

The Code of Practice for Mangrove Harvesting



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Many local documents were reviewed which contributed greatly in guiding the preparation of this Code. These included: *National Mangrove Management Plan 2010*; *Guyana Forestry Commission Draft Code of Practice for Mangrove Management 2004*; *Code of Practice for Forest Harvesting 2002*; *The Socio-Economic Context of the Harvesting and Utilisation of Mangrove Vegetation (Allan et al)*; The *National Mangrove Management Secretariat* provided much logistical support for its development. The contributions of the following organisations are also gratefully acknowledged: The Guyana Forestry Commission, Sea and River Defence Department, Fisheries Department, Environmental Protection Agency, Guyana Lands and Surveys Commission, Georgetown Sewage and Water Commission, Ministry of Housing and Water, Hydrometeorological Service, National Drainage and Irrigation Authority and the Regional Democratic Councils.

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ABBREVIATIONS

CDC	Community Democratic Council
DBH	Diameter Breast Height (1.3 m above ground)
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
GFC	Guyana Forestry Commission
ICZMC	Integrated Coastal Zone Management Committee
ILO	International Labour Organization
ISO	International Organization for Standardization
ITTO	International Tropical Timber Organization
NDC	Neighbourhood Democratic Council
NMMAP	National Mangrove Management Action Plan
RDC	Regional Democratic Council
SFM	Sustainable Forest Management
SFP	State Forest Permission
SRDD	Sea and River Defence Division
UNCED	United Nations Conference on Environment and Development

1.0 BACKGROUND

1.1. What are mangroves?

Mangrove ecosystems (or simply ‘mangroves’) are the tide-influenced wetland complex consisting of mangrove forests, estuaries, lagoons, and associated habitats along the coasts and around islands in the tropics and subtropics. The mangrove forest consists of seawater-adapted flowering trees and shrubs, and the many associated ferns, fungi, and algae, including many epiphytes (Pastakia, 1991).

1.2. Mangroves in Guyana

There are three (3) main types of mangrove species occurring in Guyana. These are (Hussain, 1990): *Avicennia germinans* also known as “Courida” (Black mangrove); *Rhizophora mangle* (Red mangrove) and *Laguncularia racemosa* (White mangrove).

1.3. Mangrove Utilization in Guyana

Historic Utilization

Mangroves, as a sea defense, are very important because they have the capacity to protect our very important coastal regions. Around 90% of Guyana's population lives in the coastal zone (UNDP, 1996) It is the main agricultural area comprising 400,000 ha. most of which lies below sea level (Ministry of Agriculture, 2002). Agriculture contributed 27% of Guyana’s GDP in 2001, and 20% is due entirely to the key coastal crops of rice and sugar (Ministry of Agriculture, 2002b). The most affordable sea defense is a band of mangrove with a simple earthen dam behind. This is cheaper comparably with costly artificial barriers (concrete structures) which currently cost US\$2200 per linear meter (George Howard pers. comm., 2002).

The mangrove areas also provide a habitat for juvenile off-shore fisheries. This is another indirect but economically important use of mangrove vegetation. Mangroves are important breeding areas for off shore fish and shrimp (SSPA Project Team, 1994; EPA, 2000). Fisheries contributed 3% of the GDP (prawns and shrimp being about 26% of production by weight) (Ministry of Agriculture, 2002b). Although there has been no research into the role of Guyana’s mangrove in supporting the national fishing industry, in the Philippines it has been estimated that the removal of 1 ha of mangroves will lower fish catches in the nearby sea by 765 kg/yr (Primavera, 1991).

The third major indirect use of mangrove vegetation is tourism. The mangrove forest at Shell-beach in Region 1 is a key part of this tourist site, providing the habitat for the scarlet ibis (*Eudocimus ruber*) and many other species (Evans, 1998; EPA, 2000). In fact, the mangrove forest along the coast of Region 1 is such an important area for biodiversity in Guyana that it has

been proposed as one of the new protected areas, to preserve the nation's wildlife and protect a key area for eco-tourism (EPA, 2000; GFC & ICZMC, 2001).

Direct Uses of Mangroves:

Direct uses involve harvesting of bark for the domestic leather tanning industry, which supplies the leather craft producers for the domestic and Caribbean markets (GFC & ICZMC, 2001). The bark of the Red Mangrove produces a high quality tannin which is used to tan all kinds of leather (GFC & ICZMC, 2001). The tree is locally abundant; occurring in mono-specific stands (Andel, 1998). The majority of extraction takes place around the Mora Passage near Mabaruma in Region 1 (Andel, 1998). To harvest the bark, the entire tree is cut down and debarked (Andel, 1998).

Another important direct use of mangroves is for fuel-wood (GFC & ICZMC, 2001) including that for burnt earth production. There are still some rural communities who are dependent on mangroves for fuel wood (Evans, 1998).

Other uses minor uses include: poles for fishing seines, honey production, crab harvesting and charcoal production.

Current Utilization

This information was produced from a survey that was conducted by the Mangrove Specialist in January/February 2011 (Annex IV). The major direct uses of mangroves are bark harvesting and fuel wood for domestic use and burnt earth production. Main indirect uses involved tourism and beekeeping.

Mangrove Bark production

Currently, mangrove use for bark production is on the decline (Winter; Sam; Rufino; Wilson-personal communication 2011). Most of the mangrove bark harvesters got out of business because of the low price - G\$5.00/lb. The current price is G\$6.00/lb landed at the Wharf at Morawhanna. This is still considered inadequate.

There is only one State Forest Permission (SFP) issued for mangrove harvesting, this SFP is located in the Northwest District (GFC Divisional Forest Officer -Kumaka – personal communication). However there are about four (4) other bark harvesters operating in the Barima area.

Approximately 15-50 bags (140lbs/bag) of bark are being shipped to Georgetown fortnightly. This bark harvesting is being done in the Barima River throughout the year. The bag weights range from large (150 -175lbs) to small (90- 115lbs). Up to four (4) years ago, bark production from Northwest was 200-300 bags/fortnight.

As a result in the low production of bark, tanners are now using a tannin substitute (*Mimosa*) which is currently imported from Brazil. Tanners still prefer the bark. Once it is available they will use it because of the superior quality of the tanned leather that it produces compared to that produced by the *Mimosa*. In addition the importation of mimosa from Brazil is costly (Winter – personal communication).

Persons living in the Northwest area (Barima, Imbatero, Morawhana, Kumaka, Mora Passage) expressed the view that they are willing to get back into bark production because it provided livelihood in the past, but they need to have a reasonable price, somewhere in the vicinity of G\$12.00-\$15.00/lb for the product.

The harvesting procedure has not changed. This was demonstrated and explained by a current bark harvester (Philbert Sam). The implements are still the beater, cutlass and axe (no chainsaw felling is done). Three (3) persons can harvest between 8 to 10 trees per day and bark production between is 350-450 lbs per tree. The minimum size of trees harvested is one (1) metre in girth and above seven (7) metres in height. (See Annex IV).

Regeneration is generally good in previously cut small gaps (one or two-tree gaps). After 3-4 months gaps are fully colonized with seedlings 30- 40cm tall. However in larger gaps (>2trees), the regeneration was less and seedlings grew in tufts and patches. In large old gaps (>5years old) the same patchy pattern holds.

There is very little utilization of the debarked dead trees. In openings, where the remaining vegetation was lopped or removed for fuelwood, regenerating seedlings fully covered the gaps. However, where the debarked dead tree left on the ground (not lopped) it reduced regeneration in was patchy, even in small gaps. Similar reduction was also evident in the older gaps.

Fire wood

Coastal communities in Regions' 3,4,5 and 6 are still using firewood for domestic purposes which include, cooking for homes, religious functions, weddings and other large gatherings. Firewood supply target large mangrove trees and produce large gaps in the forest, because wood cutters target close-by areas (closest to the activity of supply) so as to reduce transportation costs as well as a matter of convenience. The size of trees targeted is between 20 - 150cm in diameter and of invariable length. This activity has severe negative consequences on the mangrove environment. Sometimes, tractor and trailer pathways are cut in the mangrove forests for ease of extraction, thereby damaging both juvenile and adult mangrove growth.

Burnt Earth production

The burnt earth brick makers have also declined over the years. The majority of these operators were found in the Regions' 5 and 6 with isolated cases in Regions' 2, 3 and 4. There were approximately twelve (12) brick makers over the past ten years in this Berbice area (De Santos –

personal communication). This number is now reduced to seven (7) - five in the No. 51 and 52 villages, Corentyne and two in West Coast Berbice. The production of burnt earth for road construction is low as a result of alternative road building material 'chip seal' that is mostly used by the Local Authorities in the respective areas for capping the access-road surfaces.

The freshly cut black mangrove wood is used for the burnt earth process because it is claimed to produce good quality brick (larger-sized and stronger bricks) compared to other wood species. However, most of the operators now use a mixture of hardwood from sawmills and old fallen mangrove trees along with the freshly cut black mangrove trees. The trees cut for this purpose range from 150 - >250 cm in girth. Ninety (90) percent of the tree is utilized, which includes the bole of the tree as well as the large branches (>10cm diameter). Trees are mainly selected for their large boles and branches.

Many black mangrove trees were cut in the past to support the brick-making process; as much as two trees per week per person. That has been greatly reduced to one or two trees per month per person.

Both in the past and at present only one-tree gaps are created and the regeneration is always good- seedlings completely colonized the gaps. This was observed in gaps of different ages (2 and 4-months old openings) - approximately 50-80 seedlings/sq.metre.

Tourism

The mangrove forest at Shell-beach in Region 1 is still a key tourist destination, providing the habitat for the scarlet ibis (*Eudocimus ruber*) and many other species. The mangrove forest along the coast of Region 1 is an important area for biodiversity in Guyana and a key area for eco-tourism (EPA, 2000; GFC & ICZMC, 2001). No cutting is allowed in this area. The community adjacent to the mangroves, tour operators and dwellers in the vicinity of the Shell Beach Wildlife Sanctuary are vigilant of activities in the mangrove areas.

Other coastal mangrove use

Mangroves are still used for fuelwood in some Regions, specifically fire wood and charcoal making for domestic use in rural communities as was suggested by Evans, 1998.

Fishermen throughout the Guyana coast are currently using black mangroves for poles for fishing seines; this activity seems to target young slender stems (10-20cm in diameter) and between 5 - >7m long. Whole trees are not cut for this purpose, but parts of trees. The remainder of the tree continues to grow after the part is removed. No major gaps are created. Eight (8) to twelve 12 poles are cut per fisherman every four months.

The larger islands in the Essequibo River – Leguan, Wakenaan, are areas where there is evidence of natural erosion, but very little sporadic cutting of mangroves is done in on the islands.

Visually there seems to be no negative impact. Dead mangrove trees are used as fuel wood for domestic purposes in isolated cases.

Both the red and black mangroves are indirectly used for a honey production in Regions' 3,4, and 5. The impact of this economic activity on the mangrove resource seems minimal - there is no evidence of large-scale destruction of trees. The honey production is more largely concentrated in Region 4. Honey still supplies a local as well as an overseas market.

Very slender stems (<10cm diameter) mangroves are regularly used by farmers and kitchen gardener. This activity is done with much regularity in farming and gardening areas. These smaller stems are cut from larger growing trees. The visual impact of this can be seen by the thinning of sections of the mangrove forest adjacent to villages. This alone does not seem to pose a severe environmental impact, but in combination with the activities of fishermen and other mangrove users may pose a serious threat to mangrove growth and survival. ***Other activities of Concern***

Rubbish dumping and burning as well as animal grazing are still activities of concern in the mangrove areas. These greatly negatively affect growth of juvenile and adult mangroves. Evidence of these detrimental activities can be seen in throughout the Regions' 3 - 6.

The majority of coastal dwellers interviewed are still not fully aware of the importance of mangroves. However, they were sure that it would protect them from the sea. Sixty percent (60%) of the fishermen knew that loss of mangroves meant loss of fish production.

1.4.Sustainable Forest Management

In recent decades, the mangrove belt has been severely depleted. This has sparked much debate on their role, purpose, sustainable benefits and beneficiaries. Recently however, this forest has received additional attention for its role in carbon sequestration, having the capacity to sequester 17 metric tonnes of carbon/hectare/year. The Guyana Forestry Commission's (GFC) National Forest Policy and National Forest Plan (NFP), and the implementation of the National Mangrove Management Plan (NMMP) have demonstrated the government's commitment to sustainably manage this mangrove resource.

1.5.Growing International Awareness and Initiatives

Concern for the world's mangrove forests and their capacity to maintain their environmental values while producing timber and non-timber products in perpetuity has been manifested by

increased exposure in the media and heightened consumer concerns. This concern has been highlighted by a number of major initiatives, including the following:

- The International Society for Mangrove Ecosystems (ISME) has adopted a Charter for Mangroves in Bangkok, Thailand, in November 1991. The Charter for Mangroves complements the World Charter for Nature (ANNEX III) that the General Assembly of the United Nations proclaimed on 28th October, 1982 affirming that nature shall be respected, genetic viability on earth shall not be compromised, conservation shall be practiced, sustainable management shall be practiced by man, and nature shall be secured against degradation.

- The Convention on Biological Diversity: This Convention is the first global, comprehensive binding agreement to address all aspects of biological diversity: genetic resources, species and ecosystems. It requires countries to develop and implement strategies for sustainable use and protection of biodiversity and provides a forum for continuing dialogue on biodiversity-related issues through the annual Conference of the Parties. These strategies were adopted in Rio de Janeiro, Brazil, June 1992 and came into force December 1993. Signed by over 150 countries and is a legally binding agreement with three key objectives:
 - Biodiversity conservation
 - Sustainable use of biodiversity
 - Fair and equitable sharing of the resulting benefits

- Mangrove Action Project (MAP): a non-profit organization based in USA, which is dedicated to reversing the degradation of mangrove forest ecosystems worldwide. Its central tenet is to promote the rights of local coastal peoples, including fishers and farmers, in the sustainable management of coastal environments. MAP provides four essential services to grassroots associations and other proponents of mangrove conservation:
 - It coordinates a unique international NGO network and information clearinghouse on mangrove forests;
 - It promotes public awareness of mangrove forest issues;
 - It develops technical and financial support for NGO projects; and
 - MAP helps publicize within the developed nations the basic needs and struggles of Third World coastal fishing and farming communities affected by the consumer demands of the wealthy nations. (This we do through our quarterly newsletter, bi-weekly news bulletins, action alerts, and published articles, as well as planned public forums and presentations.)

FAO Mangrove forest management Planning principles: Given the many types of products and services which might be obtained from forest and aquatic resources in mangroves, a multidisciplinary approach towards their management is essential.

The following principles can be used as a guide when preparing management plans for mangroves.

1. **Wood, non-wood and aquatic resources are managed in an integrated way and used to meet local, regional or national needs.**

Managing natural resources to meet peoples' needs implies knowledge of what people want. An assessment of needs and public participation is an integral part of the planning process. The importance of a resource supply is not only determined by its physical or biological characteristics but also by the priority that society places on its use. This prioritization among the management objectives should be clearly reflected in the management plan's activities.

2. **Plans must be objective oriented.**

When the problems or issues are understood, a set of objectives should be identified to address key issues. Objectives should be quantifiable targets that serve to focus management efforts and measure performance.

3. **Plans must try to achieve the greatest good for the greatest number of people in the long run.**

Minority interests must be weighed in relation to the general well-being of larger communities. In practice it is impossible to achieve complete or unanimous support for all the management objectives. Compromises between local level and national level interests are necessary.

4. **The ecological carrying capacity should never be exceeded and resource sustainability should be given high priority.**

This is a non-negotiable requirement, if sustainable production is to be achieved. This requirement should be given high priority in the management planning agenda and for example a code of conduct for responsible harvesting of given products (forest-based or aquatic) should be elaborated.

5. **The need for the conservation of biological diversity and wildlife should be recognized.**

This should be incorporated into the plan in relation to the scale of the management area. For small and/or highly fragmented areas, it is impractical to reserve large tracts of pristine vegetation for conservation purposes. Instead, the establishment of well-placed control plots may be more feasible.

6. **Planning is an on-going dynamic process.**

Planning must be flexible enough to accommodate shifts in demand/supplies and

priorities. Because society's values change over time, planning is an on-going dynamic process.

7. The plan must provide for improvements in data collection to reduce areas of uncertainty associated with an incomplete or weak information base.

The ultimate objective may be achieved in phases, taking into account an improved information base over time and applying a conservative approach where the uncertainty is perceived to be great.

8. The decision-making process must be visible and equitable.

Involving the public in the decision-making process is necessary to promote local support and acceptance for integrated forest management planning. It is the duty of the forest service to explain to the public the implications of various decisions. Customary rights should be respected where possible. Decision-making should not marginalize the traditional incomes of local people nor their access to forest products without offering practical and acceptable alternatives.

9. Planning functions and responsibilities.

The responsibility for planning functions should be clearly spelt out at different levels, from the local forest management unit level towards the national level.

1.6. Development of the Code

In May 2001, the document “Socio-economic Context of the Harvesting and Utilization of Mangrove Vegetation (Allan 2002)” was prepared as a first step in the development of a Code of Practice for management of mangrove ecosystem.

April – May 2010 – Regional Stakeholders’ Workshops were held through the country (APPENDIX V) getting feedback from stakeholders.

In 2011, a recent survey by the Mangrove Specialist acquired data on current and previous mangrove utilization/harvesting procedures and production trends that gives more direct information to guide the preparation of the code. The survey targeted mangrove users at the domestic and economic levels as well as persons living adjacent to the mangrove forest and coastal dwellers (APPENDIX IV).

The Code takes into consideration activities and contributions of the communities, stakeholder agencies and NGOs. Formulation of this Code of Practice is based on existing knowledge, experience and concepts regarding Forest Management. The Code of Practice will identify linkages and co-ordination needs among stakeholder agencies, NGOs, communities and users of the mangrove resource. The Code of Practice will also consider legislative aspects and enforcement mechanisms required for the effective conservation, protection and sustainable use of mangroves.

The development of the Code of Practice has become necessary to guide the government in its management of the mangrove ecosystems. The Code of Practice is therefore designed to assist as a tool for mangrove management. It is directed to all stakeholders concerned with the conservation and sustainable utilization of mangrove resources, such as foresters, fishermen, persons engaged in harvesting and processing mangrove products and extracts, local, regional, international organizations and local communities.

The Code of Practice provides principles, guidelines and recommended actions and practices applicable to the conservation and management of mangrove ecosystems. It recognizes previous and current efforts, initiatives and programmes regarding mangrove management. The Code of Practice is a set of guidelines and requirements covering all aspects of mangrove utilization in Guyana.

1.7.Objective

The Code of practice for mangrove harvesting is established within a logical framework (ANNEX II) in the background of the guidelines of the Guyana Forestry Commission's COP for timber harvesting to:

- Define principles, guidelines, and best practices for responsible harvesting mangrove in Guyana
- Provide a tool to guide governmental agencies, non-government organizations, research and academic institutions, mangrove managers, local communities, international and local aid, financial institutions, and other stakeholders concerned with the sustainable harvesting of mangrove forests.
- Identify key legislation, enforcement and monitoring mechanisms to ensure responsible harvesting, thereby contributing to the conservation and sustainable use of mangroves

1.8.Scope and Coverage

The Code, if followed, will allow the mangrove forests to be harvested with minimal adverse impact on the forested environment. It recognizes previous and current efforts, initiatives and programmes regarding mangrove management in Guyana. It is designed to balance commercial considerations with protection of environmental and social values. Implementation of the

guidelines will help ensure that important resources and values are recognized and protected during harvesting operations, and that the benefits of harvesting to communities, industry and to the nation are maximized. It will, while providing details on harvesting practices, attempt to ensure there is flexibility to account for the specifications for existing mangrove uses.

If used correctly, it can effectively, help the implementation of standards or guidelines, participate in the planning process of stakeholders, and integrate with other sustainable forest management instruments. The code will assist in minimizing negative impacts of mangrove harvesting

1.9.Sustainable Harvesting

Sustainable harvesting will apply across all harvesting activities consistent with similar timber harvesting principles recommend by GFC, ITTO and FAO (Dykstra et al 1996) and include:

- commitment to long-term sustainable provision of products and services;
- maintenance of environmental integrity in harvesting planning and implementation;
- consultation on all issues with all effected stakeholders, including those recognized under the laws of Guyana;
- harvest planning where necessary;
- effective implementation and control of harvesting operations with predetermined guidelines and benchmarks;
- thorough post-harvest assessment and communication of results to the planning team and to harvesting personnel;
- development of a competent and properly trained and motivated workforce.

The primary focus of the Code is on the sustainable harvesting of mangrove trees since if not sustained, it can have deleterious effects on the mangrove and other related ecosystems.

Harvesting is a major silvicultural tool available to foresters in the Guyana. Hence, it is this one aspect of forest management that if correctly done can very effectively contribute to maintaining healthy and productive forests in perpetuity.

1.10. Geographic Coverage

The Code is designed to cover all mangrove areas on state lands while acknowledging the existence of mangrove forest on private lands.

1.11. Implementation

This *Code of Practice for Mangrove Harvesting* provides guidelines or regulations on harvesting. The Code concentrates on “what should be done” rather than “how to do the work”. The “**how to**” is the mechanism by which the Code is actually implemented in the field and involves for example, reduced impact guidelines and silvicultural prescriptions.

This *Code of Practice* should be implemented by undertaking staged development within the sustainable limits of the resource to avoid undesirable social effects, paralleled with improvement of regulatory authorities’ ability to evaluate and monitor operations.

All stakeholders should be concerned with the conservation and management of mangrove ecosystems and should collaborate in the fulfillment and implementation of the objectives and principles contained in this document. Conservation of mangrove ecosystems must be a national concern and as information, data and knowledge increase, the operational standards will be revised where applicable.

The code will first be implemented on a voluntary basis to allow stakeholders time to adjust to the changes, to develop further management capacity and to train supervisors and operators. After the code has been publicly released the relevant agencies will assume monitoring against the standards described in the code. The result of monitoring will be evaluated to determine an operator’s performance and will be made available to the public. Mechanisms will be put in place to reward compliance while non-compliance with critical standards will have penalties attached. It is anticipated that through education on the required operating standards and the scientific reason behind these standards, operators gradually will become the supporters of the Code of Practice (Operational Standards) for Mangrove Harvesting.

1.12. Stakeholder Roles in Implementing the Code

1.12.1. Issues for Stakeholders

A number of issues need to be considered by the stakeholders for the successful implementation of the Code. Two of the most important issues are:

- participation and shared understanding between all stakeholders at all stages of the planning and implementation process;

- responsibility for mangrove management to be shared among all stakeholders

1.12.2. Roles of Stakeholders

Government

- Provide policies, legislation, mechanisms, staff, education and training, resources and encouragement for the ecologically sustainable use, on all classes of land ownership, for the benefit of all of society.
- Facilitate training and funding for implementation of the *Code of Practice*.

Environmental Protection Agency

- As the agency responsible for the management of the natural environment (**Environmental Protection Act of 1996**), the EPA should collaborate with all other agencies and stakeholders to take steps necessary for the effective management of the mangrove areas so as to ensure conservation, protection, sustainable use resources.
- Provide the relevant technical (environmental) support/advice as is related to mangroves and adjacent areas in relation to harvesting
- Monitor and enforce the environmental regulations

Lands and surveys Commission

The LSC be responsible for all mangroves on public lands, rivers and creeks of Guyana (**Guyana Land and Survey Commission Act**). **Guyana Forestry Commission**

- As the agency with the technical expertise on forest harvesting practices the GFC should collaborate with EPA to provide forest owners and local communities in implementing the principles of Sustainable Forest Management (SFM) practices (**Forest Act 2009**).
- Assist the mangrove users to implement sound harvesting practices.
- Evaluate harvesting preparations/procedure.
- Monitor and evaluate harvesting operations for compliance with this harvesting *Code of Practice*.
- Be responsible for all mangrove areas on state forest lands (**Forest Act 2009**)

Guyana Mangrove Restoration Project

- Coordinate with agencies on all aspects of mangrove harvesting

University of Guyana

- Assume the lead role in research as they relate to harvesting and related activities;
- Coordinate research with all relevant agencies as well as the GMRP;
- Assist GMRP in deciding on research priorities;
- Providing or sourcing technical assistance in areas of research, in collaboration with stakeholders.

Sea & River Defense Department

- Assist in monitoring of harvesting/cutting of coastal mangroves;
- Collaborating with other mangrove related agencies as it relates to harvesting of coastal mangroves.

Private land owners

- Harvest mangrove resource wisely in a way that will maintain options for future development and so provide for their long-term benefit;
- Maintain the capacity of the forest resource to supply essential needs;
- Protect neighbouring and downstream resources;
- Monitor operations for compliance with good practice.

Lessees/Other mangrove harvesters

- Where necessary do harvesting preparation in consultation with forest owners and/or the Guyana Forestry Commission;
- Implement effective and safe operations;
- Optimize the benefits to society and lessee/individual/company;
- Train and employ local community members to increase the level of skills that can be used in the future.

Communities

- Assist in educating and training forest owners/dwellers and users in the wise management of forests;
- Make use of Local Authority/GFC/EPA/SRDD expertise;
- Identify multiple use needs of communities;
- Assist in arranging the equitable sharing of benefits from mangrove use.

Non-governmental Organizations

- Provide education and promotion of this Code and related regulations to communities and others;
- Assist with ensuring Code compliance, monitoring and auditing procedures.

2.0 CODE OF PRACTICE

In the development of this Code many local documents were reviewed to have a historical perspective of mangrove utilization. These included: National Mangrove Management Plan 2010; Guyana Forestry Commission Draft Code of Practice for Mangrove Management 2004; Code of Practice for Forest Harvesting 2002; The Socio-Economic Context of the Harvesting and Utilization of Mangrove Vegetation (Allan et al).

Country-wide stakeholder meetings were held to get a feedback from as many stakeholders as possible with regards the management and utilization of mangroves. Further, a survey of the coastal regions that targeted persons utilizing the mangrove forest - fishermen, makers of burnt bricks, Honeybee keepers and coastal dwellers (gardeners, farmers and residents living adjacent to the mangrove forests) - was conducted to find out the current uses of mangroves and reasons and the methods of harvesting and cutting of mangroves trees. These activities were conducted to have an understanding of the current state of the industry and its issues. In addition, to examine conventional harvesting practices as well as the level of use by these stakeholders.

The three essential requirements for stakeholders to correctly apply the principles outlined in the Code of Practice of Mangrove Harvesting are::

- ✓ know what is to be done
- ✓ know how to do it properly
- ✓ be motivated to do it in the proper way

2.1.ARTICLE 1: PLANNING

2.1.1. National Planning

Planning should be carried out at two hierarchical levels (national and site-specific) to ensure that the process is acceptable to all stakeholders.

- Broad scale planning will identify the requirements for balancing the conservation and development needs of forests and communities.
- Site-specific planning will identify the most desirable harvesting practices to ensure that areas are utilised in a sustainable manner.
- An integrated approach to forest planning requires consideration of three factors that are crucial to the implementation of sustainable forest management. These factors are:
 - Environmental / Biological / Silvicultural;
 - Economic / Market / Finance;
 - Socio-economic.

Planning should be done in a simplified manner so that it is acceptable to all stakeholders. Other important considerations are the locality of proposed harvesting areas, the area specific mangrove stand density and the purpose/reason for harvesting and amount to be harvested. The code of practice ensures that mangroves are not over harvested, thus preventing any negative consequences.

These three major factors constitute the basis or foundation for sustainable development and assist in determining suitable land-use zones. Each consideration can be translated into national and location specific criteria.

The first factor to be considered refers to biological and environmental issues. What is growing and can potentially grow on a particular plot of land, and what land is available for forest management? What significant features or species occur in the area? What regulatory and legal considerations exist in the area to protect various biological and environmental features?

The second factor should consider the following questions. Will the particular area yield, in financial terms, a sufficient return? Where are the investment funds coming from and what are the cost of capital? What is the inherent value of the region for biodiversity conservation or other uses? Here, reference must be made to both traditional economics with market forecasts (domestic and external) and emerging valuation methodologies.

The third involves socio-economic criteria. These refer to people, both men and women, and their socio-economic conditions such as access:

- to, and use of land;
- to land tenure (as per custom laws or custom or individual owner rights) values and beliefs;
- to institutions and economic, political and other organizations;
- to household livelihood strategies.

Inherent in these criteria is the opportunity and the need for creating sustainable relations between the local people who depend on the mangrove forest for different user activities. This entails taking into consideration existing mangrove uses. At the same time, this set of criteria contains a large number of interesting opportunities to work with local communities as well as provide opportunities for local employment and improved communications.

2.1.2. Site-specific planning

At the site-specific level (the focus of this COP) as well, sustainable forest management should encompass biological, silvicultural, environmental, market, financial and socio-economic considerations. To do this, participation from stakeholders representing each user aspect and area is essential, as is input and guidance from persons who are independent of the issues.

Initial planning for harvesting activities should identify specific issues that are relevant to local user groups. It is important to consider any previous land-use issues or site-capability

information. This will lead to options for future use of the area developed on sound land-use principles.

As an important part of the planning process, the benefits of sustainable harvesting as well as the consequences of poor land management practices (in economic and environmental terms) need to be explained to stakeholders. These explanations and discussion should:

- present resource owners with a range of options for sustainable management of particular areas, including the conservation of mangroves;
- clearly present the consequences of harvesting mangrove areas beyond their capacity for sustained use.

Of all the leases issued by GFC, only State Forest Permissions should be allocated for mangrove areas in state forest. No management plan is required for this type of lease (GFC, 1998). However, GFC is responsible for preparing Area Management Plans for SFP areas (GFC, 1999).

2.2.ARTICLE 2. ASSESSMENT AND CLASSIFICATION OF MANGROVE AREAS

The EPA in collaboration with other mangrove-related agencies and the University of Guyana, should conduct periodic inventories and ecological assessments of the mangrove areas. The mangrove areas should be classified in terms of ecological quality and present use, and allocate or use them as recommended below:

<i>Ecological quality</i>	<i>Present use and status</i>	<i>Recommended disposition</i>
Excellent	not yet used pristine	full protection, non-use, 'no touch'
Good	slightly used	conservation, sustainable use
Poor	fully converted, damaged	optimum use, rehabilitation

Periodic post-harvest inventories and ecological assessments of the mangrove areas should be done since all human activities, including harvesting of trees, has an ecological footprint that must be accounted for. A small harvested area may have an ecological footprint that may be many times larger than the size of the cut area.

The following should be considered in the assessment and classification process:

2.2.1. Ecological assessment

This should reflect the status of, and threats to mangroves and other ecosystems, as a basis for monitoring and evaluation, or for planning, development, and management. Standard techniques for studying mangroves are described in Snedaker and Snedaker (1984) and Citron and Novelli (1984) in the same volume and include structural parameters such as crown diameter, leaf area index and above-ground biomass. These are generally measures of comparative ecosystem functions of a particular stand of mangroves that can be used for rapid characterization. Other critical factors describing functions of a mangrove stand include rainfall, temperature and tidal hydrology. The regularity of the assessment should be defined by EPA.

2.2.2. Inventory

Systematic counting, measuring, and recording of ecosystem statistics—including species diversity, population and community structures, habitats, users, products, etc.

2.2.3. Monitoring

Collection of specific information about ecosystems, environmental quality, harvesting (number of trees harvested), illegal harvesting, populations, and economic activities etc. for management purposes.

2.2.4. Geomorphological Assessment

The lay-out of the land and water bodies; geography and topography should be assessed.

2.2.5. Mangrove Zoning

Mangrove areas should be clearly zoned, with the function and conservation status of each zone identified and legally defined. Restrictions must be set for the use of land, water and waterways, and the biological resources. Zoning is a practical means to help implement conservation and other management objectives, and should be part of the overall coastal zone management plan.

The general proposed zoning criteria for Mangrove Forests (Source Mangrove Management Action Plan, 2001) are:

- **Permanent Protection Forests**
Large mangrove forests (areas greater than 100 hectares) are habitat for rare species, richness and diversity of species. Mangrove areas are managed for protective and scientific functions.
- **Reserve Forests Mangrove**
Areas that are crucial for erosion control.
- **Rehabilitation Forest**
Degraded mangrove forest and mangrove areas are being established by natural process. Areas managed for the rehabilitation of mangroves.
- **Production Forest**
Mangrove areas with potential for provision of approved goods and services; Mangrove forest managed for the production of fire wood, bark, fish, honey etc.

2.3.ARTICLE 3. EXCLUSION AREAS AND BUFFER STRIPS

Areas to be excluded from harvesting are very important in the management of Mangrove forests. Watercourse buffer strips, protected areas and wildlife strips dispersed throughout the forests are very important in the maintenance of genetic resources (GFC 2002).

2.3.1. Protected Areas

Conservation of environmental diversity (biodiversity, including flora, fauna, threatened species, and genetic resources; landscape; cultural heritage) is of great importance in sound forest management. Maintenance of genetic resources can be assisted by the retention of flora and fauna in formal and informal reserves including wildlife habitat strips and watercourse buffer strips dispersed throughout the forest. Wildlife habitat strips can be based on watercourse buffer strips. Ideally, buffer strip links should be included to connect with watercourses in adjoining catchments; nonproductive forest could perform this function. Considerations for flora and fauna conservation should always be taken into account at the national and site-specific levels.

2.3.2. Areas to be excluded from harvesting

- Conservation areas (e.g. biodiversity reserves)
- Declared protected areas under national legislation
- Areas of cultural importance (historical, archaeological and spiritual sites, settlements and farms)
- Areas required for community needs

2.3.3. Watercourses

Water quality and flow are affected by natural factors such as annual rainfall; vegetation type and cover; soil type and exposure; topography; wildfires and storm events; and by human factors such as road construction and maintenance, timber harvesting, dam construction and chemical use. Maintenance of acceptable water quality and flow; and catchment and channel stability is of major concern. This can be achieved by minimizing disturbance to watercourse channels and riparian zones, and by reducing soil disturbance in and near watercourses. All watercourses require protection during forest operations; the type of protection required depending on the nature of the catchment, size and permanence of the watercourse and the volume of water carried.

2.3.4. Watercourse Definitions

Watercourses	The width of a watercourse is the bank-to-bank distance during normal wet season (peak) flow, and may include a flood plain area. This adjacent flood plain may be a swamp or a stream meander.
Rivers	Rivers are those watercourses where water flows all year round in most years and that are depicted and named as such on the 1:50,000 Lands and Surveys maps.
Creeks	Creeks are those watercourses where water may flow or pond for more than six months in most years, or whose beds are of stony, gravelly, or exposed bedrock materials.
Waterways	Waterways are stable, non-incised depressions. The slope of both banks is less than 30%. Beds are of soil and often covered with vegetation. Water will flow or pond for less than six months in most years.
Swamps	Swamps have (standing) surface water present for six months or more in most years.
Lakes	Lakes have surface water present all year round for most years

2.3.5. Buffer Strip Protection

Buffer strips are required, irrespective of whether a feature is identified on available maps of any scale. Field inspection prior to harvest to identify buffer strips is required before any harvesting operation.

Buffer strip widths depend on the nature of the protected area or watercourse (GFC, 2002)

Type	Minimum required buffer strip protection
Conservation and declared protected areas	20 metres
Cultural areas	Villages, farms, settlements and cultural, spiritual or historical heritage areas - 20 metres
Sites susceptible to degradation	No additional buffer required
Watercourses	Buffer width is measured horizontally from the top of the watercourse bank, or the edge of the flood plan when present, or the point above the high bank where the slope becomes less than 50% (27°) - whichever provides the greatest distance from the edge of the watercourse bed. Rivers - 30 metres each side. Retain vegetation on both sides (felling not allowed) Creeks - 20 metres each side. Retain vegetation on both sides (felling not allowed) Waterways - Merchantable trees may be felled but extraction equipment is not permitted within 5 metres of either side
Lakes, swamps and other inland wetlands	20 metres from the peak level mark or edge of typical wetland Vegetation
Ocean	500 metres from edge of typical wetland Vegetation

2.3.6. Management of Buffer Strips

- A mangrove buffer zone should be maintained along the coasts and rivers for protection from erosion, waves, and storms.
- A mangrove buffer zone should be maintained for mangrove harvesting operations to protect the coastal and riverain lands, communities and infrastructure.
- A mangrove buffer zone should be maintained according to the buffer zone regulations as set out in the *Code of Practice* for timber harvesting:
- No trees shall be felled within exclusion areas or their buffer strips, except for waterway buffer strips;
- Machine access within exclusion areas and their buffer strips is not allowed, except at designated watercourse crossing points. Where permitted, access should be by the shortest possible distance;

- No earthworks, or spoils from earthworks, shall end up in a exclusion area or its buffer strip;
- No harvesting debris shall be pushed into exclusion areas or their buffer strips;
- Trees should be felled away from buffer strips and watercourses;
- Where trees inadvertently fall into a watercourse or its buffer strip, the head as well as any accompanying logging debris should be pulled clear, unless unacceptable damage to the bank or buffer strip is likely to occur.

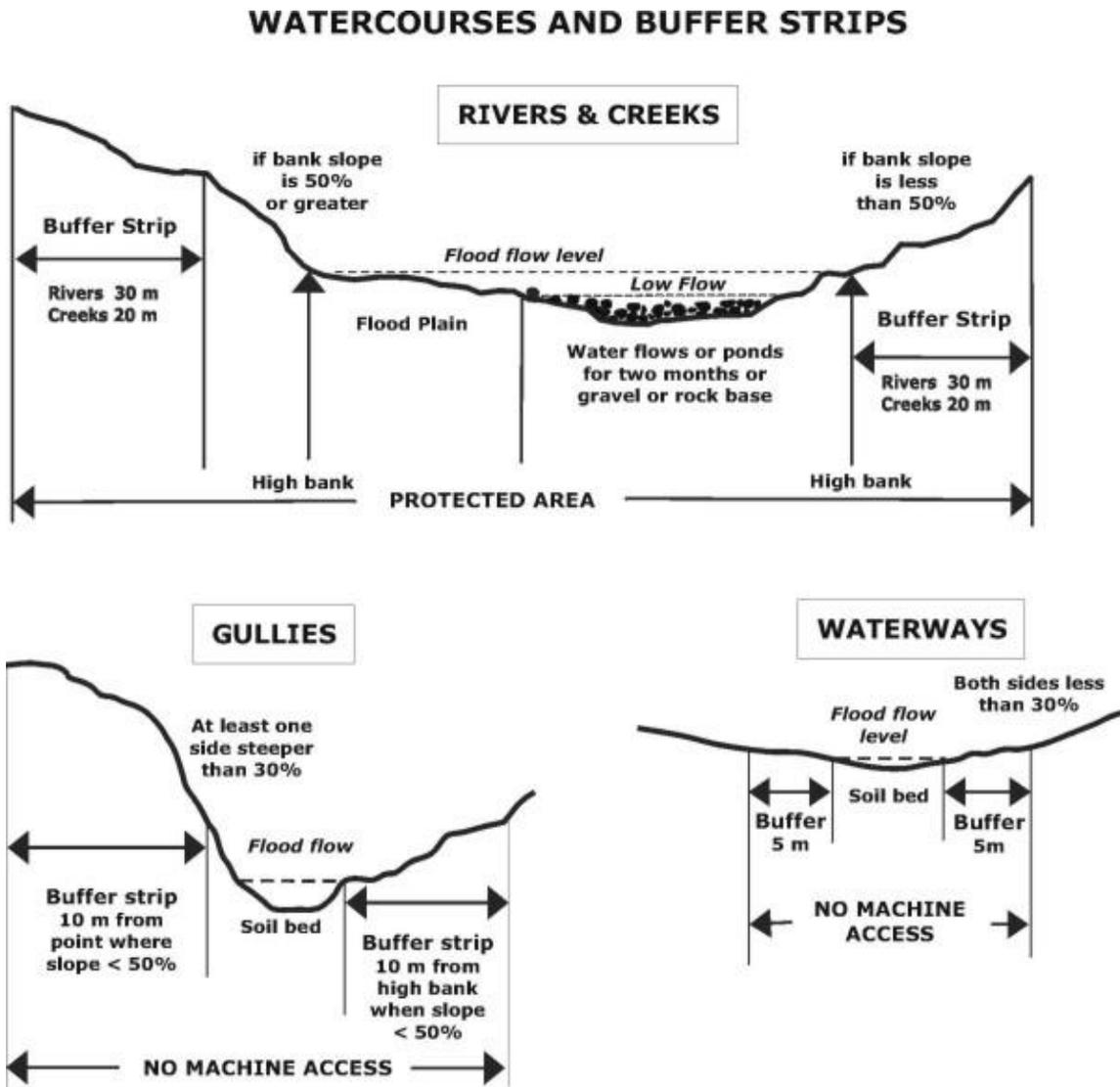


Figure 1. Buffer strips along watercourses (GFC, 2002)

2.4.ARTICLE 4. HARVESTING

The application of the precautionary approach to the conservation and sustainable management of mangrove ecosystems is applied in this code. Here harvesting includes consideration of the traditional knowledge, beliefs and customs of local communities.

This is in keeping with Principle 15 of the Rio Declaration on Environment and Development states that: “In order to protect the environment, the precautionary approach shall be widely applied by the States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” (Jakarta Mandate, 1995).

2.4.1. Harvesting permission

All harvesting of parts of mangrove trees, mangrove trees and other trees in the Mangrove forest on state forest lands must be authorized by the Guyana Forestry Commission before harvest. For areas outside state forest, the Lands and Surveys Commission as lead agency (**Guyana Land and Survey Commission Act: mandated the Commission to take charge of and act as guardian over all public lands, rivers and creeks of Guyana...**) should collaborate with EPA, GMRP, GFC and SRDD and any other agency deemed relevant will be responsible for granting harvesting permission.

No harvesting of mangroves and associated vegetation should be done in mangrove areas outside state forest without permission from the relevant authority as stated in the above paragraph.

No person shall fell, cut, lop, tap, bleed, injure, take or extract any bark, leaf, seed, fruit, gum or other part or substance from, or transport, remove or export any mangrove tree or plant in a state forest without permission from the Guyana Forestry Commission.

Harvesting should not be done within the one half of a mile of mean high water mark along any land along the sea foreshore. Harvesting away from the sea foreshore area will be conducted with strict adherence to protected areas, buffer strips and zones as stipulated by the code.

No harvesting should be done in areas that are being managed for sea defenses.

2.4.2. Felling

Directional felling is required in keeping with the GFC *Code of Practice for Timber harvesting* to:

- minimize damage to the residual mangrove stand
- facilitate easy log extraction, thereby minimizing ground disturbance

- avoid disturbance to watercourses, exclusion areas and buffer strips
- prevent trees from hanging up in adjacent canopy trees
- minimize canopy openings by felling into gaps formed by previous felled trees or natural tree fall
- increase work safety

Special permission is required for the use of chainsaws in the mangrove forest as this practice seems to interfere with the coppicing ability of the cut tree. In the event of use of the chainsaw the operator and assistant should be trained in directional felling. The felling crew should be equipped with at least two felling wedges, a sledgehammer or hatchet and a cutlass.

Stump height should be as low as practicable - 30 cm. Stump heights over 30 cm are acceptable, where butt defect is obvious; or in the case of a red mangrove tree cut for general use (other than for bark)- cutting should not be higher than the point at which stilt roots adjoin the main stem

Felling should be done at the intensity of 10 trees/ha – as being applied to SFPs through the quota system, unless otherwise permitted by the GFC in the case of harvesting state forests or the relevant authority for non-state forest mangroves.

2.4.3. Felling Restrictions

- Felling is not allowed within protected/exclusion areas, buffer strips and areas deemed closed by the respective regulating authority;
- Where trees fall unintentionally into watercourses or their buffer strips, the tree head as well as any accompanying logging debris should be pulled clear, lopped and scattered;
- Mangroves on islands should only be cut with special permission from the relevant authority;
- Felling by chainsaw in red mangrove forest for bark production is prohibited;
- No two trees should be felled less than eight (8) metres of each other.

2.4.4. Harvesting Cycle

The cutting cycle duration is 20 years. Thus, if a certain area has been deemed to be closed to current harvesting, then the next harvest may be carried out in 21 years later.

2.4.5. Minimum cutting size

Cutting for Bark

Only trees of red mangroves trees should be cut for bark harvesting. Trees should be more than 7m in height and have a bark thickness of at least 1.2cm.

Cutting for logs and fuel wood (domestic use and brick making)

Both red and black mangroves that are equal to and more than 7m in height and above 3m circumference should be cut for these purposes. White mangrove should be cut above 5m and 2m in height and circumference respectfully.

Cutting for fishing poles

All three species of mangroves can be cut for this purpose. Poles should be cut at least 7m in height and no smaller than 10cm in diameter. No mangrove stem should be cut above 20cm diameter for poles. No more than one (1) pole should be removed from an individual tree. Stems should not be harvested less the 8m apart.

Cutting for other uses

Special permission is required from the relevant authorities for cutting mangroves for uses such as gardening, farming, logs or clearing mangrove areas. This permission should be sought from GFC with respect to cutting on state forest and Lands and Surveys Commission in the case of cutting outside of state forests but not on private lands.

2.4.6. Restricted areas

Machine access is prohibited in protection/exclusion areas and buffer strips.

Trees felled (for firewood, burnt earth) inadvertently into a these areas should be cut into smaller pieces then extracted with minimal residual damage to the forest.

Trees felled (for logs) unintentionally into a buffer strip should have their crowns removed from the exclusion zone via winch where possible or cut into manageable pieces then extracted with minimal residual damage to the forest – whichever looks likely to cause the least damage.

2.4.7. Extraction Operation

When harvesting for bark, a one-metre (1m) wide extraction route should be cut (avoiding harvestable trees) for ease of taking out the product to waterway/transshipment point.

Trees cut for use as fuelwood should be further cut into small pieces (< 4m length) that would minimize the damage to the residual stand when extracting wood.

Trees harvested for logs should be extracted using a winch wherever possible OR the most appropriate manual method of extraction, whichever is likely to cause the least damage to residual stand. A one-metre (1m) wide extraction route (avoiding harvestable trees) is allowed.

Extraction for poles and smaller stems should be done in a manner to cause minimal damage to the residual trees.

2.4.8. Post harvest activities

Rehabilitation of harvested areas is required to prevent further deterioration of the logged area and downstream soil and water values, and to encourage forest regeneration.

All areas should be left in a clean and tidy condition (free of fuels, chemicals and garbage).

The residue of trees felled for bark, fuelwood, logs etc. should be lopped and scattered in the vicinity of the cut area but not into buffer zones and protected areas.

2.4.9. Closure of cutting areas

An area will be closed when the forest authority is satisfied that it has exhausted its supply of both domestic and economic timber and any further extraction will have negative environmental consequences.

Any mangrove area that is considered closed by the relevant authority on mangrove forest harvesting (GFC or other) should not be re-entered and should remain closed until the next scheduled cutting cycle.

The public will be notified of closed areas by the erection of notice boards stipulating the closure of areas outside of state forest.

In the case of a SFP the Guyana Forestry Commission will write the lessee to the effect.

2.5.ARTICLE 5. FORESTRY/SILVICULTURE MANAGEMENT

2.5.1. Silviculture prescriptions

Mangrove forestry/silviculture objectives may have an economic, environmental or aesthetic basis, or a combination of these. The specific objectives for forest management include timber and fuelwood production, shoreline and river channel stabilisation, landfill and waste management, fisheries and wildlife support, storm and flood protection, ecological and biodiversity restoration and habitat rehabilitation. This is done to promote increased awareness and educate stakeholders on benefits and importance of the mangrove forests and to promote better harvesting techniques for the optimum utilization of mangrove resources.

The primary objectives for mangrove forest management should be clearly defined and prioritized. Where possible, multiple-use management should be considered as the ultimate goal of management.

In locations where pristine mangrove forests no longer exist, the priority should be to protect mature stands that are still reproductively viable. Given the fact that mangrove trees have very good dispersal mechanisms it is also important that in disturbed areas trees and shrubs may still be considered as valuable and capable of supporting sustainable forest management and mangrove rehabilitation efforts.

Degraded and destroyed areas should be identified and prioritized for rehabilitation. Natural regeneration should be encouraged where possible, but interventions should also be considered as an option when natural regeneration is difficult.

Careful technical assessments should be undertaken prior to any decision on replanting if deemed necessary to rehabilitate a site. When this is the case local species should be used.

Any rehabilitation programme should involve community members and stakeholders. This will provide an opportunity for involvement and success.

All harvesting of mangrove resources must be done in a sustainable manner and in accordance with the rules, regulations and guidelines stipulated by the Code to ensure that optimum growth is achieved. It should also take into account all the relevant biological, technical, economical and social aspects of the mangrove community.

To this end, silvicultural prescriptions should be the driving force. Due consideration to the practicability to actually enforce the prescriptions should be given (see prescriptions below).

Management Objective	Silvicultural Prescriptions
To provide for wood production	Retention of enough trees to provide for natural regeneration rather than create a dependence on artificial regeneration.
To provide coastal protection	Thinning on a silvicultural schedule rather than on an enduse demand schedule
To provide areas for scientific research	Use extraction methods that minimize damage to trees and the ecosystem
To promote biodiversity conservation in mangrove ecosystems	Refrain from clear felling activities. Retain buffer strips to stabilize river banks, coastal areas and to protect natural processes. Conduct scientific studies on regeneration rates, growth and yield of wood and products, site damage, utilization, seasoning and preservation of wood.
To promote the rehabilitation of degraded mangrove ecosystems	Replanting to rehabilitate degraded mangrove areas that proved to be slow to restore the forest because of the lack of mother trees

Table.2. Silvicultural management prescriptions

2.6. ARTICLE 6: MONITORING

2.6.1. Monitoring by Government Agencies/Stakeholders

Guyana Forestry Commission, the Sea and River Defense Department, the Fisheries Department and the Environmental Protection Agency are among the main government institutions that legally have the sole responsibility for overseeing monitoring of mangrove forest in Guyana. However, all stakeholders, interested parties and private individuals concerned with the conservation and management of mangrove ecosystem should collaborate in the fulfillment and implementation of the objectives of this code. Monitoring of all activities taking place in state forest and other harvesting sites/locations in the mangrove forest should be done by the two authorities respectively.

EPA in collaboration with other stakeholder agencies should develop and adopt simple indicators as a tool to monitor environmental changes in mangrove ecosystems. These should be understood by local managers and communities and used by them to record the impacts of management interventions, for example:

- Number of trees harvested as planned (high = positive indicator)
- Number of damaged trees (high = negative indicator)
- Viable fruiting on mangrove trees (high = positive indicator)
- Abundance and diversity of birds (high = positive indicator)
- Soil stability (high erosion rate = negative indicator)
- Crab abundance and diversity (high = positive indicator)
- Good water chemistry quality (high = positive indicator)

This should be integrated into the mangrove baseline data/inventory information then into a national database and update this regularly as a tool for management decision-making and made available to all stakeholders. Government should strengthen and develop existing institutions and information systems and establish standardized databases and procedures for collection, collation, retrieval and dissemination of information related to mangrove harvesting (Bagarinao & Primavera, 2005)

2.6.2. Monitoring by local communities

Local communities that are solely dependent on mangrove forest for economic, social, financial, and environmental reasons and should assist in protecting the mangrove forest from large scale unsustainable harvesting. They have a responsibility to inform the EPA, GFC, SRDD, LSC and any other stakeholder agency if a problem should arise. Rangers should be elected from among residents for the purpose of protecting the mangrove forest ecosystem. All people (Guyanese) have a responsibility for protecting the mangrove forests.

ARTICLE 7.0 CONTROL AND ENFORCEMENT

According to IUCN guidelines, strict controls must be instituted in protected areas where various types of utilization are permitted, to ensure that the resource being used and the other objectives of the protected area are not compromised (GFC 2004).

Any formula for control of harvesting of products in mangrove forests should consider:

- The territorial element (forest license) into harvesting so that a given area is designated as being for the sole use of people from one village who will defend their privilege against outsiders;
- The benefit to be derived by each household should be fairly distributed; otherwise those left out will not respect harvesting limits. However, to avoid creating an attractive zone which draws more people, harvesting rights should be granted only to original households;
- Monitoring Officers, Forest Guards or Rangers (EPA, GFC or SRDD personnel) should be familiar with the rules and regulations of mangrove areas. It is best if they possess real handling power, for example to arrest law breakers, and confiscate arms, tools, logs, cattle and illegally collected produce;
- There should be simple legal proceedings in delivering arrested persons into the hands of the law and filing charges;
- Illegal harvesters have to be tracked down, identified or arrested and persuaded through legal action to cease their activities inside mangrove areas.

Where possible the enforcing of mangrove regulation should be supported by the Guyana Police Force and the Guyana Defence Force. To this end these two entities should have training in the workings of the Code of Practice for mangrove harvesting.

ARTICLE 8.0: LEGISLATION

In all law enforcement matters, the relevant agencies involved should try to develop a humanitarian image. They should however be firm but sympathetic and understanding of the needs of local people. It should be uncompromising in its determination to protect the integrity of protected areas (Trevin et al 2009).

The code of practice hopes to ensure that all the rules and guidelines are administered and adhered to for example:

No mangroves should be cut without the permission from the GFC

“Protected Trees” 17. (1) “No bullet-wood tree or red, black or white mangrove trees shall be felled without first obtaining the permission in writing of an authorized forest officer not below the rank of an Assistant Commissioner of Forests”.

No sea defense vegetation should be removed without the permission of SRDD

Chapter 64.02: Laws of Guyana Sea Defence Act Part V Offences Article 20, states that “removal of earth, shell etc, sea weed or vegetation , or any other matter or thing, whatsoever from any sea defence or from any land along the foreshore within one half of a mile of mean high water mark (seaward) is liable to a fine of twelve thousand dollars (\$12,000.00) and to imprisonment for twelve months , and any such matter or thing together with any article used in connection with the removal thereof shall be forfeited”

Guyana Lands and surveys Commission responsible for all public lands:

Guyana Land and Survey Commission Act: mandated the Commission to take charge of and act as guardian over all public lands, rivers and creeks of Guyana,

The EPA is responsible for the management, conservation, protection and improvement of the environment:

Environmental Protection Act of 1996: mandated that they will provide for the management, conservation, protection and improvement of the environment; danger of extinction; (2) any person who in any marine reserve without permission granted under subsection 3 (b) takes or destroys any flora and fauna other than fish is guilty of an offence.

2.7.ARTICLE 9.0 INTEGRATION OF MANGROVE HARVESTING INTO COASTAL ZONE MANAGEMENT

Mangrove ecosystem management is an integral part of the coastal zone management process in Guyana. Strong coordination is required between the concerned stakeholder agencies for mangroves to ensure an integrated approach to planning and management of the use of mangrove ecosystems, coordination among concerned agencies and users of other coastal and riverain resources is required.

To this end a working group comprising of technical expertise to manage the coastal zone should come on stream and be supported by the Government. The entity should focus on achieving the following:

- **Consensus:** To achieve a national consensus, seminars and workshops to discuss mangrove management policy and land use should be organized by the committee;
- **Development strategy:** A strategy for sustainable mangrove management and use of land and aquatic resources, including conservation of wildlife and bio-diversity, should be prepared and implemented;
- **Coordination:** Close liaison should be fostered between the Services of Forestry, Fisheries, Environment, Agriculture, Sea Defense and NGOs who have an interest in mangroves;
- **Social forestry:** In forestry there is an economic and social welfare sub-sector. Sufficient mangrove forests should be designated for the local supply of goods and services needed by the rural communities.

The functioning of the mangrove ecosystem is closely linked to terrestrial land use practices. In particular, changes in water-flow regimes affect mangroves, and the overdrawn of ground water or excessive removal of mangrove vegetation may increase the danger of aquifer salinization and contamination.

Consequently, the coastal zone should be considered as an integral component of overall land use planning and development so that appropriate land use policies and action programmes may be formulated. Priority should be given to the sustainable use of mangrove and mangrove-related areas, including the environmentally sound extraction of mangrove products.

Many of the uses and services of mangroves are compatible such as wood harvesting, bark and honey collection, coastal protection and small scale capture fishery. Others are less so, and hence a zonation of mangrove areas according to primary land-use objectives is necessary. This underscores the need for a holistic approach within the framework of integrated coastal zone management planning (FAO 1994).

The working group should be tasked with the updating of the Mangrove Management Plan and the development of Operational Plans so as to provide coordinated, cross-sectoral actions for implementation and monitoring. This Committee should address the following:

- Stakeholder participation at all stages of planning and implementation mangrove harvesting.
- Assessment of the status of mangroves and the success of management initiatives in the respective areas and progress reporting.
- Local academic and research institutions with the appropriate expertise of implementation, monitoring and evaluation of mangrove ecosystems.
- Performance criteria on the effectiveness of *Code of Practice* for harvesting repeated at least every 3 to 5 years.

2.8.ARTICLE 10.0 HEALTH AND SAFETY

Health and safety should be adhered to in the light of guidelines set out by the GFC Code of Practice of Timber Harvesting. Good safety and health practices in forestry are essential. The following practices and standards are based on the Code of Practice for Safety and Health in Forestry Work of the International Labour Organisation, Geneva and on the occupational health and safety laws of Guyana (GFC 2002).

- Employers have the main responsibility for safety and health in forestry work; therefore is responsible for installing and maintaining work systems and methods which are safe and without risk to health.
- All operators of any kind of machine or mechanical device should receive all the necessary training and instructions to ensure competency to safely operate equipment for the job they are assigned to do.
- Basic first-aid training (and refresher course) should be provided to all personnel involved in field operations etc. Also a kit should be provided to every crew or should be located close to where crews are working.
- No machine should be operated by a person who is drowsy, under the influence of alcohol, medicine or drugs, suffers blackouts, or is suffering from any physical or mental distraction that could contribute to unsafe operation.
- Working hours should not exceed the number prescribed by national law or collective agreements.
- All persons should be provided with and wear all the necessary safety equipment needed.
- Periods for rest, which includes: short breaks during work hours, sufficient breaks for meals, nightly rest and weekly rest should be arranged for all workers.
- In the event of injury or illness which requires medical assistance, provision should be made for quick evacuation.
- In case of emergency, transport or a means of communication should be available at the worksite to contact rescue services.
- Workers applying hazardous chemicals must receive training and full information on the risk involved and the use of protective equipment and first-aid techniques.

2.9.ARTICLE 11.0 SOCIAL ISSUES

All social issues should be dealt with in the context of GFC code of practice for timber harvesting. Sustainable forest management is about people and the forest they use. Good social behavior while managing the forests promotes sound production which develops Guyana's economy. The forests need to supply social benefits to enhance sustainable development. The benefits derived from the existence and management of the forests, and accruing to people living in and around them may be a prerequisite for the preservation of the forest.

2.9.1. Land and forest use rights and responsibilities

Respect for legal or customary rights to land:

- Mangrove workers shall have legal evidence of their right to operate in a given area
- Mangrove workers shall restrict their forest operations to the area to which they are legally entitled
- The mangrove authority should be informed of any illegal activity in mangrove areas

Rights of Amerindians:

- The legal, social, and ecological integrity of all Amerindian lands shall be respected
- Disputes over Amerindian land tenure and use rights should be brought to the attention of the Ministry of Amerindian Affairs and Guyana Lands and Surveys commission

Commercial contracts with Amerindian communities:

- Persons desirous of negotiating commercial mangrove contracts with an Amerindian Council should contact the relevant Amerindian Council and the Ministry of Amerindian Affairs
- Amerindian Village Councils that are desirous of entering into commercial forestry contracts should seek advice from the Ministry of Amerindian Affairs, and the mangrove authority

Conflict management between forest operations and local communities:

- Forest operators and elected or recognized community representatives should use methods of consultation as a first step to resolving any conflict(s) that might arise before exploring other legal options
- A neutral third party should be invited to facilitate negotiated agreements between forest operators and communities

2.10. ARTICLE 12.0: COMMUNITY AND WORKPLACE RELATIONS, RIGHTS AND RESPONSIBILITIES

All community and workplace relations rights and responsibilities should be dealt with in the framework of GFC code of practice for timber harvesting as set out below. However the mangrove authority shall be responsible for ensuring the rights and responsibilities are adequately addressed.

Respect for cultural and traditional values

- Forest operators should give special regard to the cultural and traditional values of the communities in and adjacent to their operations

Building mutually beneficial partnerships

- Forest management operators should adopt a mechanism for engaging the local communities, community base organizations and other interest groups in a dialogue that is aimed at ensuring that socio-economic benefits accrue to the local population
- All parties have copies of a joint plan
- Local representatives are present at meetings and participate in decision making
- Attention is given to such critical areas as health, education, transportation
- Local population is not totally dependent on the forestry operation and the services that they provide

Terms and conditions of employment

- Employers shall inform employees of the terms and conditions of service prior to or at the time they are hired
- Prior to or upon assumption of duties, an employer shall document and inform employee of his/her wages by task or by day
- Contractors are obliged to adhere to conditions applicable to employers
- Employers should develop a contract agreement between the employer and the contractor to include the following:
 - i. The parties agree that a written agreement between the employer and any contractor shall be the basis of any engagement with any such contractor for the purpose of conducting forest operations on the concession area
 - ii. The employer shall provide a copy of any written agreement with any contractor(s) for the consideration of the mangrove authority at least one

month prior to the desired date of commencement of work by the contractor(s)

iii. The parties agree that any agreement regarding contractual work in which the employer is engaged must include the following:

Social Issues:

- an explicit statement that the employer is responsible directly for all actions of the contractor
- an explicit statement committing the employer and the contractor(s) to full compliance with the terms of the concession agreement, the provisions of the most recent Forest Management Plan and the provisions of the most recent Annual Operational Plan where applicable
- an explicit statement committing the employer to responsibility for the social welfare of contractors and their families, while such contractors are engaged in the approved contractual operations
- an explicit provision making clear that there shall be no transfer whatsoever of the concession, the concession area or any part thereof.

iv. The contractor agrees that it will maintain registers of all employees together with employment records (including PAYE and NIS contributions) and that such registers will be available for scrutiny by the mangrove authority and employer, and such other agencies

Equal opportunity employment:

- Women and men shall be paid equal remuneration for the same work or work of equal value
- Employees shall not be discriminated against based on race, sex, religion, colour, ethnic origin, etc.

Prohibition against forced labour:

- Employers shall ensure fair remuneration and humane working conditions in return for all services rendered
- Employers shall observe ILO Convention 182 on forced labour

Employment Opportunities for local and forest-dependent populations:

Management should give priority to employing equally qualified persons who live in communities within or adjacent to the mangrove operation

Education and training for workforce and local populations:

- A range of educational and skills training programmes for the purpose of enhancing workers' job performance and promotion within the workplace should be made available on an appropriate basis
- Educational and vocational skills programmes should be made available to communities within or adjacent to the forest management operation
- Wherever possible, certification for educational and skills training programmes should be issued by a recognized institution or body

Social security benefits:

- Employers shall provide employees with information on the NIS
- Employers shall make the necessary arrangements for NIS coverage for their employees
- Employers should inform employees about the procedures for recovering damages in respect of personal injury or in respect of death resulting from personal injury

Recreation:

- Employees shall have the benefit of adequate rest and recreation time and facilities in keeping with the labour laws of Guyana

Prohibition against child labour:

- Employers shall not knowingly employ persons under the age of 14 years in keeping with the International Labour Organization Convention 182

Workers right to union representation:

- Employees shall not be prevented from joining a union or association or from negotiating for wages and conditions with their employers as stipulated under the Trade Union and Recognition Act No: 32 of 1997

Conflict management in the workplace:

- In the event of an industrial dispute, the relevant parties should first explore to resolve through management/shop steward discussions. If this step fails then the parties involved should seek to utilize the mechanisms of conciliation and arbitration

Regulation of occupational safety and health:

- Stipulation in the 1997 Occupational Safety and Health Act shall be observed

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ANNEX I. LEGISLATION GOVERNING MANGROVES IN GUYANA

ISSUES AND CONCERNS ON MANGROVE	LAWS, POLICIES, RULES AND REGULATION
Conservation and Protection of natural resources including mangrove	<p>Guyana Constitution Article 36 states that in the interest of the present and future generation, the state will protect and make rational use of its land, mineral and water resources, as well as its flora and fauna, and will take all appropriate measures to conserve and improve the environment</p> <p>The Forests Act 2009 Part 3. 5.23. (1) mandates the EPA to declare a specific area of state forest to be a specifically protected area for a period not exceeding 25years (a) declare a specified area of State forest to be a specially protected area for a specified period not exceeding 25 years ;Purpose of Part 3,5.22 (1) is to</p> <ol style="list-style-type: none"> 1) conserve biological diversity 2) protect specific trees and plants 3) conserve soil and water reserves 4) protect forests from fires, pest, diseases and degradation <p>Forest Act 2009 Part 3. 5. 30 Minister can make order for protection of trees and plants any tree or plant, Part 3. 5. 31 Minister can declare private land to be a forest conservation area.</p> <p>Environmental Protection Act of 1996 mandated that the will provide for the management, conservation, protection and improvement of the environment; danger of extinction; (2) any person who in any marine reserve without permission granted under subsection 3 (b) takes or destroys any flora and fauna other than fish is guilty of an offence.</p> <p>Fisheries Act 1957 Part 8, Marine Reserves and Fishing Priority Areas, Section 21. (1). (a) to afford special protection to the flora and fauna of such areas and to protect and preserve the natural breeding grounds and habitat of aquatic life with particular regard to flora and fauna in danger of extinction; (2) any person who in any marine reserve without permission granted under subsection 3 (b) takes or destroys any flora and fauna other than fish is guilty of an offence.</p>
Mangrove as Forest	The Forests Act 2009, Part 1 5.2 (b) (1) defines forest with reference to mangroves
Mangrove as part of state forest and as state land	<p>Forest Act 2009. Part 1. 5.3. state the Minister can declare public forested land as state forest</p> <p>Civil Act Article 4.1 define foreshore of Guyana as the part of the shore of the sea and tidal navigable rivers which is covered by the medium high tide between the spring tides and the neap tide, the soil under tidal waters called land shall be deemed to be under state land</p> <p>Sea Defence Act of 1998 declares that “sea defence includes – any shell bank or reef, sand bank or reef or other natural feature which serves as a protection of the sea coast against the erosive action of the river current”. In Part 3 Section 12 of the Act declares that “all sea defences which are or shall be in existence in any district shall by force of this Act become the property of the state”.</p>

ISSUES AND CONCERNS ON MANGROVE	LAWS, POLICIES, RULES AND REGULATION
<p>Jurisdiction over mangrove forest</p>	<p>Environmental Protection Agency states that their functions is to take steps necessary for the effective management of the natural environment so as to ensure conservation, protection, sustainable use of its natural resources; establish, monitor and enforce the environmental regulations; assessed environment impact of the project ;and promote and encourage a better understanding and appreciation of the natural environment and its role in social and economic development;</p>
	<p>Sea Defence Act 1998 defined sea defence as (c, e)“All land fifty (50) feet landwards from the centre of any sea or river dam or sea or river wall and all land on the other side of such sea or river dam or sea or river wall in the direction of the sea or river to the toe of such sea or river wall ; and declares that “sea defence includes – any shell bank or reef, sand bank or reef or other natural feature which serves as a protection of the sea coast against the erosive action performed by the Ministry or its agents at the expense of the Board</p>
	<p>Guyana Land and Survey Commission Act mandated the commission to take charge of and act as guardian over all public lands, rivers and creeks of Guyana,</p>
	<p>Municipal and District Council Act Part II Sec. 7 (2) states that the jurisdiction of the City Council shall extend to low water mark of spring tide of the Demerara River and to all structure thereon (2) town council shall extend to low water mark of spring tides of the Berbice River and to all structures. Part IX 302 (19) to plant, trim, preserve or remove trees, flowers and shrubs in any public places.</p>
<p>Island and embankment (beach) for protection and rehabilitation and regulations on cutting and burning mangroves</p>	<p>The Forests Act 2009 Part 3. 23 (b) prohibiting any disturbance of the soil, vegetation, rivers, or creeks in that specially protected area; and Part 3.31. (1) The Minister may by public notice make an order – (a) declaring any forest on private land to be a forest conservation area; and (b) prohibiting, restricting, or regulating all or any of the following - (i) entry into the forest conservation area (ii) cutting, damaging, taking, or removing any forest produce in the forest conservation area; (v) clearing, cultivating, or turning of soil in the forest conservation area; (vi) grazing or pasturing of livestock in the forest conservation area; (vii) setting of fire in the forest conservation area; (2) No order may be made except on the advice of the Commission that the order is necessary for – (a) conserving the forests of Guyana and securing the proper management of forest land; (b) preventing soil erosion, coastal erosion, or erosion of the banks of rivers or creeks; (c) preventing the deposit of mud, stones, or sand in rivers or creeks or on agricultural land; (d) maintaining water supplies in springs, rivers, canals, reservoirs, aquifers, or water conservancies; (e) minimising the risk or mitigating the impact of storms, winds, floods, or landslides;</p>
	<p>The Environmental Protection Act of 1996 Part 10.68.1 Minister may make regulations for giving the effect to the provisions of this Act for the protection of particular species of prescribed fauna and flora (j.) protecting the coastal and marine resources and establish, monitor and enforce the environmental regulations</p>

	<p>Sea Defences Act of 1998 Sec.13 (1) and Sec. 16 (b) mandated to make regulations for (a) protecting the growth of Underwood, shrubs, and trees, on or near the foreshore or between high and low water marks (b) and the protection of the land and soil between high and low marks ; and generally, conserving the foreshore; and require estate to protect the foreshore by sowing seed, planting shoots to promote the growth of or the other tree, underwood, or shrubs, between and low water marks on the foreshore courida</p>
	<p>Civil Act Article 4.3 states that no one shall remove any sand, shell, gravel, shingle or other mineral substances or any seaweed or vegetation from the lands without the permission of the Minister responsible for sea defences and are subject to the like penalties.</p> <p>The Forests Act 2009, Part 3.31. prohibits the cutting, damaging, or taking any forest produce, or carry out any other kind of forest operation in a State forest; occupy or use any land in a State forest;</p> <p>Sea Defence Act of 1998 Sec.13 (1 Sec. 14, 15 and Sec. 16 (b) (a) (b) Sec. 26 states that everyone who infringes any of the provision of this Act shall be liable on summary conviction of twenty-two thousand five hundred dollars (G\$ 22,500)</p> <p>Municipal and District Council Act sec. 302(28). states the power of the council to regulate the cutting of wood on land vested in the council.</p> <p>Local Government Act part IV sec 51. Cutting of trees will have fix fees</p> <p>The Forests Act 2009 Part 3.24., Part 3. 25 (2), Part 6. 68 b.(iv) section 25(2), section30(3), section 31(4), section 23(5)- prohibits person in any State forest to throw down a lighted match or lighted or inflammable material; or do anything else likely to result in any forest produce being burnt or damaged. Penalty range from G\$250,000 to 1,00000</p>
Cattle grazing	<p>Municipal and District Council Act sec. 287,290 (28). stated the power of the council to regulate the grazing of animals; impounding the stray animal found in public places</p> <p>Local Government Act Part IV sec 50 states that grazing of animals on common land of the village and in country district will be impound and sec.102 (1-5) straying animals</p>
Community Involvement and Participation	<p>Guyana constitution Article 25 state that every citizen has a duty to participate in activities designed to improve the environment and protect the health of the nation.</p> <p>Article 74 (1) states that it is the duty of the Local Democratic to ensure in accordance with the law the efficient management and development of their areas and to provide leadership by example (3) to maintain and protect property , improve working and living condition and raise the level of civic consciousness..</p> <p>Local Democratic Organs Act Part II Sec. 7 states that duties of the local democratic organs is (a) maintain and protect property (b) protect and improve the physical environment (f) raise the level of civic consciousness (awareness)</p>

ANNEX II: LOGICAL FRAMEWORK OBJECTIVES ACTIVITIES REQUIRED

#	OBJECTIVES
1	To reduce destruction of coastal and riverine mangrove ecosystems, to promote improved management, and to conserve biodiversity in these ecosystems.
2	Directly protect critical mangrove areas from destruction, degradation and other anthropogenic activities that have negative impacts on the resource.
3	Promote natural regeneration where possible
4	Recognize, protect and enhance local cultural and social values of mangrove resources
5	Promote and support traditional management approaches
6	Establish Protected Areas where necessary to protect and conserve mangrove ecosystems and resources.
7	Implement and enforce buffer zones where necessary.
8	Encourage community participation in management of mangroves.
9	Integrate mangrove management and conservation measures with Integrated Coastal Zone Management.
10	Develop and implement appropriate policies and strategies for the management and conservation of mangrove ecosystems and resources
11	Promote research on mangrove ecosystems, species, genetics and habitat functions
12	Promote interagency collaboration in mangrove management
13	Review, strengthen and harmonise appropriate legislation to promote sustainable utilization of mangroves
14	Develop awareness and education programmes to disseminate information for better policy conformation and decisions.
15	Empower local communities for participation in management and conservation of coastal resources.
16	Strengthen stakeholder capacity for their involvement in management and conservation efforts.
17	Promote sustainable livelihood options
18	Provide education and awareness support

ANNEX III: EXCERPT FROM CHARTER FOR MANGROVES

The International Society for Mangrove Ecosystems (ISME) has adopted a Charter for Mangroves in Bangkok, Thailand, in November 1991. The Charter for Mangroves complements the World Charter for Nature that the General Assembly of the United Nations proclaimed on 28th October 1982 affirming that nature shall be respected, genetic viability on earth shall not be compromised, conservation shall be practiced, sustainable management shall be practised by man, and nature shall be secured against degradation.

ISME being aware that:

- Mangrove forests are unique intertidal ecosystems that occur primarily in tropical regions of the world.
- The total worldwide mangrove area is estimated at not less than 170,000 km² and there are some sixty species of trees and shrubs that are exclusive to the mangrove habitat.
- Mangroves support genetically diverse communities of terrestrial and aquatic fauna and flora of direct and indirect environmental, economic, and social value to human societies throughout the world.
- Sustainable development of mangrove ecosystem implies the maintenance and rational use of the natural resource to ensure ecological resilience and economic opportunities for present and future generations.
- Mangroves must be conserved in various parts of the world to prevent the occurrence of degraded coastal lands.

Convinced that:

- Destruction and degradation of mangrove forests are worldwide phenomena as a result of activities related to the non-sustainable use and overexploitation.
- The value of mangrove lands is consistently underestimated when the areas are converted for non-sustainable purposes
- The sustainable use of mangrove ecosystems would provide a better use of the resource.
- There is an urgent need to restore degraded mangrove ecosystems for economic, social and conservation reasons.

Persuaded that:

- Mangroves are a valuable natural resource with distinctive genetic diversity, high intrinsic natural productivity and unique habitat value.
- Mangroves sustain important economic and ecological values in adjacent terrestrial and marine systems.
- Mangroves play an important role in the economic and social resources available to subsistence coastal dwellers in the tropics.
- Mangroves play an important role in coastal protection and in the reduction of coastal erosion.
- Mangroves buffer coastal waters from undesirable land-based influences, such as sediment, contaminant or nutrient runoff.

ANNEX IV: INTERVIEWS/OBSERVATIONS

Information from interviews at Mabaruma, Imbatero, Waini, Aruka, Mora Passage, Shell Beach – North West District

Current Harvesting Procedure for Bark Production (Demonstrated by Philbert Sam)

Tree selection

- a. The *Rhizophora mangle* (red mangrove) is the species selected for bark production
- b. The tree is selected for its relatively straight bole and based on ‘sounding’ by hitting it with the dull end of the axe. The dull sound of the tree is indicative of a tree that is eligible to be cut. A hollow sound indicates a tree with a thin bark (ineligible for harvesting)
- c. This earmark tree is however further tested by cutting a small diamond shape bark to check for bark thickness ($\geq 1.2\text{cm}$). If the tree meets the criteria it is selected for felling.

Felling

- a. The tree is felled from the highest stilt root or 1m from the ground
- b. There is haphazard felling – the nearest eligible tree
- c. Felling is not done by chainsaw (only by axe)
- d. Harvesting implements: cutlass, axe, beater
- e. Harvesting is done within a 200m distance from the river
- f. Three persons can debark one tree within an hour
- g. An average of 10 trees can be harvested per day by three (3) persons

Debarking

- a. Sections of the tree along the length of the bole and the larger stems are cut around the bark at 60-75 cm intervals – this is called marking the tree.
- b. A ‘beater’ made out of the red mangrove stilt root is carved out (sickle-shaped) and used to beat off the bark in the different segments
- c. The remainder of the tree is left on the ground

Transportation

- a. A one-metre wide extraction route is cut and small young slender stems 15-20 cm in diameter are cut to make a footpath to the waiting boat. The bark is strapped together in bundles of ten pieces and stacked in the boat.

- b. This is then transported to the wharf and put in bags ranging from 40- 54Kg (88-120lbs). Sometimes larger bags are stacked from 68-80kg (150 -175 lbs)

Information Collected

1. Current harvesting is being done in the Barima
2. Harvesting is done throughout the year
3. Three persons can harvest bark from a large tree in one hour
4. Eight to ten trees can be harvested per day
5. Average bark production from one large tree was 350 – 450lbs)
6. Large bags of bark weigh as much as 150 -175lbs
7. Small bags as much as 90- 115lbs
8. Production four years ago – 200-300bags per fortnight; currently it is 15-50bags/fortnight
9. Producers got out of business because of the low price (G\$5.00/lb) and the tannin substitute (stein) was imported from Brazil. Current price is (G\$6.00/lb)
10. The harvesting procedure was demonstrated and explained by Mr. Philbert Sam and photos were taken at each stage of the process. The photos are part of the student's project and cannot be displayed here.
11. Regeneration is good in gaps after 3-4months (area completely filled with seedlings 30-40cm)
12. The remaining debris left uncut and greatly reduced regeneration in the spot where they remained
13. Tanners still prefer the bark and once it is available will use it because of the good quality of the tanning that it does. In addition the import from Brazil is expensive.
14. Persons living in the area expressed the view that they are willing to get back into bark production because it provided a livelihood, but need to have a good price (\$12.00-\$15.00/lb).

Personal Contacts and Interviewees: Ernest Santiago (former producer); James Calistro-Aka/Old man), Philbert Sam (current producer), Terrence Rufino - Aka/Khan (former producer); Dereck Chacon (former producer); Venus Wilson (purchaser) representing the SFP holder Hazel

Jericho; Neville Nebllette (bark purchaser)Janice Jack (teacher – Imbtero (St. Cyprians Primary School).

Information from brick makers' No. 51 and No.52 Villages Corentyne

1. The production of burnt earth for road construction is low as a result of alternative road building material 'chip seal'.
2. When the black mangroves are cut with chainsaw it does not coppice (resprout) but with the axe there is early resprouting and good regeneration in the cut area.
3. The trees cut for this purpose range from 150 - >250 cm in girth.
4. Freshly cut trees (wood) that is needed for the burnt earth process, because it gives a blue flame that produces larger and more solid bricks than any other wood.
5. Black mangroves were previously harvested (5years ago) at the rate of 2 trees/week/person. The current rate is 2-4 trees per month/person.
6. Level of harvesting currently did not negatively affect the mangrove area. Natural erosion destroying the mangrove trees
7. Brick makers use a mixture of hard wood from the sawmills and old trees along with the black mangroves.
8. Regeneration is not a problem in the cut areas - within 2 months there are hundreds of seedlings about 10cm tall.
9. Seedling regeneration density approximately 50-80 seedlings per sq. metre - in gaps of different ages (2 and 4- month old gaps).

Personal contacts: Edward DeSantos Aka/Bruce Lee- no. 51 (Rice farmer/former brick maker for over 20 years);Ms C. Harvey – No. 52 (Rice farmer and brick maker);Leslie Johnson – No. 51 (largest brick maker for over 8 years) – explained the burnt earth process; Elina Thatcher No. 51 (brick maker and rice farmer);David Thatcher No.51(brick maker)

Interviews with Fishermen/Coastal Dwellers in Regions 3,4 & 6

1. Fishermen cut black mangroves for seine 10-20 cm in diameter 7-9meters long
2. Eight (8) to twelve (12) poles are cut per fisherman every four months.
3. Do not know all the benefits of mangroves

4. All fishermen knew that mangroves protect them from the sea
5. All fishermen knew that loss of mangrove areas meant loss of fish catch.
6. Felt that the level of harvest did not affect the mangroves.
7. Minimal use of mangrove stems for farming.

Personal Contact: Sixty-four fishermen and coastal dwellers at: No. 42 Corentyne; Canjie Corentyne – Region #6; Mahaica – Region #4; Greenfield – Region #4; Hope- Region #4; Mon Repos – Region #4; Winsdor Forest – Region #3; Parika – Region #3; Leguan Island – Region #3; Wakenaam – Region #3.

APPENDIX V Regional stakeholders' Consultations

Dates: April 16 - May 28 2010 Total number of persons registered: 497

Date	Region	Location	Places represented	No. of Persons
April 16, 2010	2	AnnaRegina, Esseq	Charity, Reliance, Bush Lot, Adventure, Better Success, Devonshire Castle, Anna Regina, Dartmouth, Airy Hall, Mainstay, Affiance, Bounty Hall, Pomona, Queenstown, Golden Fleece, Cotton Filed, Lima, Suddie, Henrietta, Pomeroun River, Three Friends, Tapakuma, Windsor Castle, Cullen, Hampton Court, Onderneering	81
April 23, 2010	6	# 63 Village, East Berbice	Rosignol, New Amsterdam, Bath, N0. 68 Village, No. 51 Village, No. 62 Village, No. 60 Village, Bloomfield, No. 6 Village, Kildonar, No. 52 Village, No. 64 Village, Edinburg, Skeldon, No. 58 Village, No. 54 Village, Nurney Village, Springlands, Corriverton, Black Bush Polder, Brothers Village, Rose Hall, No. 17 Village, Queenstown, Crabwood Creek, Eversham Village, Williamsburg, Tain, No. 70 Village, Albion, Cane Field, Kilroy, No. 69 Village, Adventure, Hamshire, Bush lot	104
April 30, 2010	3	Crane, West Coast Demerara	Zeelugt, Cornelia Ida, Parika, Verngenogen, La'Union, Best, Klien Pouderoyen, Anna Catherina, Windsor Forest, La Jalousie, Vreed-en-Hoop, Greenwich Park, Rumzeight, Zeeburg, Crane, Stewartville, Vergenoegen, Tuschen, DeKenderen, Den Amstel, Farm Village,	111
May 7, 2010	4	Mon Repos, East Coast Demerara	Cane Grove, Mon Repos, Chateau Margot, Enterprise, Golden Grove, Kuru Kururu, Better Hope, Bladen Hall, Vigilance, Foulis, Tuschen, Nabacalis, East LaPenitance, Enmore, Friendship, Patentia, Haslington, Triumph, Victoria, Lusignan,	90
May 14, 2010	5	# 28 Village, West Cost Berbice	No. 28 Village, No. 3 Vilalge, No. 30 Village, Bath, No. 29 Village, Woodley Park, Blairmont, Lichfield, Perth, Hopetown, Golden Grove, Cotton Tree, Onverwagt, Lovely Lass, Dundee, No. 29 Vilalge, No. 30 Village, Shieldstown Settlement, Britannia Village,	59