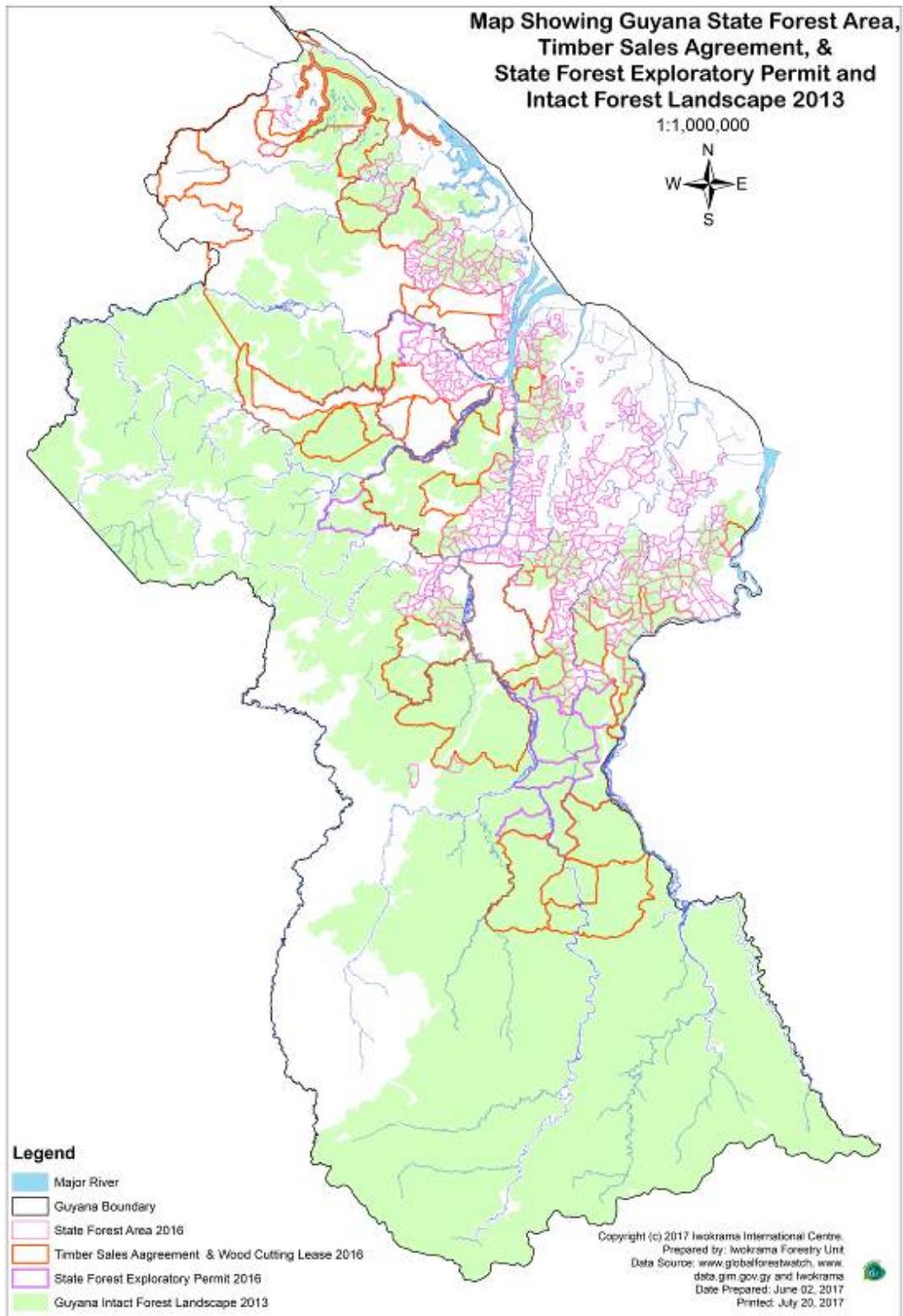


Figure 5: Map of Guyana showing SFAs, TSAs, SFEP allocations and IFLs

Motion 65 Advice Note to Certificate Holders and Certification Bodies in IFL countries stipulates:

1. Forest Management operations, including harvesting and road building may proceed in IFLs, if they:
 - 1.1. Do not impact more than 20% of Intact Forest Landscapes within the Management Unit (MU), and
 - 1.2. Do not reduce any IFLs below the 50,000 ha threshold in the landscape.

Iwokrama's maximum annual harvesting area of 1,800 ha only impacts 0.5% of the total Iwokrama Forest per year, therefore Iwokrama will not impact 20% of the IFL for 40 years even at maximum harvest rates. Historically, this is borne out by the harvest records from IIC's first 5-year plan, as well as by the post-harvest silvicultural reports from that period. For example, the maximum harvest area for a 5-year plan should be 9,000 ha and the maximum volume (MAC) at 20 m³/ha should be 180,000 m³. IIC only harvested 44,400 m³ from 4,200 ha, or 10.5 m³/ha. During this period, only 2.9 trees/ha were harvested.

N Sizer, WRI⁴ outlines in the presentation "*Intact Forests Mapping and Monitoring: Status and Plans*" that "*old or low intensity human influence is considered insignificant e.g. diffuse grazing by domestic animals, low intensity selective logging and hunting*"

Since Iwokrama's harvesting system is based on selective harvesting with a small number of stems removed per ha and non-permanent roads, then it can be considered that Iwokrama is practicing low-intensity selective logging with minimal disturbance.

⁴Sizer, N, WRI - GFW: Intact Forests Mapping and Monitoring: Status and Plans

HCV 3 – Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.

The Iwokrama Forest contains several forest and ecosystem types, many of which may be considered rare globally though none can be described as rare in Guyana.

Iwokrama's zoning exercise divided the Iwokrama Forest into two zones: the 50.4% Wilderness Preserve (WP) and the 49.6% Sustainable Use Area (SUA). The SUA was further zoned – defining the net operable area (NOA) resulting in a total area of 70.8% or 263,247.7 ha being removed from any commercial timber harvesting activities.

Taking into account the WP and the areas outside the NOA, all forest and ecosystem types are represented in the Wilderness Preserve and reserve areas. More research is needed to adequately determine the presence of rare, threatened, or endangered ecosystems and habitats.

HCV 4 – Critical ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

The FSC® International Generic Indicators (FSC-STD-60-004 V1-0-EN) defines Critical as follows

“The concept of criticality or fundamentality in Principle 9 and HCVs relates to irreplaceability and to cases where loss or major damage to this HCV would cause serious prejudice or suffering to affected stakeholders. An ecosystem service is considered to be critical (HCV 4) where a disruption of that service is likely to cause, or poses a threat of, severe negative impacts on the welfare, health or survival of local communities, on the environment, on HCVs, or on the functioning of significant infrastructure (roads, dams, buildings etc.). The notion of criticality here refers to the importance and risk for natural resources and environmental and socio-economic values (Source: FSC-STD-01-001 V5-0).”

Iwokrama's zoning process and the further zoning of the SUA to define the net operable area has resulted in a total area of 70.8% or 263,247.7 ha being removed from any commercial timber harvesting activities. This translates to 29.2% of the forest being set aside for commercial timber harvesting. The annual

harvesting area is approximately 1,800 ha (less than 0.5% of the forest) which will result in only a few stems per ha (5-6 trees per ha) being removed and no large gaps created in the forest canopy. This zonation is particularly relevant for the protection of ecosystem services since more than 70% in the forest is exempt from commercial timber harvesting.

Additionally, compliance with the Guyana Forestry Commission's Code of Practice for Timber Harvesting and Reduced Impact Logging Guidelines will mitigate damage to ecosystem services in harvesting areas.

HCV 5 – Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities or Indigenous Peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or Indigenous Peoples.

Fair View Village obtained legal title for 21,950 hectares of the Iwokrama Forest. It is the only Amerindian village located within the boundaries of the Iwokrama Forest and as such has special rights-holder relations with *Iwokrama*. The community opted to remain part of the Iwokrama Forest and has signed several agreements with the Centre which elaborate collaborative management⁵, business and benefit-sharing arrangements and community management planning.

The village lands and other areas of the forest are fundamental to meeting the needs of the people. Critical waterways; which supply the village's drinking water have been identified; signage has been established (on road) and waterways are subject to testing under Iwokrama's water quality monitoring regime.

A system to monitor hunting and fishing off-take for community users entering the southern end of the Iwokrama Forest is in place. Fishing data from Fair View is collected and quantified through personal interaction with the villagers involved in this activity and the Iwokrama Rangers. Iwokrama also keeps records of fish consumption for the Iwokrama River Lodge (what is used in the kitchen). Fishing is the most common community resource use activity that occurs within the forest.

⁵ The Fair View Management plan was completed in 2009, it addresses issues related to village resource use, critical areas, hunting grounds and special reserves.

The Iwokrama International Centre for Rain Forest Conservation and Development Act, Act No 7 of 1996 and the Amerindian Act, Act No 6 of 2006 recognise the “*traditional rights*” of Amerindians. The Iwokrama Act specifically refers to the protection of Amerindian Rights with a particular connection to any area of the land within or neighbouring the Programme Site.

HCV 6 – Cultural values. Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or Indigenous Peoples, identified through engagement with these local communities or Indigenous Peoples.

Through community consultations and studies, several sites have been identified. Most notable are the Iwokrama Mountains which were identified in the zoning process as a place of great spiritual and cultural significance for the Makushi people. This was one of the main criteria for inclusion of the entire Mountain range within the Wilderness Preserve where protection is ensured.

A forest impact monitoring system is in place for discovery of sites within harvesting units. In the first instance, forest inventory teams look out for potentially important sites when conducting inventories and if any such sites are located, management and monitoring teams and the community are informed. After checks and if the site is determined to be a potential site of cultural and spiritual significance, the Walter Roth Museum is contacted to do an assessment.

If any sites identified are determined to be of cultural significance, the site is removed from the NOA and protected by an appropriate buffer.

Linking Iwokrama's Zoning Principles and Criteria to HCVs and related Monitoring

Zoning P & C	HCV link	Observations	Monitoring
1. Conservation of traditional uses of Iwokrama Forest by Amerindian Communities			
1.1 Integrity and accessibility of plant collection sites ensured	HCV 5	1.1, 1.2 Amerindian Act and Iwokrama Act protect rights of associated 20 communities	1.1, 1.2 Information collected by monitoring team on fishing and hunting off-take by community members accessing the South end of the Reserve. Hunting off take for Fair View is recorded and quantified by Iwokrama Rangers through personal interviews with individuals involved.
1.2 Integrity and accessibility of traditional hunting and fishing grounds ensured	HCV 5		
1.3 Access to subsistence use areas for traditional agriculture ensured (SUA)	HCV 5	1.3 Fair View traditional agriculture occurs within Titled (owned) Area	1.3 Areas of farmland are dynamic and are managed by Fair View Village Council using the Management Plan developed by Fair View with support from Iwokrama. GIS/Satellite mapping (when established) to assist with monitoring change (with Iwokrama's assistance). Data collection on agricultural expansion within Fair View commenced in 2010.
1.4 Integrity and accessibility of sites of cultural or spiritual significance ensured	HCV 6	1.4 Iwokrama Mountain identified by communities as place of such significance, area set aside in the Wilderness Preserve	1.4 Forest inventory documentation takes potentially important sites into account. This is followed by checks by monitoring staff and community residents. The Walter Roth Museum is then contacted to do an investigation if determined to be a site of possible significance Newly identified sites are excluded from the NOA and appropriate buffer implemented.

2. Conservation of Iwokrama's natural resources			
2.1 Natural forest types protected	HCV 2	<p>2.1</p> <ul style="list-style-type: none"> 50% of Iwokrama's Forest is dedicated as a Wilderness Preserve catering for representative forest types, 71% percent of Reserve will not be harvested. 	<p>2.1</p> <ul style="list-style-type: none"> GIS/Satellite monitoring to be implemented in future to assess change once funding and linkages attained. On the ground checks currently being done in accessible areas for illegal incursions – Road and River monitoring (Monitoring Protocol), forest management monitoring and adherence to the relevant Codes of Practice (timber harvesting)
2.2 Aquatic habitats conserved	HCV 1	<ul style="list-style-type: none"> Key indicator species used to assess impacts on fauna 	<ul style="list-style-type: none"> Forest impact monitoring assessing key indicator faunal species
	HCV 1	<ul style="list-style-type: none"> PSP growth data used to inform annual allowable cut 	<ul style="list-style-type: none"> PSP scheduled re-measurements
	HCV 1	<p>2.2</p> <ul style="list-style-type: none"> Rivers bordering and one running thorough (Burro Burro) Iwokrama are legally accessible to the public. 	<p>2.2</p> <ul style="list-style-type: none"> River monitoring for illegal activities. Co-monitoring agreement with Surama Community to monitor Burro Burro quarterly Co-Monitoring of upstream Essequibo River – Memorandum of cooperation signed with Rewa and Apoteri Villages. Water quality testing for rivers and key creeks including those critical to village
	HCV	<ul style="list-style-type: none"> Important 	<ul style="list-style-type: none"> Road monitoring also makes

potential (SUA)	N/A		3.4 Not applicable
4. Optimisation of benefits from conversion of the Iwokrama Forest for long-term, non-forest land uses	NA		
4.1 Contribution to permanent agricultural production 4.2 Contribution to permanent livestock production 4.3 Contribution to permanent plantation forest production			Not yet applicable
5. Optimisation of benefits from the sustainable, commercial, non-extractive utilisation of the Iwokrama Forest			
5.1 Ecotourism potential maximised 5.2 Paid Scientific Research / Education Maximised	HCV 5 NA		5.1 Revenue generation from Iwokrama Tourism business, Benefits transfer evidence to communities (Fair View- Visitor Fee, NRDDDB- Visitor Fee allocation to Community fund), 5.2 Research accommodated, Director, Resource Management and Training is directly responsible for this aspect. Research Projects that contribute to our Monitoring Programme <ul style="list-style-type: none"> • Forest Impact Monitoring- this

<p>5.3 Carbon sequestration / offset potential</p>	<p>HCV 4</p>	<p>5.3 PSP data from logged and unlogged plots</p>	<p>programme set up since 2008 under the Biophysical Protocol has worked in collaboration with Scientist Jake Bicknell to look at timber harvesting impacts on fauna using key bio-indicator species.</p> <ul style="list-style-type: none"> • Annual expedition (Operation Wallacea) since 2011 have been conducting faunal research using bio-indicator species, based on Iwokrama Monitoring protocols and the Forest Impact Monitoring methodology. • Camera trapping study focussed on the effects of logging and hunting on large terrestrial vertebrate species in a sustainable use reserve. Paper in press. Collaboration between former Iwokrama staffers Anand Roopsind and H Sambhu and Dr Jose Fragosa. • Collaboration with Researcher Matt Hallet on Camera Trapping study. Key questions 1.) Can a collaborative process (with high level of participation by local resource users) be facilitated that will address local issues and generate scientifically relevant data? • Study on Effect of reduced-impact logging on seedling recruitment Iwokrama's logged area completed and paper published in 2016. Study concluded that the forestry practices associated with RIL have little effect on natural regeneration rates of key commercially valuable tree species within the logged Iwokrama Forest <p>Several University and school groups visit to learn about Iwokrama's system of management.</p>
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maximized		used in determining carbon stocks recovery	5.3 PSP scheduled re-measurements
5.4 Hydropower generation potential maximized			5.4-5.6 NA
5.5 Wind power generation potential maximized			
5.6 Endowment potential maximised			
6. Protection of Iwokrama's cultural heritage			
6.1 Archaeological / Historical sites protected	HCV 6	Refer to 1	
7. Accounting for the effects of long-term climate change on forest benefits and management objectives			
7.1 Likelihood of forest fire events reduced	HCV 1		7.1 and 7.2 Specific climate and weather monitoring programme implemented in 2010 in collaboration with Newcastle University
7.2 Impacts of shifting environmental conditions along altitudinal gradients	HCV 3		
8. Efficient and effective			

management of Iwokrama Forest			
8.1 Administrative, Recreational, research and educational infrastructure developed and maintained			<ul style="list-style-type: none"> • Vehicles/boats and other relevant equipment for current operation mostly available • Research/Training/Monitoring/Business facilities continually upgraded

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