

# Green Practices Guideline for Forest Operations

This document is intended for a restricted audience only, i.e. the individuals and organizations that have received this document. The document may not be reviewed, abstracted, quoted, reproduced, transmitted, distributed, translated, or adapted in part or any form or other means by these individuals and organizations without permission. The document should not be displayed on any website



### **PROJECT TEAM (MGTC)**

Ts. Shamsul Bahar Mohd Nor  
Kamaradzaman Mohd Bakri  
Abd. Malik Atan  
Azlina Hashim  
Muhammad Faiz Abdul Rahman  
Nur Amalina Hasanudin  
Khairul Ikhwan Jamaludin

### **TECHNICAL EXPERTS (UPM)**

ASP K/S Assoc. Prof. Dr. Pakhriazad Hassan Zaki  
Lt. Cdr. Prof. Gs.Ts. Dr. Mohd Hasmadi Ismail RMNVR

### **RESOURCE PERSONS**

Dato' Ahmad Fadzil Abd Majid (JPSM)  
Dato' Norhaidi Yunus (JPSM)  
Ts. Dr. Noor Jannatun Naim Jemali (UMK)  
Dr. Azian Mohti (FRIM)  
Wan Farinie Wan Zee ( WZ Timber Industry Sdn. Bhd.)  
Norsheilla Mohd Johan Chuah (FRIM)  
Mohd Hidhir Hamdan (DQS Certification (M) Sdn. Bhd.)  
Mohd Firdaus Jamel (JPSM)  
Azelan Ishak (MTIB)  
Melvin Ku Kin Kin (MTCC)  
Hanif Salleh (MTCC)  
Modin Anak Nyambau (For. Dept., Sarawak)  
Razatul Aini Razlan (DoE)  
Stephinie Lai@ Lai Rei Yen (JPSM)  
Noorshathiroh Saidin (JPSM)

### **ACKNOWLEDGEMENTS**

We wish to express appreciation to all stakeholders who have provided feedback and comments of this document.

Faculty of Forestry and Environment, UPM  
Forestry Department of Peninsular Malaysia  
Forest Research Institute Malaysia  
Malaysian Timber Certification Council  
Malaysia Timber Industry Board



# **Green Practices Guideline for Forest Operations**



# FOREWORD

The development of green practice guidelines is a continuation of the implementation of the MyHIJAU Program under the Ministry of Environment and Water (KASA) and the Malaysian Green Technology and Climate Change Corporation (MGTC) which is a coordinating agency and secretariat for the program. This program has been approved by the National Council for Green Technology and Climate Change (MTHPI) which was held on 23 October 2012. This is one of the Government's initiatives in the development of Green Technology in Malaysia. It is in line with the implementation of the National Green Technology Policy as well as the direction of Sustainable Consumption & Production (SCP) to encourage local manufacturers, producers and suppliers, especially to companies and Small and Medium Enterprises (SMEs). In addition, it will also focus on the Government's initiatives and direction in the development of the country's SMEs.

The development of Green Practice Guidelines is to provide guidance to the green industry in implementing green practices at the preliminary stage, during and after construction is implemented. These guidelines also have an implementation direction to ensure that these Guidelines will continue to be referred to and used by all parties, especially industry players to help achieve the government's goal of implementing green development in Malaysia. This green practice can help the industrial sector to have the potential to venture into the field of green technology, especially in the production of green products and services, as well as increase the encouragement of producers, manufacturers and suppliers to apply green technology in the premises, production process and operation.

These Guidelines are more towards the requirements that need to be put into practice so that industries, companies and organizations have green practice guidelines that can be referred to as well as help companies achieve the government's goal of using green practices in line with SDG 12.6, which is to encourage the industry to use sustainable practices and integrate information sustainability into the reporting cycle.

Referring to the twelfth Malaysia plan under the eighth main focus which is to accelerate green growth, where this green practice development program is able to play a very important role in being a catalyst to ensure that these green practices are more practical and applicable to all parties in the green industry whether directly or indirectly for local companies and businesses to gain exposure to this green industry practice guide.

Therefore, increasing productivity and long-term profits through environmental, social and governance (ESG) elements should be applied in decision-making by ensuring that companies focus on reducing the negative impact on the environment. Although Malaysia only contributes 0.7 percent to greenhouse gas emissions, the Government will continue to fulfil its commitment to reduce GHG emission intensity up to 45 percent to GDP in 2030, based on emission intensity in 2005, in line with the aspiration to become a low carbon country.

It is hoped that this goal can be achieved by focusing on the industry to understand the importance of green practices in business by applying knowledge about the benefits and applications of green technology as well as the implementation strategy of the green practice monitoring mechanism in business management to obtain the recognition of the green industry.



# TABLE OF CONTENT

## SECTION 1 : INTRODUCTION

1.1	Background	1
1.2	The “Green” Principal of the Forestry	3
1.3	The Need for Green Practices in Forest Operations	5
	1.3.1 Forest Governance and Green Practices	6
	1.3.2 Green Practices Compliance with Legislations and Regulations	7
1.4	Purpose of the Green Practice Guideline	9
1.5	Scope and Application	10
	1.5.1 Scope of Forest Operations	11
1.6	Success Story of Green Practices in Forest Operations	19

## SECTION 2 : OPERATIONAL DEFINITION

2.1	Definition of Green Forest Operations	21
2.2	Forest Operations in Context	22
2.3	Sustainable Forest Management Objectives	23
	2.3.1 Malaysia Criteria and Indicators for Sustainable Forest Management	24

## SECTION 3 : GUIDELINE OF THE GREEN PRACTICES FOR FOREST OPERATIONS

3.1	Introduction	26
3.2	General Indicators	27
	3.2.1 Materials	
	3.2.2 Waste	
	3.2.3 Water	
	3.2.4 Energy	
	3.2.5 Innovation	
	3.2.6 Management	
3.3	Guideline Implementation	31
	3.3.1 Setting the Target	32
	3.3.2 Framework of Strategic Approach	33
	3.3.3 Monitoring and Evaluation	35

## TABLE OF CONTENT

3.4	Indicators Alignment with the Existing Policies, Benefits and Recognition	36
3.5	Roadmap of Green Practices	38
<b>SECTION 4 : DRIVERS AND CHALLENGES OF THE GREEN PRACTICES</b>		
4.1	Drivers and Challenges	40
4.2	Challenges and Strategies	42
4.3	A Proposed Action of the Green Practices Toward Sustainable Forest Management	43
<b>SECTION 5 : CONCLUSION</b>		
5.1	Conclusion	45
<b>REFERENCES</b>		

## ABBREVIATIONS

<b>SMS</b>	-	Selective management system
<b>ESG</b>	-	Environmental, social, and governance
<b>RIL</b>	-	Reduced impact logging
<b>SIA</b>	-	Social impact assessment
<b>FAO</b>	-	Food and Agriculture Organization
<b>ITTO</b>	-	International Tropical Timber Organization
<b>IUFRO</b>	-	International Union of Forest Research Organizations
<b>UNEP</b>	-	United Nations Environment Programme
<b>IUCN</b>	-	International Union for Conservation of Nature
<b>MTCS</b>	-	Malaysian Timber Certification Scheme
<b>MTTC</b>	-	Malaysian Timber Certification Council
<b>PEFC</b>	-	Programme for the Endorsement of Forest Certification
<b>MC&amp;I SFM</b>	-	Malaysian Criteria and Indicators for Sustainable Forest Management
<b>FCS</b>	-	Forest Stewardship Council
<b>GITA</b>	-	Green Investment Tax Allowance
<b>GITE</b>	-	Green Income Tax Exemptions
<b>NGTP</b>	-	National Green Technology Policy
<b>LCCF</b>	-	Low Carbon Cities Framework
<b>EMGS</b>	-	Energy Management Gold Standard



## Terminologies

**Forest operations** are the specific activities implemented to achieve a stakeholder's desired forest use. Typically, these activities involve harvesting timber, include constructing roads and other facilities.

**Green practices** are an environmentally friendly practice in forest harvest operations and how they are perceived practically in environmental sound ways.

**Good practices** are the effort to maintain and improve the environmental values of forests associated with soils, water, and biological diversity. These practices are often used during and following the harvesting of timber.

**Green technology**-Definition by MGTC: The development and application of products, equipment and systems used to conserve the natural environment and resources, which minimizes and reduces the negative impact of human activities.

**Green agenda** is an institutional movement related to or are concerned with the protection of the environments.



# SECTION 1



## Introduction



# 1.1 Background



1. The government of Malaysia is committed to maintaining at least 50% of the country's landmass under forest cover, as pledged during the 1992 Earth Summit in Rio de Janeiro, Brazil. At present, 55.3 % of the land area in Malaysia, or 18.27 million hectares, are covered by forests.

2. Particular focus will be given to the greening Malaysia agenda to enhance forest conservation through tree planting, rehabilitation and restoration of degraded forest areas in collaboration with state governments.

3. In this direction, various special financial instruments were created, including the National Conservation Trust Fund for Natural Resources and Forest Development Trust Fund under the state governments in Peninsular Malaysia and the Malaysia Forest Fund (MFF).



## Permanent Reserved Forest by Functional

Protection Forest  
(2.97 mil. ha)

Production Forest  
(1.84 mil. ha.)

### Definition of Forest:

Minimum area of land of 0.5 hectare with tree crown cover (or equivalent stocking level) of at least 30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest.

(Source: Adapted from ITO, 2002 and FAO, 2003)



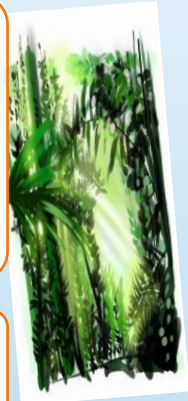
4.



One of the revolutionary events of the twenty-first century is the emergence of sustainable development and the green technology concept. However, as a policy goal, sustainable development can be attributed to the failure the challenges faced by societies today arise from unplanned socio-economic activities which resulted in antagonistic depletion of environmental resources, pollution, economic instability, low standard of living, food insecurity, poverty, etc., with considerable impact on people's well-being and societal development.

5.

Forests are resilient ecosystems, there are limits to their ability to withstand environmental change, and they degrade when these limits are exceeded. Therefore, sustainable forest development means recognizing the limitations of forests to withstand environmental change, individually and collectively, and managing human activities to produce the maximum level of benefits obtainable within these limits



6.

The above definition of sustainable forest development recognizes three critical parameters (i) productive capacity, (ii) renewal capacity and (iii) species and ecological diversity.



**PRODUCTIVE CAPACITY.** Site productivity is a function of the number of species and individual trees growing on a location, soil fertility and climate.

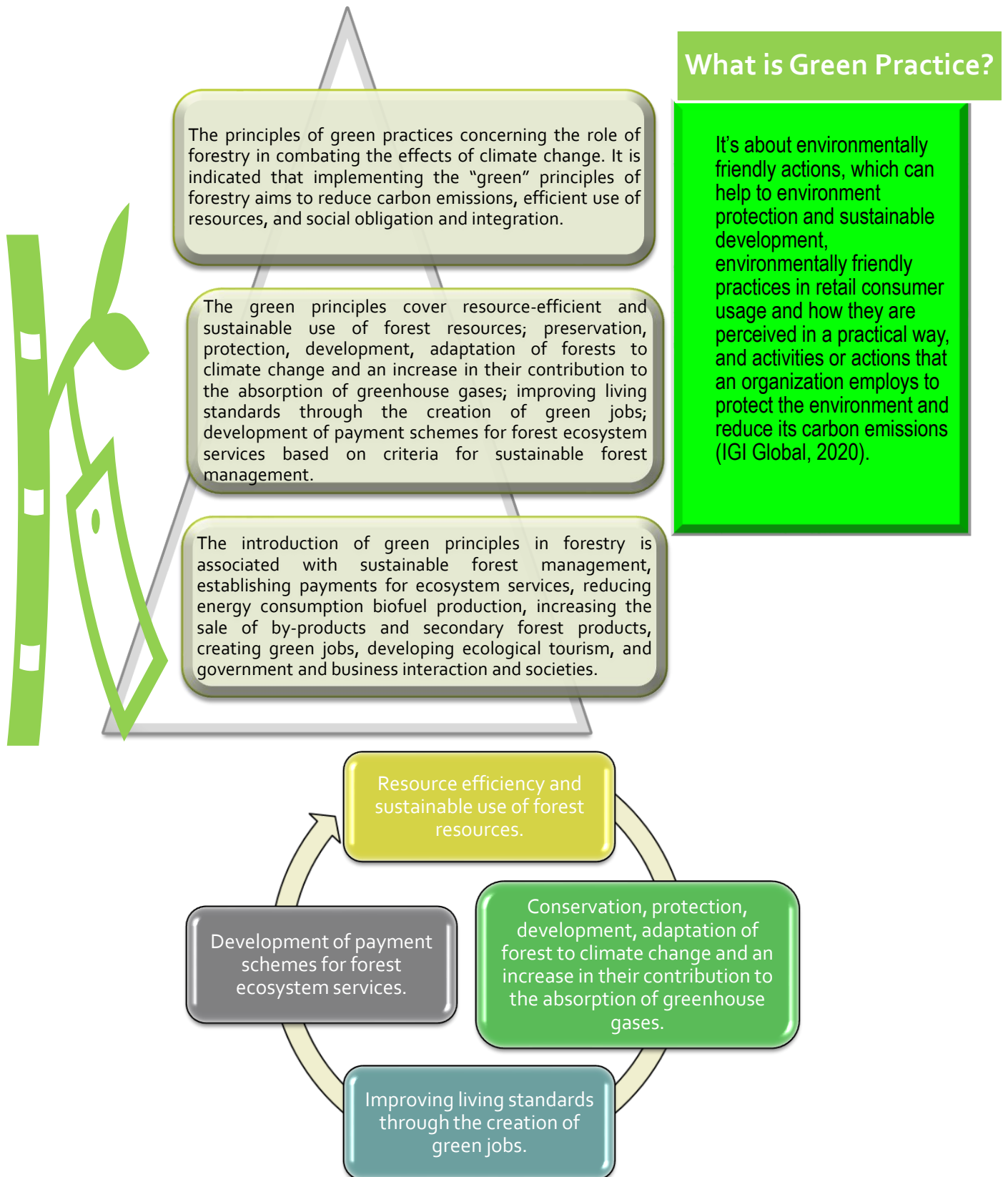
**RENEWAL CAPACITY.** Renewal of a forest ecosystem, following harvesting or other forms of disturbances, is dependent on the nature and intensity of disturbance and the mode of reproduction of species located on the site.

**SPECIES AND ECOLOGICAL DIVERSITY.** Forests are a rich repository of planet Earth's genetic heritage. Tropical forests contain more than 50 percent of all plant and animal species in about six percent of the world's surface area. Species diversity and ecological diversity are closely related, and their preservation is an integral component of efforts to maintain future options.

**Figure 1:** Three critical parameters for sustainable forest development.

*Source: Maini, J.S (1991)*

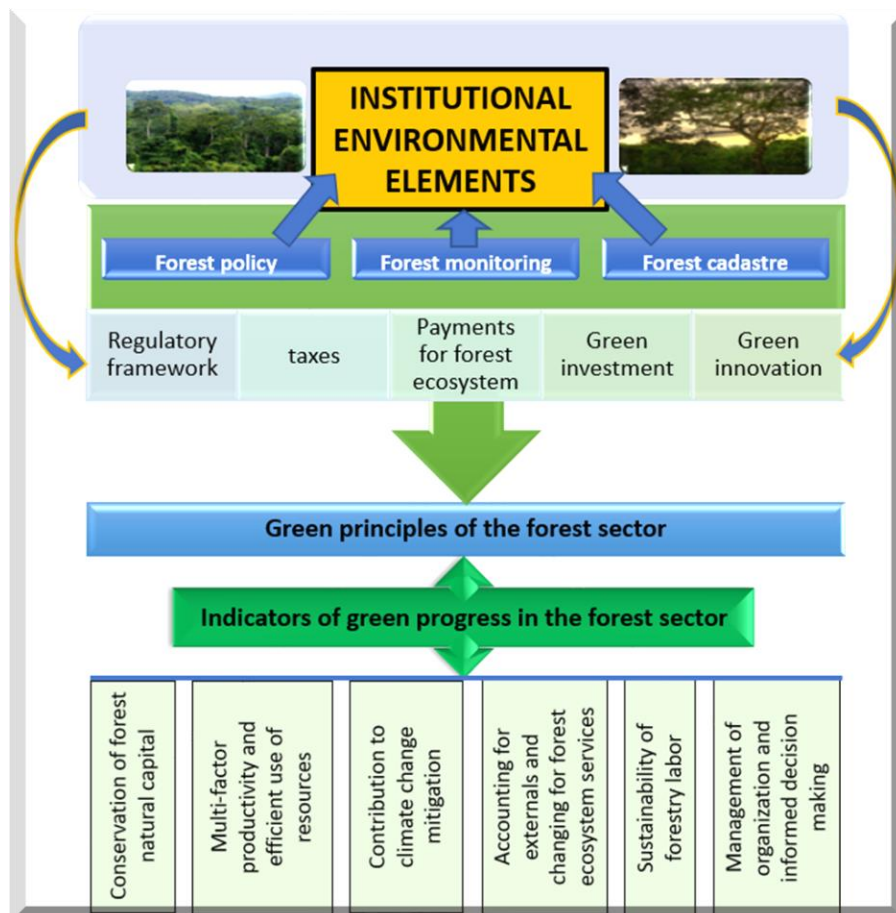
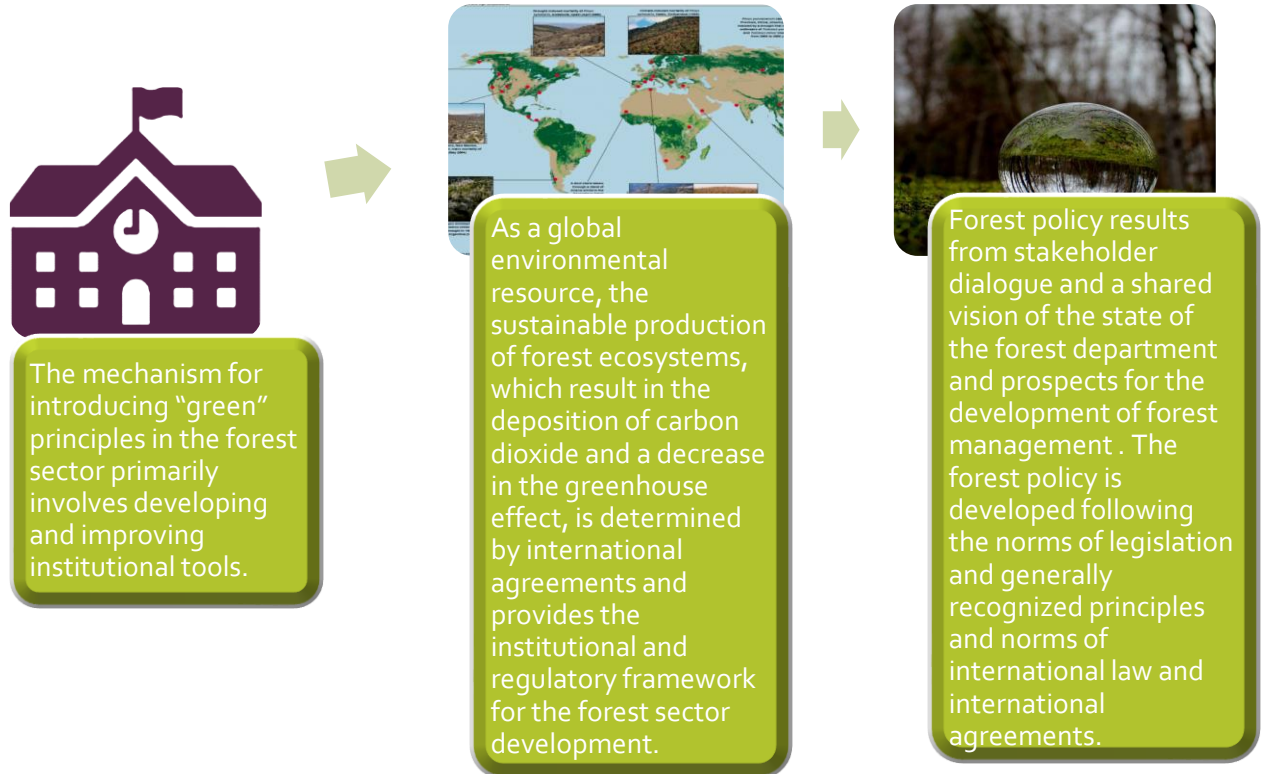
## 1.2 The “Green” Principles of the Forestry



**Figure 2.** “Green” principles of the forestry sector.

(Source: Yakovleva, E.A. & Subhonberdiev, A. Sh. 2019)

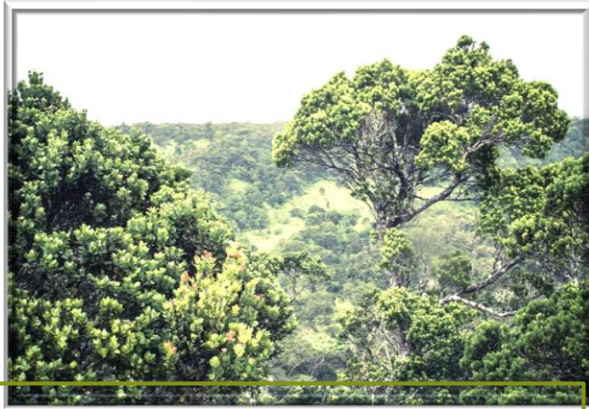
## The "Green" Principles of the Forestry



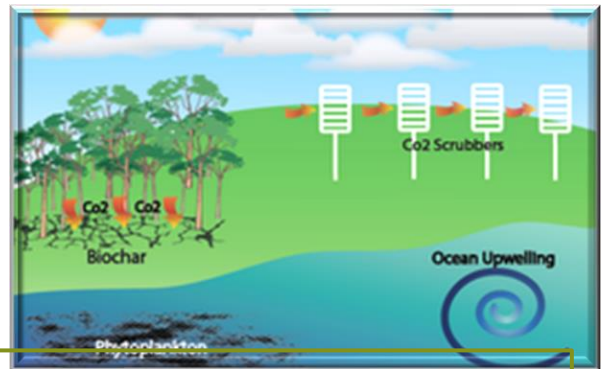
**Figure 3.** The mechanism of "green" principles implementation in the forest sector.



## 1.3 The Need for Green Practices in Forest Operations



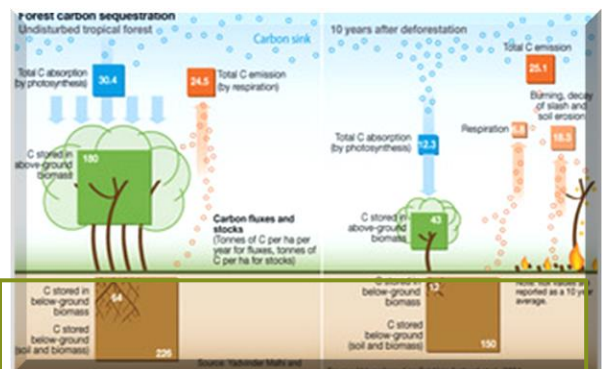
Forest management with low greenhouse gas emissions aims to achieve sustainable, economically efficient, environmentally responsible and socially-oriented forest management and exploitation. Improved forest management practices enable forests to transition to sustainable forests that are more resilient to impacts of climate change.



Forests provide regulatory services to reduce the impact of climate change. However, forest ecosystems are vulnerable to climate change. Therefore, the adaptation strategy should integrate a biophysical approach involving biodiversity conservation, forest management and reforestation, and a social process.



The forestry sectors can significantly contribute towards meeting green practices objectives linked to climate change policies, mainly through reducing greenhouse gas emissions and expanding renewable energy objectives.



The need for best forest operations practices to mitigate climate change and contribute to a green practice was linked to managing the forest. Sustainable forest management (SFM) becomes even more critical now that forests are recognized for their crucial role as carbon sinks.

### 1.3.1 Forest Governance and Green Practices

1

Sustainable forestry, or sustainable forest management, is the practice of managing forests to meet current needs and desires of society for forest resources, i.e., products, services, and values, without compromising the availability of these for future generations (Boyle et al., 2016).

2

Forest governance is defined as the way in which public and private actors, including formal and informal institutions, smallholder and indigenous organizations, small, medium-sized and large enterprises, civil society organizations and other stakeholders negotiate, make and enforce binding decisions about the management, use and conservation of forest resources (FAO, 2005).

3

The New Deal describes the greening of the economy as the “process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities.”

4

The concept of forest governance has evolved to engage multiple (public and private) actors at various scales, from local to global. The key principles guiding good governance of “green forests” include equity and justice, empowerment, accountability, transparency, subsidiarity and sustainability.



The concept of the green economy was introduced by Laura Altinger from the UNECE Environment, Housing and Land Management Division, concerning the Global Green New Deal launched by the United Nations Environment Programme in October 2008.

## 1.3.2 Green Practice Compliance with Legislation and Regulations

Forest management and green practices shall comply with all applicable laws of Malaysia and respect international treaties and agreements to which Malaysia is a signatory.

The Cabinet Council Meeting has approved the National Forest Policy on 11 November 2020 and the 78th National Land Council Meeting on 29 January 2021.

**Table 1:** Existing legislation and regulations pertaining to forest operations

National Forestry Act 1984 (revised 1993) <i>(Act 313)</i>	Aboriginal Peoples Act 1954 <i>(Act 134)</i>	Environmental Quality Act 1974 <i>(Act 127)</i>
National Land Code 1965 <i>(Act 56)</i>	Land Conservation Act 1960 <i>(Act 385)</i>	Industrial Relations Act 1967 <i>(Act 177)</i>
Wildlife Conservation Act 2010 <i>(Act 716)</i>	International Trade in Endangered Species Act 2008 <i>(Act 686)</i>	Occupational Safety and Health Act 1994 <i>(Act 514)</i>
Waters Act 1920 <i>(Act 418)</i>	Machinery Act 1967 <i>(Act 139)</i>	Employment Act 1955 <i>(Act 265)</i>



In addition, the International Standard Organization (ISO) develops 19,500 international standards applicable across industries.

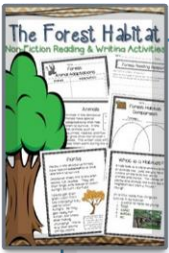
**Table 2:** ISO Standards that are applicable in green industrial practices.

 <p>ISO 14001 Environmental Management</p> <p><b>ISO</b></p> <p><b>14001</b></p>	 <p>ISO 45001 Occupational Health and Safety</p> <p><b>ISO</b></p> <p><b>45001</b></p>	 <p>ISO 50001 Energy Management</p> <p><b>ISO</b></p> <p><b>50001</b></p>
<p>Recognises organizations that have enhanced environmental performance and met compliance requirements by implementing and maintaining equipment, systems, processes, and personnel training to reduce environmental impact.</p>	<p>Recognises organizations that have implemented rigorous workplace health and safety systems that improve employee safety, reduce workplace risks and create better and safer working conditions.</p>	<p>Recognises organizations that have developed and integrated an efficient energy management system that has been integrated into their overall efforts to improve operational efficiencies and improve energy use.</p>

## 1.4 Purpose of the Green Practice Guideline



The Green Practice Guideline aims to place forest operation in the context of green practices mobilization and innovation for sustainable management and development in Malaysia



The guidance will refer to good practice examples of successful and sustainable mobilization of forest operation to assist policy-makers and practitioners alike in taking and supporting similar measures. This document gives clear, concise and operational guidance.



The guideline focuses on understanding the potential of green practices in the forest operation sector, one of the key sectors contributing to the transition to a green economy and, hence, sustainable development.

Provide guidance in implementing green practices.

Provide a practical contribution and offers direction on green practices implementation in supporting the national strategies, policies and governance structures for forestry sector.

Present “good-practice examples” of forest operations, linked to each measure, and explaining determinant factors and possible constraints, ease of implementation, time scales, and potential scale of mobilization

Make sound choices and implement appropriate actions concerning all aspects of Green Practices for forest operation, whilst ensuring sustainable forest management and inline with the development of SDGs.

## 1.5 Scope and Application



The green policies and initiatives identified in this guideline cover a broad spectrum of issues, involving government and non-government stakeholders of the forest operations sector, under scoring the need for strong institutional integration, and supporting policies.



The scope of this guideline is focused on the processes, phases and techniques in the forest operations sector which were meant to boost output, also does not harming the environment underlying the social, financial and policy barriers that hinder the implementation of the green initiative in this sector.



## 1.5.1 Scope of Forest Operations



The "green of forest operations practice" are sets of guidelines designed to help forest operation industries implement practices to be followed in forest operation management. The green practices are only cover the scope for the forest operations.



The Green Practices Guidelines for the forest operations provide information on what is known about how to accomplish a forest operation in environmentally sound.



The guideline makes it possible to conduct forest harvesting operations consistent with sustainable forest management.

**The scope of green practices in forest operations considered are as follows:**



**Thrust 1: Forest Road Construction**

**Thrust 2: Tree Felling**

**Thrust 3: Extraction**

**Thrust 4: Transportation Operation**

**Thrust 5: River Buffer Zones**

**Thrust 6: Log Yard/Landing Operations**

**Thrust 7: Forest Camp**

# Thrust 1: Forest Roads Construction

## Guiding principle

**Forest roads** are complex engineering structures. They are unquestionably the most complex forest operation since a major part of the total soil erosion resulting from harvest operations can be attributed directly to roads, often because of design or construction flaws or poor maintenance practices. Forest roads should be designed and laid out by skilled engineers who understand the need to minimize soil disturbance, maintain proper drainage and avoid stream crossings where possible. Construction and maintenance of forest roads is specialized work that engineers should supervise and carry out by specially trained crews. All roads should be carefully designed according to the proposals Forest Road Guideline 2010 (amended 2013) by the Forestry Department.





## Thrust 2 : Tree Felling

### Guiding principle

**Tree felling** is among the most hazardous occupations. Trees are large, heavy objects and fall with a tremendous force that can smash or uproot neighbouring trees. Their branches may break off and fly in unpredictable directions. The felled tree may roll or slide downhill, and its stem may shatter into pieces that can bounce into the air and roll uncontrollably.

Felling operations should be performed by equipped and skilled workers who have had training, closely supervised and minimize damage through carefully controlled directional felling. In addition, excessive damage caused by felling impacted advanced regeneration and residual trees. Uncontrolled felling can also substantially reduce efficiency in the subsequent extraction operation. On the other hand, directional felling can minimise damage to both vegetation and soils, keep trees away from streams and increase the utilizable volume of the tree stem by reducing breakage. Consequently, every emphasis must be placed on training, clear instructions, and supervision.





# Thrust 3 : Extraction

## Guiding principle

**Extraction** is the process of moving trees or logs from the cutting site to a temporary log yard/landing or roadside, where the trees will be processed into logs for transport to the main/primary log yard or other final destination.

Regardless of the harvesting system, extraction is a challenging, often risky operation that substantially damages forest ecosystems. Therefore, considerable skill is required, on the part of both supervisors and workers, to carry out extraction operations that are efficient and safe, as well as environmentally sound.



# Thrust 4 : Transportation Operations

## Guiding principle

**Transportation operations** can be challenging and costly since trees are often far from roads. The most common timber transport from forest to processing facility is by road, using logging trucks. Environmentally, the transport of logs from the landing to the processing facility or other final destination is a relatively low-impact operation.

Most of the direct damage is caused by the transport infrastructure (usually roads), rather than by transport operations. Nevertheless, certain operating practices can be damaging and threaten public safety.

They can also increase costs and reduce the value of the logs delivered to the final destination. Transport costs often represent one half or more of the total timber harvesting cost.





## Thrust 5 : River Buffer Zones

### Guiding principle

**River buffer zones** are naturally vegetated areas along a river or stream corridor. Negative impacts of forest operations on water quality can be prevented or mitigated using river buffers with vegetation that takes up nutrients and facilitates sedimentation and infiltration of suspended solids. In order to reduce the dissemination of suspended solids, river buffers should be protected from soil disturbance caused by activities such as road construction, tree felling, and extraction.

Moreover, driving forestry machinery should be avoided in river buffers since soil compaction and rutting may facilitate channelized overland flow. The expansion of stream length and width during high-flow periods must be considered to ensure river buffer functionality during all weather conditions (wet and dry).





# Thrust 6 : Log yard/landing Operations

## Guiding principle

**Log yard or landings** are collection areas where timber is delivered during the extraction process. At the landing, timbers may be sorted, possibly stored temporarily in log decks, and then assembled for transport to the processing facility or other final destination. This area is busy, noisy places, with one or more large machines often in motion and several chainsaws working on trimming uneven logs or removing branches that were missed by the cutting crew. In short, they are places of potentially high risk. However, proper planning and layout can help reduce the risks and ensure that operations proceed efficiently and safely.

Landings are also potential sources of water pollutants and soil sediments. They are relatively large areas of bare soil that may have been surfaced with rock or gravel. In addition, because they represent the interface between extraction and transport, landings are the site where fuel and spare parts are typically delivered. Therefore, fuel spills and oil contamination are potential hazards and must be guarded.



# Thrust 7 : Forest Camp

## Guiding principle

**Forest camp** (or logging camp) is a transitory work site used in forest operations. It should provide safe and healthy living and working conditions for forest harvest personnel. The following are minimum requirements and may be superseded by the authority, acts or regulations. The objective is to:

- (i) Prevent pollution of water resources.
- (ii) Prevent the introduction of new health issues to the operation area.
- (iii) Maintain a tidy operation.







## 1.6 Success Story of Green Practices in Forest Operations



### Case Study 1

Sustainable forest management, evolution can be seen in forest operation activities, where the high impact of conventional logging, especially on the forest ecosystem, has been transformed into reduced impact logging practices and the use of green practices.



There are many ways of implementing green technology within forest operations. The decision to go 'green' may come from reducing carbon footprint, utilization of RIL techniques, compliance with regulations, or contribution to society and the environment.



PGL Vision Sdn. Bhd.

Company  
Reg. No.  
0719049A

Nature of business:  
Logging, processing  
and trading of timber



### Approach

- Use of RIL machine called "Log-Fisher" in forest harvest operation.

### Added Value

- Logfisher timber harvester is based on concept of fishing.
- Been acknowledged as an effective and cost efficient alternative to existing low and reduced impact logging technologies

### Benefits

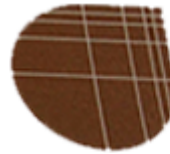
- RIL and Log-Fisher techniques greatly reduce damage to trees in residual stand and reduced the amount of ground area disturbed in harvesting area by conventional machinery (around 30%-50%). The result implies the benefits on the economic and ecological conservation.



## Success Story of Green Practices in Forest Operations



### Case Study 2



**ASRAMA RAYA**  
www.asramaroyakt.com.my



Asrama Raya Sdn. Bhd. (ARSB) was incorporated on the 13th November 1967. ARSB sawmill is the first sawmill in the country which has been given timber tracking certificates for exporting 'green' timber.

Received a *Well-Managed Nature Forest* certification under Forest Stewardship Council (FSC) and complies with the National Forest Stewardship Standard of Malaysia Principles & Criteria.



### Approach

- Conducts selective logging based on SMS and RIL by using a Logfisher.

### Added Value

- Improved Base Hydraulic Forest Harvesting Machine. Its customized and improved feature provides stability and power to perform a range of standard harvesting operations especially winching of logs from the forest in all directions and terrains for natural and plantation forests.

### Benefits

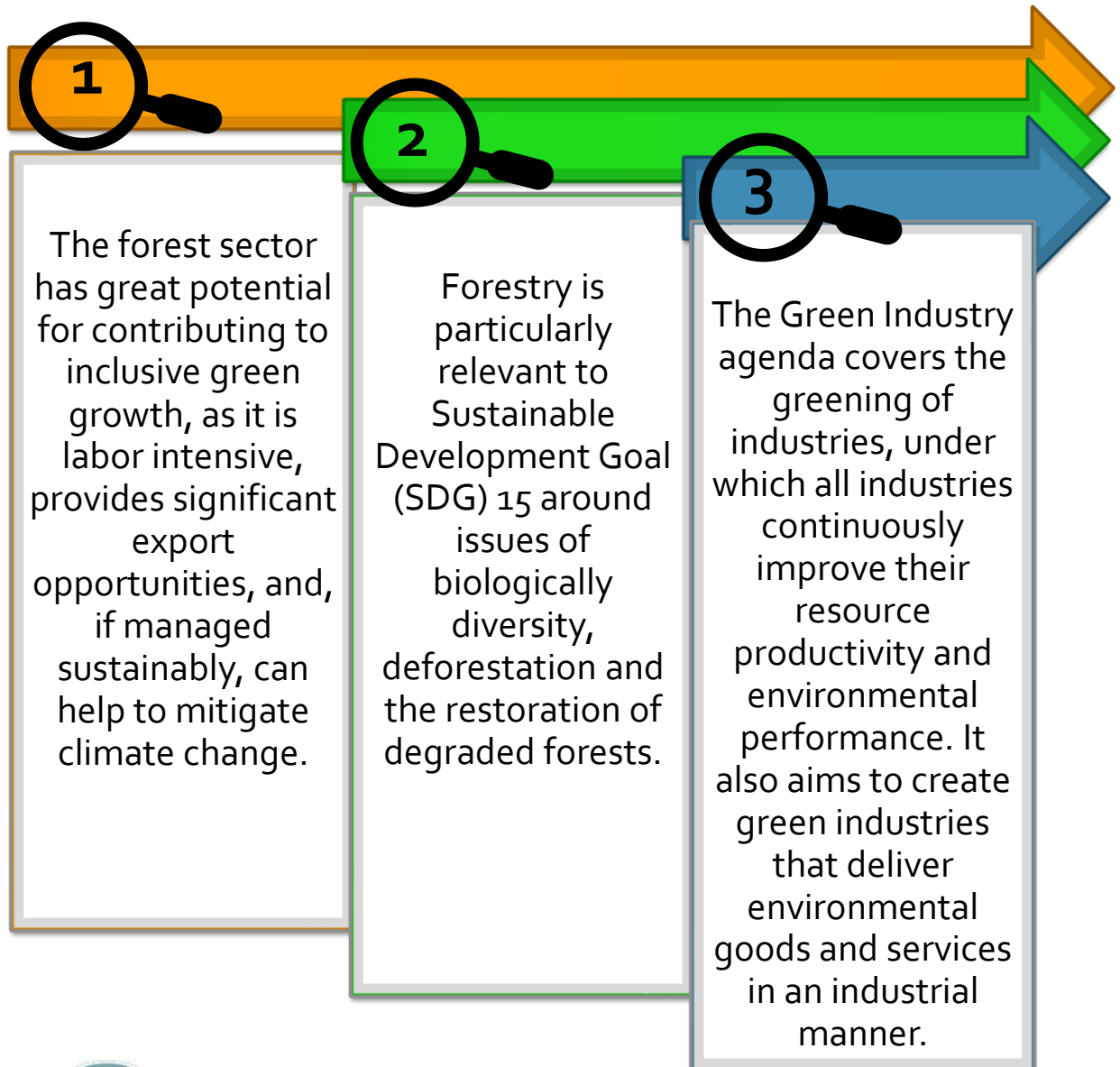
- The Logfisher can reduce soil disturbance, especially in steep areas and reduce the potential for siltation of streams. The machine can reduce around 60% of fuel energy. The result implies the benefits on the economic and ecological conservation.



# SECTION 2

## Operational Definition

## 2.1 Definition of Green Forest Operations



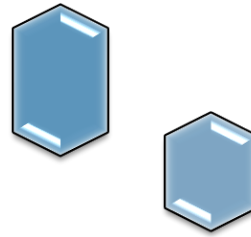
**Definitions of green and sustainable forest management for forest operations** are generally concerned with the need for the operations practices to be economically viable, meet social needs, be environmentally positive, and be involved with the quality of life without undue undesirable effects on the physical environment. In addition, green forest operations that can overcome the barriers of a rapidly changing world require attributes that constitute the defining elements of sustainable forest resources.

## 2.2 Forest Operations in Context

Forest operations management consists of all technical and administrative processes to develop technical facilities and structures, harvest timber, maintain and improve the quality of forest stands and habitats.

In the context of forest operations, it should not be confused with logging, where logging is associated with land conversion activities such as a conversion of forest land to other land uses types

Harvesting is an important activity in forest operation management. It involves all operations from felling to transporting logs to the mill.



### Forest Operations in Context

**01**  
**TECHNICALLY FEASIBLE**

Considering physical law, engineering knowledge, and environmental relationship of the forest ecosystem

Considering the cost and benefit of short-ranges and long-range consequences

**02**  
**ECONOMICALLY VIABLE**

**03**  
**ENVIRONMENTALLY SOUND**

Considering impacts on the natural and social environment, efficient use of natural resources including renewable materials, non-renewable materials, water, energy and space

Considering the law and regulations governing operations, forest management objectives and social values.

**04**  
**INSTITUTIONAL FEASIBLE**

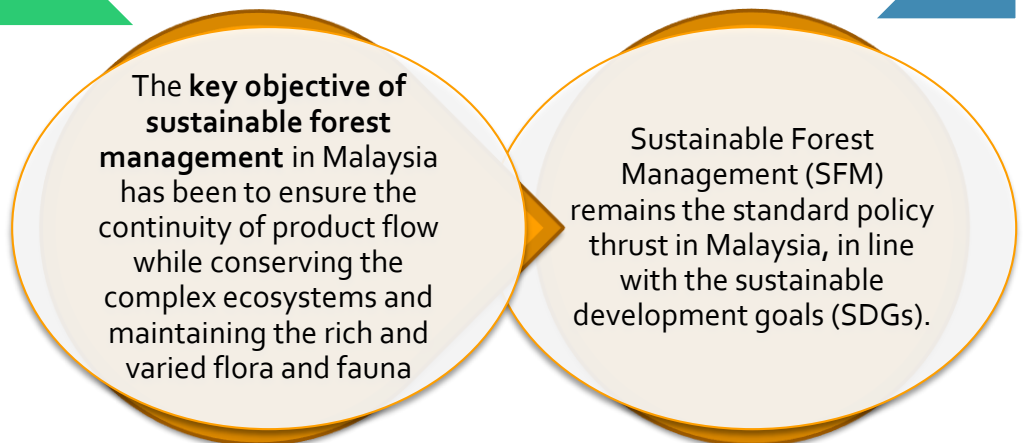


## 2.3 Sustainable Forest Management Objectives



Malaysia has been practising Sustainable Forest Management (SFM) since 1901. According to ITTO (1992), SFM practices can be defined as:

“The process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.”



**Figure 4:** Sustainable Forest Management (SFM) objectives remain Malaysia's standard policy thrust

### 2.3.1 Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I SFM)



Malaysian Timber Certification Scheme (MTCS), the Malaysian Timber Certification Council (MTCC), is responsible for facilitating the development and publication of certification standards used under the MTCS.



MTCS provides for independent assessment of forest management practices and audit of timber product manufacturers or exporters to ascertain that the timber products manufactured or exported are sourced from sustainably managed forests and meet the demand for certified timber products.



The Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I SFM) is the national forest management certification standard that specifies the requirements for the sustainable forest management .



The Standard has been designed to support and strengthen the regulatory framework within which the forest managers operate.



• The Standard is structured around nine principles are as follows:



- Principle 1: Compliance with Laws
- Principle 2: Tenure and Use Rights and Responsibilities
- Principle 3: Indigenous Peoples' Rights
- Principle 4: Community Relations and Workers' Rights
- Principle 5: Benefits from the Forest
- Principle 6: Environmental Impact
- Principle 7: Management Plan
- Principle 8: Monitoring and Assessment
- Principle 9: Maintenance of High Conservation Value Areas

**Table 3:** Principles, Criteria, Indicators and Verifiers under the MC&I SFM standard

PRINCIPLES	CRITERIA	INDICATOR	
		Natural Forest	Forest Plantation
9	49	101	107



# SECTION 3

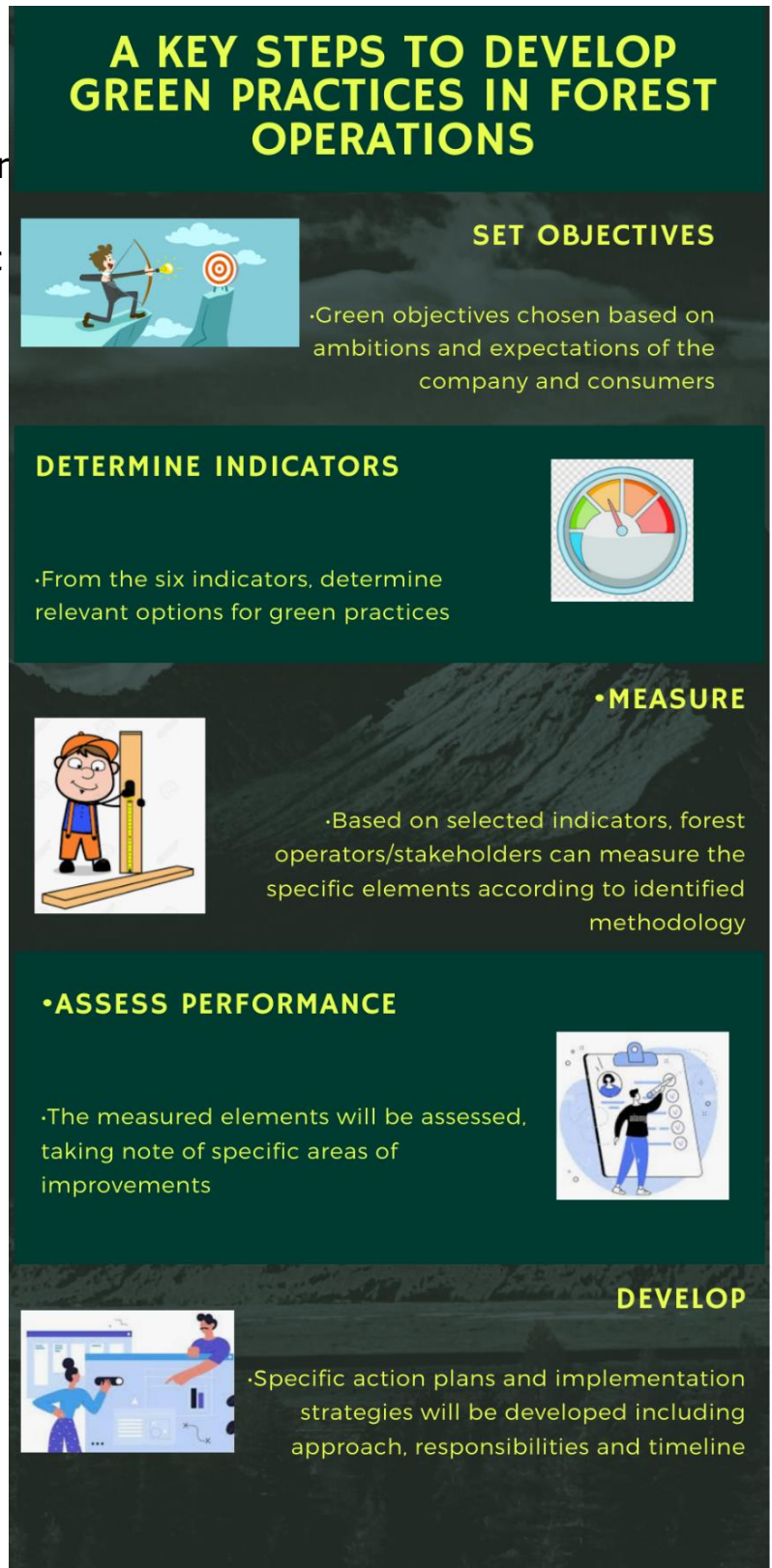


## Guideline of the Green Practices for Forest Operations



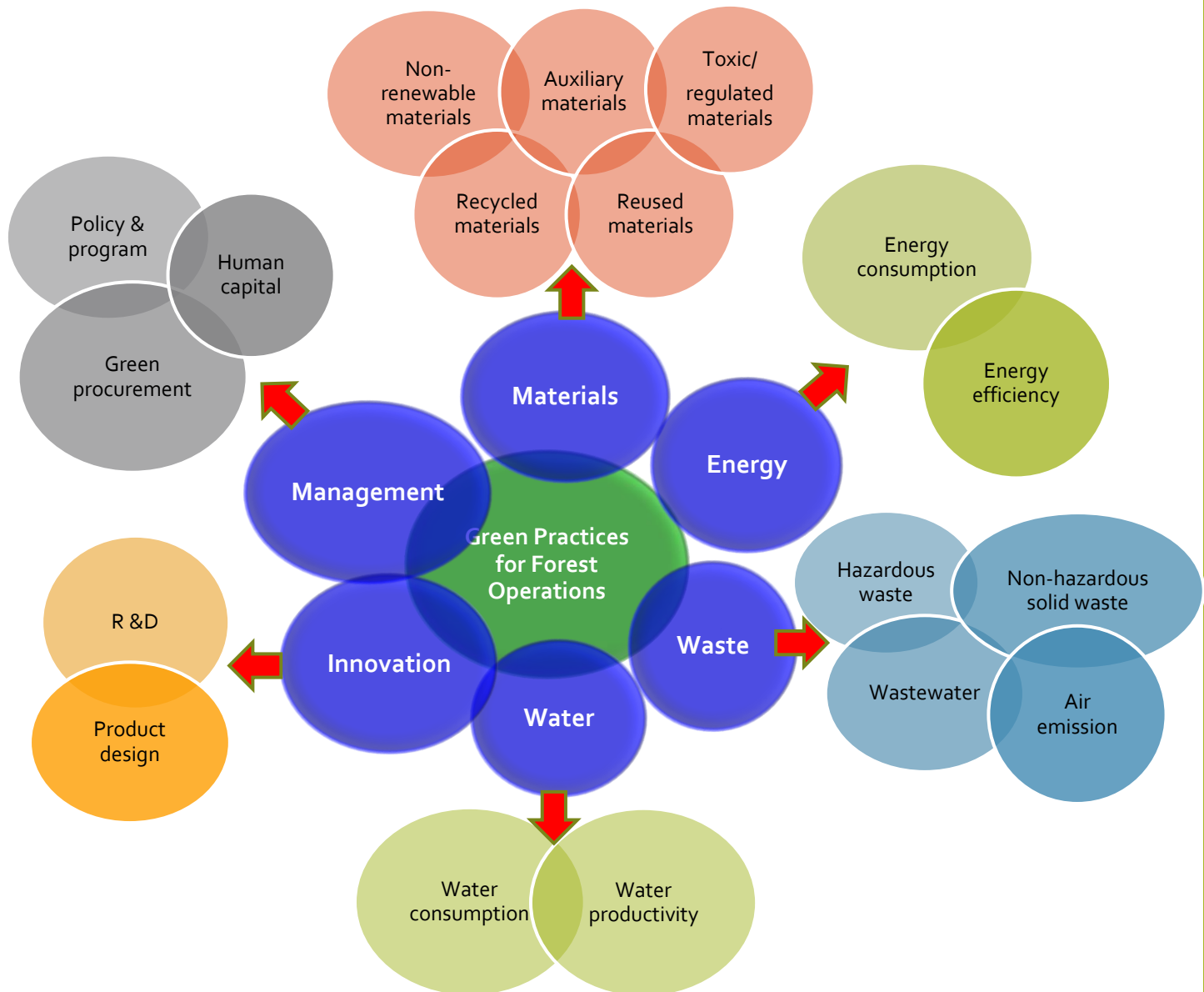
## 3.1 Introduction

- ✓ The challenges posed by climate change and resource depletion to the forestry sector requires a holistic and strategic approach to scientific knowledge with policy action.
- ✓ Malaysia has a strategic direction to use information and communication technologies in the National Forestry Policy 1978 (Amendment 1992).
- ✓ Later Malaysia Forestry Policy, where the policy outlines a clear direction, including pragmatic strategies and action plans in meeting the new challenges of the forestry sector at the domestic and international levels.
- ✓ It is an inclusive policy that considers the interests of Peninsular Malaysia, Sabah and Sarawak towards achieving sustainable development and responsible and sustainable forest management.
- ✓ The steps outlined can be applied to develop action and implementation plans for implementing green practices in existing operations, based on current capabilities and strategies.



**Figure 5:** Key step of the process for the development of the indicators

## 3.2 General Indicators



**Figure 6:** The general indicators that reflect the nature of the green practices.

Indicators are instrumental to guideline development to track progress against policy targets and assess the effectiveness of implementation programmes—the innovative and strategic thinking adopted in developing guidelines targeted towards green forest operation practices.

The improvement and increase in the use of green technology can encourage investments in green technology industries and the adoption of green technology by loggers.

Therefore, the operational measures identified in this guideline have been organized into six indicators that reflect the nature of the forest operations business. The indicators are materials, waste, water, energy, innovation and management.



## MATERIAL

A round log is a primary material. Maximization of the utilization of logs is encouraged for material efficiency. This is linked with the availability of natural resources and achieving high material efficiency is highly recommended.



## ENERGY

Energy production using non-renewable resources depletes other natural resources while generating large amounts of greenhouse gases (GHGs). Therefore, forest operators are recommended to use affordable and clean energy to reduce overall energy consumption in the forest operation process for facilities, operations, and management.



## WASTE

Waste is anything for which forest operation processes have no further use and is discarded or released to the environment. Waste comes in many forms and can present different environmental risks based on the material's chemical makeup and physical state such as hazardous waste, biomass waste, gas emission (GHG) and substances (machinery). In green practices, the strategies and approaches are different from end-of-pipe treatment as it focuses on preventing or reducing waste at the area or source.



## INNOVATION

Forest operators are driven to adapt their business processes and activities to develop marketable, viable, and sustainable eco-design products as global competition intensifies. The innovation indicators include research and development efforts into green technology and its implementation directly in the businesses.



## WATER

Although water covers over two-thirds of the earth's surface and is renewable, local pollution or quality problems occur frequently. As an invaluable resource, maintaining the quality and quantity of water in forest areas demand a commitment from forest operators to avoid any significant depletion of rivers and lakes.



## MANAGEMENT

The administration of a company or business is crucial in creating the right forward-thinking policies that support the development of a more sustainable form of management. All stakeholders, including employees and customers, benefit from taking measures to reduce the negative impacts of the business process on the environment. Being environmentally responsible entails more than just meeting legal requirements; it also means going beyond compliance and investing more in human capital and management practices contributing to the industry's green initiatives.



SDG 6: CLEAN WATER & SANITATION

SDG 7: AFFORDABLE & CLEAN ENERGY

SDG 8: DECENT WORK & ECONOMIC GROWTH

SDG 9: INNOVATION AND INFRASTRUCTURE

SDG 12: RESPONSIBLE CONSUMPTION & PRODUCTION

SDG 13: CLIMATE CHANGE

Inline with 6 of 17 Sustainable Development Goals (SDGs) global action plan 2015-2030.



## The target for indicators

### MATERIALS

- To ensure the utilized materials can generate less waste per forest operation and materials that obtain are efficiently used., the number of natural resources needed to produce logs products through more energy and material-efficient harvesting processes can be reduced by 50% by 2030.

### WASTE

- To ensure harvesting waste can be reduced and can also minimize the environmental impacts and decrease gas emissions from forest operation activities such as generation of gaseous emissions as hazardous waste, biomass waste, gas emission (GHG) and substances (machinery) or any other undesirable emissions. The target for waste reduction by 2030 is 60% from the harvest operation.

### WATER

- To ensure that the water quality and clarity from the forest operation can be improved, the rate or density and appropriate buffer zone and water/sediment filtering/trap can be established in the forest.
- The water quality and clarity target is around 60% of harvest operations, as stated by Green Technology Master Plan Malaysia 2017-2030.

### ENERGY

- To ensure the energy consumption intensity in the forest operations decreases sufficiently. As a result, even with increased production, the total energy consumption remains stable or decreases, eventually leading to sustained environmental protection and reducing energy costs through renewable energy such as solar energy and biogas.
- The target for the Renewable Energy by 2030 is 30% and 15% for Energy Efficiency usage as stated by Green Technology Master Plan Malaysia 2017-2030

### INNOVATION

- To ensure the support, recognition, and advocacy of green innovations and sustainable practices within conventional forest harvest operations. This includes efforts and financial commitments in research and development (R&D) and product eco-design that supports green practices and products by more than 50% by 2030.

### MANAGEMENT

- To ensure the adoption and improvement of good forest operations, sustainable and responsible resource utilization, strengthening the economy, and promoting research and development in forest operation management. For example, embedding green policies, practices, and systems that stimulate the creation and availability of green jobs within the organization to be achieved by more than 50% by 2030.

## Examples of green practices in forest operations

### MATERIAL

A round log is a primary material. Maximization of the utilization of logs is encouraged for material efficiency.

*Eg. Use of the efficient types of chainsaws for maximization of log materials. (MS-Stihl 070/MS-Stihl 381)*



### WASTE

Waste is anything for which forest operation processes have no further use and is discarded or released to the environment. Waste from logging is coarse woody debris from fallen tree and cut branches that left during tree harvesting

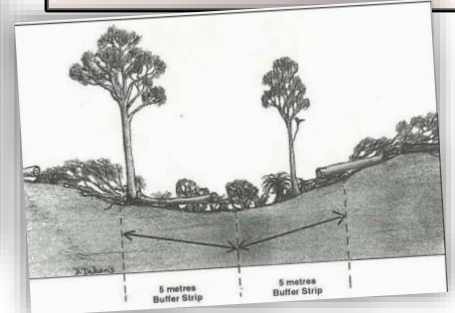
*Eg. Reuse the wood waste for a secondary product or chip woods. Processes using industrial Chipper machine.*



### WATER

As an invaluable resource, maintaining the quality and quantity of water in forest areas demand a commitment from forest operators. Too much turbid runoff can lead to silting up of rivers and drainages. This reduces water quality for agriculture and domestic use and can harm aquatic life.

*e.g. Forest operators are recommended to apply an appropriate river buffer strip/zone.*



### ENERGY

Forest operators are recommended to use affordable and clean energy to reduce overall energy consumption in the forest operation process for facilities, operations, and management.

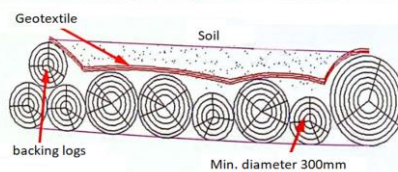
*e.g. Installing solar energy panels for forest camps could help reduce the usage of generator/fuel energy.*



### INNOVATION

The innovation indicators include research and development efforts into green technology and its implementation directly in the operations.

*e.g. Innovation in using geotextiles in the construction of log bridges in forests helps prevent sediments from entering directly into rivers.*



### MANAGEMENT

All stakeholders, including employees and customers, benefit from taking measures to reduce the negative impacts of the business process on the environment.

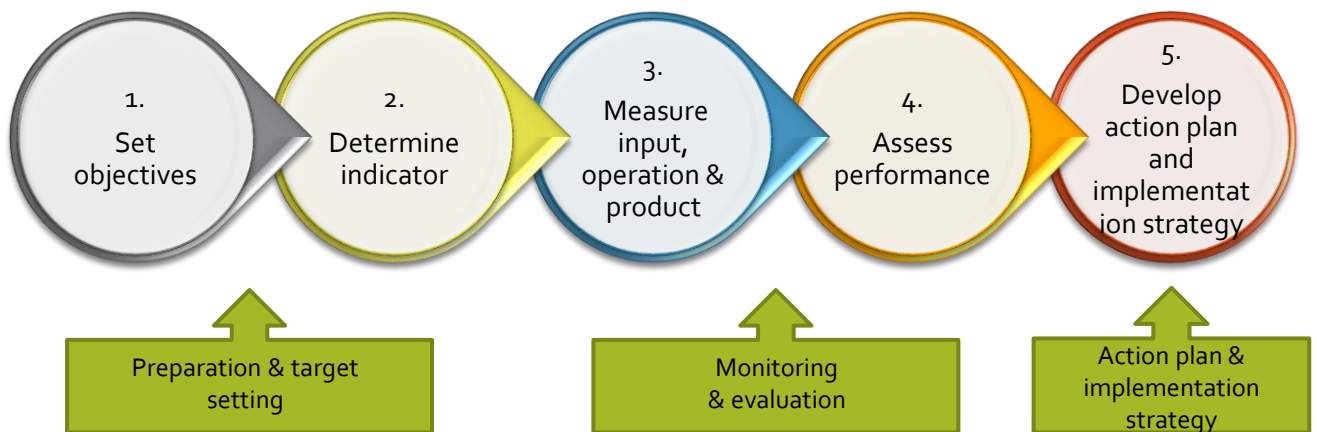
*e.g. Going beyond compliance and investing more in human capital and management practices contributing to the green initiatives is recommended.*



Source: JPSM, 2013

### 3.3 Guideline Implementation

There are five steps outlined in these guidelines for manufacturers. These five steps can be divided further into three main stages, namely 'Preparation and Target Setting', 'Monitoring and Evaluation' and 'Action Plan and Implementation Strategy'

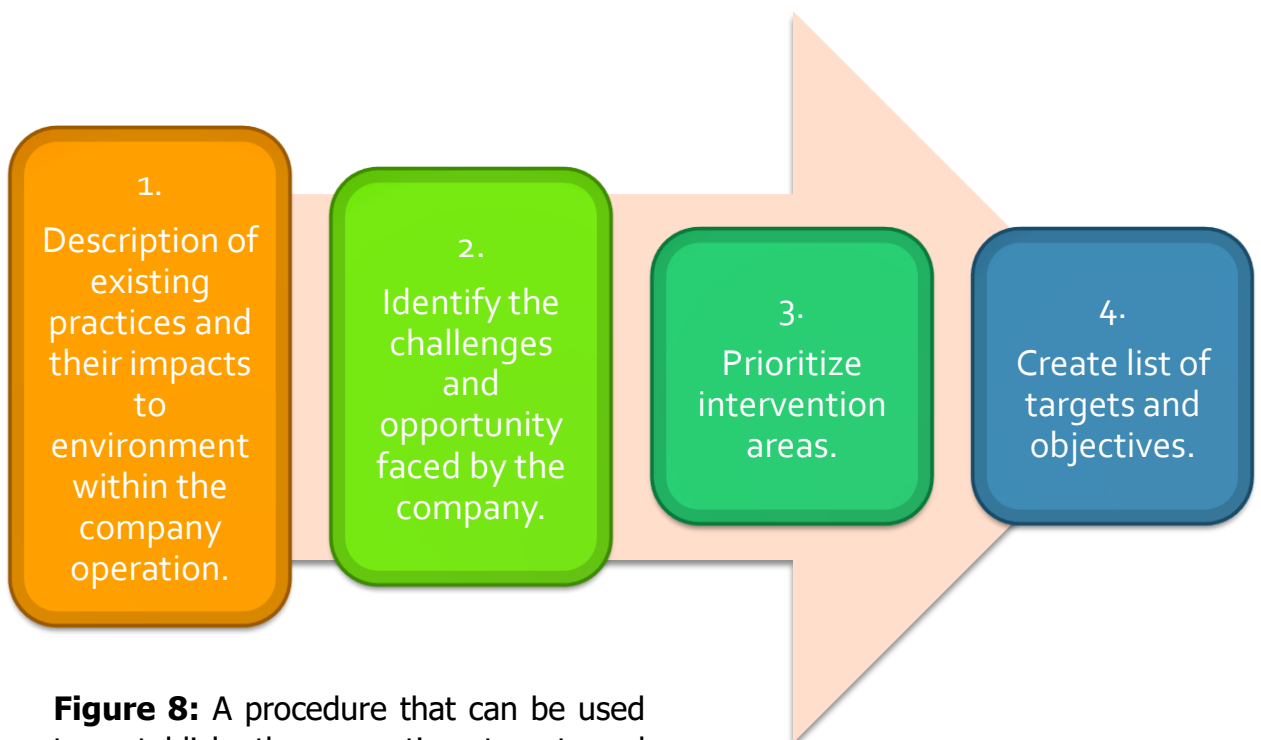


**Figure 7:** Stages for implementing the Green Practices Guideline



### 3.3.1 Setting the Target

Setting the target should be determined before an operation is commenced. Setting the target is a crucial process that will impact the indicators involved, such as resources and management.



**Figure 8:** A procedure that can be used to establish the operation target and objectives.

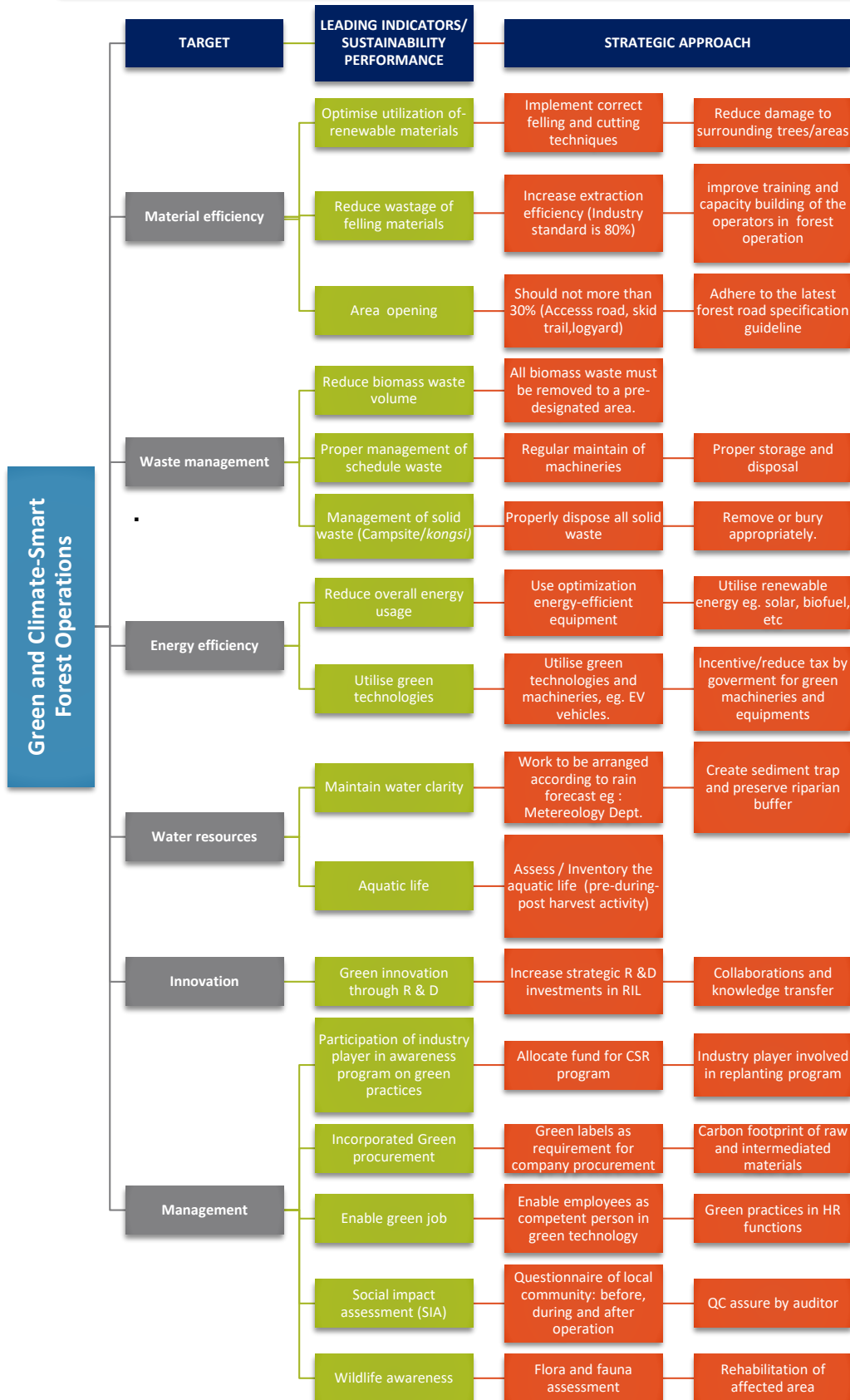
#### Set targets & objectives

Based on the specific needs of the organization or businesses, determining the objectives provides the specific direction in which the audit process may help.

Eg. To identify and list specific materials issues faced by the forest operator.

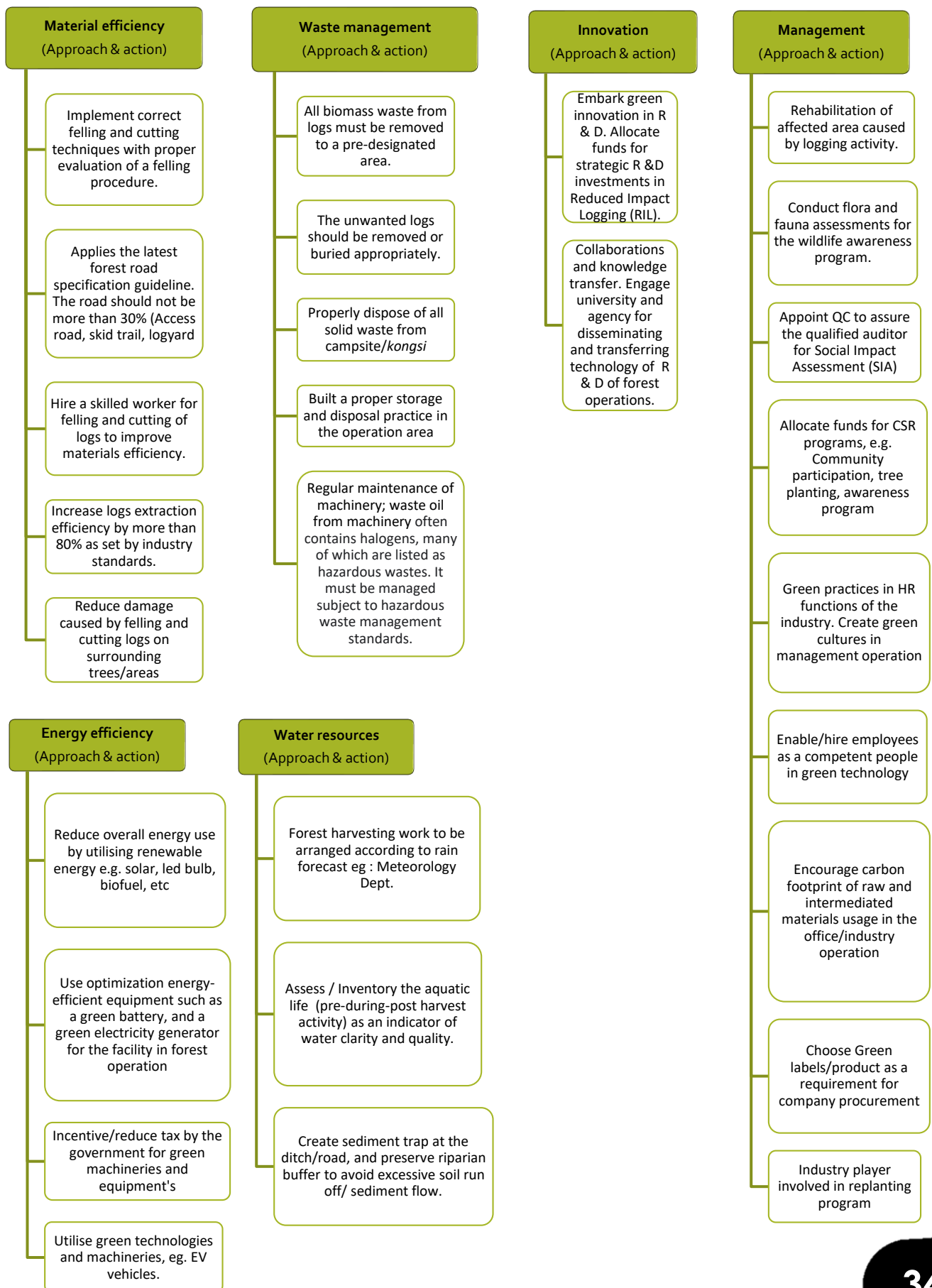
### 3.3.2 Framework of Strategic Approach & Actions

- After selecting an operation target, the indicator involved will be identified along with the appropriate action plan or strategic approach ( Figure 9)



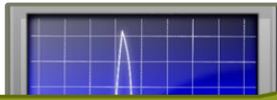
**Figure 9:** Setting targets and developing leading indicators and a strategic approach.

• An example of **framework of strategic approach & actions** based on the relevant indicators for forest operations.





### 3.3.3 Monitoring and Evaluation



Monitoring and evaluation are deemed important to ensure the success of green practices in forest operations. Forest operators/stakeholders must adhere to the standard operating procedure and self-regulation to comply with the guideline. The forest operators shall record a periodic monitoring and evaluation implementation performance report—example as in Table 4.

**Table 4:** An Example of indicators, sub-indicators, monitoring and evaluating aspects, and responsibility

Indicator	Sub-indicators	Monitoring & Evaluation	Responsibility
Material efficiency	<ul style="list-style-type: none"> <li>Optimization material</li> <li>Reduce material waste</li> </ul>	Perform and coordinate the correct directional felling and cutting of trees. Assess damage of surrounding trees/areas	Site supervisor
Waste management	<ul style="list-style-type: none"> <li>Reduce biomass waste</li> <li>Hazardous waste management</li> <li>Non-hazardous solid waste management</li> </ul>	Record schedule waste category generated, destroyed, treated, and handled in the harvesting areas. Properly dispose of all the solid waste	Site supervisor
Energy efficiency	<ul style="list-style-type: none"> <li>Reduce energy consumption</li> <li>Optimize energy efficiency</li> </ul>	Record the initiative taken for reducing overall energy used and utilising green technology (e.g solar panels or other green energy)	Site supervisor
Water resources	<ul style="list-style-type: none"> <li>Reduce Water consumption</li> <li>Water quality/clarity</li> </ul>	Assess for maintaining water quality/clarity and aquatic life before and after logging. Record any sediment trap and riparian buffer established.	Project manager /site supervisor
Innovation	<ul style="list-style-type: none"> <li>Conduct research and innovation or new technology in forest operations</li> <li>Innovate new product design</li> </ul>	Checklist the equipment's/machines and materials used in the forest operation in all aspects of the production processes.	Site supervisor
Management	<ul style="list-style-type: none"> <li>Human capital</li> <li>Policy and Program</li> <li>Green procurement</li> </ul>	Perform a monitoring record of practices that follow the harvesting guidelines and MC&I. Employ competent employees in green technology. List any green machine/office material for the company.	Project manager/ Forest Officer

### 3.4 Indicators Alignment with the Existing Policies, Benefits and Recognition

A framework is introduced to support industries in recognizing Malaysia's various certificates, recognitions, and benefits (Table 5), that have been aligned between indicator initiatives for forest operators/stakeholders.

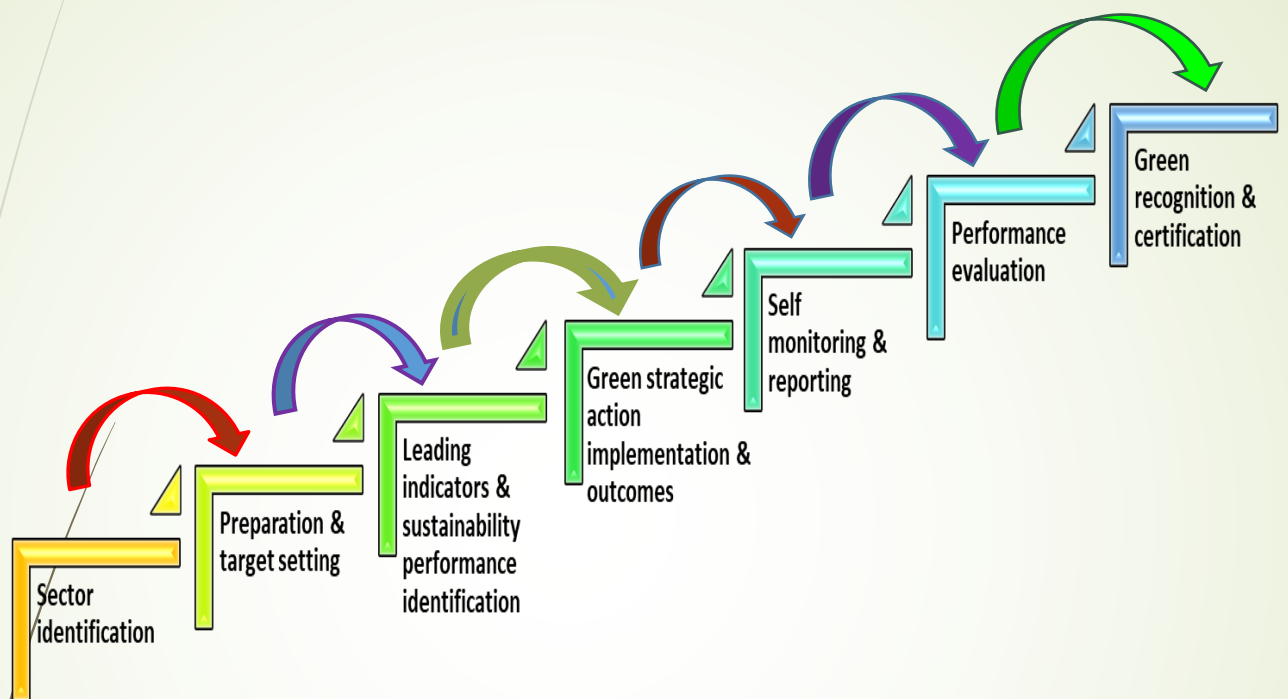
**Table 5:** A framework for green practices to refer from various Malaysia's certificates, recognitions and benefits

Existing Initiatives	Agency/ Institution	Description	Criteria of Assessment	Green Practices Indicator	Benefits	Reference
Forest Management Certification	Malaysian Timber Certification Council (MTCC)	Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I SFM)  Comprehensive environmental protection requirements, ecological, social and biological diversity for forest management.	Principle 1: Compliance with Laws  Principle 2: Tenure and Use Rights and Responsibilities  Principle 3: Indigenous Peoples' Rights  Principle 4: Community Relations and Workers' Rights  Principle 5: Benefits from the Forest  Principle 6: Environmental Impact  Principle 7: Management Plan  Principle 8: Monitoring and Assessment  Principle 9: Maintenance of High Conservation Value Areas	✓ MANAGEMENT ✓ WATER	Eligible for tax deduction.  Ensure international market access for a product is managed from forests which are managed in sustainable ways.	<a href="http://mtcc.com.my/wp-content/uploads/2020/04/MCI-Sustainable-Forest-Management-1-Apr-2020.pdf">http://mtcc.com.my/wp-content/uploads/2020/04/MCI-Sustainable-Forest-Management-1-Apr-2020.pdf</a>

Existing Initiatives	Agency/ Institution	Description	Criteria of Assessment	Green Practices Indicator	Benefits	Reference
Chain of Custody Certification	Malaysian Timber Certification Council (MTCC)	A process of third-party audit of timber product manufacturers or exporters to ascertain that the timber products manufactured or exported are sourced from forests which have been awarded the Certificate for Forest Management/ Certificate for Forest Plantation Management	<p>Certify the supply chain of the product by;</p> <ul style="list-style-type: none"> <li>•Product identification</li> <li>•Product segregation</li> <li>•Record keeping</li> </ul>	<ul style="list-style-type: none"> <li>✓ MATERIAL</li> <li>✓ MANAGEMENT</li> </ul>	<p>Eligible for tax deduction.</p> <p>Credible assurance that products which are sold originate from well-managed forests, controlled sources, or reclaimed materials.</p>	<a href="https://mtcc.com.my/chain-of-custody/">https://mtcc.com.my/chain-of-custody/</a>
Eco-Labeling Scheme	SIRIM	This labelling gives eco-friendly products a competitive advantage over similar products.	Compliance with product standards or specifications and the relevant eco-labelling criteria, as well as relevant provisions in the Environmental Quality Act	<ul style="list-style-type: none"> <li>✓ MATERIAL</li> <li>✓ WASTE</li> <li>✓ ENERGY</li> </ul>	Boost acceptance of products in international "green markets" that favour green products with a price premium	<a href="https://www.sirim-qas.com.my/our-services/product-certification/eco-labelling-scheme/">https://www.sirim-qas.com.my/our-services/product-certification/eco-labelling-scheme/</a>
MyHIJAU Mark	Malaysian Green Technology and Climate Change Corporation (MGTC)	A government initiative to promote the sourcing and purchasing of green products and services in Malaysia.	<ul style="list-style-type: none"> <li>• Existing Green Label Certification, or</li> <li>• Performance Standard Compliance report from an independent certification body that meets the minimum standards recognize/</li> </ul>	<ul style="list-style-type: none"> <li>✓ MATERIAL</li> <li>✓ WASTE</li> <li>✓ ENERGY</li> </ul>	Eligibility for Government Green Procurement (GGP), Green Private Purchasing (GPP)	<a href="https://www.myhijau.my/">https://www.myhijau.my/</a>



## 3.5 Roadmap of Green Practices



**Figure 10:** A road map for achieving green recognition and certification for forest operation.

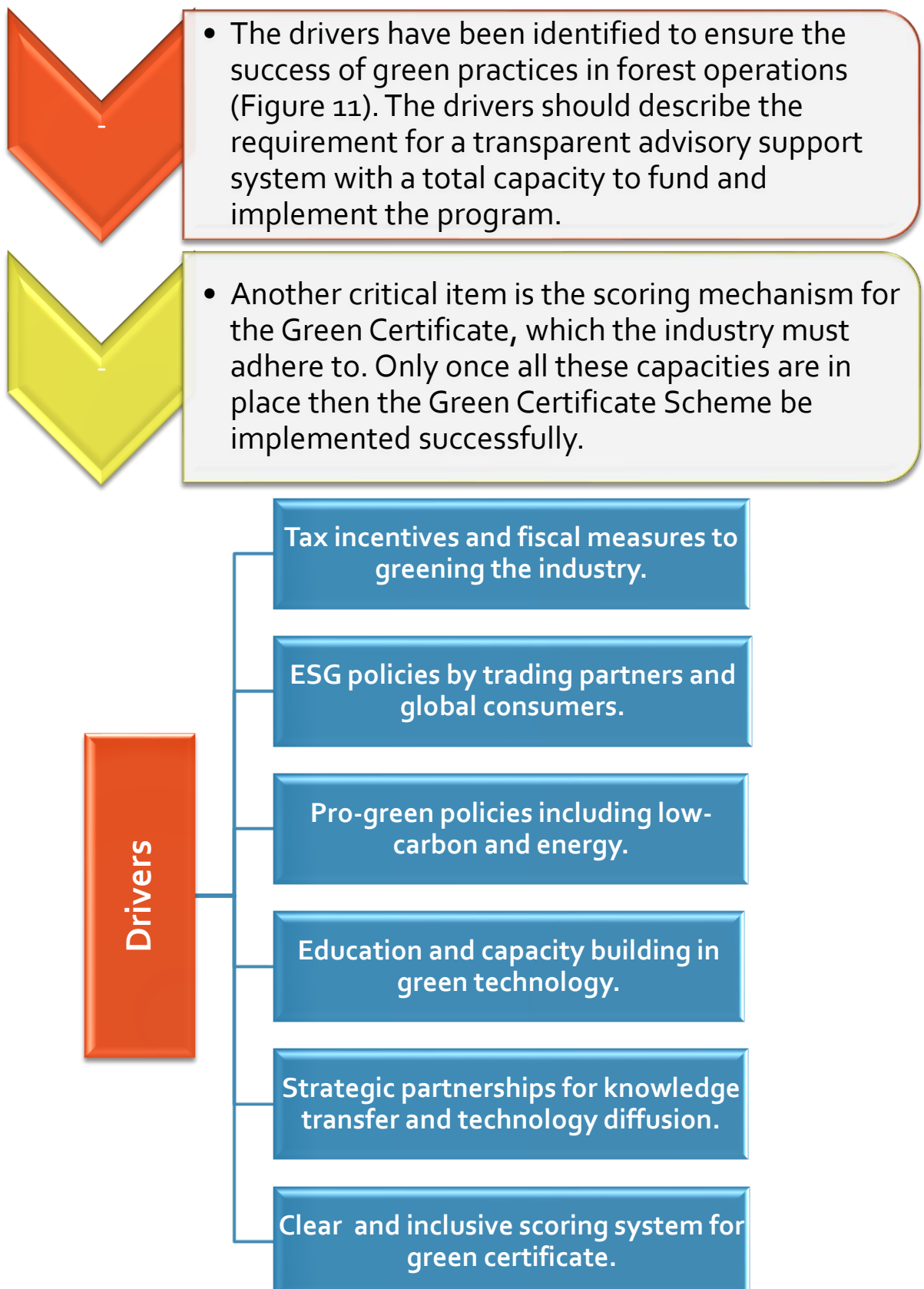




# SECTION 4

## Drivers & Challenges of the Green Practices

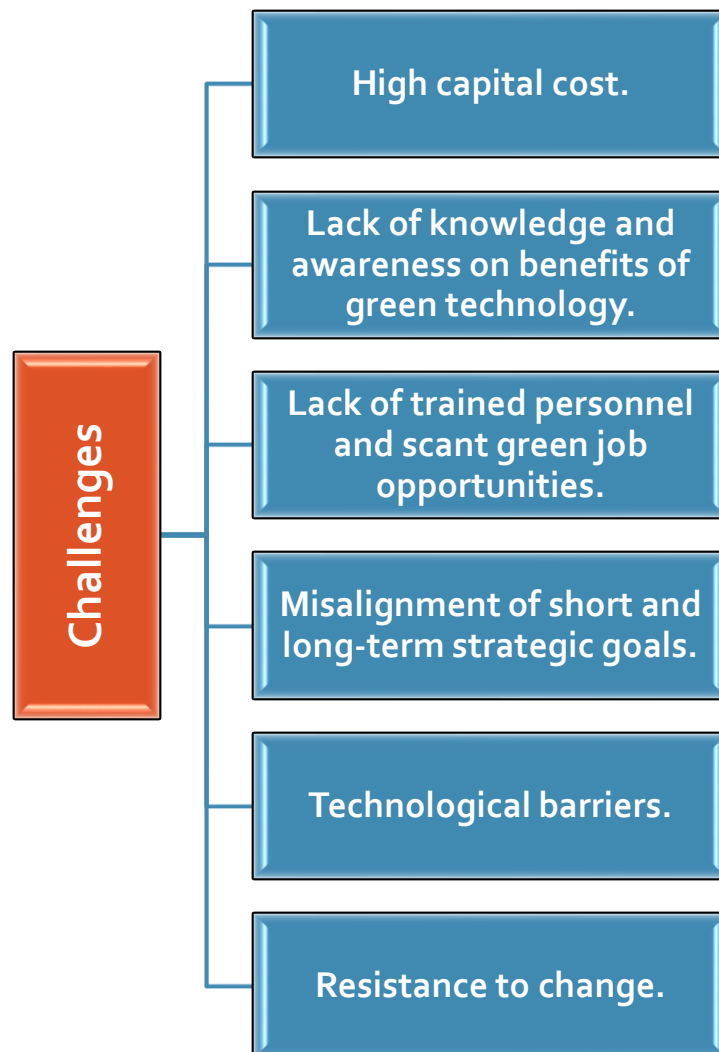
## 4.1 Drivers and Challenges



**Figure 11:** The drivers of the green practices in the forest operations



*The United Nations Environment Programme (UNEP) developed the green economy concept in 2010. It defines a green economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2010).*



**Figure 12:** The challenges of the green practices in the forest operations

## 4.2 Challenges and Strategies

“It is not surprising that tougher environmental standards impose costs on companies. The aim of such standards, after all, is to force polluters to internalize costs previously inflicted on society.”  
—Frances Cairncross (Environment Editor, *The Economist*, London, England)



### CHALLENGES AND STRATEGIES

01

- Communicate better with the stakeholders because of a lacking of role and awareness about the potential of forests for mitigating climate change.

02

- Promote the rational use of timber, with highest values first, cascading downwards, and eventually wholly using timber residues.

03

- Find the right balance between what markets should deal with and what requires Governments' involvement. This raises the issue of the extent to which the private sector needs public incentives to foster some green activities.

04

- Design the best possible mix and balance of different policy measures and instruments, including regulations, subsidies and taxes, public procurement, trade measures.

05

- Ensure best possible use of forest and forest products certification to promote the sector's contribution to greening the economy.

06

- What are the team's next steps based on the goals agreed in the meeting?

07

- Economic stimulus efforts can only provide short-term benefits to the forest sector. Governments' long-term visions are needed to enable a fundamental shift towards a green practice and economy. In addition, energy and climate change policies will likely have longer-term effects on the forest sector.

08

- Adapt to climate change: ensure the adaptation of forests and forest management to climate change, the effects of which are already noticeable. This is a prerequisite for a long-term contribution of the forest sector to climate change mitigation. There are also opportunities for the forest sector to contribute to the adaptation of societies to climate change.

## 4.3 A proposed action of the green practices toward sustainable forest management

Use existing and advanced knowledge to practice integrated forest ecosystem management and establish a national and international network of green practices of the demonstration areas.

Reinforce research to predict the response of forest ecosystems to disturbances associated with green practices in forest harvest operation develop the capability to recognize early warning signals and Indicators of environmental stress and degradation in forest ecosystems.

Accelerate the development of national and international monitoring systems to provide timely and reliable information on the state of national and global forests.

Promote the establishment of, or further develop, national ecological reserves of representative and unique forest types to protect biodiversity and ecological diversity and provide baselines against which the environmental consequences of human activities can be determined.

Increase forest land productivity in selected areas through improved management of forests and forest plantations so that more forest land is available for other uses without reducing the overall timber flow.

Reduce waste in forest harvesting operations and product manufacturing; improve wood utilisation for various end-products; encourage recycling where appropriate to reduce demand for raw materials and "do more with less".

Publicize more widely the commitment, policies, and programmes about the green practices in forest operations undertaken by various stakeholders to achieve sustainable development objectives.

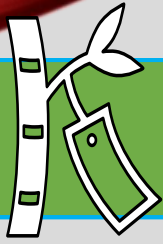




# SECTION 5



## Conclusion



## 5.1 CONCLUSION

- ❑ Forests also provide non-carbon services that are essential for human societies to succeed: from their role in sustaining livelihoods to providing water and food security and regulating global rainfall patterns.
- ❑ Green practices in forest operations can make your company more marketable. Consumers are more conscious of the environment, and making improvements will strengthen your reputation. As a result, it helps companies seeking government contracts where green practices standards are often a factor in the near future.
- ❑ Sustainability improvements are a collaborative effort. When employees work together to identify and implement green initiatives, it promotes a culture of teamwork and continuous improvement. Employees work harder when they are engaged and have a sense of pride in their company.
- ❑ Green practices can also ignite innovation. For example, if you challenge your engineers and machinists to reduce material scraps or recycle more waste during the operation process, it often leads to additional ideas for operational improvements.
- ❑ In addition to helping a company's profitability, the actions can make a real difference. By implementing changes, you will have a smaller carbon footprint and reduce the number of toxins released into the environment and atmosphere. Also, there are a variety of tax credits and rebates on both the federal and state level for companies who proactively implement green practices toward sustainable improvements.



## REFERENCES

- FAO. 2005. Sustainable forestry management toolbox.  
<https://www.fao.org/sustainable-forest-management/toolbox/modules/forest-governance/basic-knowledge/en/>
- ITTO. 1992. Criteria for Measurement of Sustainable Management of Natural Tropical Forests. ITTO Policy Development Series 3. Yokohama. 32 pp.
- Jabatan Perhutananan Semenanjung Malaysia. 2014. Garis Panduan Jalan Hutan 2010 (Pindaan 2013).
- Jordan, C.F. 1989. An Amazonian Forest: The Structure And Function Of Nutrient Stressed Systems And The Impact Of Slash-and Burn Agriculture. In Man and the Biosphere Series, vol. 2. Cornforth, UK, The Parthenon Publishing Group.
- Kuusela, K. 1990. The Dynamics Of Boreal Coniferous Forests. Helsinki, Finnish National Fund for Research and Development.
- Lamb, D. 1990. Exploiting The Tropical Rain Forest. Man and the Biosphere Series, vol. 3. Cornforth, UK, The Parthenon Publishing Group.
- Maini, J.S. 1991. Guiding principles: Towards A Global Concern For The Conservation And Sustainable Development of All Types of Forests Worldwide: Ottawa, Forestry Canada.
- MTCC., 2020. Malaysian Criteria and Indicators for Sustainable Forest Management. 50p
- Poore, D. & Sayer, J. 1991. The Management Of Tropical Moist Forest Lands Ecological Guidelines. 2<sup>nd</sup> ed. Gland, Switzerland, IUCN.
- UNEP, 2010: Green Economy: Developing Countries Success Stories. Available at: [http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/GE\\_developing\\_countries\\_success\\_stories\\_UNEP.pdf](http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/GE_developing_countries_success_stories_UNEP.pdf) (accessed on 01.10.2021)
- Yakovleva, E.A. and Subhonberdiev, A. Sh. 2019. Implementation of "Green" Economy Principles in The Forest Sector. IOP Conf. Ser.: Earth Environ. Sci. 392 012016.