BEST MANAGEMENT PRACTICES

Manual for Growers on Forest Conservation and Community Collaboration

wilmar

proforest

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Executive Summary

In December 2013, Wilmar International Limited was one of the first companies to launch an integrated No Deforestation, No Peat, No Exploitation (NDPE) policy. Since the policy's launch, Wilmar has strived to be a leader in many aspects of policy implementation.

Building on the HCV-HCS assessor training from 2019, Wilmar is well placed to further strengthen the capacity of its conservation team. Given that most of Wilmar's oil palm estates have limited scope for new planting, the greatest opportunities for conservation is through strengthening management and monitoring of existing conservation areas and improving supplier performance.

This best management practice manual by Wilmar is on managing conservation areas and community engagement with a focus on Indonesia and Malaysia. The manual draws upon Wilmar's practical experience in their own estates and is integrated together with Proforest's recommendation in solving real challenges as well as from existing best practice guidance on various topics. The intention is for the manual to be practical, rather than high-level or generic guidance, so that they will be of maximum use to Wilmar's operations teams, suppliers and other growers.

The manual covers the following broad topics with division into sub-topics where appropriate:

- Biodiversity protection and forest monitoring
- Balancing community needs and forest protection
- Management and restoration of riparian areas
- Fire and peat management

This manual is intended as a general guidance especially for plantation managers and is complementary to the series of operational manuals that are also produced by Wilmar and intended for plantation staff and workers.

List of Abbreviations

AMDAL	*Analisis Managemen Dampak Lingkungan* (Environmental Impact Assessment)
BKSDA	*Balai Konservasi dan Sumber Daya Alam* (Nature Conservation Agency)
BMP	Best Management Practice
DID	Department of Irrigation and Drainage (Peninsular Malaysia)
DWNP	Department of Wildlife and National Parks (Peninsular Malaysia). Also known as PERHILITAN.
EIA	Environmental Impact Assessment
FFB	Fresh Fruit Bunches
FIA	Forest Integrity Assessment (Tool)
FPIC	Free, Prior and Informed Consent
GIS	Geographical Information System
GPS	Global Positioning System
HBV	High Biodiversity Value (MSPO)
HCS	High Carbon Stock
HCV	High Conservation Value
HCVA	High Conservation Value Area
HCVMA	High Conservation Value Management Area
ISPO	Indonesian Sustainable Palm Oil
JPSM	*Jabatan Perhutanan Semenanjung Malaysia* (Peninsular Malaysia Forestry Department)
KPI	Key Performance Indicator
LIPI	*Lembaga Ilmu Pengetahuan Indonesia* (Indonesian Institute of Science)
MoU	Memorandum of Understanding
MSPO	Malaysian Sustainable Palm Oil
MYNI	Malaysian National Interpretation of the HCV Network Common Guidance
NDPE	No Deforestation, No Peat, No Exploitation Policy
NGO	Non-Governmental Organisation
NTFP	Non-Timber Forest Product
RBA	Rapid Biodiversity Assessment
RSPO	Roundtable on Sustainable Palm Oil
SOP	Standard Operation Procedure
ToR	Terms of Reference
UNIMAS	Universiti Malaysia Sarawak
WCS	Wildlife Conservation Society
WRI	World Resources Institute
WWF	Worldwide Fund for Nature
ZSL	Zoological Society of London

Glossary of Terms

Drainability Assessment	RSPO describes a Drainability Assessment as a means of assessing future subsidence and flood risks of peatlands so that growers could adjust their management processes to reduce subsidence rates and prolong the workable lifetime of their plantations.[1]
Core / Strict Conservation Area	Conservation areas strictly for protection only, for example, where other activities such as community use or plantation activities are not permitted. If communities are using forest areas, community access is normally needed, and then core/strict conservation areas should be only used as exceptions if there are highly rare values present (e.g., a nest of an endangered species) and with community FPIC.
Environmental Impact Assessment (EIA)	Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.
Epiphytes	Plant growing on another plant without causing it any direct harm.
Free, Prior and Informed Consent (FPIC)	FPIC is a collective human right of Indigenous Peoples and Local Communities to give or withhold their consent prior to the commencement of any activity that may affect their rights, land, resources, territories, livelihoods, and food security (Accountability Framework, 2019).
Hardening	Process of allowing a plant to transition from a protected nursery environment to the harsh outdoor conditions of high temperatures, wind, and full sun exposure.
High Carbon Stock (HCS) Forest	High Carbon Stock forests are forests identified through an approach called HCSA, allowing to classify vegetation cover from scrub to high density forest, and map the forested areas to be conserved and protected[2].
High Conservation Value (HCV)	High Conservation Values are a range of six important social and environmental values, such as rare species, habitats, ecosystems or basic needs or cultural values of communities. The specific values are defined in guidance of the HCV Network including (global) common guidance and the Malaysian and Indonesia National Interpretations[3].
HCV Area (HCVA)	Areas known to support HCVs (e.g., habitat for rare species or areas used by communities to meet basic needs)
HCV – HCS Assessment	Assessment conducted to identify High Carbon Stock (HCS) forests alongside High Conservation Values (HCVs).
Honorary Wildlife Ranger	Any person appointed by the Minister under section 8 of the Sarawak Wild Life Protection Ordinance 1998 who may be conferred powers, functions and duties as may be prescribed by rules made under this Ordinance.

[1] https://rspo.org/news-and-events/announcements/rspo-drainability-assessment-procedure

[2] http://highcarbonstock.org/

[3] https://hcvnetwork.org/

Honorary Wildlife Warden	Any person appointed by the Director under section 7 of the Sabah Wildlife Conservation Enactment 1997 to assist in the carrying into effect of the provisions of the Enactment as a mark of recognition of valuable services rendered to wildlife and wildlife habitat conservation in the State.
Human – Wildlife Conflict	When animals pose a direct and recurring threat to the livelihood or safety of people, leading to the persecution of that species (IUCN).
Indicator Species	A species sensitive to environmental changes (e.g., deforestation pollution etc.), which can therefore provide a measure of health for the ecosystem in general (adapted from IUCN).
In-Fill	Additional planting of crop on previously unplanted land within the plantation boundary.
Masting	The simultaneous fruiting or seeding of many trees over a wide area every two or more years.
Peat Rehabilitation or Restoration	Peatland Restoration is a term used to describe management measures that aim to restore the original form and function of peatland habitats to favourable conservation status (International Peatland Society).
Precautionary Practices	These are generic management practices that can be adopted as standard especially in low-risk situations to minimise potential threats to forest, people or wildlife, without the need for more detailed baseline assessments. For example: 1. Maintain vegetation cover close to rivers, ponds and lakes at all times (no bare soil) in buffer zones as legally required 2. No hunting of HCV species.
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (Society for Ecological Restoration).
Riparian Area	Area adjacent land to streams, lakes and wetlands which normally encompasses natural or non-harvested vegetation and which is important to protect due to its function in protecting waterbodies from pollution or acting as a floodplain.
Riparian Reserve	A riparian or river reserve is the land adjacent to a river that has been formally declared as a reserve in national or regional laws.
Social Mapping	Social mapping is a process of gathering and profiling data and information, including community potential, needs, and issues (social, economy, technical, and institutional) (Chamber, 1992).
Standard Operation Procedure (SOP)	A written company manual or document explaining step-by-step the instructions for staff to conduct a specific task.
Waterbodies or Waterways	Any stream, river, lake, pond or canal that is connected to the naturally occurring rivers or hydrology in the area. This usually would exclude man-made isolated waterbodies, unless they are connecting to other waterbodies.

NOTE:

Several other terms are used interchangeable throughout this document:

- Management Unit, Plantation Estate or Concession
- Organisation, Plantation Company, Company or Grower

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Introduction

Palm oil is one of the most widely used commodities in the world given the efficiency of its production and high versatility. However, oil palm plantation development has drawn considerable attention to the environmental and social impact linked to agricultural production (e.g., deforestation, biodiversity loss, forced labour, etc.).

Wilmar International Limited (Wilmar) is the world's largest oil palm trader and also a large oil palm grower with a total land area of about 311,000 ha[4] . To address environmental and social impacts of unsustainable palm oil production, in December 2013, Wilmar was one of the first companies to launch an integrated No Deforestation, No Peat, No Exploitation (NDPE) policy[5] for its whole supply base. Since the policy's launch, Wilmar has been rolling out implementation of its "no deforestation" component of the policy using the High Conservation Value (HCV) and High Carbon Stock (HCS) approaches.

Wilmar has implemented the HCV and HCS approaches in all of its own operations, building internal technical capacity and experience of managing and monitoring conservation area which includes HCV areas, HCS forest, riparian zones and others. As of December 2020, a total of 31,640 hectares in oil palm plantations, which is almost 10% of the total landbank, are conservation areas. As an example of Wilmar's conservation areas, in Malaysia, Wilmar has 8,399 ha of identified HCV areas within their plantations in Sabah (6,674 ha) and Sarawak (1,725 ha). While in Indonesia, Wilmar has 15,087 ha of HCV areas in Central Kalimantan, 1,921 ha in West Kalimantan and 3,009 ha in Sumatra.

Now, as Wilmar supports suppliers to implement their NDPE policy, Wilmar is looking to document and share this technical capacity on conservation area management and monitoring with its own staff and with suppliers to support them on the journey towards implementing NDPE.

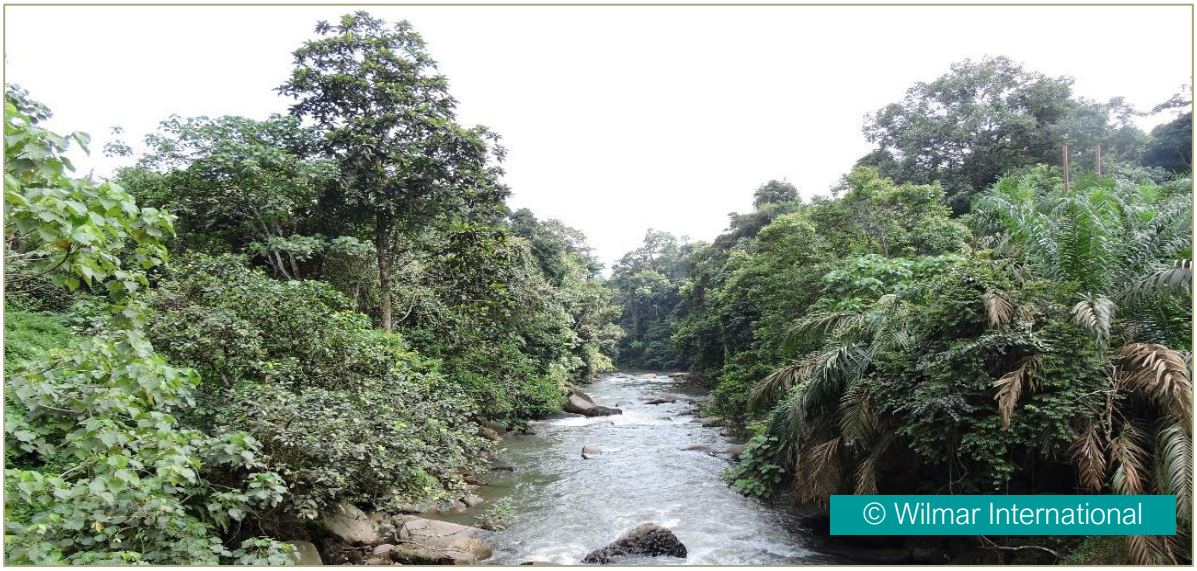


Image: A Wilmar HCV area in PT KSI in West Sumatra, Indonesia

[4] Source: RSPO ACOP Progress Report 2020

[5] https://www.wilmar-international.com/docs/default-source/default-document-library/sustainability/policies/wilmar-ndpe-policy---2019.pdf?sfvrsn=7870af13_2

Therefore, Wilmar with support from Proforest has developed this best management practice manual for growers on managing conservation areas and community engagement, with a focus on Indonesia and Malaysia. The manual draws upon Wilmar's practical experiences in their own estates in solving real challenges as well as from existing best practice guidance on various topics.

Image: Tree planting to support rehabilitation of riparian zone and degraded area along Segama River

The aim is for the manual to act as a practical operational companion for existing industry guidance such as:

1. Common Guidance for HCV Management and Monitoring
2. HCSA Toolkit
3. Malaysian HCV National Interpretation
4. Indonesian HCV Toolkit

This manual is mainly aimed at growers with established plantations, and is less relevant to those developing new landbanks (see "Getting started" for more information). This manual is intended as a guidance especially for plantation managers and is complementary to the series of operational manuals also produced by Wilmar and intended for plantation staff and workers.

Why is forest and wildlife protection important?

- Prevent local natural disasters, such as floods, landslides or water shortages
- Forests contribute to clean air and water and cooler temperatures locally,
- Reduce the risk of wildlife-human conflicts
- Support local communities depending on resources such as fresh water medicinal plants, or other natural resources for their livelihood
- Avoid contributions to climate change from deforestation
- Meet palm industry commitments on No Deforestation, Peat & Exploitation (NDPE) policy and ensure sustainability especially for No Deforestation and No Peat.

Why involve communities in forest and wildlife conservation?

- Almost every concession or estate has local communities or indigenous peoples living nearby or even overlapping areas
- Most local communities or indigenous peoples use forest or land overlapping estates for their livelihoods, which may have been their practice for many years even before the plantation was established
- Some communities or community members may consider forest and wildlife as their own resources and want to protect them, OR some community activities may pose a threat to forest or wildlife (for example, farming, hunting or logging)
- This means forest and wildlife can only be protected if communities are involved. Being open and collaborative with local communities is important to understand how they use forest and wildlife and reach agreement on any forest and wildlife conservation activities.

Image: Wilmar engaging local communities for conservation efforts in the Sekar Imej Conservation Area

This manual is aimed mainly at estates and larger growers (not independent smallholders), and particularly those that have existing plantations. However, we provide some brief guidance for new plantings or in-fill on the next page.

This section explains to companies which topics in the manual are most relevant and how to start planning for conservation activities.

For companies that are new to the topics of conservation, forest and wildlife protection, these may seem daunting and complex. However, not all topics or modules in this guide will be relevant to all companies, so to start the company should evaluate by considering the following flow chart:

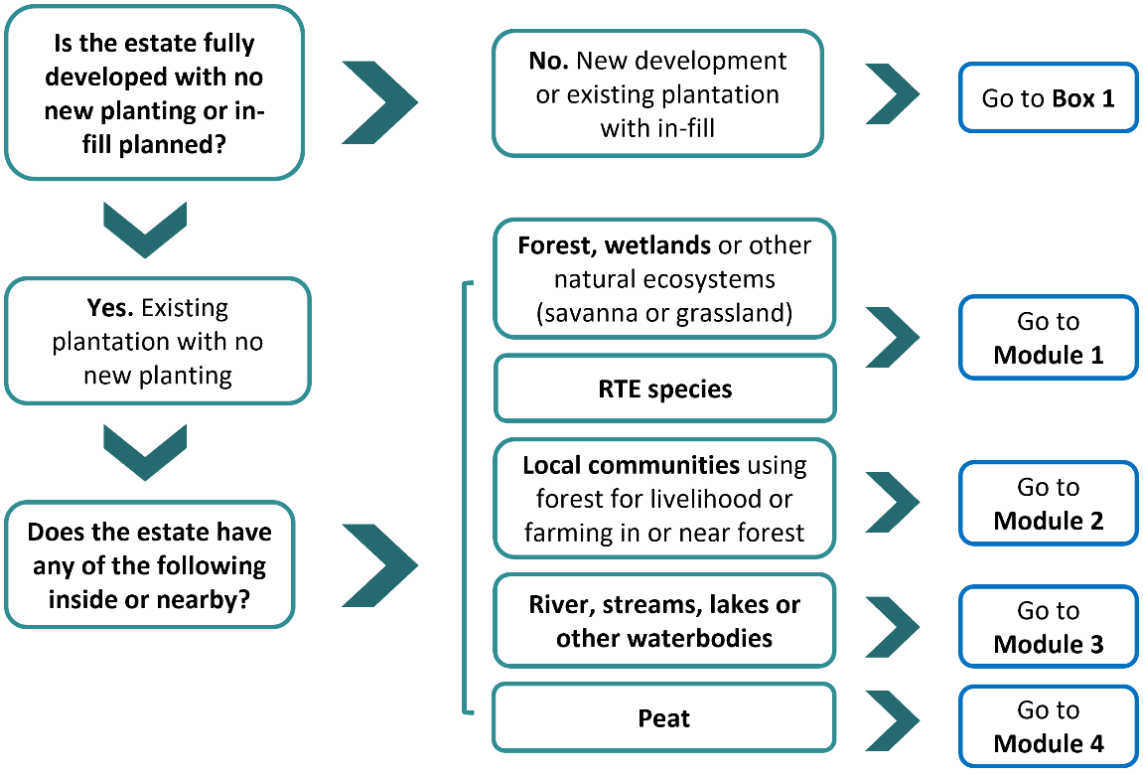


Figure 1.1: Decision tree to assess your starting situation and identify the relevant modules in this manual.

Note: RTE species are rare, threatened and / or endangered species that requires specific management / protection as per EIA / AMDAL, HBV or HCV / HCS assessment.

The flow chart provides a starting guide on which modules are relevant, but if you are not sure of the answer or if the flow chart is not specific enough you may also review any HCV, HCS or EIA / AMDAL assessment you have for the estate (if available). The report should provide maps and indicate if the social or environmental values listed are present, while providing recommendations on how to mitigate or manage these values.

These can provide a starting point and be supplemented by this manual. It is also helpful to look at maps included in the report to understand what values are present and where they are located – then you should consider planning relevant activities from the Modules in this manual in those zones, e.g. where are rivers in need of riparian reserves (see Figure 1.2).

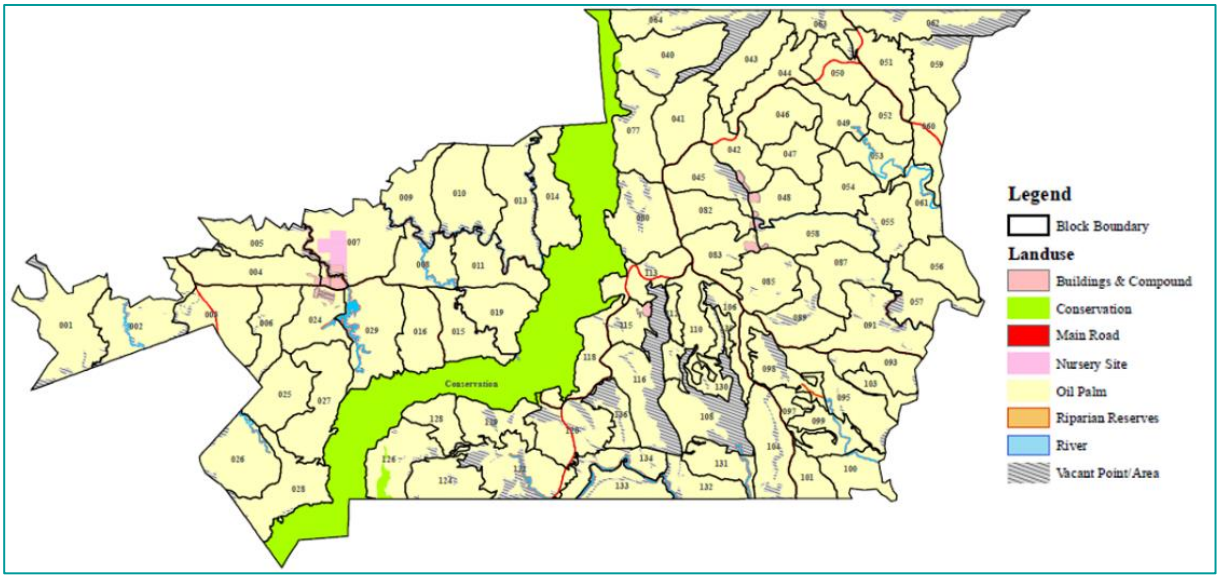


Figure 1.2: Example of a land use plan for a Wilmar estate in Sarawak, Malaysia, showing conservation area, rivers and riparian reserves and other zones. There are no communities or community use areas inside this plantation but in other Wilmar estates they have agreed with communities to set aside areas for community use.

If these assessments have not yet been carried out, but the company is not planning any new planting or in-fill, the company should review their plantation maps to see whether there are any forest (e.g., Intact/degraded forest or fragmented forest patches), conservation areas, unplantable areas, community areas or villages, agroforestry site, flood plain, riparian or buffer zones. These areas can be classified and managed as special zone or conservation areas, and inform the company which modules are most relevant.

New Plantings and In-Fill

If the company has not conducted any assessments AND is planning new planting or significant in-fill with clearing of natural vegetation (even very degraded forest or scrub areas), Wilmar's policy requires suppliers to conduct an integrated HCV-HCSA assessment before any new planting and also new development on existing plantation. To do this the company will need to hire a licensed ALS HCV assessor, for more information refer to the following links:

- To find an assessor for your area: https://hcvnetwork.org/find-assessors/
- HCV-HCSA Assessment Manual for more details on the assessment process: https://hcvnetwork.org/wp-content/uploads/2018/05/HCV_HCSA_Manual_Final_Eng.pdf

These studies will help to identify the presence and location of forests or biodiversity to be conserved and protected and if any communities are using any lands inside or near the permit area that should be consulted and engaged with.

Such studies should be carried out on the plantations under the company's management and take into consideration the wider landscape, in order to include the areas which are or will be impacted by the company's operations (water stream, neighbouring forest reserves, nearby communities, etc.).

Before commissioning a full assessment, the company can get an idea of the type of vegetation or values present by looking at free online map tools such as Global Forest Watch or using guidance such as the RSPO's Land Use Risk Identification (LURI) guidance:

- RSPO LURI Guidance, and also the user-friendly guidance usually for independent smallholders. These can also be used as a first rapid check by larger companies
- Global Forest Watch map: https://www.globalforestwatch.org/map/

Topics and Subtopics

The manual covers the following key topics, in four modules:

1. Biodiversity protection & forest monitoring
    - 1.1 Forest and biodiversity monitoring
    - 1.2 Wildlife protection
    - 1.3 How to initiate 3rd party collaboration program on wildlife monitoring
2. Balancing community needs and forest protection
    - 2.1 Community awareness raising & engagement strategy on the importance of conservation
    - 2.2 How to initiate community-based wildlife monitoring & patrolling
3. Management and restoration of riparian areas
    - 3.1 Management and monitoring of riparian zone
    - 3.2 How to initiate restoration projects for riparian areas
    - 3.3 How to prepare planting materials for riparian area restoration
4. Fire and Peat management
    - 4.1 Fire prevention and monitoring
    - 4.2 Peat Management and monitoring

MODULE 1

Wildlife and Forest Management and Monitoring

The intent of this module is to provide guidance to companies in charge of plantation management units with forest, biodiversity or wildlife in or around the units, on steps to take to ensure the conservation of forest areas and wildlife.

Ultimately the responsibility to maintain the natural habitats or areas so that the relevant species can survive fall on the company or organisation in charge of the management unit/plantation. There is detailed guidance available, for example from the HCVN and HCSA, on managing and monitoring forests and wildlife. However, much of this could be seen as too technical for companies starting out. Therefore, this module aims to provide the first step for starting to protect and monitor forest and wildlife in and around estates.

The company's responsibility towards forest and biodiversity protection applies primarily to inside their plantation boundary, but the consideration of neighbouring communities must also be taken into account as the impacts may be beyond its boundaries. The company needs to have clear procedures for its workers on what activities are allowed and prohibited within and surrounding the plantation area. For local communities who inhabit areas surrounding the plantation but may use areas in the plantation, procedures should be mutually agreed with the communities (see Module 2). It is vital to establish a common understanding between the company and local community regarding the importance of protecting the area. Furthermore, companies such as Wilmar have developed conservation programmes with neighbouring communities such as Fire Free Village programmes and others mentioned in Module 2 to help protect areas outside of the plantation boundary.

1.1 Forest and Biodiversity Management and Monitoring

Once the forests and biodiversity attributes have been identified within and around the plantation, the next step is to develop a forest and biodiversity conservation management plan which identifies the appropriate measures to implement to conserve and to protect the conservation attributes. Plantations with larger forest or significant conservation areas should include the following 8 steps[6]:

1. Description and location of each forest area or location with important species (e.g. HCVs)
2. Establishment of baseline data (e.g. presence of biodiversity and other conservation values)
3. Formulation of conservation management objectives and targets
4. Assessment of threats
5. Consultation with stakeholders and experts
6. Development and implementation of effective management strategies
7. Development and implementation of a monitoring plan
8. Adaptive management strategies, based on monitoring results.

[6] Threats listed are examples only and will vary depending on the species or value.

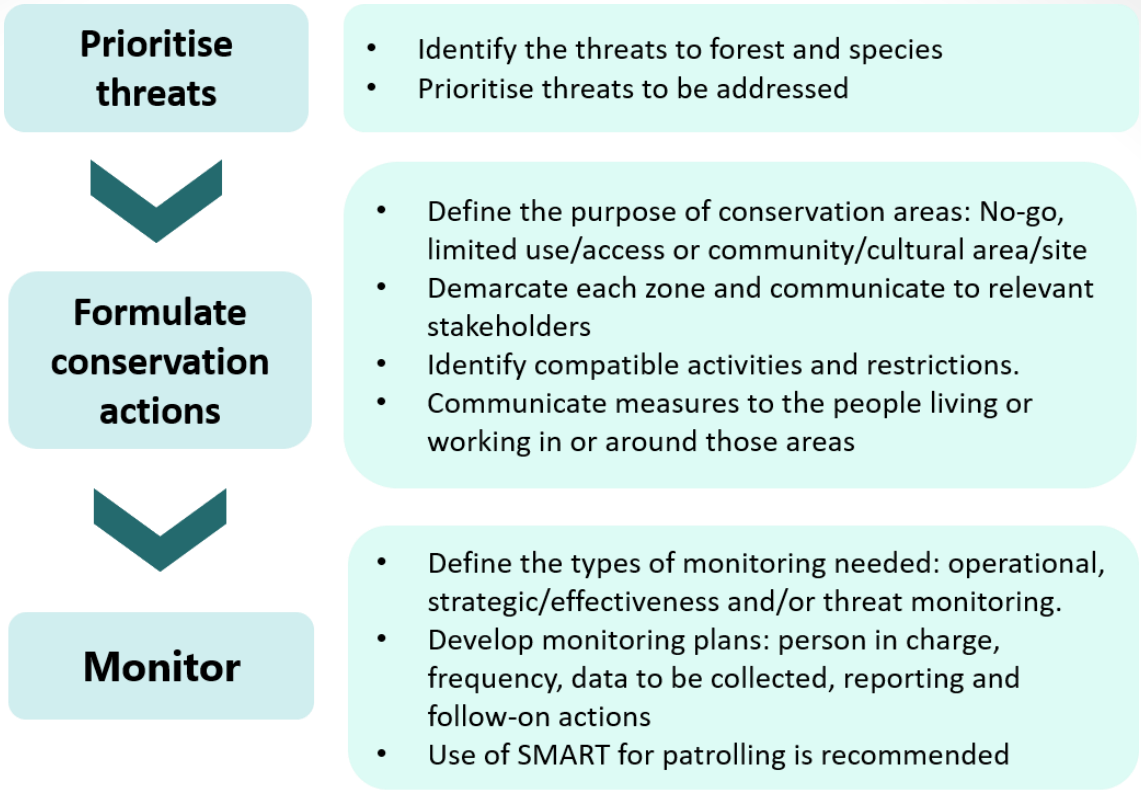


Figure 1.3: Flowchart for forest and biodiversity management and monitoring

However, if there are serious resource constraints, follow the simplified set of steps below:

1. Prioritisation,
2. Major actions and measures,
3. Monitoring actions/protocols.

For further guidance on developing a full management and monitoring plan please refer to the Common Guidance for the Management and Monitoring of HCVs (Brown & Senior, 2014) and the practical guidance (Series 2) for operational actions.

Step 1: Prioritisation

The objective of the prioritisation process is to target species of greatest importance given their conservation value and the threats they face. For example, in some cases, if rare species are absent or the rare species are not at immediate risk, the company may take a precautionary approach of making sure the forest area or habitat remains intact without specific management actions for the species. However, certain species may be particularly vulnerable to threats such as hunting or pollution and therefore may need specific management or monitoring measures.

The prioritisation process can be broken into 2 sub-steps as follows.

1a. **Identify / list the habitats and species** found in estates that need management or further prioritisation. Where possible these should be taken from baseline reports (e.g., EIA/AMDAL, High Biodiversity Value (HBV) Assessment Report or HCV-HCS reports)

1b. **Identify the specific threats** to the forests/habitats and rare/threatened species to decide on what conservation measures need to be implemented. Some general threats to biodiversity are listed below, followed by a table (Table 1.1) showing common threats to specific forest or biodiversity attributes[7]. The reports mentioned in 1a above may also contain information related to threats.

- Plantation or processing activities taking place within or near the forest or biodiversity habitat (e.g., agrochemical run-off into waterbodies, clearance of forest for plantation etc.)
- Road development or poor road maintenance (causing soil erosion, etc.)
- Logging
- Hunting/poaching
- Land or forest clearing for community or subsistence farming
- Draining of peat/marsh/swamp areas
- Settlement development
- Fire/bush burning
- Excessive extraction of non-timber forest products
- Clearing of buffer vegetation
- Agro-chemicals including herbicides, pesticides and fertilisers
- Invasive species, etc.

[7] Threats listed are examples only and will vary depending on the species or value.

Table 1.1: Common threats to specific forest of biodiversity attributes

Values / Attributes	Common Threats
HCV 1 Rare / threatened large terrestrial mammals - E.g. elephants, tigers, sun bears	• Hunting or other activities that lead to death/injuries e.g. poisoning, trapping • Loss of food sources of herbivores (e.g. fruit trees) • Loss and fragmentation of habitat (e.g. due to roads cutting through forested areas) – many large terrestrial species require large areas of habitat to survive or obtain enough food
HCV 1 Rare or threatened primates e.g. orangutan, gibbons, and fruit-eating birds e.g. hornbills	• Logging (removal of large trees important for primate movement or feeding) • Hunting • Loss and fragmentation of forest habitat (primates like gibbons in particular rarely move on the ground so require trees to move between areas)
HCV 1 Rare or threatened aquatic species e.g. otters, fish, crocodiles	• Pollution of water bodies (e.g. agrochemicals run-off, sedimentation from soil erosion, domestic waste (chemicals, soap, fuel, etc.) • Removal of riparian vegetation (leading to soil degradation, soil erosion and increased water temperature) • Poor management and planning of roads and bridges • Unsustainable fishing (e.g. overfishing, use of poisons or fish-bombing) • Unsustainable/poorly managed extraction of water (e.g. for mills or domestic use) • Mining (e.g. gold)
HCV 1 Rare or threatened tree species	• Logging/ tree felling. Note that some tree species are fully protected by law and cannot be cut down at all • Loss of pollinators (e.g. fruit bats) or seed dispersers, usually due to loss of habitat or hunting
HCV 1 / HCV 2 Forest areas	• Logging • Loss and fragmentation of habitat due to plantations, farming or other uses. • Fire (caused either by human for land clearance or by extreme weather and droughts)

Table 1.1: Common threats to specific forest of biodiversity attributes *(continued)*

Values / Attributes	Common Threats
HCV 4 Forest on steep slopes or hills	• Logging • Poor planning and management of roads • Clearance of vegetation on slopes e.g. for farming (in some places communities may consider steep slopes as the only areas left for farming after plantations are developed on less sloping areas) • All of the above may increase the risk of landslides or erosion from these areas • Invasive species (e.g. creepers)
HCV4 Riparian forest, peat or swamp forest	• Habitat loss due to vegetation clearance for mining, farming, infrastructure development, access to river bank for recreational or domestic uses, etc. • Poor management and planning of roads and bridges • Poor water management, especially on peatland. • Invasive species e.g. creepers • Floods. • Forest fire

1c. **Prioritise the threats** based on the following (Bakewell *et al,* 2012):

i. **Frequency** – How often does it occur?

ii. **Scale** - To what extent does it occur?

iii. **Severity** – How serious / long-term are the impacts?

Tables 1.2 and 1.3 provide a framework for assessing the frequency, scale and severity of each identified threat. This will help determine the urgency and importance of taking remedial action to reverse or halt negative impacts.

Table 1.2: Threat assessment matrix – Frequency and Scale

Nature of Threat	*(Name each identified threat here)*				
Frequency	Scale				
	Very small (a few square metres)	Affects one area	Affects several areas	Affects many parts of the conservation areas	Affects the landscape beyond the conservation areas
Very rare *< Once in 5 years*	1	2	3	4	5
Rare *Less than annual*	2	3	4	5	6
Once or twice a year	3	4	5	6	7
Several times a year	4	5	6	7	8
Most of the time	5	6	7	8	9

Table 1.3: Threat assessment matrix – Frequency and Severity

Nature of Threat	*(Name each identified threat here)*				
Frequency	Severity				
	Temporary and easily reversed	Short-term impact - reversible	Medium-term impact – costly to reverse	Long-term impact – difficult and costly to reverse	Catastrophic and irreversible
Very rare *< Once in 5 years*	1	2	3	4	5
Rare *Less than annual*	2	3	4	5	6
Once or twice a year	3	4	5	6	7
Several times a year	4	5	6	7	8
Most of the time	5	6	7	8	9

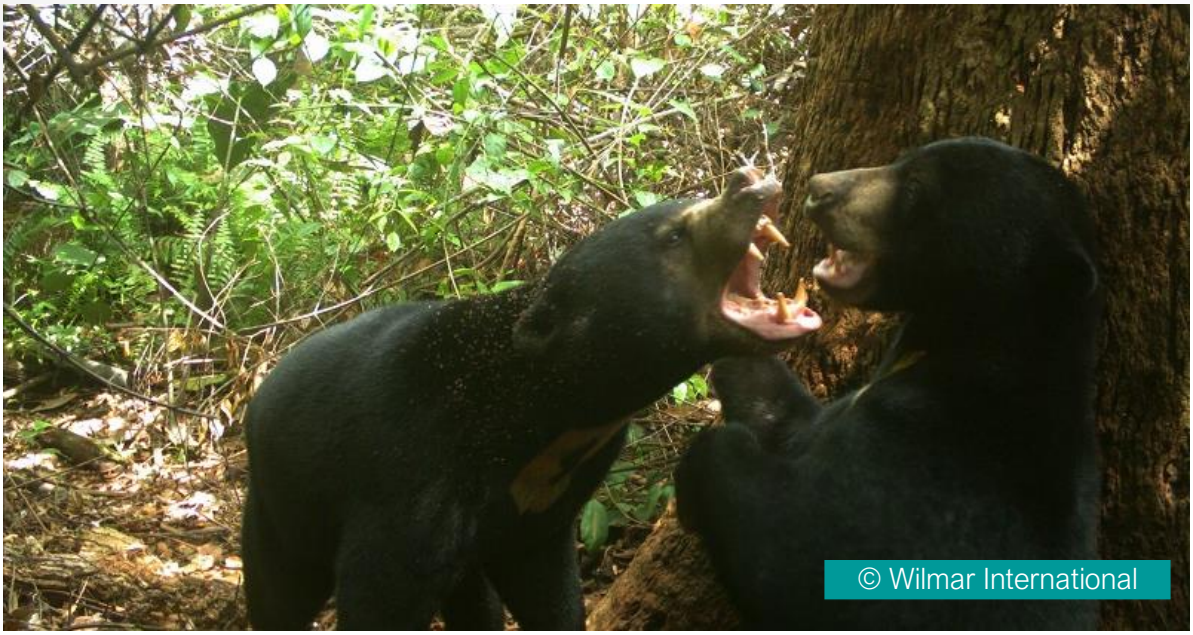


Image: Protection of Rare, Threaten and Endangered (RTE) species such as Sun bear (*Helarctos malayanus*) in the plantation landscape is crucial | Indonesia

For each identified threat, the frequency, scale and severity of that threat should be ranked. For example, a threat happening infrequently (once or twice a year) and occurs at a small scale (one part of the conservation area) would usually be of a lower priority for management action than one that occurs several times a year, and impacts similar or larger area.

Based on the assessment and prioritisation of threats the company can now proceed to identify the necessary management and monitoring actions starting with the highest priority threats.

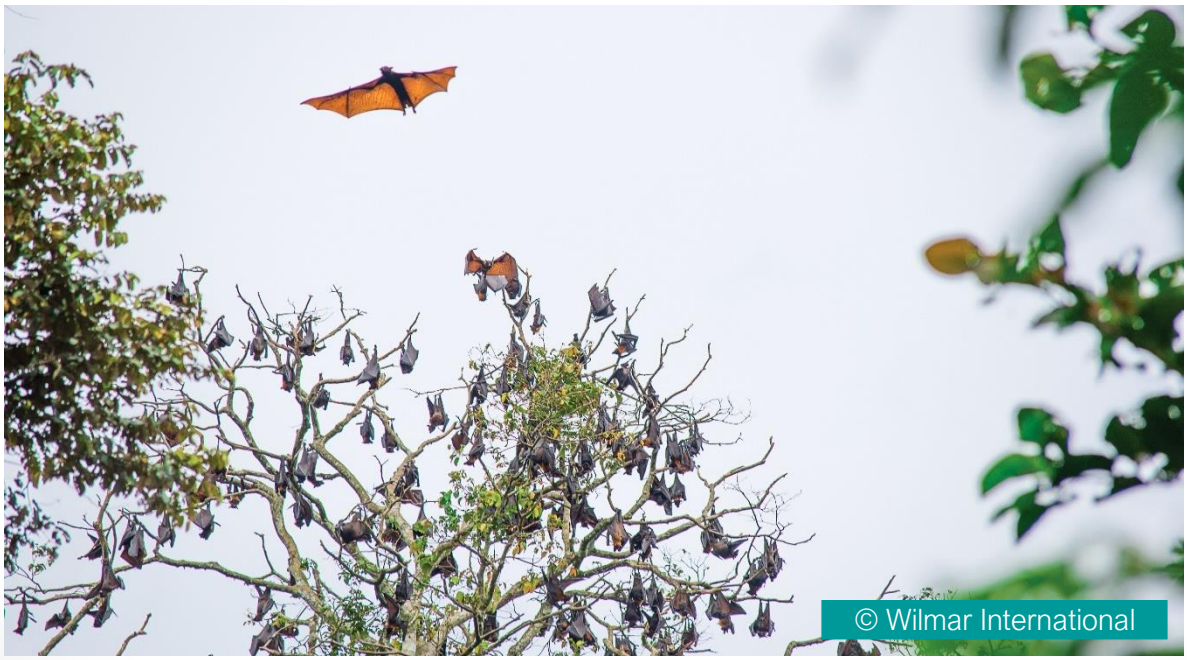


Image: Flying foxes plays an important role in dispersing seeds and pollinating flowering plants to maintain healthy ecosystem | Sabahmas Estate - Malaysia

Step 2: Develop Conservation Measures

Once the threats have been prioritised, the company can then formulate the necessary conservation management actions.

2a. Prepare a Zoning Plan

The management unit or plantation can be divided into different management zones according to their purpose. For example:

- No-go area (also known as Strict Protection Area / Core Conservation Area / HCV Area)
- Area with limited use / access (buffer areas / HCV management area)
- Community-use areas
- Cultural areas / sites (not usually intended for biodiversity conservation but may still support species or protect forest)

➢ Maps should be prepared showing the boundaries of the plantation and management zones (e.g. in Figure 1.4)

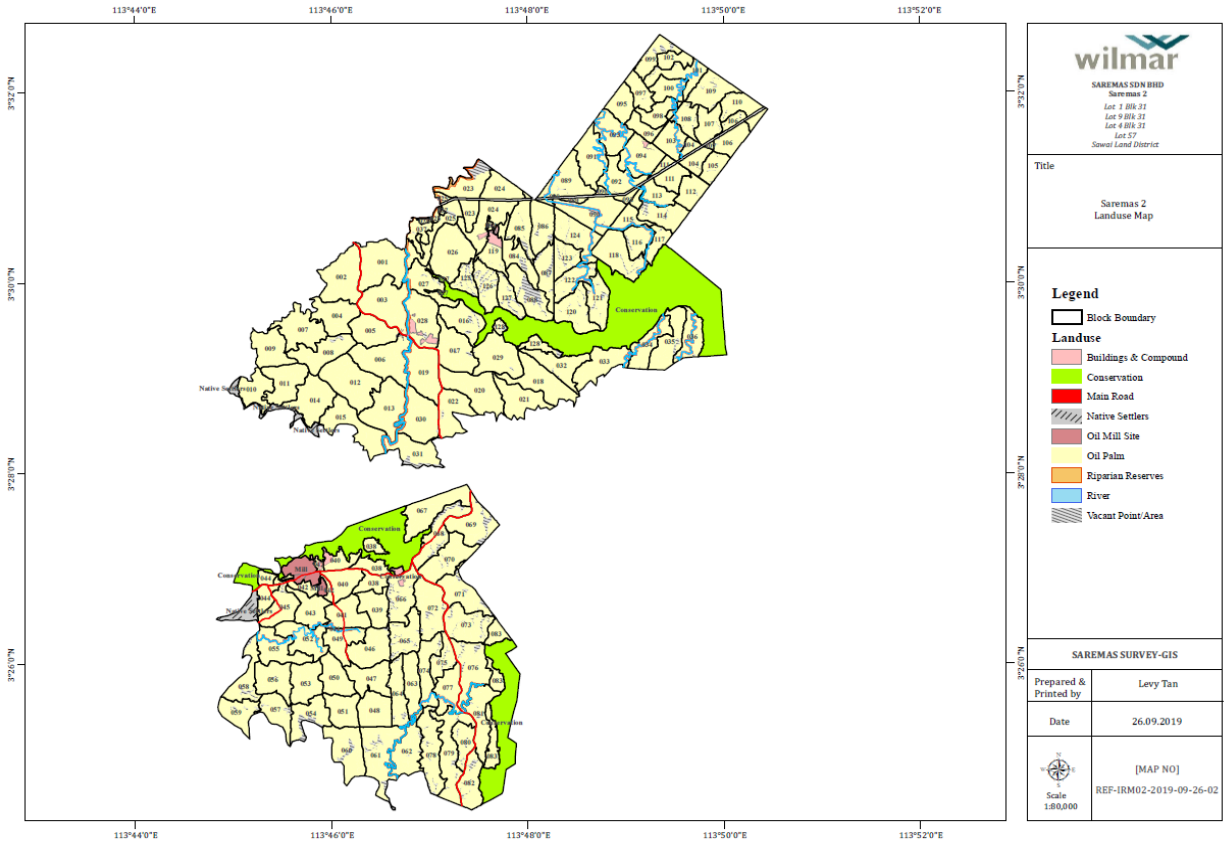


Figure 1.4: Example of a Wilmar estate map showing conservation areas, rivers, riparian zones and community areas ('native settlers')

2b. Demarcate Boundaries of Management Zones

Once the zoning plan has been prepared, the different management zones should be clearly demarcated on the ground. The boundaries can be demarcated using marker stones, paint on trees, etc.

2c. Determine allowable and prohibited activities in each management zone

The company needs to identify which activities are compatible with maintaining the conservation or biodiversity values and can be allowed, and activities that are damaging to the values and therefore should be restricted or prohibited (see examples in Fig. 1.5 below).

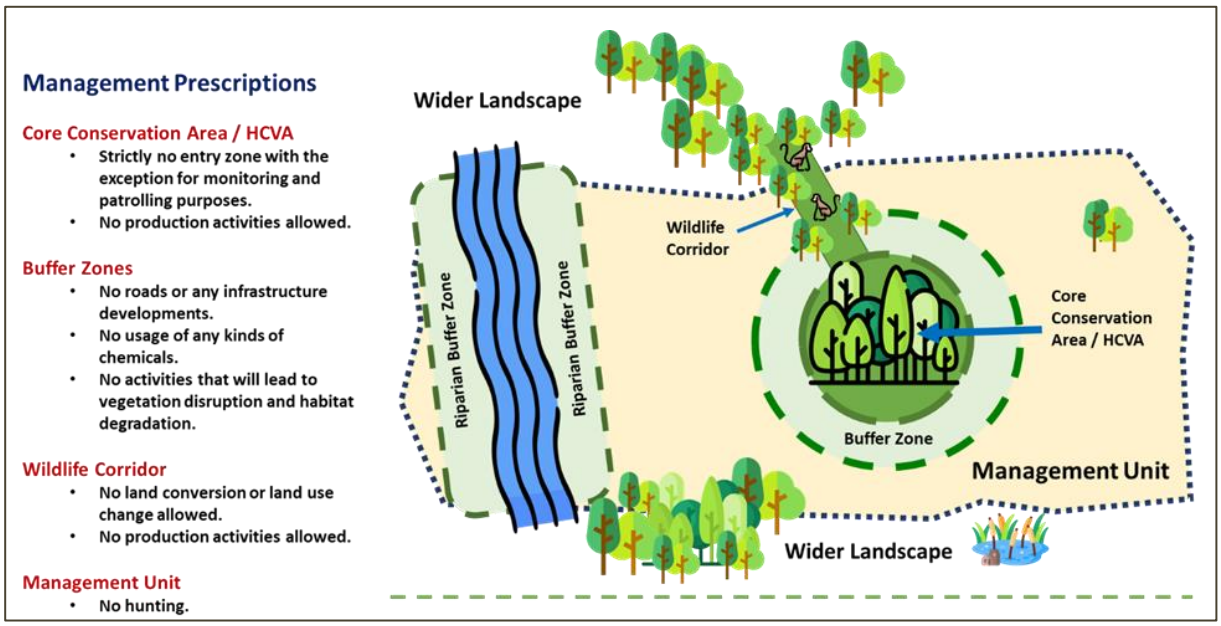


Figure 1.5: Example of Management Zones and Prescriptions | *Credit: Lisa Lok (Proforest)*

2d. Prepare specific management strategies

In addition to management zoning, specific management strategies can also be prepared for priority conservation values or attributes that are found within the plantation. For example, if rare and threatened species of animal or plants (HCV 1) are present in the plantation areas, a management strategy for each of the rare or threatened species can be prepared. Table 1.4 below is an example of an HCV 1 management strategy for conserving orangutans in a plantation taken from the Malaysian National Interpretation for Management and Monitoring of HCVs. Where no HCV-HCS assessment have been conducted, conservation management objectives and strategies can still be developed based on the known biodiversity present and existing site conditions.

Table 1.4: Management strategy for orangutan conservation (HCV 1)

Management Objectives	Management Strategies	
	Areas	Prescriptions
• Original population of orangutan (based on baseline data) is maintained within the plantation • Sites and resources on which orangutans depend are maintained, including nesting and feeding sites	Core Conservation Area Wildlife Corridor Buffer Areas	• Maintain forest cover and natural ecosystems. • Maintain a corridor of a minimum width between the core conservation area in the plantation and the larger forest landscape/nearby protected area. • Conduct restoration activities (e.g. planting of orangutan food trees) where appropriate
	Throughout the Plantation	• Control access into the plantation and forested areas (roadblocks, checks at entry point, close old routes). • Conduct patrols to prevent hunting, encroachment etc. • Planting of fruit trees to enhance food source of orangutans. • Develop SOP and conduct training for staff on human-wildlife conflict mitigation. • Install signage on prohibited activities (e.g. hunting, fishing, lighting of fires) within the MU.
	Wider Landscape	• Establish an honorary wildlife warden/ranger program involving local communities. • Build capacity of local community to establish a forest tree nursery to sell seedlings for restoration activities.

NOTE: In cases where threats to a value come from community activities, it is vital that activities permitted or prohibited are agreed collaboratively with the community – not imposed unilaterally by the company. Otherwise, there is a serious risk of causing community-company conflict. The company should also consider the impact of restricting community activities on livelihoods or income and consider supporting or offering alternatives if needed.

For example:

- If the community traditionally hunts a rare species for meat, perhaps the company can support livestock or fish-farming projects with the community or reach agreement on limited hunting of non-threatened/HCV species, or;
- If community members are reliant on timber from the conservation area for house construction, the company could consider buying materials for construction e.g. timber sourced externally, concrete or bricks.

See Module 2 (page 49) for more information about community–company engagement.

Figure 1.6: An orangutan nest

2e. Communicate conservation measures to stakeholders

Once the management zones have been demarcated and the conservation measures have been identified, it is essential to share the essentials of it to the people living or working in or around the plantation. These include the workers, relevant subcontractors and communities.

- **To Workers:** People working within the plantation, being staff, workers or sub-contractors, need to understand the need for conservation as well as the measures or Standard Operating Procedures (SOP) which are relevant to their operations (e.g. what actions/activities not to be carried out, when, where, etc.). To ensure this, the management should communicate this information to them in a concise and understandable way, using the appropriate / most understood language (may require translation for migrant workers, no technical words, etc.). Where possible this should be included as part of planned or regular training to avoid overburdening staff with too many information sessions. Posters and other communication tools with illustrations are a good way to convey the key messages to plantation workers.
- **To Communities:** Affected local communities should be included in management and monitoring activities e.g. through participatory community-based monitoring of conservation areas. For further guidance on communication with communities, please refer to Module 2.

Signboards should be installed at strategic locations indicating the management zone, with the relevant dos and don'ts, including explaining the type of area, providing some basic information on the purpose of the zone, type of activities allowed and who to contact if any breaches are observed or if any stakeholders have questions. These should be placed at intervals around the areas, and in particular put at the main access points or on roads passing by.

Note that if conservation areas are also community lands or culturally significant sites, the company must first check with the community before installing any signboards.

Figure 1.7: Example of signboards at a buffer area

2f. Conduct additional conservation programmes

In some cases, depending on the values present and their threats, additional specific management interventions may be required. For example, human-wildlife conflict measures, alternative livelihoods programmes, targeted/extra outreach programmes or forest restoration activities. This manual does not go into detail on this topic but identifies some topics and existing guidance documents below.

Human–Wildlife Conflict: If large mammals such as elephants or orangutans are known to come into the plantation area then there is a risk of them coming into contact with workers. It is highly recommended that companies put in place measures to minimise the risk of conflict in advance BEFORE an incident occurs.

- Guidelines on the Better Management Practices for the Mitigation and Management of Human-Elephant Conflict in and around Oil-Palm Plantations in Indonesia and Malaysia[8]
- Guidelines for the better management practices on avoidance, mitigation and management of human-orangutan conflict in and around oil palm plantations[9]
- Best practice guidelines for conflict prevention and mitigation between humans and great apes[10]

Figure 1.8: A Bornean Pygmy Elephant in an oil palm plantation (left) and crop damage (right)

Alternative livelihoods programmes or support may be needed if conservation activities limit community activities and livelihoods. It is the responsibility of the company to support communities to identify alternatives.

Forest restoration activities may be needed if a conservation area is particularly degraded either at the time of planning or becomes degraded due to fire or encroachment. It may also be required if a particular species' needs are not met, e.g. if there may not be enough food then enrichment planting of food sources or trees could be needed. See Module 3 (page 64) for more information about restoration. It may be useful to consult experts about specific needs such as food species.

[8] https://wwf.panda.org/?98200/Guidelines-to-better-manage-Human-Elephant-Conflicts-in-Indonesian-and-Malaysian-oil-palm-plantations

[9] http://d2ouvy59p0dg6k.cloudfront.net/downloads/ou_bmt_report.pdf

[10] http://www.budongo.org/media/1103/bp_conflict.pdf

PONGO Alliance

In 1984, the government of Sabah decided to allocate half of Sabah as permanent forest and half for development, however the half allocated for development coincided with the area containing the highest population densities of orangutans.

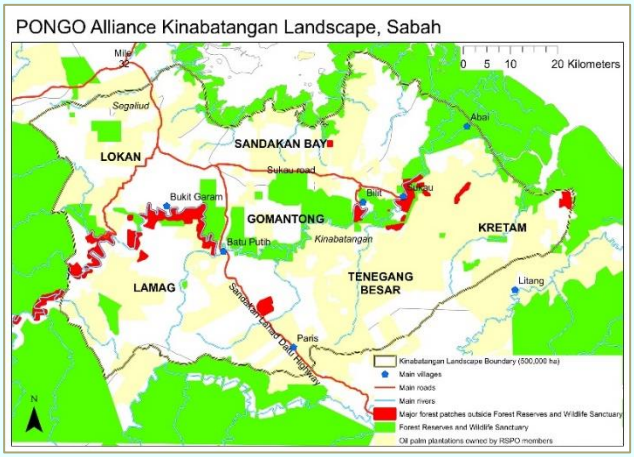
The PONGO Alliance has set up the Kinabatangan landscape area covering about 5,000 square kilometres. The landscape vegetation cover is made of about 90% under oil palm plantation, 9% natural forest and unplanted swamp, and 1% villages. It is estimated that about 800 orangutans live there now, representing 10% of the original orangutan population size. Most live in the residual forests legislated by government as protected areas.

In the absence of new measures to connect the fragments of orangutan habitats, these protected areas are believed to be too small and scattered to be able to support a viable orangutan population long-term.

However, it seems that the younger generation of orangutans can learn to live in a mix of oil palm plantation and forest *(*Ancrenaz *et al., 2021)*, if steps are taken to provide more orangutan foods on a large scale within plantations (e.g. by planting fig trees to grow on palm trunks and planting other food trees in buffer zones), and to stop people from harming or removing orangutans from oil palm plantations.

The PONGO Alliance seeks to put in place conditions whereby targeted nature restoration work can ensure that a wild orangutan population will be able to survive long term in the Kinabatangan landscape.

Pongo Alliance is an alliance of oil palm growers, businesses and NGOs, who advocate for and support the conservation of orangutans and other wildlife within the oil palm landscapes. Further information can be obtained at https://www.pongoalliance.org/ .



Step 3: Monitoring

To ensure the conservation measures are appropriate and effective, specific monitoring protocols should be agreed and carried out. In this section separate guidance for biodiversity monitoring and forest monitoring is provided.

Note that enriching buffer areas of the plantation with food trees or medicinal plants is, regardless of any assessment, a good measure to provide either source of food for wildlife or alternative resources for the communities.

There are 3 types of monitoring (Brown & Senior, 2014):

i. Operational monitoring – is the biodiversity management plan being implemented? Are the SOPs for forest patrolling or enforcement being followed and logbooks completed?

   Example: patrolling to assess the presence and the state of signboards and marking

ii. Strategic/Effectiveness monitoring – are the conservation attributes being effectively protected? For example, is forest cover still in place or is the population of orangutans remaining constant or growing? This may require expert support and can be conducted over longer time scales than operational and threat monitoring.

   Example: Annual rapid survey to assess the presence (including the number of individuals) and the status of conservation attributes.

iii. Threat monitoring – are the threats to biodiversity being addressed (i.e. is there a reduction over time)? For example, have instances of encroachment or hunting reduced?

   Example: patrolling to assess the threats identified, and/or using Spatial Monitoring and Reporting Tool (SMART)[11]

Further examples (Table 1.5) applied on different types of HCVs can be found in the Common Guidance for the Management and Monitoring of HCVs and the MYNI for HCV Management and Monitoring.

[11] https://smartconservationtools.org/

Table 1.5: Example of different types of monitoring for HCV1 and HCV2 taken from Common Guidance on Management and Monitoring of HCVs

EXAMPLE OF HCV	OPERATIONAL MONITORING	STRATEGIC MONITORING	THREAT MONITORING
HCV 1 mammal population present in riparian forest areas in MU	Regular monitoring patrols to: • Maintain HCV area boundaries • Ensure no pesticide application or chemical dumping in or near riparian buffer zones • Prevent hunting	• Annual species population surveys (e.g. individuals) • Habitat quality surveys (e.g. food plants present)	• Hunting monitoring patrols (more targeted, extensive than operational monitoring) • Local hunter interviews • Opportunistic observations of hunting indicators (from operational/ strategic monitoring)
HCV 2 large landscape level forest	Annual remote sensing and ground patrols to confirm that road management plan is correctly implemented	• Remote sensing to confirm no increase in deforestation, or fragmentation	Monitor threats to landscape size and connectivity: • Development plans in the wider landscape • Migration trends • Encroachment into corridors

Once the types of monitoring needed have been identified, monitoring plans need to be developed to explain who is responsible, the frequency of monitoring, what information is to be collected, and what are the protocols for reporting and responding to threats. For further details on how to develop and what to put in a monitoring plan, please refer to the MYNI for HCV Management and Monitoring (HCV Malaysia Toolkit Steering Committee, 2021).

Within monitoring activities, patrolling is a common approach and some more information is provided below:

Threat Monitoring: Example of Patrolling

The need for patrolling should be identified in the management plan (see Step 2c above). In a nutshell, patrols are done with the purpose of assessing:

- Primary purpose: Recording or preventing threats/prohibited activities e.g. encroachment, hunting, spraying of chemicals in buffer zones, etc.
- Primary purpose: Implementation of conservation measures by workers, subcontractors or communities.
- A secondary purpose can be to assess status and condition of conservation/biodiversity areas, which can form part of strategic monitoring. This is usually only practical to be done opportunistically, for example, to record any sightings of wildlife (especially HCV1 species).

To support the patrol team or conservation wardens, it is recommended to develop SOPs for how to record, report and act when different threats are identified. For example, Wilmar has developed different SOPs for logging, fire, encroachment and mining. These SOPs should clearly indicate what activities the patrol team need to take and also any follow up action by management. See the example in Fig. 1.9 below of one of Wilmar's encroachment SOPs. Note that this is only an example and should be adjusted to the local context and roles of each estate. Further examples are made available in the practical guidance (series 2).

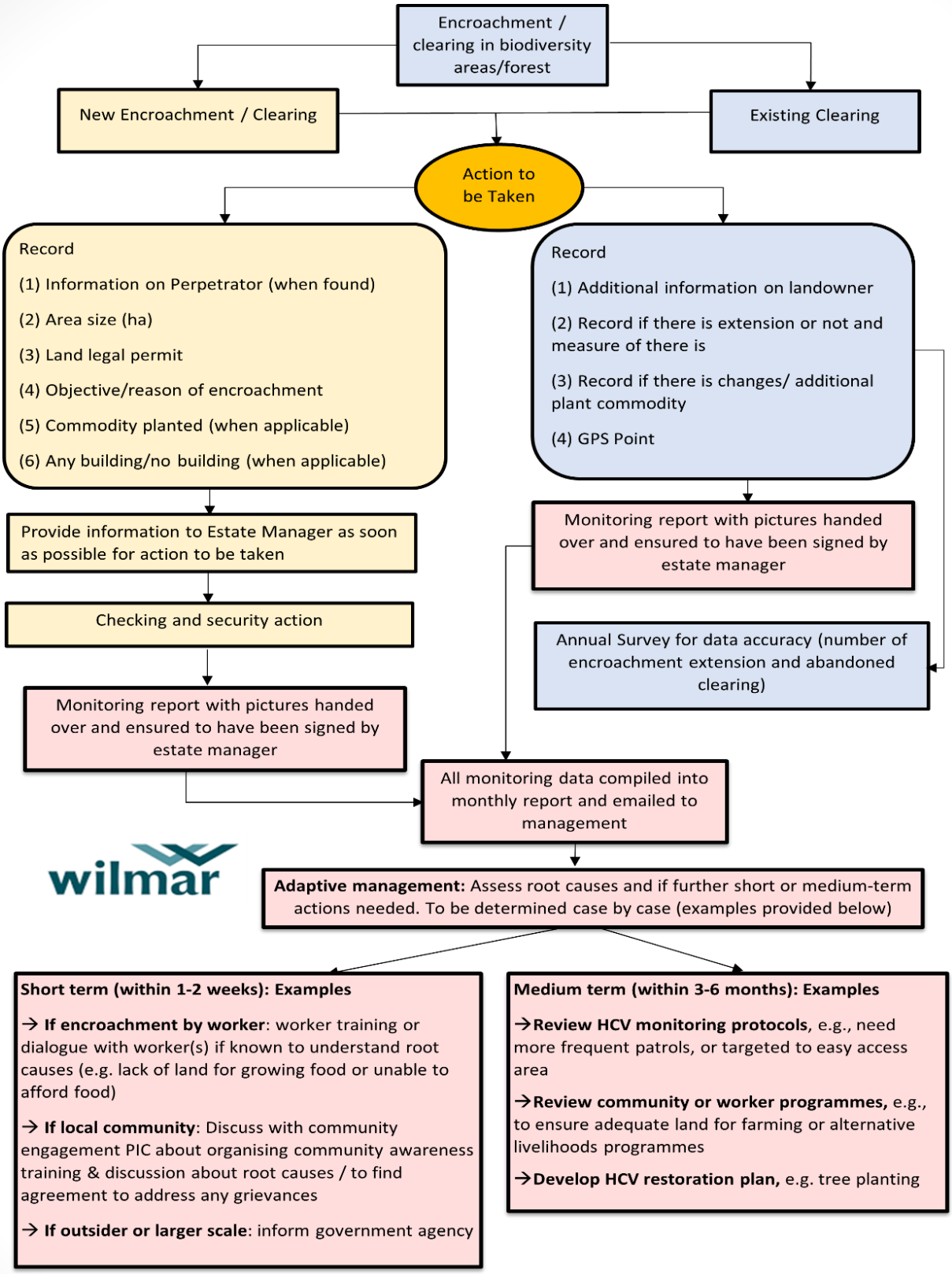


Figure 1.9: Example of Wilmar's Encroachment SOP

Strategic Monitoring: Example of Forest Monitoring

To assess the state of forest conservation areas one tool that is simple to use is the Forest Integrity Assessment (FIA) tool[12] developed by the HCVN with the support of WWF. This tool can be used independently from the HCV approach and simple to use as it does not require the user to be familiar with HCV or have high level of skill and knowledge in ecology. The cost and effort needed is very low compared to more complicated techniques of forest monitoring.

The tool:

- Is based on a check-list approach with yes / no questions
- Allows users to conduct assessment and monitoring of forest conditions for biodiversity in managed forest, HCV or other conservation areas
- If used consistently over time (e.g. in the same plots each year), can help growers understand the trend in a conservation area or to track restoration *(See Module 3 for examples of a riparian restoration area)*
- Can help to raise awareness and educate non-biologists about forest conditions important for biodiversity

Monitoring Forest using the FIA Tool

Where to use FIA?

- In forest patches or buffer zones
- In the concession or in nearby conservation areas

When to use FIA?

- Every year and in the same season

Who to use FIA?

- Anyone, this tool can be used by non-biologists
- Engaging the same pool of people year after year promotes consistency and reduces the need to train new assessors from scratch.

[12] https://hcvnetwork.org/wp-content/uploads/2018/05/FIA_Manual_Final_Press_Updated_ENG.pdf

Below is a summary of the FIA methodology, which can be explained in 4 stages:

1. Define Plots

   - Small forest patches (from maybe 0.5 ha of very varied forest, up to perhaps 5 ha of more similar forest with good visibility) may be surveyed in one plot
   - For larger forest patches, sub-units must be defined so that you can assess if the forest quality differs across the patch (for example if one area has been encroached for logging)
   - Sampling can be done randomly or by line transects
   - Each plot size should normally be 0.2-1 ha depending on the visibility
   - Each sample plot is scored on a separate field form
   - Annual monitoring programs should be designed to sample new plots rather than revisit previously assessed ones

2. Carry Out Field Assessments

   Answer a checklist with yes/no questions, for every plot identified. A higher score indicates a better quality forest for biodiversity. See example checklist[13] below for lowland dipterocarp forest (Figure 1.11), to assess:

   - The forest structure and composition
   - The impacts and threats
   - The state of key habitats and indicator species

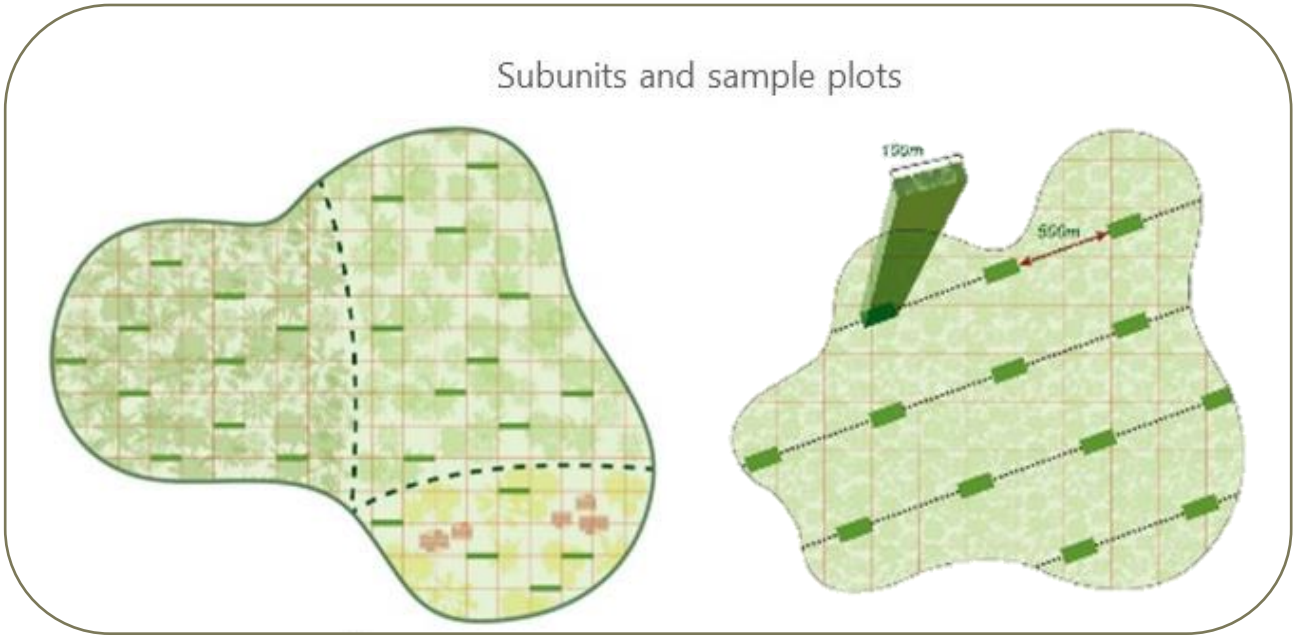


Figure 1.10: Line transects. Idealised example, showing sampling a new 100-metre-long section every 500 metres. Other distances between plots are between different transects may be chosen to suit the size and heterogeneity of the particular forest unit and the amount of available resources.

[13] http://www.sensorproject.net/wp-content/uploads/2017/04/FIA-study-FINAL.pdf

	Yes ☑	No ☑
LANDSCAPE (1ha =approximately 1.5 football pitches)		
1. Site is itself, or is part of, a continuous forested area **larger than 200 ha**		
2. Site is part of, or **closer than 500 m** to, a continuous forested area **larger than 200 ha**		
3. Site is part of, or **closer than 500 m** to, a continuous forested area **larger than 10 ha**		
4. Site is **larger than 1 ha**		
5. Site is mostly bordered by natural forest and/or water (river or lake)		
TOPOGRAPHY		
6. Site generally steeply sloping (greater than 1:2 gradient - 45 degrees) or is of generally **very** rough, steep terrain		
7. Presence of prominent gorges or ravines		
8. Presence of prominent rocky outcrops		
9. Presence of caves or prominent rocky overhangs		
WATER		
10. Presence of seasonal/ephemeral streams, swamps or ponds		
11. Presence of permanent swamps, ponds or wallows (or an oxbow lake)		
12. Presence of permanent streams or rivers		
13. Any rivers or streams present have section(s) of riffles or cascades		
14. Presence of waterfalls		
TREES		
15. Many (>100) saplings or trees **1-10 cm DBH** (**D**iameter at **B**reast **H**eight) observed		
16. Many (>100) saplings or trees **1-10 cm DBH** growing beneath a **high intact or partially intact canopy** (of >30m)		
17. Presence of emergent trees **40-50 m** tall		
18. Some (10-30) trees **10-40 cm DBH**		
19. Many (>30) trees **10-40 cm DBH**		
20. Some (3-10) trees larger than **40 cm DBH** (or above buttresses, where present)		
21. Many (>10) trees larger than **40 cm DBH**		
22. Some (3-5) trees larger than **80 cm DBH** (or above buttresses, where present)		
23. Many (>5) trees larger than **80 cm DBH**		
24. Presence of standing dead trees larger than 40 cm diameter		
25. Presence of fallen dead trees or logs larger than 40 cm diameter		
FLORA		
26. Some (3-5) woody plants in flower - including woody vines or lianas (can be indicated by fallen flowers)		
27. Many (>5) woody plants in flower - including woody vines or lianas (can be indicated by fallen flowers)		
28. Some (3-5) woody plants in fruit - including woody vines or lianas (can be indicated by fallen fruit)		
29. Many (>5) woody plants in fruit - including woody vines or lianas (can be indicated by fallen fruit)		
30. Some (3-5) large vines or lianas with **stem(s) larger than 10 cm diameter**		

Figure 1.11: FIA checklist for lowland inland dipterocarp forest developed for Sabah, Malaysia. Excludes forest species.

Figure 1.11: FIA checklist for lowland inland dipterocarp forest developed for Sabah, Malaysia. Excludes forest species. *(continued)*

31. Many (>5) large vines or lianas with **stem(s) larger than 10 cm diameter**		
32. Some (3-5) trees with ferns, orchids or other epiphytic plants present in their crowns/branches		
33. Many (>5) trees with ferns, orchids or other epiphytic plants present in their crowns/branches		
34. Some (3-5) trees with mosses and/or lichens on stems or in branches		
35. Many (>5) trees with mosses and/or lichens on stems or in branches		
36. Some (3-5) conglomerations of leaf-trapping thread-like fungal strands in the understory		
37. Many (>5) conglomerations of leaf-trapping thread-like fungal strands in the understory		
FAUNA		
38. Signs of nests, nesting holes or burrows of mammals, birds, reptiles or amphibians		
39. Signs of foraging, feeding or other clear activity by mammals, birds, reptiles or amphibians		
40. Sightings or signs of **two or more** mammal species (can include presence of dung)		
41. Leeches present		
42. Some (3-5) earthworm casts or cicada chimneys		
43. Many (>5) earthworm casts or cicada chimneys		
DISTURBANCE		
44. Presence of tangled masses, curtains or 'towers' of narrow-stemmed climbers or vines (including climbing bamboo)		
45. Presence of open grassy areas		
46. Average visibility within forest more than 10 m but less than 50 m (off trail)		
47. Average visibility within forest more than 20 m but less than 50 m (off trail)		
48. Obvious man-made clearings present (roads, skid tracks, log landings etc)		
49. Signs of recent logging		
50. Signs of hunting (e.g. shotgun cartridges/bullet cases, traps, campsites observed)		

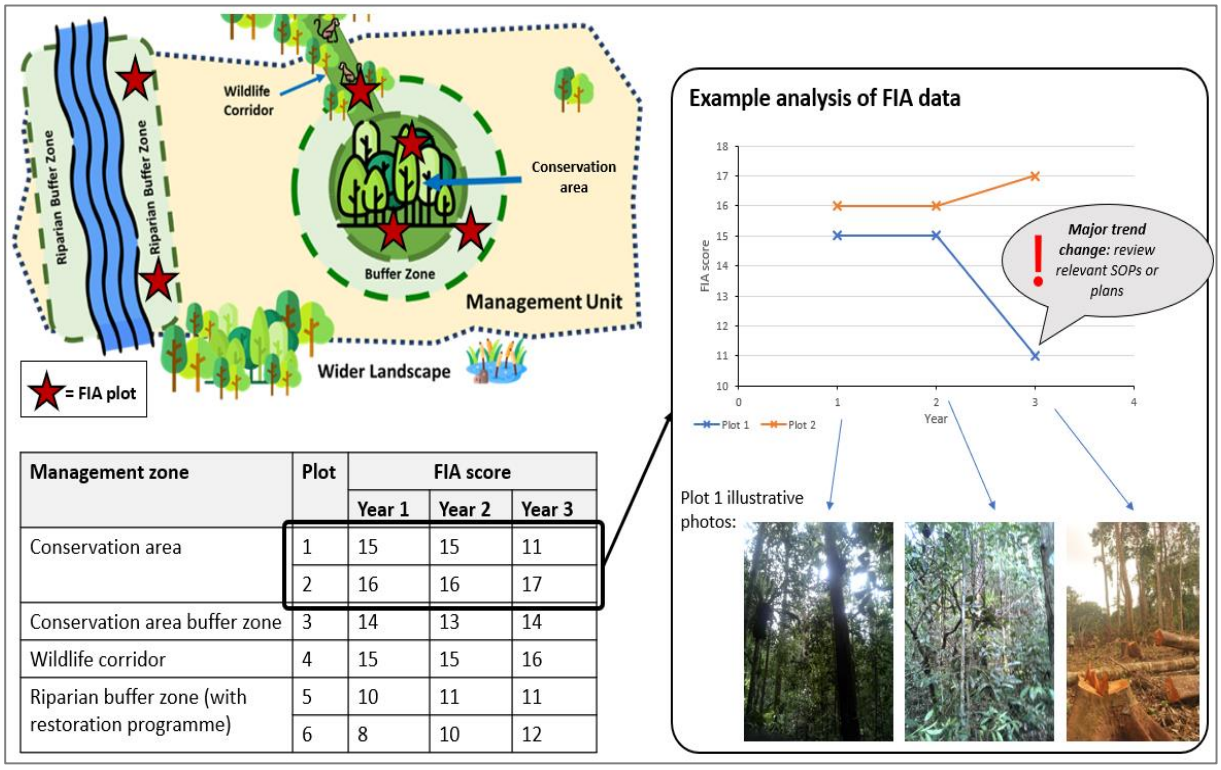
3. Analyse the Data

This is done through simple calculations and analysis:

- Aggregating into a table (ideally a spreadsheet) the scores from all plots in a forest subunit or patch
- Analyse the trends over the time of each patch monitored. Note:
  - Negative trends (meaning when it gets lower and lower) or sudden declines may be cause for concern. In such cases, all field forms should be examined to identify what changes might have caused the scores to drop.
  - In well-managed or well-protected areas there should no decline or even a positive change over time. In contrast to deforestation and degradation (which may be rapid and dramatic), positive changes are likely to be more gradual.

4. Define and Adapt Management Measures

The outcomes of the FIA analysis should then be used to either define the management measures (at the initial stage) or to adapt the conservation and protection measures to improve it (see Fig. 1.12 below). For example, based on re-examining the data sheets and identifying the cause of the drop may inform what management measure may need changing (e.g. if logging: more frequent or targeted patrols and blocking of entry routes)



Management zone	Plot	FIA score		
		Year 1	Year 2	Year 3
Conservation area	1	15	15	11
	2	16	16	17
Conservation area buffer zone	3	14	13	14
Wildlife corridor	4	15	15	16
Riparian buffer zone (with restoration programme)	5	10	11	11
	6	8	10	12

Figure 1.12: Illustration of where to place FIA plots, summary results and example analysis

1.2 Wildlife Protection: Management of Wild Primates within Concessions

This sub-topic is intended for plantation company to prepare its wildlife protection plan, with a focus on primates, which are the wildlife of concern in most plantations. This subtopic addresses key steps on how the company can protect wildlife within its concession area and also in the wider landscape.

Maintaining the wildlife may require specific expertise but if this is not readily available a precautionary approach should be taken to minimise impacts on the habitat. This means that the operational activities of the company should minimise negative effects to the habitat, and the first priority is to maintain the habitat/forest area and, where needed, restore the habitat. Ideally, the company should involve wildlife experts when preparing plans for wildlife protection and monitoring and if the company does not have internal experts, the company should consult relevant external experts (Wich & Marshall, 2016).

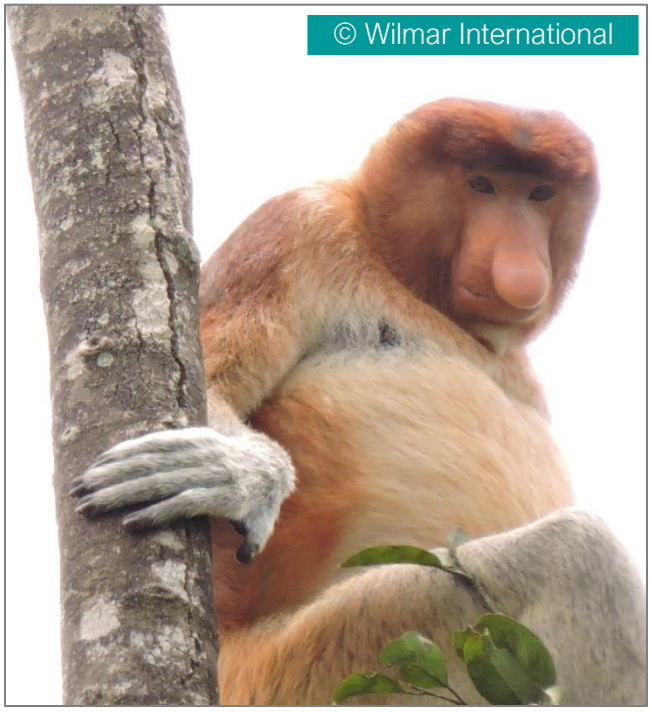


Figure 1.13: A Proboscis monkey in Wilmar's HCV area

One of the wildlife groups that is commonly found inhabiting companies' conservation areas or plantations is primates. There are many cases, such as in Wilmar's estates, where companies can live side-by-side with primates by conserving their habitat, ensuring the feeding and other needs of the primates inhabiting the area can be met, and even collaborating with local communities for primate conservation. This includes primates such as agile gibbons (*Hylobates agilis*), orangutans (*Pongo pygmaeus*), proboscis monkeys (*Nasalis larvatus*) and siamangs (*Symphalangus syndactylus*) (Schapiro, 2017).

Primate conservation is essential because many are facing the threat of extinction, but also because they play important roles in forests for example dispersing the seeds of important fruit tree species for other wildlife and maintaining populations of these tree species. Primates such as gibbons, proboscis monkeys and orangutans are also iconic species, part of the natural heritage of Malaysia and Indonesia and protected by law.

These species are popular attractions for tourists, and by protecting them in estates, it can contribute to maintaining healthy populations of the species including in neighbouring protected areas or forest areas.

Certain primates such as orangutans and gibbons are declining due to hunting, disease, climate change, fragmentation of their habitats due to human activities, etc. Therefore, it is important for companies to be aware of the existence of primates in their area and maintain or increase the quality of their habitat to protect these species.

This subtopic will serve as a guidance specifically on management and monitoring of wild primates. This guidance is also developed as a reference to be utilized by both newly developed plantations and existing plantations.

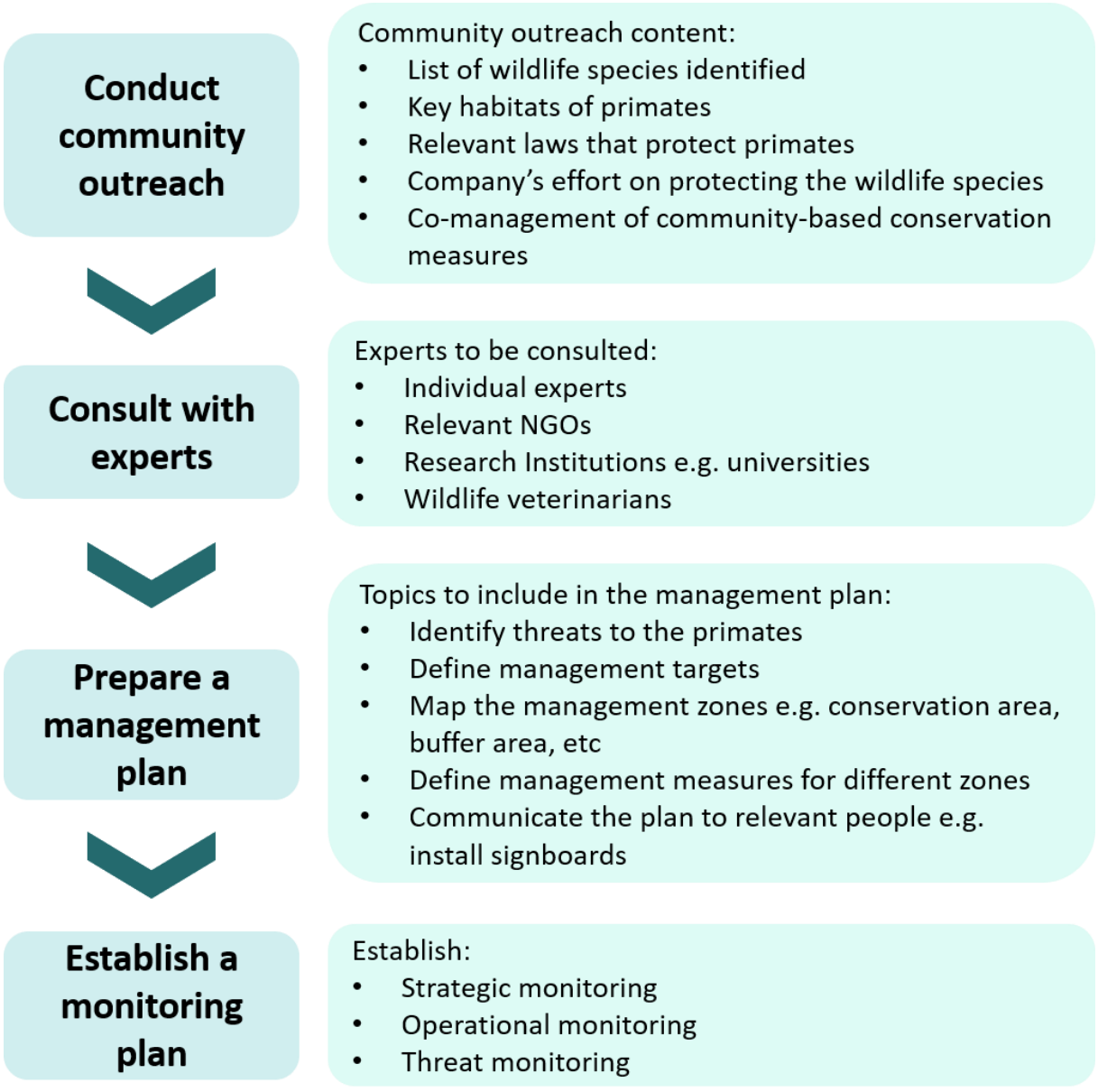


Figure 1.14: Flowchart for the management and monitoring of primates within the concession area

Step 1: Conduct Community Outreach

Community outreach is an essential activity and not limited to local communities but includes company workers. This activity is considered as a preventive action from the company to minimize the external threats to wildlife. The content of community outreach includes:

- List of wildlife species identified within the concession area
- Key habitats of primate species within the concession
- National laws that regulate wildlife protection e.g. hunting and possession of primates (infant and adult) prohibition (Yuwono *et al.*, 2017)
- Company's effort on protecting the wildlife species
- Discussion and mutual agreement on co-management or community-based conservation measures (see Module 1).

Step 2: Consult with Experts

Depending on the species present and the size/type of conservation area, specific management requirements may be needed. For example, if a gibbon or orangutan population is present in a very small, isolated forest area keeping the area as a no-go area may not be enough for the population to survive over time. Therefore, as a precautionary measure if the company has rare or threatened primates in their plantation, they should consult with one or more experts and relevant government departments on specific management requirements for the primate identified. An expert can be:

- Individual experts
- Non-governmental organizations that work on the identified wildlife species, e.g. Sumatran Orangutan Society, Kalaweit Foundation, PONGO Alliance, HUTAN, Wildlife Conservation Society (WCS)
- Research institutions such as universities, for example, in Indonesia: Universitas Nasional's Primate Research Centre, and Prof. Supriatna from the Research Centre for Climate Change, University of Indonesia; and in Malaysia: the Primate Research and Conservation Group of Universiti Sains Malaysia (USM) and the Unit for Borneo Primate Studies of Universiti Malaysia Sabah (UMS).
- Wildlife veterinarians

Government agencies such as Balai Konservasi Sumber Daya Alam (BKSDA) and Indonesian Institute of Science (LIPI) for Indonesia and Sabah Wildlife Department, Sarawak Forestry Corporation, Department of Wildlife and National Parks (DWNP) Peninsular Malaysia for Malaysia.

Step 3: Prepare a Management Plan

Develop a management plan, often with the support or direction of the identified expert, which includes:

- **Identify threats to the primate** – the company is recommended to identify the internal and external threats for specific primate and its habitat. By identifying threat, the organisation can further develop threat monitoring to minimise the occurrence of disturbance, and also will be better able to define appropriate management targets and actions. As an example, a threat to the primates is hunting, encroachment, and land clearing (Schapiro, 2017; Yuwono *et al*., 2017) that could be managed by monitoring protocols and SOPs.
- **Define management targets** e.g. all primate habitats are maintained as conservation areas; primate population is maintained or increased.
- **Map the management zones.** Based on expert consultation, the key habitats of the primates e.g. nesting sites (in the case of orangutan), feeding sites etc. should be identified and mapped. The conservation or set-aside area is usually an HCV 1 Area and Management Area. This may include a block of forest and/or the river buffer zone, and these are the most critical areas to protect to maintain the primate population. Buffer zones (which can be considered to be HCV 1 Management Areas) can also be designated between conservation area and plantations that can provide additional protection. Buffer zones can reduce the risk of primates entering plantation area, reduce the risk of primate-human conflict and also to minimise disturbance of primates by plantation activities (e.g. pesticide application or harvesting).
- **Define management measures** for the conservation area, buffer zone and if needed the wider plantation (see section 4.1). For example, hunting of primates should be banned throughout the concession, the conservation areas should be no-go for plantation activities and with perhaps only limited community activities (such as NTFP collection).
- **Communicate the wildlife management plan** to workers, local communities and other relevant staff or contractors. This could be done through briefings for workers, community consultation sessions and the installation of signboards to inform workers or other stakeholders passing by about the conservation or buffer area, and the do's and don'ts. Wherever possible, the company should socialise the wildlife management plan with the hunters and community in general and persuade them to cease hunting of the primates (Brown & Senior, 2014).

Step 4: Establish a Monitoring Plan

Once a wildlife management plan is in place, the company should establish a monitoring plan which includes:

- **Strategic monitoring** – aimed at assessing whether the population of wild primates are maintained by conducting species population surveys at certain time intervals e.g. annually. It may be necessary to seek support from third party experts to conduct the population surveys as the methods used often require specialist knowledge and equipment (see section 1.3). For example, techniques such as nest surveys for orangutans or audial/song surveys for gibbons/siamangs. In addition to population surveys, the company also needs to assess whether the conservation area is still suitable for these primates to inhabit. The company can monitor whether the food plants/food trees of the primates are present and are sufficient for their nutrition. If not, the organisation may consider restoration or enrichment planting of food source species/trees.
- **Operational monitoring** – the company is expected to develop a patrol schedule and then monitor that this schedule is being followed. This wildlife warden or estate manager may be responsible to check that the patrolling team are following the schedule. The patrolling team should also check that signboards or other operational measures remain in place.
- **Threat monitoring** – following the threat identification (see Module 1), the company should develop threat monitoring protocols including patrols. For example, if the company identifies hunting activities as a threat, the monitoring patrols should include protocols targeted at hunting including identifying signs of hunting or trapping (bullet casings, snares etc.) and focus on areas where hunting is known to occur. In addition to patrols, it is recommended to conduct community interviews to obtain information on encroachment, hunting etc.

Image: Wilmar's Conservation teams are trained to conduct HCV Monitoring | Sabahmas Estate - Malaysia

Case Study

Management and Monitoring of Biodiversity through Partnerships in Sumatra and Kalimantan in Indonesia

Relevant Topics: Biodiversity Protection and Forest Monitoring

Location: West Sumatra (PT KSI) and Central Kalimantan (PT RHS)

Key Stakeholders: Kalaweit Fdoundataion – *ex-situ conservation*

ZSL – *application developer*

Background:

In 2014, Wilmar initiated a collaboration with the Kalaweit foundation; an organisation that focuses on gibbon conservation and protection. As an effort to enhance the value of an HCV area, PT KSI collaborates with Kalaweit Foundation in developing ex-situ conservation of siamang *(Symphalangus syndactylus)* within the concession area. The methodology used by Kalaweit was to first develop a temporary cage for the siamang to get familiar with the caged environment. Kalaweit team provided feed for the siamang and stimulated them to reach for fruits from the upper side of the cage until they were capable to feed themselves with available resources within the cage range. Although the initially the siamang will have to adapt to the new environment, newborns will have natural instincts. Wilmar's HCV team is responsible for conserving the HCV area and minimise the risk of encroachment while Kalaweit foundation ensures that gibbons remain healthy and with a normal behaviour. To date, Kalaweit Foundation monitors the 21 siamang individuals in two HCV sites within PT KSI covering approximately 1,000 hectares of land. As this collaboration has led to positive impacts, PT KSI plans to expand the project to other HCV areas to be utilized as ex-situ conservation.

On the other hand, PT RHS has initiated a partnership with an external party. In 2012, PT RHS decided to improve their monitoring activity by using SMART technology. PT ZSL assisted the company including setting up the system and provided training for their staff. The utilization of the SMART system allowed PT RHS to automatically generate reports after inputting data to the system. The SMART system is used not only for monitoring activities, but also as a database for biodiversity in PT RHS. The database can be used for internal planning. This system increases the efficiency of monitoring and facilitates the task of developing a field report. PT RHS is currently still using the system and has been involved in several improvements of the system from the day it first was implemented.

Case Study
(Continued)

Enabling Factors:

- Both PT KSI and PT RHS are relatively open for collaboration with external parties as long as the output of the collaboration is to increase and maintain the value of HCV.
- PT KSI organised outreach activities with local communities to raise awareness about the importance of maintaining the HCV area and inform about the project.
- In PT RHS, the management provided training for the application of the SMART system led by ZSL. The management team is also involved in any development of the system and always update the staff regarding new features, etc.

Challenges:

- In PT KSI, the internal challenge for the development of ex-situ conservation with Kalaweit Foundation is the inability of the siamang to compete with other primates such as *Macaca fascicularis* and *Macaca nemestrin*.
- The competition between these primates could lead to the siamang getting injured and behavioral changes.
- An external challenge is encroachment by local communities.
- In PT RHS the challenge is that the field staff is still using physical forms to record data from the field. The utilization of the SMART mobile app will provide real-time monitoring data and minimize input error. However, upgrading the service into mobile monitoring means additional investment and training.

Lessons Learnt:

- Before releasing the siamang, Kalaweit Foundation conducted a suitability assessment. This assessment included: range capacity, stratification, conflict risk and food resource availability.
- SMART has been proven to be a very useful tool for biodiversity monitoring. It also saves time in reporting.

1.3 How to Initiate a Third-Party Collaboration Programme on Wildlife Monitoring

Wildlife monitoring, or biodiversity monitoring as a whole, can be a resource-intensive activity for a plantation company to undertake on its own. Furthermore, it requires expertise in specific topics, depending on the biodiversity values that are present within the plantation area and the surrounding landscape. Even for larger plantation companies, it is not feasible to have all the expertise in-house as the scope of knowledge can be very wide and some topics may require many years of experience.

As has been explained elsewhere in this manual, there are three main types of monitoring (operational, strategic and threat). Operational and threat monitoring are usually undertaken by the plantation company as they are relatively straightforward and can be more easily integrated into the company's operational activities. However, strategic monitoring is usually more challenging for the company as it is about measuring the outcome of management actions. This requires a longer-term effort with time inputs from dedicated personnel who are unlikely to also undertake more operational activities. In the context of biodiversity conservation, the strategic monitoring involved would be about whether the conservation outcomes have been achieved, e.g., what is the status of the targeted wildlife species (is the population declining, increasing or maintained?) or what is the condition of the wildlife habitat (is the forest quality improving, deteriorating or maintained?).

Assessing the condition of habitat may be possible in-house if the company has a GIS and field team by combining satellite imagery to assess forest quality and using field tools such as the FIA (section 1.1). However, in many cases it may be more cost-effective for strategic wildlife and habitat monitoring to be undertaken by an external/third party with the relevant expertise, such as a research institution, university or conservation NGOs and in collaboration with government agencies (e.g. DWNP in the case of Peninsular Malaysia, Sabah Wildlife Department in the case of Sabah and BKSDA in the case of Indonesia). An example of such a third-party collaboration is described in the case study below.

This section of the manual provides the key steps that are relevant when initiating a third-party collaboration programme on wildlife monitoring.

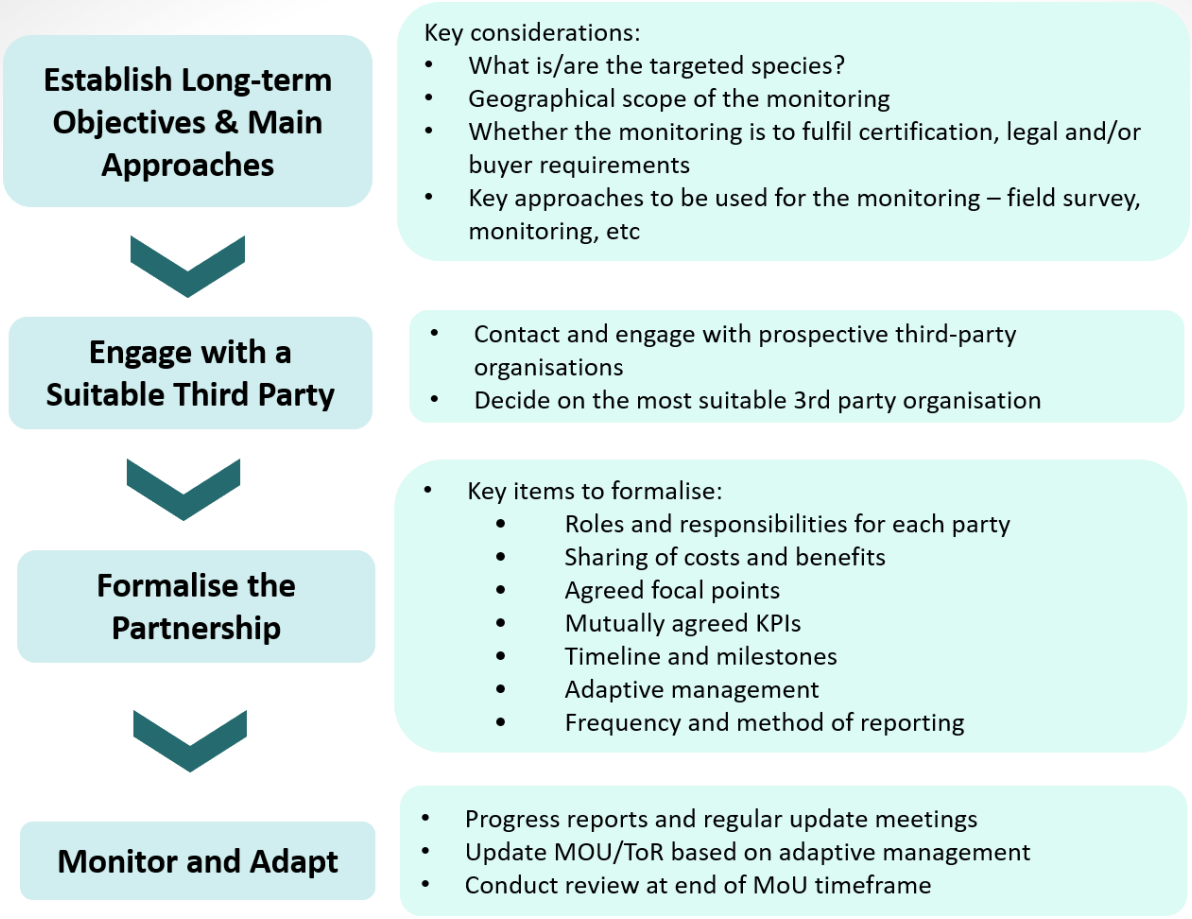


Figure 1.14: Flowchart for initiating third-party collaboration programmes on wildlife monitoring

Step 1: Establish the Long-Term Objectives and Main Approaches of the Wildlife Monitoring Programme

Before embarking on a biodiversity monitoring programme with a third party, the company should deliberate on the long-term objective of wildlife monitoring and key approaches to be used, taking into consideration the following:

- What is / are the targeted species (e.g., orangutan, Malayan tiger, rhinoceros, hornbill etc.)? If the target species are these types of rare or protected species then third-party expertise may be needed
- What is the geographical scope of the monitoring, whether it is only within the HCV/conservation area(s), throughout the plantation, or including the surrounding landscape (e.g. on other plantation companies land or government land). If the scope is only within the companies land it may be more feasible to conduct the monitoring in-house but the larger the area to be monitored the more likely external expertise is needed

- Whether the monitoring is to fulfil certification requirements (ISPO, MSPO, RSPO etc.), legal requirements, or to meet requirements of the buyer or certain palm oil markets, or a combination of the above. Check the requirements of these schemes or legislation in terms of what data needs to be collected
- What are the available resources for the wildlife monitoring programme in terms of the budget, staff availability, equipment and materials needed etc.
- What are the key approaches to be used for the monitoring – field surveys (using camera traps, sign surveys, or a combination?), remote monitoring (using satellite or drone imagery) etc. If the company is not sure you can seek advice from the expert.

Step 2: Engage with a Suitable Third-Party with a Common Objective

Once the plantation company has established the key objectives and main approaches, it can proceed to contact and engage with prospective third-party organisations or collaborate with government agencies, ensuring the approaches are in line with national regulation. As with the procurement of other goods and services, it is usually beneficial to explore a few options before deciding which organisation is the most suitable. A key consideration is whether the organisation has a shared objective in terms of the wildlife species to be monitored, the location of the monitoring/their personnel, their experience doing similar work, timelines etc. It is likely that the third party may have their own objectives (e.g. organisational KPIs in terms of number of partnerships established, number of research projects implemented, number of MSc. and PhD. students produced etc.) and usually this would not be a major issue as long as there is strong alignment with regard to the common objective.

Step 3: Formalise the Partnership with the Third-Party

As the engagement with the selected third party reaches a more advanced stage, it is a good practice to have a formalised arrangement on how the plantation company and the third party will work together in implementing the wildlife monitoring programme. It is good practice to have a Memorandum of Understanding (MoU) or a Terms of Reference (ToR) to provide a framework for an effective collaboration between the two parties. The key contents of the MoU / ToR should include the following:

- Roles and responsibilities for each party
- Sharing of costs and benefits
- Agreed focal points of contact for each organisation
- Mutually agreed key performance indicators (KPIs) or outputs
- Timeframe for the MoU/ToR and a specific timeline for key milestones or deliverables
- Adaptive management *(see Step 4)*
- Frequency and method of reporting *(see Step 4)*

Step 4: Monitor and Adapt the Collaborative Programme

Progress reports should be prepared by the third party and/or regular meetings should be conducted between the two parties. Through the progress meetings/reports, any deviation from the agreed monitoring programme or delays could be discussed and the root causes identified. Corrective measures could be formulated to ensure that the objectives remain on track.

As mentioned above, there should be flexibility within the MoU/ToR to allow for adaptive management in case there are unforeseen changes that impact on the monitoring program. For example, there could be an increase in hunting of the wildlife being monitored and therefore the monitoring could be refocused towards detecting the presence of hunters (i.e. threat monitoring) or the collaboration may decide to initiate new community engagement activities to raise awareness, or the wildlife may be discovered to be more common in a different location from the agreed monitoring sites requiring the survey design to be changed.

A review of the monitoring programme should be conducted at the end of the MoU/ToR timeframe in order to evaluate the overall success of the wildlife monitoring programme (i.e. whether the KPIs/ outputs have been achieved) and also document what worked and what didn't work and why. Based on this evaluation, a bilateral decision can be made on whether the collaboration should be continued through the renewal of the MoU/ToR with improvements (if any) on specific terms and conditions.

Case Study

Collaborative Biodiversity Monitoring at Wilmar Oil Palm Plantations in Miri, Sarawak in Malaysia

Relevant Topics: Biodiversity Protection and Forest Monitoring

Location: Saremas 1, Saremas 2 and Segarmas Estate in Miri Division

Key Stakeholders: Universiti Malaysia Sarawak (UNIMAS)

Background:

Wilmar has a long-term collaboration with UNIMAS since 2013 to conduct biodiversity monitoring (including camera trapping for monitoring mammals) at its estates in the Miri Division in Sarawak. The collaboration was initiated by Wilmar and involved the signing of two Memoranda of Agreement (MoA), the first of which covers the period of 2013-2016, followed by a second MoA covering 2018-2020. There is also a Memorandum of Understanding (MoU) covering a period of five years overlapping the two MoA. The MoU and MoA provide the framework for the collaboration between Wilmar and UNIMAS including the resources contributed by each party. For example, Wilmar covers the costs for fieldwork, travel research consumables, and the salaries of contract researchers directly engaged in the project. On the other hand, UNIMAS provides scientific expertise for research and monitoring activities without charging consultancy fees, and also conducts capacity building activities for Wilmar staff.

The biodiversity monitoring sites consist of three High Conservation Value Areas (HCVAs) that are located within the estates of Saremas 1, Saremas 2 and Segarmas. Bukit Durang is the largest HCVA measuring 989.9 ha, the Segarmas HCVA is 147.9 ha and the smallest is the Saremas 1 HCVA at 116.3 ha (see accompanying map). These forested areas are designated as HCVAs as they contain substantial proportions of remnant native biodiversity. The HCVs are managed by Wilmar's Eco Management Unit (EMU) under the Sustainability Division and financed by the individual estates. A total of 25 mammal species have been recorded, including the rare marbled cat *(Pardofelis mamorata)* although this species was not detected during the latest monitoring survey. The Sunda pangolin *(Manis javanica)* and Malayan sun bear *(Helarctos malayanus)*, are other species of high conservation importance. Biodiversity monitoring indicates that the HCV areas in Wilmar's plantations in Sarawak sustain some species of high conservation importance and therefore existing HCV management and monitoring tools should be continued.

Case Study
(Continued)

Enabling Factors:

- Although both parties were motivated by their own objectives (Wilmar was motivated by RSPO compliance and UNIMAS by their policy on industry collaboration) there were benefits for both parties: Wilmar found it more cost-effective to outsource the biodiversity monitoring and UNIMAS benefits from the access to Wilmar's HCV areas for its research.

Challenges:

- Having an external party conducting the biodiversity monitoring resulted in additional responsibility for Wilmar staff in arranging for the logistics and ensuring safety of the UNIMAS researchers.
- There were opportunity costs for Wilmar when the staff were diverted from their usual tasks.
- When the collaboration began, there was a lack of clarity on the roles and responsibilities for each party, especially on the level of on-site support to be provided by Wilmar.
- The scope of biodiversity monitoring and research had to be reduced for the second MoU partly due to funding availability.

Lessons Learnt:

- The MoA and MoU provided a framework for an effective collaboration between the two parties, especially on the roles and responsibilities for each party.
- In order to maintain the quality of the outputs, it was necessary for Wilmar to be more selective in approving research/monitoring projects during the second MoA period.
- Based on the experience of this collaboration and the Wilmar-SEARRP collaboration in Sabah, a more effective management system was developed. Lessons learnt were incorporated into the second MoA including on cost sharing and on agreed outputs.
- It is beneficial to have focal points of contact for each organisation.
- KPIs or outputs should be set in the MoU/MoA, and the continuation of the collaboration should be based on the delivery of these KPIs/ outputs.
-

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MODULE 2

Balancing Community Needs and Forest Protection

2.1 Community Awareness Raising and Engagement Strategy on the Importance of Conservation

This module provides a simple approach and process flow for the company to start the journey from engaging with the community, to increasing their awareness on the importance of conservation values, and to getting them involved as part of the collaborative efforts to manage these values together and minimise potential encroachment issues. Note that this guidance does not cover wider community engagement that is also covered under Wilmar's policy, such as applying FPIC for all company operations and other community incentives.

Figure 2.1: Flowchart for community engagement to increase awareness on the importance of conservation values, and involvement in collaborative efforts for the management of values.

In most places where oil palms are grown, local communities and indigenous peoples have traditionally used land, water or other natural resources in or near plantations for generations. This means that working with these communities and respecting their customs is crucial for a good working relationship and to be able to deliver "no deforestation" commitments and minimise land and resource use conflicts. The senior management of the company should assign a team tasked with community engagement to follow these steps. These staff should work directly and closely with staff responsible for conservation (if they are part of a separate team).

Step 1: Know the Specific Conservation, HCV and HCS Values within your Plantation

In order to raise awareness, it may not be sufficient to just give general awareness of the conservation value to the community. All the specific values present need to be identified and then prioritised for the purpose of creating a simple presentation when raising awareness. Ideally, the company should have conducted a baseline assessment such as HBV, HCV, HCS or EIA, AMDAL assessment where conservation values and conservation areas have been identified and that the company should base their plans and engagement on.

Conservation values and areas that overlap with community land or traditional activities (such as hunting, fishing or farming) should be prioritised for engagement with communities. It is common for some areas to have multiple values, for example, a forest may support protected animal or tree species but also be used by the local community for harvesting timber. This means that community activities sometimes conflict with conservation objectives – this does not mean that communities should be excluded from these areas, but the company should prioritise engaging with the community to raise their awareness on these values and then develop mutually agreed plans with the community for managing these areas/values.

Step 2: Know your Staff and Workers

In order to increase awareness of the surrounding community, it is critical to first ensure awareness raising is conducted for the company's own staff and workers. Often workers are part of the local community, which means that raising awareness of workers can be a good way of spreading awareness into the wider community, as workers can be ambassadors to share the knowledge with family and community members. Also, some company activities may pose a threat to conservation values or areas if appropriate SOPs are not followed, so it is important to identify possible internal threats and then train relevant staff on SOPs to minimise threats, e.g. limiting chemical use in buffer zones or ensuring no hunting in the plantation.

Step 3: Know the Community surrounding the Plantations

Before engaging and starting awareness raising with communities, ensure you have sufficient knowledge of the communities' demographics, culture, sub-groups, and social interactions. If not, it may be necessary to conduct social mapping first[14]. This is especially useful to identify community sub-groups that could potentially help support conservation efforts, but also to identify sub-groups that may pose threats to conservation areas or values. A key approach is to search for cultural references or values within the community that have potential to support the company conservation program e.g. the Ninik Mamak tradition where communities (considered as nieces and nephews) are quite obedient to the instruction from the head of the tribe; *Lubuk Laranga*n for water bodies; *Pohon Keramat* for certain protected tree species; tradition to always left a bit of the honey nest when extracting honey, etc. On the other hand, the company should also take note of other community values that are not in conflict with conservation values so that the company take measures to respect and maintain community use of those values.

Sometimes, there will be conflict between a few sub-groups of the communities with the conservation values e.g. communities who want to have a schemed smallholders programme at a forested (HCS) location'; communities who consider orangutans, bearded pigs or elephants as pests at their own oil palm oil estates.

Hence, the companies should ensure these issues are properly discussed: dialogue and awareness raising must be the starting point to identify possible solutions for addressing conflicts. For example, by explaining that:

- If the forest is cleared, the company would receive backlash or even risk being suspended by the buyer and downstream customers due to violation of those companies' own commitment and policy.
- Forest areas play an important role in providing services such as clean water (for drinking, domestic use or fishing), maintaining water flow and avoiding drought during dry periods, and protecting soils against landslides and erosion (which also effects water quality). If the local community is using the forest, they may already recognise these values but if there is not much forest remaining it might be important to share stories from older generations when more forest was standing.

By maintaining the conservation area and sources of food inside the plantation and the wider landscape, it will reduce the incident of orangutans entering plantations in search of food such as oil palm seedlings or seeds.

[14] Social mapping in this case is a development of a community profile to identify all sub-groups. Then identify which one could potentially support conservation efforts, and which may pose a threat. This can be done through discussion with the head of the village or village representative that understands the social, economy, and political dynamics within the village.

Step 4: Prepare the Awareness Raising Materials accordingly

The company's community engagement team should prepare the relevant awareness materials (culturally appropriate, simple/easy to digest, avoid complicated or technical phrases, terms or references) as follows:

- Clearly explain the objective of the meetings or training with the community. Communicating clearly on the objective is important because sometimes the communities would use the opportunities to raise their grievance which may be related/unrelated to the conservation values. While such grievance is also important, the meeting may not be the forum to discuss such grievances and the company should organise separate meetings to discuss community grievances.
- When explaining each specific value, it is useful to share actual photos where available, the plantation's management zones on large printed maps, and information on the size of relevant areas, etc. (any information which is not confidential). While doing so, ask participants to also recall the condition of that conservation value in the past to help understand any changes or losses. Does the community have any cultural values or practices (whether present or diminishing) that can support maintenance of conservation values? Ideally this exercise should be conducted at the start when a plantation is first planned and during the HCV-HCS assessment and FPIC[15] process. However, even for established plantations it is useful to reflect and discuss whether and how they can better protect that value in the future, for example, by regulating hunting or logging by the community and exploring whether alternative sources of fuel, timber or food can be provided. Should there be any existing conflict with local communities, companies should aim to resolve the root cause of the issue through a proper conflict resolution process.
- The company will need to discuss BEFORE engaging the community what incentives or alternatives they are prepared to provide: for example, it is not uncommon to provide alternative building materials purchased by the company (e.g. zinc roofs, timber purchased from other legal sources). The company should be careful not to imply financial incentive unless this is a genuine option as that may raise unrealistic community expectations. Instead, prospects of alternative livelihoods (e.g. non-timber forest products, fish farming employment as forest rangers/wildlife warden) can be used as a form of incentive. See box below for more information on incentives.
- Ensure that the discussion is interactive and create a safe environment to hear opinions of all different social groups. This may require separate discussions with these different groups.

It is important to ensure that an FPIC process is followed in seeking and agreeing any collaboration with the community[16]

[15] Free, Prior and Informed Consent (FPIC) is a collective human right of Indigenous Peoples and Local Communities (IP/LC) to give or withhold their consent prior to the commencement of any activity that may affect their rights, land, resources, territories, livelihoods, and food security." (Accountability Framework initiative (AFi) Steering Group, 2019)

[16] FPIC Guide for RSPO members. Available at: https://www.rspo.org/articles/download/d57294a05493ff6

Incentives for Communities

Several examples are provided below of where incentives have been created to reach mutual agreement between companies and communities. These demonstrate two objectives, not only to support company conservation effort, but also to ensure improvement of livelihood for the communities, as follows:

- PT Kencana Sawit Indonesia from Wilmar Group has ongoing agreement with the communities of Talao and Sei Kunyit where representatives of the communities are trained and hired as forest rangers/wildlife warden patrolling the HCV areas to prevent any activities that may pose a threat to the HCV attributes within the company concession. See Case Study below for more information and see Module 4 on "Fire Free Village" programmes.
- Tree adoption projects have been growing recently in Indonesia. Example of cases include:
    - Gunung Halimun Salak National Park (https://halimunsalak.org/tentang-kami/kegiatan-pengelolaan/program-adopsi-pohon/) showed how adopters can pay IDR 70,000 for planting and maintenance of trees for five year period: this money is paid to a community fund for community members to conduct planting activities (watering, planting, etc.) and also to support other community livelihood programmes. System is in place to ensure the fund is fully utilized for the benefit of both environment and communities.
    - ASRI (Alam Sehat Lestari) is a not-for-profit organization based in Kayong Utara District of West Kalimantan that have a tree adoption programme. The organization integrates health services with conservation by allowing community members to pay for healthcare using credits from tree adoption whilst also providing native seedlings that can then be planted in the reforestation area in Gunung Palung National Park. This addresses a common problem where community members previously often had to cut down high value trees to be able to pay for healthcare. It has public reporting of their tree adoption programme available at https://alamsehatlestari.org/adopsi-bibit-detail.

The samples above are some of the options that can help company decide which incentives will be suitable for the condition and situation of the conservation area and communities within and surrounding the concession. Incentives options should be developed based on local context and consultation with local communities to achieve the desired outcome.

Step 5: Ensure all Sub-Groups of Communities are involved

In conducting a meeting or training, the company should ensure that all sub-groups of the community are well represented and engaged. Otherwise, conduct a follow up event involving the absentee group(s). Based on the initial engagements, the company should prioritise sub-groups that are more willing or have more capacity to support the company in the conservation activities.

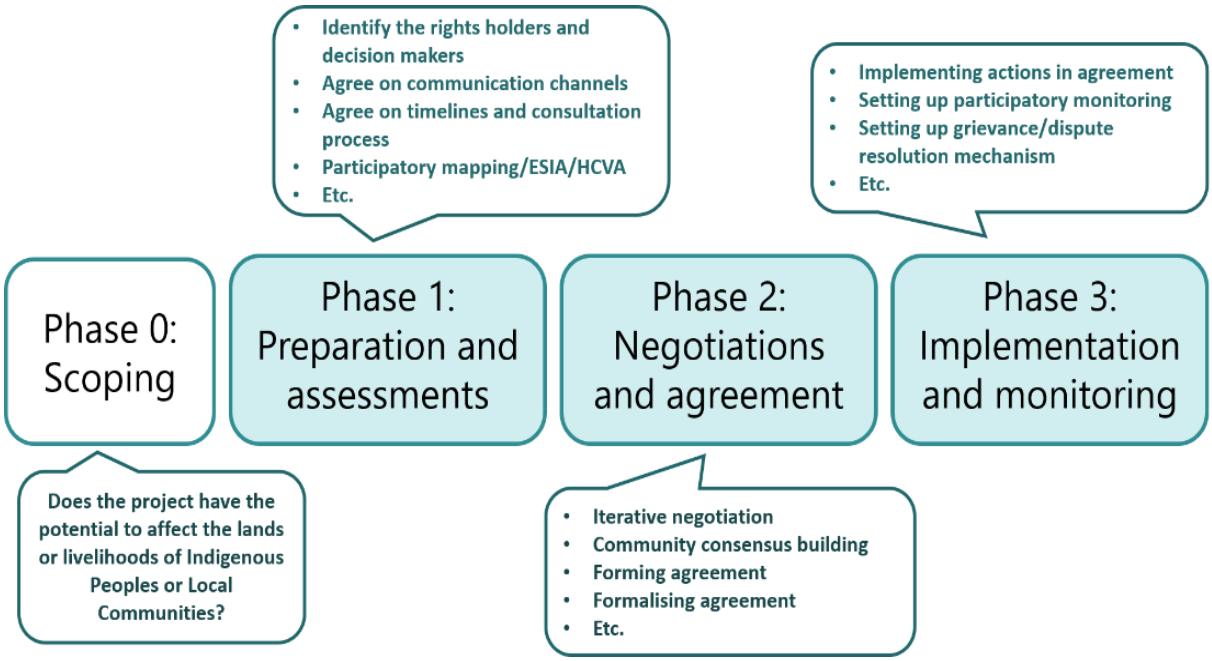

Figure 2.2: Key phrases in the FPIC process

Case Study

Community Involvement in Conservation Activities in Sumatra and Central Kalimantan in Indonesia

Relevant Topics:	Balancing Community Needs and Forest Protection
Location:	West Sumatra – Villages of Talao and Sei Kunyit; PT KSI
	Central Kalimantan – Halmlet of Pondok Aur; PT RHS
Key Stakeholders:	Indigenous Peoples and Local Communities

Background:

As part of Wilmar's NDPE protocol, PT KSI identified the existence of a High Conservation Value area within its concession. This HCV area was surrounded by two villages, namely Talao and Sei Kunyit. PT KSI acknowledged the need to cooperate with these local communities to ensure the protection of the HCV area. After extensive discussions with the community leaders, a number of individuals were recruited from each village to support PT KSI HCV team. These individuals received training regarding HCV assessments and what they needed to know in terms of monitoring and reporting to contribute to the adequate conservation of the site. PT KSI successfully reached out to the community to learn about their necessities (e.g., access to natural resources and need for jobs for members of the community) and came up with a win-win solution for both the company and the communities surrounding the landscape. It is also worth noted that the community representatives during the negotiation are people highly respected and considered as leaders within the community.

Different from PT KSI, PT RHS in Central Kalimantan has a unique approach to involve locals in conservation activities. It was identified that within the PT RHS concession, there is a river that is still used by the Pondok Aur hamlet community for their livelihood (e.g., water supply and fishing). The settlement area of the community is outside of the concession area. However, they still use the river path along the concession to fulfill their needs. PT RHS and the Pondok Aur community had a discussion on conserving the river and riparian area as an effort to maintain the environmental function of the river.

PT RHS organized outreach activities with the Pondok Aur community members to showcase the importance of maintaining HCV sites for their own welfare. After these sessions the company and community arranged a joint monitoring programme of already identified HCV 4 and HCV 5 sites. This regular monitoring resulted in the maintenance of the fish stock as Pondok Aur's source of food.

Case Study
(Continued)

Enabling Factors:

- The purpose of this collaboration was to actively contribute to the conservation of an HCV area. The partnership was initiated by PT KSI and PT RHS through extensive communication with community leaders.
- Involving communities and explaining what activities are compatible with the management of the HCV site have permitted its adequate conservation.
- PT RHS and Pondok Aur community realized that preserving the river would benefit them both.
- Involving community members in conservation activities is crucial to ensure biodiversity conservation including recruiting representatives from villages as done by PT KSI and PT RHS.

Challenges:

- For PT KSI, the internal challenge would be ensuring the recruited representative can undertake their responsibility based on HCV team goals.
- For PT RHS, the challenge would be to avoid outsiders to conduct illegal fishing within the area and or wildlife hunting.

Lessons Learnt:

- In order to effectively engage local communities in conservation activities, taking into account the needs of local communities is key.
- After extensive discussions with local communities, it is possible to find solutions that suit both parties.
- Joint monitoring has been proved successful to enhance fish stock in the river.

2.2 How to Initiate Community-Based Wildlife Monitoring and Patrolling

Getting local communities to be involved in wildlife monitoring is a key strategy especially in plantation locations where communities can exert a strong hunting pressure. Based on Wilmar's experience at its various plantation locations, it is often more effective for local communities to monitor their own hunting activities rather than to rely solely on government authorities to carry out law strict enforcement.

Figure 2.3: Flowchart for initiating a community-based wildlife monitoring and patrolling programme

Step 1: Secure Approval and Commitment from Internal and External Stakeholders

Such a programme is a multi-stakeholder effort and therefore there is a need to secure the support and commitment from the key stakeholders, starting from internal stakeholders. It is crucial for the plantation company to ensure that there is full support from the top management in terms of resources (budget, personnel, equipment etc.).

Where the external stakeholders are concerned, the most important to be engaged are the local communities within or surrounding the plantation area, as well as the relevant government agencies involved in the enforcement of wildlife and forestry laws. The plantation company needs to secure the necessary approval and support from the relevant authorities depending on the location, e.g.:

- Sabah – Sabah Wildlife Department and / or Sabah Forestry Department (SFD)
- Sarawak – Sarawak Forestry Corporation
- Peninsular Malaysia – Department of Wildlife and National Parks Peninsular Malaysia (DWNP / PERHILITAN) and Peninsular Malaysia Forestry Department (JPSM)
- Indonesia – Provincial Nature Conservation Agency or *Balai Besar Konservasi dan Sumber Daya Alam* (BBKSDA)

In Sabah and Sarawak, there are legal provisions for the conferment of honorary wildlife warden or ranger status, and therefore the relevant authorities need to approve the applications of prospective wardens/rangers.

Image: Appointed Honorary Wildlife Wardens conducting roadblocks to enforce conservation laws

When engaging with the local communities, it is crucial to ensure good representation from various segments or subgroups of the local communities. It is insufficient to just involve the official village leaders as they may not always represent the views of everyone in the community. In order to get a more holistic representation from the local community, the plantation company should make the effort to reach out to the different groups within the community (e.g. women, youths, elderly, etc.) – the best approach is usually to organise separate discussions with each group.

Step 2: Organise Training for Local Communities

Once the necessary approval, commitment and support from relevant stakeholders have been secured, the next step is to conduct training for the local communities on wildlife monitoring and patrolling. Suitable and qualified trainers could be sources internally i.e., from the plantation company itself or from external agencies such as:

- Relevant government agencies as described in Step 1
- Wildlife conservation NGOs (e.g. WWF, WCS, ZSL, WRI)
- Research institutions and universities specialising in wildlife and forestry.

The monitoring and patrolling activities may be company or government-led with local community participation, or in some cases it may also be community-led. Based on Wilmar's experience in conducting the Honorary Wildlife Warden programme in Sabah and the Honorary Wildlife Ranger programme in Sarawak, it is important to build a sense of pride amongst the local communities in order to maintain their interest and keep the programme active in the long run.

The plantation company should organise the logistics for the training activities, including the accommodation and food for trainers and participants. Due to the practical nature of the training, it is important that it includes a field exercise, with demonstrations by the trainers and then exercises for the community members to learn how to apply the tools themselves. Where appropriate and where budget permits, an allowance may be provided to trainers and participants.

In preparing the training programme, it is important to ensure that the training activities do not disturb the daily routines of the local community. The schedule should be agreed with community members that will be involved in the training. For example, training activities in the evenings or afternoon may work best as livelihood activities by the local communities are often conducted in the mornings.

Step 3: Implement and Maintain Community-Based Wildlife Monitoring and Patrolling

Once the training is complete, the company and/or other stakeholders (government or NGO) should make necessary resources available to start implementing the community-based wildlife monitoring & patrolling activities, e.g. ensuring allowance or other in-kind payments are available for the monitors.

Depending on the location, the community-based wildlife monitoring and patrolling programme can be focused on enforcement (where the local communities are more respectful of authorities) or emphasise more on awareness and education if a softer approach is needed. Enforcement is usually conducted by the government authorities and the community team involved in the monitoring and patrolling will have to work closely with the relevant authorities when doing enforcement. In some cases, there may be local community courts that could also decide on penalties or other forms of punishment for wildlife-related offences committed by local community members. It is important to ensure that enforcement is carried out through the appropriate channels that are agreed amongst the community members in advance of being implemented. This will minimise the risk of any conflict within the community later.

Furthermore, any patrolling or enforcement-based community-based monitoring should always be combined with wider community engagement and awareness activities let by the company if not community led. This ensures collaboration is mutual and not based on the perception of "us against them".

For some communities, involving more women in the programme can promote buy-in from local communities due to their influence over the household e.g. family diet (including wild meat). The application of technology has also been shown to be an effective strategy, particularly the use of social media (e.g. WhatsApp groups) in communicating and coordinating activities as well as promoting a closer working relationship amongst those involved.

Image: Capacity training for local communities involved in conservation monitoring and patrolling | Malaysia

Case Study

Facilitating Community Participation in Biodiversity Protection in Sabah and Sarawak, Malaysia

Relevant Topics:	Balancing Community Needs and Forest Protection Biodiversity Protection and Forest Monitoring
Location:	Wilmar Estates in the States of Sabah and Sarawak
Key Stakeholders:	Indigenous Peoples and Local Communities Sabah Forestry Department Sarawak Forestry Corporation

Background:

Getting local communities to be involved in wildlife monitoring is crucial, especially in plantation locations where communities can exert a strong hunting pressure. Given that the estates border Protected Areas and local villages, conservation awareness programmes are important to ensure the protection of on Rare, Threatened and Endangered (RTE) species. In response to this, Wilmar started to train its first batch of Honorary Wildlife Wardens in 2012. As of the mid of 2021, Wilmar had 42 Honorary Wardens in Sabah and 36 Honorary Rangers in Sarawak involving staff, workers and local communities and out of this, 9 are women. These rangers and wardens are empowered to stop any illegal wildlife activity, and perform regular patrolling, setting up roadblocks and engaging with local communities to ensure the HCV areas are protected and managed. Overall, the programmes have been well received and the response has improved over the years.

In Sabah, the programme started in around 2012-2013 with the first batch of Wilmar staff undergoing training as Honorary Wildlife Wardens. The programme was then expanded to a bigger group including local communities in 2018. The programme is particularly active at Sabahmas estate because warden activities are incorporated as part of their daily activities because there is more wildlife conservation projects there. The team's work creates opportunities to engage with local stakeholders, to jointly improve the understanding of biodiversity importance and to inculcate positive attitudes towards conservation and sustainable practices in the oil palm sector. In 2019, the program carried out extensive engagement in Sabah with more than 1,800 stakeholders in the districts of Sugut, Labuk and Segama, together with the Sabah Wildlife Department (SWD), and NGOs like HUTAN and Bornean Sun Bear Conservation Centre (BSBCC). The programme activities included talks, exhibitions and games that conveyed information on the conservation of RTE species such as orangutan.

Case Study
(Continued)

In Sarawak there are 4 groups, with each group having one major activity each year. The Wildlife Rangers Programme in Wilmar's Sarawak plantations works with long house communities on conservation awareness and understanding. The approach involves seven local community members as rangers, to increase direct involvement in biodiversity conservation. The success of the Honorary Rangers programme has also led to the rangers becoming trainers for Forest Management Units in the state, specifically in sharing experience on how to set up similar programmes. In Sarawak, the Honorary Rangers programme started around 2014 when Wilmar approached the Sarawak Forest Corporation to do the training for their staff. The programme started with a big group of people including representatives from longhouses.

Enabling Factors:

- Top management commitment within Wilmar is critical in ensuring the success of the programme through demonstrating leadership by example.
- The programme was aimed at not only educating but also to build a sense of pride amongst the local communities to be protectors of wildlife which in turn generated interest amongst the community.
- Participation in the training sessions incurred minimal if any cost to the trainers and participants who were provided with accommodation, food and in some cases even an allowance. In addition, training activities were conducted in the evening not to disturb daily routines.

Case Study
(Continued)

Challenges:

- Hunting is a traditional activity and part of the culture of these communities (some of the participants were even involved in hunting activities).
- Strict enforcement of wildlife laws by an external party (e.g., Wilmar) was shown to be not very effective, especially in Sarawak.
- Raising awareness amongst the younger generation was more challenging than expected.
- In locations where the local communities are scattered e.g., in Sugut, it was difficult to group people together for the programme.
- How to retain the wardens and keep them active.

Lessons Learnt:

- In Sabah the focus of the training was more on enforcement (locals are more respectful of authorities) while in Sarawak the focus was more on awareness and education.
- Getting local communities to monitor their own hunting activities is a key strategy.
- In Sarawak, involving more women as Honorary Rangers can promote buy-in from local communities due to their influence over the household e.g. family diet (including wild meat).
- Utilising social media (e.g., WhatsApp groups) in communicating and coordinating activities is an effective approach.

References / Further Reading

- Accountability Framework initiative (AFi) Steering Group. 2019. Operational Guidance on Free, Prior and Informed Consent. Accountability Framework, viewed 1 July 2020 https://accountability-framework.org/wp-content/uploads/2020/03 /OG_FPIC-Mar2020.pdf

MODULE 3

Management and Restoration of Riparian Areas

A riparian area or zone is the land adjacent to streams, lakes and wetlands which normally encompasses natural or non-harvested vegetation. Well-maintained riparian areas provide multiple environmental and social benefits. For example, when there are heavy rains and the water flow increases, riparian vegetation serves as a buffer mitigating floods and preventing landbank erosion. This riparian vegetation also helps improve water quality by intercepting herbicides and pesticides from agricultural plantations before they reach the waterway which helps protect fish stocks and other biodiversity. Riparian zones are also beneficial to biodiversity conservation, providing habitat for endangered species such as the Asian elephant or proboscis monkey. Maintaining these riparian areas is a legal requirement in many countries (which may even require that these areas are legally constituted as riparian reserves[17]) and also a requirement under certification schemes such as the RSPO.

The first step to planning management and monitoring of riparian areas is to identify the waterways within the palm oil plantation boundaries and its surroundings. The plantation company may already have this information from existing baseline assessments, such as HCV or EIA assessments. If not, they should gather the following information:

- Plantation boundaries
- Maps of rivers and other water bodies (if available, consult the HCV assessment). As a minimum this should include all rivers/streams wider than >1m at their widest point (including those flowing only for a few months in the wet season), and all permanent waterbodies (including ponds / lakes / wetlands)
- Any land or areas gazetted for protection legally including forest reserves, protected areas and river reserves
- Water intake or sampling points (from official site maps or satellite imagery)
- Status of the riparian areas around all identified waterbodies, e.g.
    - Is there forest or natural vegetation buffering the water bodies? If so what condition is this in: no natural vegetation (e.g. plantation to the edge of the water body), very degraded (with only cover crop or small shrubs), partial tree or forest cover, or good quality forest (with larger trees)
    - How wide is the natural vegetation from the edge of the waterbody?

If the company needs to map waterways from scratch, they should start with a desk-based assessment to identify any potential waterways in the plantation area using satellite imagery, GIS data or official government datasets.

[17] A riparian or river reserve is the land adjacent to a river that has been formally declared as protected in national or regional laws.

This exercise should always be followed by a field survey to validate the information and if possible, the plantation company should consult local communities and plantation workers. It is important to accurately map the course of rivers or edge of lakes using GPS so that any riparian areas can be accurately mapped – this minimises the risk of accidentally planting too close to rivers or flooding of planted palms.

The field assessment aims to document all relevant details such as waterways used for water supply and potential sources of threats (e.g. effluents, human encroachment, riverbank erosion, clearing of riparian vegetation, etc.). When visiting the site, the following items are recommended as a minimum:

- Printed site map showing known waterways, plantation boundaries, previously identified conservation areas, HCV areas (if available) etc.
- GPS (or smart phone) to record the location of features or threats identified in the field
- Field notebook to take any additional notes.

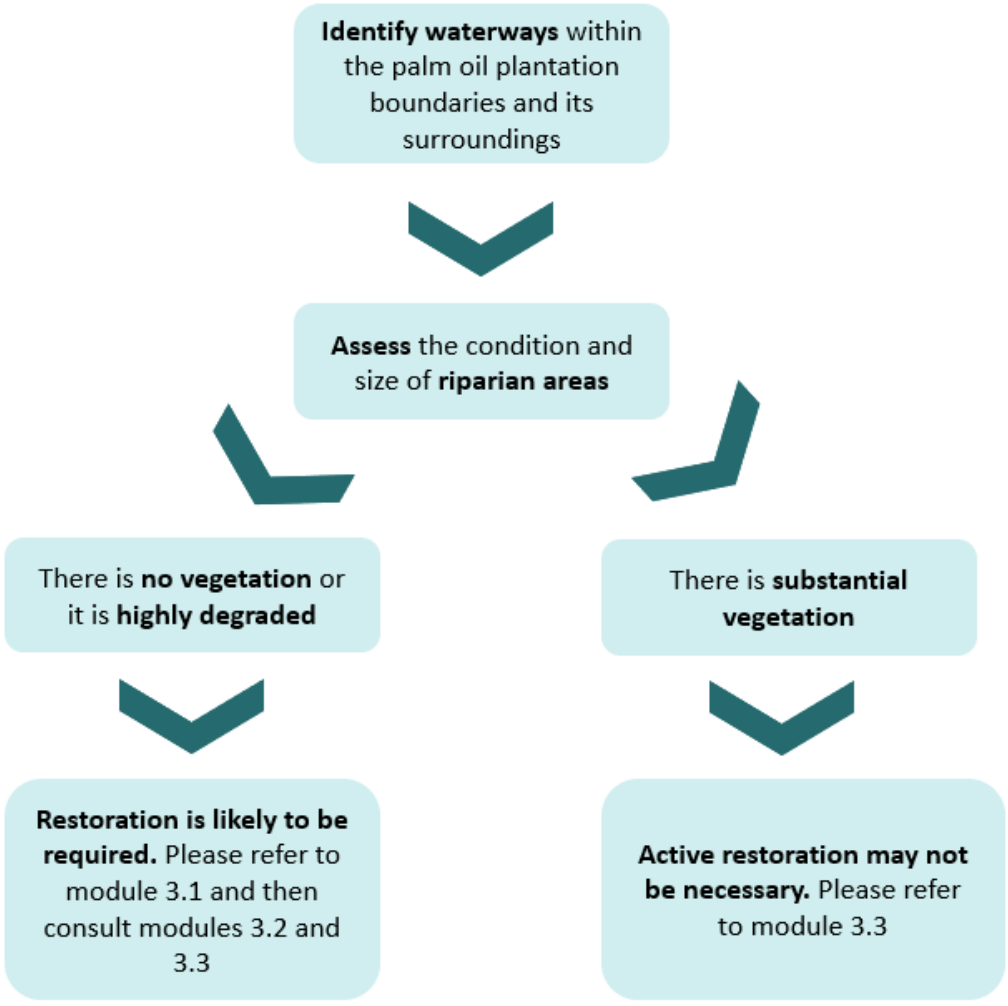

Figure 3.1: Flowchart to support Wilmar suppliers and other growers to decide on the most relevant approach for the conversation and management of riparian areas

Based on this assessment, the company should then have a good picture of where the main waterbodies are and the condition and size of any riparian areas (also see section 3.1, step 1). Based on this they can decide what the next steps are for riparian management and monitoring, for example:

- For waterbodies with no or very degraded riparian buffers/areas → restoration is likely to be required – see sections 3.1 and 3.2 (followed by section 3.3)
- For waterbodies with substantial natural vegetation around them → see section 3.3.

3.1 How to Initiate a Restoration Project at a Riparian Buffer

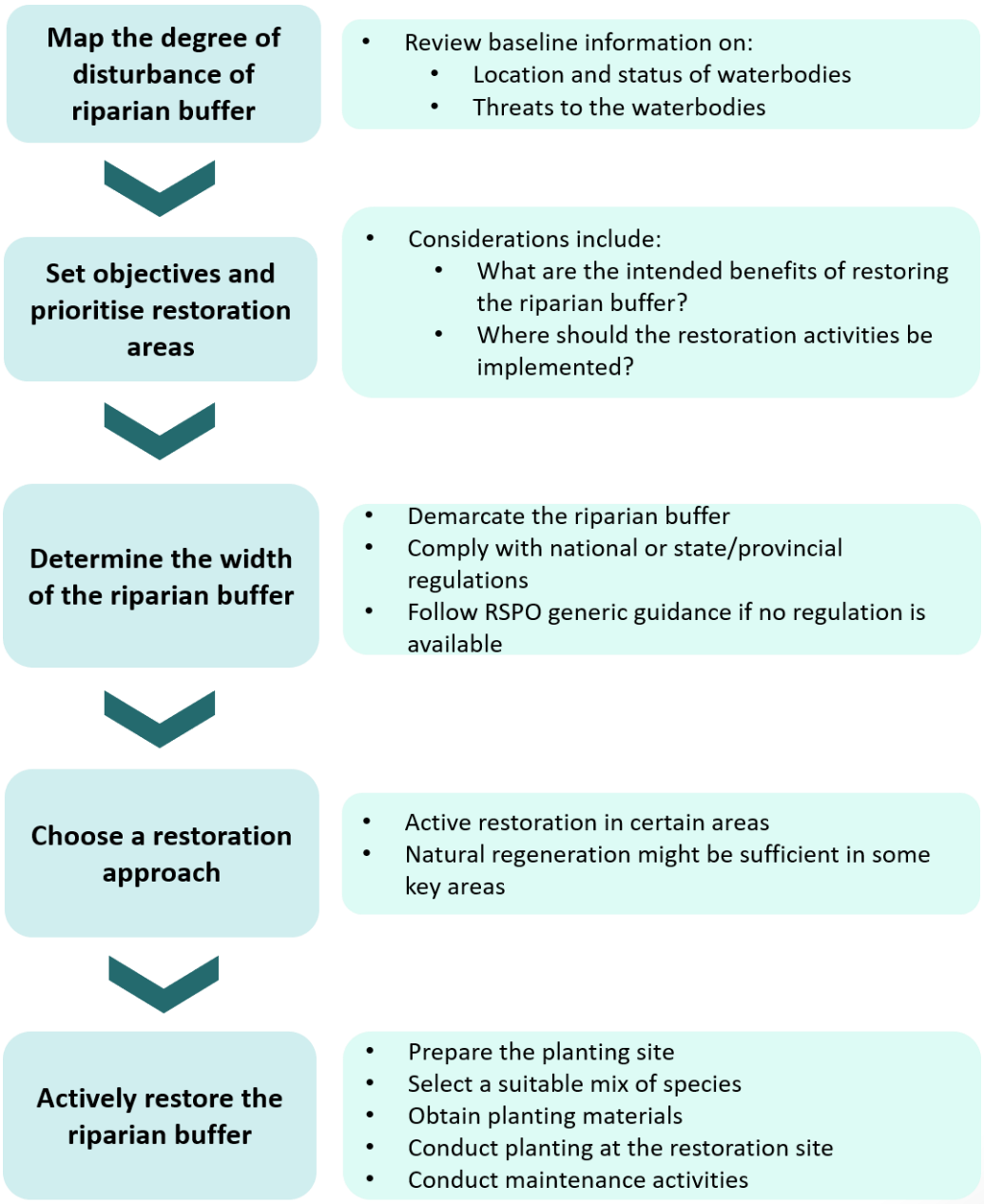

Figure 3.1: Flowchart for initiating a restoration project at a riparian buffer

Step 1: Mapping the Degree of Disturbance of Riparian Buffer and Identifying Threats

Prior to initiating a restoration project at riparian buffer, it is necessary to review the baseline information on:

- The location of the waterbodies within the palm oil plantation boundaries and its surroundings
- The status of the riparian areas/buffers
- Threats to the waterbodies (e.g., effluents, human encroachment, riverbank erosion, clearing of riparian vegetation, etc.)

For all waterbodies with no or very degraded buffer zones, the buffer zones should be restored to minimise pollution of the waterbodies and ensure that the other benefits of riparian areas mentioned above are met.

Step 2: Objective Setting and Prioritisation of Riparian Restoration Areas

After conducting the field surveys, plantation companies should have a better understanding of the threats and condition of the riparian buffer and use this information to determine the objectives of riparian restoration and prioritise where the restoration efforts should be implemented. Some considerations include:

- What are the intended benefits of restoring the riparian buffer?
  For example, to maintain or enhance specific ecological functions such as riverbank stabilisation, provide habitat to endangered species or even facilitate the migration of native wildlife.
- Where within the plantation boundaries should the restoration activities be implemented?
  The location of the restoration activities should maximise the potential for achieving the intended restoration objectives. In this sense, plantation companies should also consider the ability of the ecosystem to naturally regenerate. For example, active restoration may not be required in locations where there is already natural regeneration (e.g., near to or connected to larger forest areas) while other locations at a higher risk of degradation (e.g., areas of bare soil where there is ongoing erosion) may require urgent action.

Step 3: Determine the Width of the Riparian Buffer

Once the purpose and location of the riparian restoration is clear, the plantation company has to determine the width of the riparian buffer to be set aside and/or rehabilitated (ideally on both sides of the river if under company operations). In the case of a lake or wetland, the buffer should apply to the complete boundary of the water body.

The plantation company is expected to comply with national or state/provincial or Department of Irrigation and Drainage (DID) regulations and/or RSPO generic guidance (it is recommended to follow whichever is most strict to ensure protection of waterbodies and their services).

In Indonesia, the legal requirement is for buffer zones of 50-100 m on each side of the river depending on the width of the river. RSPO also provides the following recommended buffer zones (Table 3.1):

Table 3.1: RSPO recommended width for riparian buffers | *Source: Adapted from Barclay et al. (2017)*

River Width (m)	RSPO Generic Guidelines (m)
1 – 5	5
5 – 10	10
10 – 20	20
20 – 40	40
40 – 50	50
> 50	100
Other Permanent Water Bodies *(e.g., Lakes and Wetlands)*	100

However, in order to achieve the objectives of riparian management and/or restoration it may be beneficial to extend the riparian buffer beyond the legal requirement in certain locations. See some examples below extracted from the RSPO guidance (Table 3.2):

Table 3.2: Optimal width for riparian buffer beyond minimum requirements
Source: Adapted from Lucey et al. (2018)

River Width (m)	Optimal Riparian Buffer Width (m)		
	Waterways are critical for meeting basic needs of local communities *(e.g., clean water supply or fish)*	Upstream of a protected area or essential habitat for fish *(e.g., spawning grounds)*	Endangered species are present, or area is of critical importance to local communities
1 – 5	30	30	30
5 – 10	30	30	70
10 – 20	30	30	>200
20 – 40	40	40	>200
40 – 50	50	50	>200
> 50	100	100	>200
Other Permanent Water Bodies *(e.g., Lakes and Wetlands)*	100	100	>200

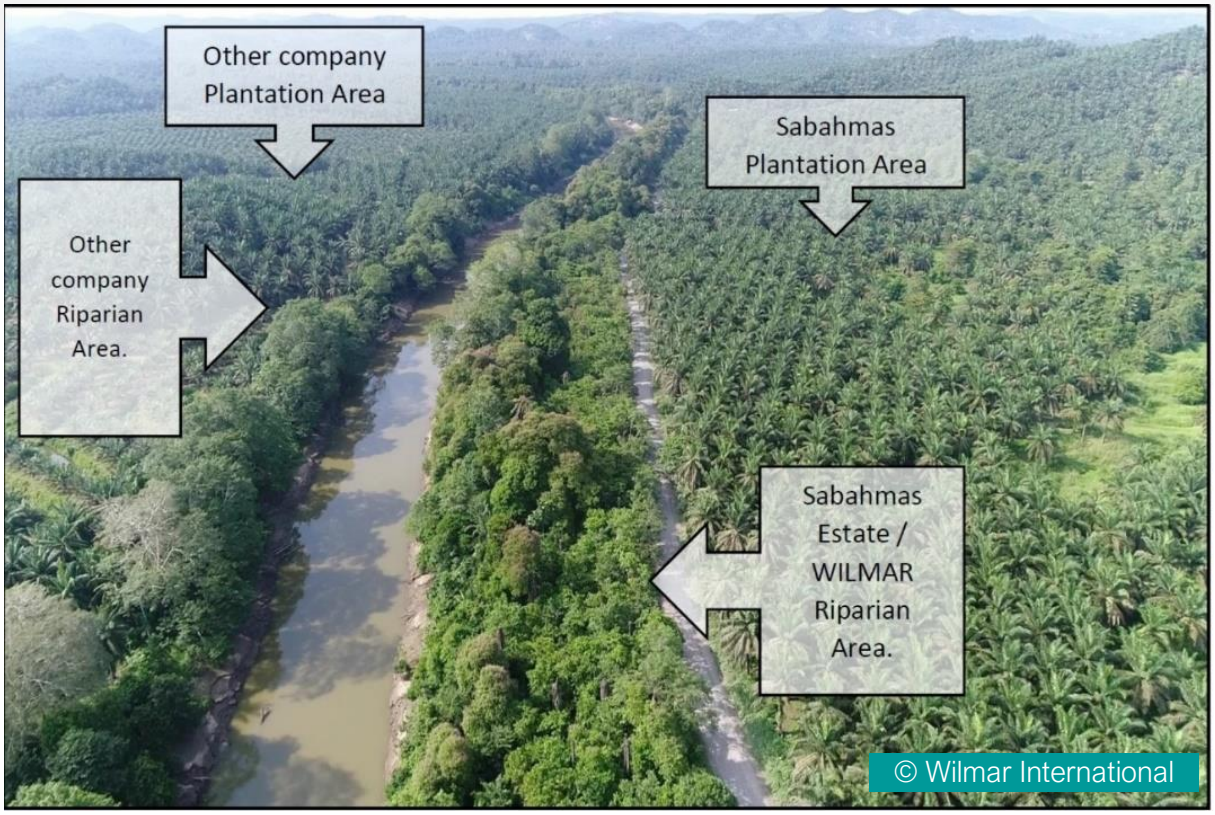

Figure 3.3: Riparian areas along the Segama River

Step 4: Decide on the Restoration Approach

The next step consists of deciding on the restoration approach to follow. Sometimes allowing vegetation to naturally regenerate will increase the effectiveness of the riparian buffer while in other cases a more "proactive" approach will be needed. Hence the importance of assessing vegetation quality within the riparian area. According to the RSPO, some indicators to decide whether active replanting is needed include (Table 3.3):

Table 3.3: Active replanting indicators | *Source: Adapted from Lucey et al. (2018)*

Type of Indicator	Indicator
Vegetation Cover	No remaining forest close to the riparian buffer
	Very few or lack of mature trees
	Poor natural regeneration (<200 seedlings / ha)
Seed Dispersers	Riparian buffer poorly connected to adjacent remaining forest
	Very few or lack of appropriate wildlife species present. E.g. fruit eating birds such as hornbills, or mammals such as gibbons, civets or fruit bats
Soil Disturbance	Lack of vegetation
	High erosion and / or landslides
	Area previously terraced

Active restoration may only be needed in certain riparian areas while other locations might only require effective protection to allow for the ecosystem to regenerate on its own. Natural regeneration could potentially include some degree of intervention (e.g., enrichment planting to favour key species or weed removal). Therefore, a combined approach may be optimal. For more information on how to actively restore a riparian zone please see Step 5.

One option for resourcing the planting activities and maintenance is to offer jobs to local community members, who often have good knowledge of local tree species and such jobs could be part of incentives in the community engagement programme. This can also be a first test of community interest to potentially offer longer-terms roles as forest wardens (see Module 2), following on from the short-term planting jobs.

Step 5: Actively Restore the Riparian Buffer

The following sub-steps have been identified for the restoration of degraded areas:

I. Prepare the Planting Site

Once the extent of the riparian buffer is clear, the plantation company should avoid the use of herbicides and pesticides within the riparian buffer. In the case that oil palms are already planted in the riparian reserve, the company must decide whether to leave or remove them. Many growers find it is best to keep the palms standing at least for a few years until other native vegetation has established because the palm fronds help to provide some protection of the soil by slowing down flow of heavy rain, however, palm roots are shallow so this approach usually must be combined with ground cover crops and enrichment planting (with careful management to ensure any cover crops do not smother tree seedlings).

The RSPO riparian guidance provides further details on the advantages and disadvantages of maintaining oil palms in riparian buffers[18]. Where there are slopes with high risk of erosion or instability, the plantation company may also consider the use of soft engineering methods such as coconut fibre coir logs to increase bank stability.

II. Select Suitable Mix of Species

As a key principle, the plantation company should select native species which naturally occur in the geographic region and therefore are adapted to local conditions (e.g., climate, soil type, etc.). The planting design should aim for a minimum of 10 species and ideally to 20-30 species to promote the recovery of tropical ecosystems. The number of species will be highly dependent on the availability of planting material in local nurseries or the capability of the plantation company to establish its own tree nursery (see below).

[18] See Section 4.5.1 Managing areas planted with oil palms of Barclay *et al*., 2017

III. Obtain Planting Materials (Saplings or Seedlings)

Planting materials could be obtained from external or internal sources. External sources include commercial nurseries, relevant government agencies such as the forestry department, local communities or environmental NGOs. The plantation company may also decide to establish their own tree nursery, please refer to Module 3.2 on "How to preparing planting materials".

IV. Conduct Planting at the Restoration Site

Generally, planting activities should take place three months before the annual flooding season. Line planting is commonly used as it allows for higher efficiency in terms of access and maintenance; trees should be planted in rows 2-4 m apart to encourage faster canopy closure. The plantation company should install temporary fencing or protective material around saplings to avoid predatory attacks in the early restoration stages (protective materials should be made from strong materials especially if there are wild pigs, monkeys, elephants or livestock in the area).

Palm oil fronds could also be used to protect and provide shade to seedlings, especially when planting on bare soil. Plantation companies should avoid planting in elephant pathways where they are known to exist.

Image: Vegetation cover in Wilmar's conservation area | Indonesia

V. Conduct Maintenance Activities

Regular maintenance activities should be performed to ensure the success of the restoration efforts. This is especially crucial for the first two years after planting. See Table 3.4 below for an overview of key maintenance activities:

Table 3.4: Key maintenance activities and frequency

Maintenance Activity	Frequency	Methods	Materials
Damage Prevention	Right after Planting	Fence the boundary of the replanting site or install netting materials around young seedlings to prevent wildlife or livestock predation	Fencing / Netting Materials
Encroachment Protection	Weekly / Monthly Basis	Regular patrolling, caution offenders and report to competent authorities where needed	Communications and Security Equipment
Weed Clearance	Every 2 to 3 months during the 2 years following replanting. Less frequent after 3 to 5 years	Manual removal (e.g., using a machete) or mechanical (e.g., machinery) when larger areas. Mulch can be applied around seedlings to reduce the frequency needed for weeding.	Machinery, Tools and Protection Equipment
Tree Replacement	When Required	Replace dead individual with new seedlings	Tree Seedlings
Irrigation	When Required	In accordance with available budget and site conditions. Some options include manual watering, drip irrigation or sprinkler system. It is especially important to make sure seedlings receive enough water in the early weeks/months after planting	Irrigation / Water System

3.2 How to Prepare Planting Materials for Riparian Restoration

There are two main approaches with regard to the sourcing of planting materials i.e., whether using planting materials grown in nurseries managed by company itself; or using planting materials sourced from a third party.

Advanced planting materials can provide canopy cover relatively rapidly and are more resilient compared to younger seedlings/saplings. They are able to restore the forest structure more rapidly in terms of multiple canopy layers, providing shade for herbaceous flora, and allowing for climbing plants and epiphytes to reestablish themselves. Moreover, advanced planting materials are quicker to flower and fruit, therefore accelerating the in-migration of wildlife that are pollinators and seed dispersers such as various insects, birds, bats and small mammals. A disadvantage of advanced planting material is a higher upfront cost. However, in the medium term it may be cheaper to use advanced materials compared to the cost of labour to germinate seedlings from scratch and losses of seedlings.

This module is on how to prepare advanced planting materials in the company's own nursery (if the company decides to buy advanced materials from a third party this module is not relevant). There are three main types of planting materials:

- Seeds
- Wildlings *(naturally germinated seedlings that are found in the wild)*
- Cuttings

Each type of planting materials has its pros and cons. For example, seeds are only available after trees of interest have fruited and many forest tree species in Malaysia and Indonesia only flower and fruit once in a few years during what is called a "masting" event, and seeds usually germinate within a few days of falling, meaning that they are only available for collection for a short window. Seed collectors usually target masting events to collect a large number of seeds and advanced preparations are needed to make sure that there are sufficient numbers of polybags, topsoil, nursery space etc. to accommodate the sudden influx of seeds. One advantage of **collecting seeds for planting** is that usually the seeds are found close to the mother tree and shape and size of the seeds / fruits can be compared with those that are still on the tree – therefore it is relatively straightforward exercise to identify the species. However, some seeds are difficult to germinate ("recalcitrant" seeds) and may require specific treatment in order to stimulate germination.

Wildlings may provide a better chance of success compared to planting from seeds as wildlings are already germinated and may already be in a more advanced stage of growth. However, if the wildings are collected long after the fruiting event, it may be difficult to figure out which tree they come from and therefore it may be necessary to look up relevant manuals or consult with experts in order to positively identify the species. Also, it is logistically more challenging to collect wildings as they are bulkier to collect than seeds and have to be transferred to the nursery quickly to stop them drying out.

Cuttings allow for the propagation of trees without having to depend on the availability of seeds or wildings. However, it requires a higher degree of skills as well as more preparation and time inputs to ensure that cuttings grow roots and become viable for planting. A key advantage of cuttings is that once the mother trees are identified there is little or no risk of mis-identifying the propagules and it is also possible to select trees with good growth characteristics as the source material. The selection of species to be planted for riparian restoration efforts should be based on the following factors:

- Suitability of planting in the riparian zone
- Suitability as food source for wildlife
- Growth rate
- Avoidance of invasive or non-native species

For Malaysia, a list of suitable tree species for planting in riparian areas have been compiled as an annex in the government's guideline on managing biodiversity in the riparian zone (NRE, 2009). There are also lists of tree species suitable for birds (e.g., Hails *et al*., 1990) and other wildlife (e.g., Norsham, 2005).

For Indonesia, several lists of suitable tree species for planting in riparian areas have been compiled by TFT / Earthworm Foundation through its Tools for Transformation website[19]. The Indonesian Institute of Sciences have identified bamboos as suitable for riparian area planting as they act as a soil stabiliser (through their fibrous roots), are fast growing, can produce 30% more oxygen compared to tree species, and are able to absorb water through their capillary stems.

Section 4.3.3. of the RSPO Riparian Management Guidance (Barclay *et al*., 2017) also lists additional sources for selecting species[20].

Based on Wilmar's experience in carrying out riparian restoration activities within its own plantations in Sumatra and Sabah, the following tree species are recommended:

- **Sumatra, Indonesia:** *Shorea* spp. (meranti) including *S. balangeran, Syzygium* spp. (kelat / jambu), *Tetramerista glabra* (punah / punak / kayu hujan);
- **Sabah, Malaysia:** *Nauclea subdita* (bangkal), *Pterospermum elongatum* (bayor), *Mallotus multicus* (selung apid), *Alstonia angustiloba* (pulai) and *Ficus* racemosa (tangkol).

[19] https://toolsfortransformation.net/indonesia/wp-content/uploads/2017/05/SOP-Pemilihan-jenis-tanaman.pdf

[20] https://rspo.org/publications/download/291282332c4e5b5

The key steps in riparian restoration are described below.

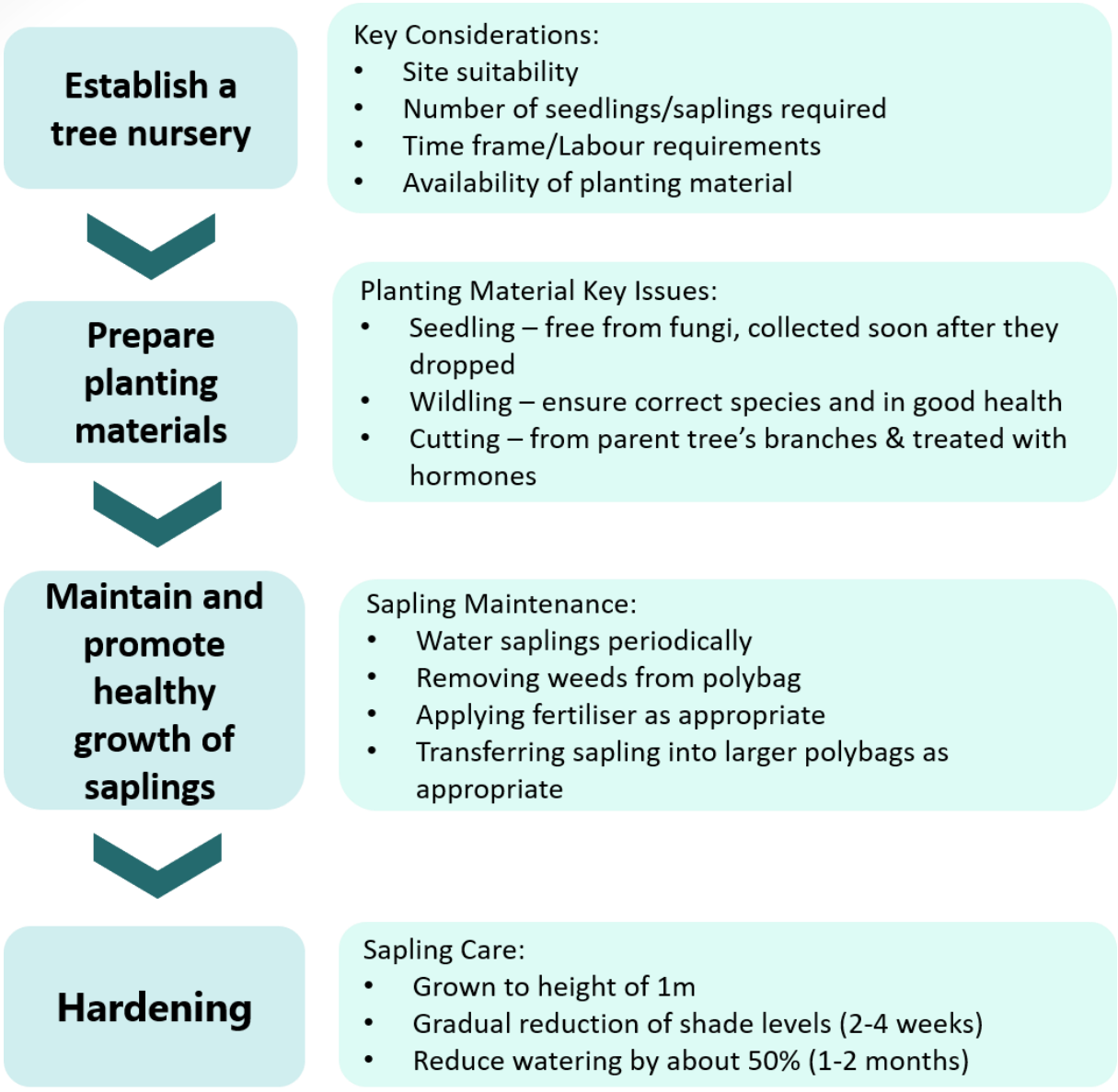

Figure 3.4: Flow chart for preparing planting materials for riparian restoration

Step 1: Establish a Tree Nursery

When establishing a tree nursery, the plantation company should take into consideration the following factors:

- Site suitability – the availability of large flat (or gently sloping) areas, availability of water source, risk of flooding / inundation, etc.
- The number of seedlings/saplings needed for the restoration activities etc.
- Time-frame/labour requirements – intensive planting over a short period of time vs. phased planting over many years
- Availability of planting material – availability of suitable species from the riparian area itself or from other areas; distance from source to nursery etc.

Figure 3.5: Tree nursery

Step 2: Prepare Planting Materials

As discussed above, there are three main types of planting materials and each source has its pros and cons. The plantation company can choose to use one or more type of planting material, depending on the expertise, availability of workers, budget available, etc.

Depending on the type of planting material, there are some key issues to take note of, as follows:

- **Seedlings** – ensure that seeds are free from fungi and are collected soon after they dropped; germinate the seeds in planting boxes at the nursery; when seedlings reach about 5cm in height, transfer them into polybags
- **Wildings** – ensure that they are from the correct species, are in good health and are around 30-50cm in height; transfer them to polybags
- **Cuttings** – from branches of the parent tree and treated with hormones that promote root growth (e.g., Seradix); plant the cuttings in polybags

Step 3: Maintain and Promote Healthy Growth of Saplings

While the saplings are growing in the nursery, maintenance activities should be carried out to keep them in good health and keep mortality rates low. Maintenance activities include:

- Watering the saplings periodically but don't allow them to get too wet
- Removing weeds from polybags
- Applying fertiliser as appropriate
- Transferring saplings into larger polybags as appropriate.

Step 4: Hardening

The saplings should be grown to a height of 1m before they are planted in the field. Before saplings are planted, they should go through a process of 'hardening' which involves the gradual reduction in the level of shade for at least 2-4 weeks before planting. Watering should also be reduced by about 50% over a period of 1-2 months before seedlings are planted.

Case Study

Riparian Management along the Segama River at Sabahmas Estate in Sabah, Malaysia

Relevant Topics: Management and Restoration of Riparian Areas
Biodiversity Protection and Forest Monitoring

Location: Sabahmas Estate

Key Stakeholders: Sabah Forestry Department
HUTAN (local NGO)

Background:

In 2009, Wilmar's Sabahmas estate, with a total area of 10,477ha of which 5.2% are conservation areas, began a project to restore and rehabilitate a 50-metre zone in a 47 km stretch of riparian area along the Segama River. This decision was made to enable the continued management of HCV 1, HCV 2 and HCV 4 that were identified within the riparian reserve areas in Sabahmas estate. The riparian reserves are adjacent to the Tabin Wildlife Sanctuary and function as a wildlife corridor notably for the proboscis monkey *(Nasalis larvatus)* a Totally Protected Species under the Sabah Wildlife Conservation Enactment 1997, and globally an Endangered Species (IUCN classification).

Restoration activities were carried out along the 47 km stretch, with the original 20m buffer (required by law) extended to 50m, therefore increasing the riparian buffer area from 94 ha to 381 ha including state land area (i.e., outside the estate boundary). Seeds for planting were collected from the original 20m corridor and a forest nursery was established in collaboration with the Sabah Forestry Department to grow the seedlings. Between 2009 and 2014, approximately 68,000 tree seedlings of 19 species were planted, including Bangkal *(Nauclea subdita)*, Bayor *(Pterospermum elongatum)*, Selung Apid *(Mallotus multicus)*, Pulai *(Alstonia angustiloba)* and Tangkol *(Ficus racemosa)*.

After completing the restoration activities, the Primate Monitoring Project (PMP) was initiated in 2015 to study the population and distribution of the proboscis monkey and the silvered langur *(Trachypithecus cristatus)* along the Segama River. Results indicate that the population has remained stable for the past 5 years. The population of the silvered langur has also increased although being sensitive to habitat degradation. This project proves that restoration efforts in riparian reserves in oil palm estates can create wildlife corridors that help to sustain wildlife populations.

Case Study
(Continued)

Enabling Factors:

- A commitment from top to the bottom is needed to conduct a reforestation project
- A substantial initial investment is needed for setting up nurseries and hiring planting workers. Wilmar spent about RM10 mil on the restoration project over a period of 5 years (not including the salaries of the conservation team)
- Capacity building plays a crucial role; estate workers were provided with regular training including on primate monitoring by HUTAN
- There was little or no risk of encroachment as there were no local communities nearby.
- A dedicated conservation team is needed to ensure success
- Good support from government agencies and NGOs that share a common conservation objective

Challenges:

- Initially the seedlings had a high mortality rate as they were planted too early to facilitate the transfer of the seedlings from the nursery to the restoration site. The main cause of seedling fatality was river water action and inundation.

Lessons Learnt:

- Through trial and error, it was decided that the seedlings should be transferred into larger polybags and allowed to grow to a height of 1m before they are planted.
- When Wilmar bought the estate, the riparian area was already planted with oil palm. It was not necessary to chop down the oil palms in order to plant the seedlings as they could be planted around the existing oil palms that acted as shade trees.
- In order for a wildlife corridor to be effective, there must be a potential to connect to a larger conservation area, rather than just having an isolated riparian corridor.
- In this case, there is already a core conservation site within the estate which is adjacent to the Tabin Wildlife Reserve.

There will always be a “background” level of human-wildlife conflict (HWC) and crop damage (especially by elephants). Although there is no significant change in trend regarding HWC, the impacts could potentially have been worse if the restoration project had not been implemented in the first place.

3.3 Adaptive Management and Monitoring of Riparian Zone

There are two main approaches with regard to the sourcing of planting materials i.e., whether using planting materials grown in nurseries managed by company itself; or using planting materials sourced from a third party.

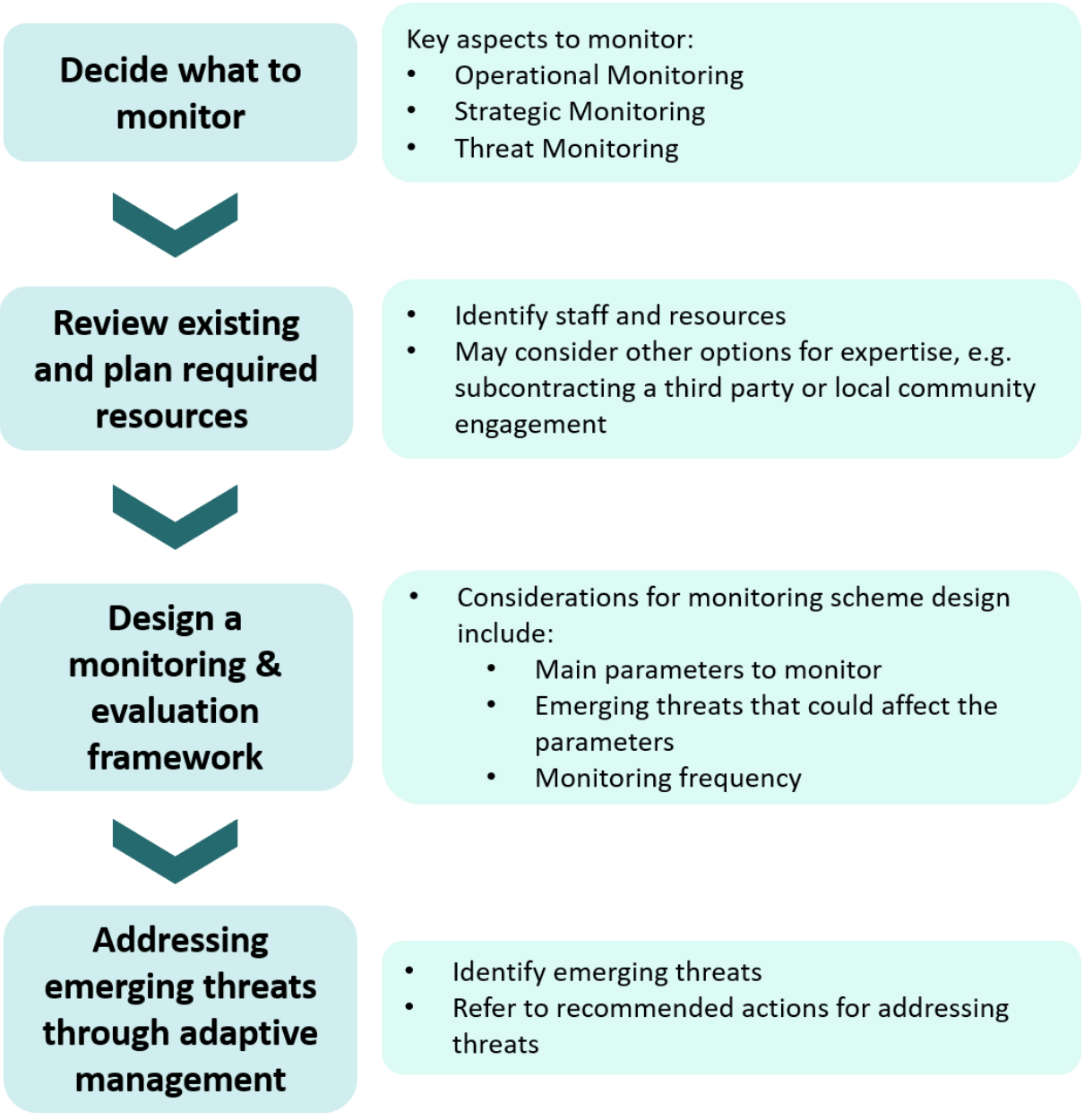

Figure 3.6: Key steps on adaptive management and monitoring of riparian zones

Regardless of whether the company is doing restoration of riparian areas or not, it is essential to conduct adaptive management and monitoring of all riparian areas. In particular, there should be a protocol for periodic monitoring of riparian zones. The information gathered from the monitoring activities enables the evaluation of whether the objectives are being met and if adjustments are necessary.

Monitoring activities should be repeated to measure changes over time (for example tree survival or water quality). The monitoring protocol should involve regular field visits to the riparian areas to record information on site conditions using standard protocols that are tailored to the budget and staff available. The purpose of this module is to guide the plantation company in designing their monitoring protocol in a systematic manner.

Step 1: Decide What to Monitor

Monitoring every aspect of the riparian area is neither practical nor feasible. Therefore, the plantation company should focus on the key aspects to be monitored and the types of monitoring needed, as follows:

i. Operational Monitoring

- Check that signboards are in place and boundaries of riparian zones are clearly demarcated
- Check that staff responsible for monitoring / patrolling are following SOPs, (e.g., patrolling at the frequency agreed, completing logbooks etc.)
- Check that other staff are following SOPs related to riparian buffers (e.g., no chemical spraying or dumping of any waste in buffer zones / waterbodies). Can be done by spot checks or interviews
- Track implementation of restoration activities and whether SOPs are being followed.

ii. Strategic Monitoring

Assess whether the objectives of the project are being achieved over time. For example, by monitoring water quality and quantity, and checking vegetation cover in buffer areas remains intact or that trees in restored areas are growing as planned.

iii. Threat Monitoring

Monitor the threats to riparian areas and whether they are being addressed. For example, by patrols that log any encroachment, SOP breaches or pollution events.

Step 2: Review Existing and Plan Required Resources

Prior to developing a detailed riparian monitoring programme, the plantation company should identify who should be in the monitoring team that will regularly visit the site, the number of personnel and resources needed. If the plantation company does not currently have all the required in-house expertise, they may wish to consider the following options:

- Subcontract a third party to build capacity and provide monitoring training to existing plantation workers
- Organise internal training of existing workers (if the company already has staff familiar with conservation/monitoring work)
- Recruit new staff to fulfil the role – it is likely that they would not exclusively work on riparian monitoring but be part of a wider conservation or sustainability team
- Subcontract a third-party to conduct specific monitoring – whilst this may seem appealing it is usually not very practical to entirely subcontract because riparian management and monitoring is ongoing and will need some activities to be conducted regularly. However, subcontracting an expert to help develop the monitoring framework or to conduct annual detailed monitoring or specific monitoring activities (e.g. water quality monitoring) is an option
- Initiate a third-party collaboration (please refer to Module 1.3 for more information in the topic)
- Engage with local communities to establish a community-based monitoring programme (see Module 2.2). This is likely to require initial training (by in-house or external experts) on monitoring techniques

Step 3: Design a Monitoring and Evaluation Framework

In order to design a monitoring scheme, companies need to consider:

- The main parameters to monitor (as defined under step 1)
- The threats / factors that affect the parameters, e.g., if encroachment is quite rare then patrolling could be conducted monthly by a small team, but if it is common, it may need a bigger team patrolling more regularly.
- Monitoring frequency. This will be highly context specific, as it depends on the parameters that will be measured. For example, in the case of Operational Monitoring, tracking the implementation of the different activities and steps of the project will require a higher frequency at the early stages of the project. Effectiveness monitoring is usually conducted over longer timeframes but also should consider the intended benefits being delivered and how they relate to operational activities or weather events, e.g., pollution or soil erosion is most likely to affect water quality after heavy rains, and during periods of re-planting, roading, bridge-building or major earthworks.

Monitoring vegetation in the riparian zone is essential (due to the variety of ecosystem services provided by the riparian vegetation) and must also be carried out in projects based on natural regeneration. In the case of active restoration projects, exhaustive monitoring should be carried out during the first years after planting. For this purpose, plantation companies can consider the following options:

- Either establish permanent plots to record both tree/seedling height and diameter at breast height at least until the seedlings are well established (approx. 3-5 m high). To measure tree height, plantation companies will need to use a ruler or measuring tape on a mm graduated scale. To measure diameter growth, Wilmar encourages the use of an electronic caliper. When measuring diameter growth in tree species, it must be measured from the main stem. In the case of shrub species, crown cover should be measured using a measuring tape.
- Or monitor planted saplings (or at least a sample of them) using periodic photos from the same angle to monitor vegetation growth until the plantings are well established (approx. 3-5 m high). A permanent measuring pole can be installed at the photo location to allow for easy comparison of tree height.

For riparian areas without restoration activities, vegetation quality may not need such intensive monitoring, for example, an annual check on vegetation/forest cover using satellite imagery, drones and a rapid field check may be enough to verify that vegetation cover remains intact. However, if threat monitoring reveals encroachment the company will need a protocol for restoring the cleared area and measures to minimise the risk of future encroachment (if it was community encroachment measures should be developed sensitively with communities and ideally agreed through consultation to avoid escalating conflict; see also Module 2).

Improving water quality is usually another objective of riparian restoration projects. Water quality tends to be altered in those river basins that cross oil palm plantations mainly due to the use of herbicides, pesticides and fertilizers. RSPO recommends measuring water quality at the point where the water first spans the plantation and at the exit point. Some parameters that plantation companies may consider when monitoring water quality include temperature, nitrate and phosphate concentration, or sediment concentration. Plantation companies may decide to purchase simple tests that can be used in situ or take samples to be analysed at a laboratory.

Table 3.5 below provides an example for a Monitoring and Evaluation Framework that plantation companies can use to measure the success of their project:

Table 3.5: Example of a Monitoring and Evaluation Framework

Monitoring Type	Indicator	Methods	Suggested Frequency
Operational	Number of Trees Planted	• Direct observation and revision of planting records	• Weekly basis during planting period
	Plant Protected (%)	• Direct observation of fence / netting and whether adequately installed	• Daily (on planting days)
	Riparian Buffer Boundaries Marked (%)	• Direct observation of in situ signage (to prevent clearing or oil palm expansion) • Direct observation of official documentation to verify inclusion on official documents.	• Prior to the commencement of the project • Every 6 months to verify status of the signage *in situ*
	Avoided use of Herbicides / Pesticides in Riparian Buffer	• Field assessments to verify 100% compliance with the SOP	• Every 6 months
Strategic	Tree survival	• Field surveys to measure whether trees are alive AND the degree of health (e.g. predatory attacks, plagues, etc.)	• Every 6 months during the first 2 years following planting • Yearly basis from 3rd year
	Tree growth	• Field surveys in permanent plots measuring for each individual both its height and collar diameter	• Every 6 months during the first 2 years following planting • Yearly basis from 3rd year
	Water quality	• Water quality sampling and laboratory analysis	• Yearly basis if no threat of pollution identified, otherwise monthly.
	Species diversity and abundance	• Install camera traps • Field surveys (designed by biodiversity experts)	• Monthly monitoring for analysing camera-traps footage • 3-6 months in the case of field surveys

Table 3.5: Example of a Monitoring and Evaluation Framework *(continued)*

Monitoring Type	Indicator	Methods	Suggested Frequency
Threat	Encroachment	• Patrolling • Drone surveys • Remote sensing techniques	• To be determined based on level of threat
	Poaching	• Patrolling	• To be determined based on level of threat
	Illegal clearance	• Patrolling • Drone surveys • Remote sensing techniques	• To be determined based on level of threat
	Fire occurrence	• Field observation • In case of areas where there is a high- occurrence install watchtowers (for more info see Module 4.1)	• To be determined based on level of threat • Daily or weekly basis during dry season

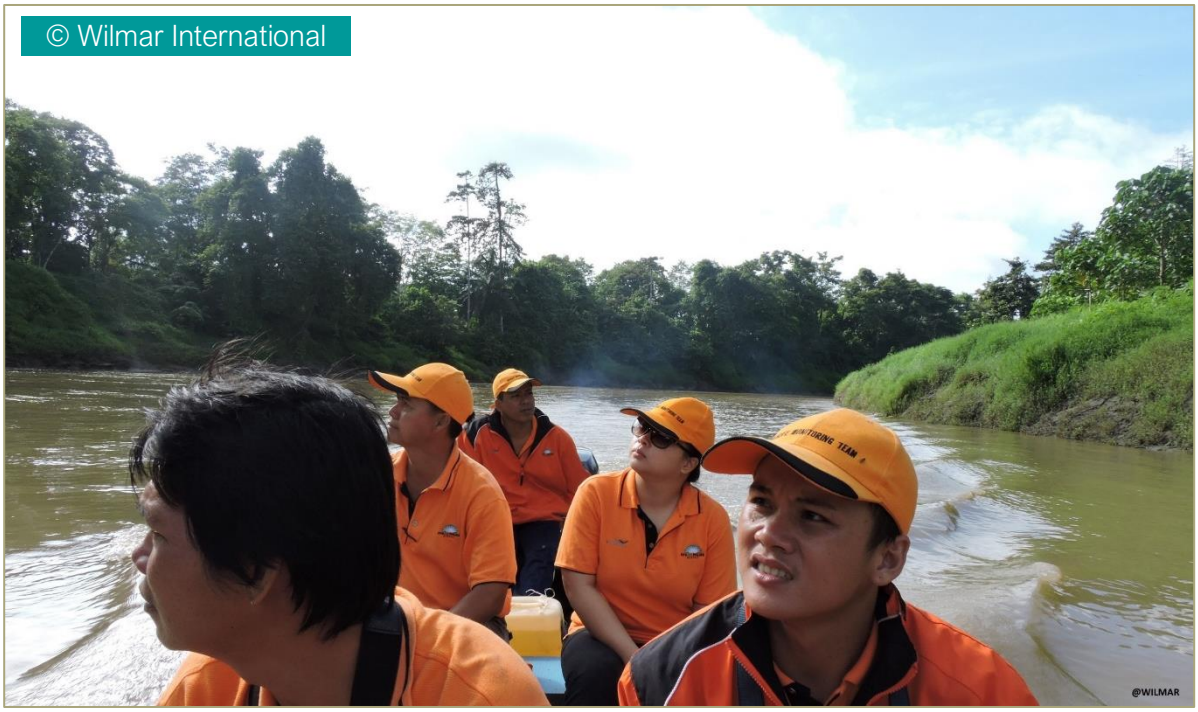

Figure 3.7: Patrolling of riparian areas by boat

Step 4: Addressing Emerging Threats through Adaptive Management

When conducting the monitoring activities and analysing the data, the company will be able to determine the effectiveness of the restoration efforts and whether specific project adaptations are required. For example, after conducting field surveys or aerial monitoring, plantation companies may detect that the river is changing its course. In this case, the extent and location of the riparian buffer will have to be adapted.

Plantation companies may also identify emerging threats. For example, if one of the benefits of the restoration project is higher fish stocks, more people may visit the riparian buffer. The presence of people has the potential to undermine the restoration efforts by diminishing its environmental quality (e.g., overfishing, leaving rubbish, unintended fires, etc.). Depending on the type of threat to be addressed, Wilmar has gathered the following set of actions for certain key locations that plantation companies may wish to incorporate to their project (Table 3.6):

Table 3.6: Threats and proposed set of action

Type of Threat	Proposed Actions	Intended Benefit
High Erosion and / or River Siltation	• Re-establish the vegetation cover prioritising shrub species especially in the adjacent areas to the river/waterway. • Make use of coconut coir rolls or any effective or traditional methods to stabilise the slope if needed before planting.	• Riverbank stabilisation • Flood mitigation • Cleaner water supply.
Water Pollution	• Avoid the usage of herbicides and pesticides in the buffer boundaries. • Leave a strip between the oil palm plantation and the riparian buffer which is mainly covered by grasses (which have the potential to absorb pollutants) • Re-establish the riparian vegetation cover beyond minimum requirements	• Cleaner water supply • Higher fish stocks • Enhance local livelihoods • Recreation
Illegal Clearance	• Prioritise action at already vegetated areas to ensure connectivity (preferably to protected areas or large patches of forest) • Select species which can provide food and shelter to endangered species • When possible, select species of economic importance to local communities. • Design the corridor considering the terrestrial species that will benefit from it (e.g. large mammals such as elephants or tigers often require a wider corridor)	• Establish a natural wildlife corridor, • Enhance pollination and seed dispersal • Local livelihoods
Illegal Fishing and Contaminated Fish	• Avoid the usage of herbicides and pesticides in the buffer boundaries • Patrolling and reporting to law enforcement authorities	• Higher fish stocks • Water quality • Local livelihoods

References / Further Reading

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MODULE 4

Fire and Peat Management

4.1 Fire Prevention and Monitoring

Fire is a troubling issue which not only concerns the plantation company but also communities surrounding the concession. The occurrence of fire can lead to financial loss, national disaster, poor health and even death either directly from the fire or from the hazardous smoke.

Fires can occur in both peatland and dryland/mineral soil areas. Especially in a dry season, the possibility of fire occurrence will increase in both types of ecosystems. Specifically for peatlands, the fire is harder to control compared to dryland fire. Fire detection is also harder in peatlands because the fire often burns underground in the peat which cannot be visually identified at the surface. Furthermore, the availability of water in large quantities and the access to the fire sites are also considered as crucial for effective fire management. Without available water or easy access, additional resources will be needed for firefighting (e.g., water bombing) or even a reliance on natural means to extinguish the fire (e.g., rain) (Adinugroho *et al*., 2005).

This subtopic is intended for plantation companies to develop a fire management plan to prevent fire in the plantation and surrounding area, and how to handle post-fire management and recovery.

Image: Firefighting during dry season | Indonesia

This subtopic addresses key steps on how to conduct fire prevention and monitoring. The steps are summarised in Figure 4.1.

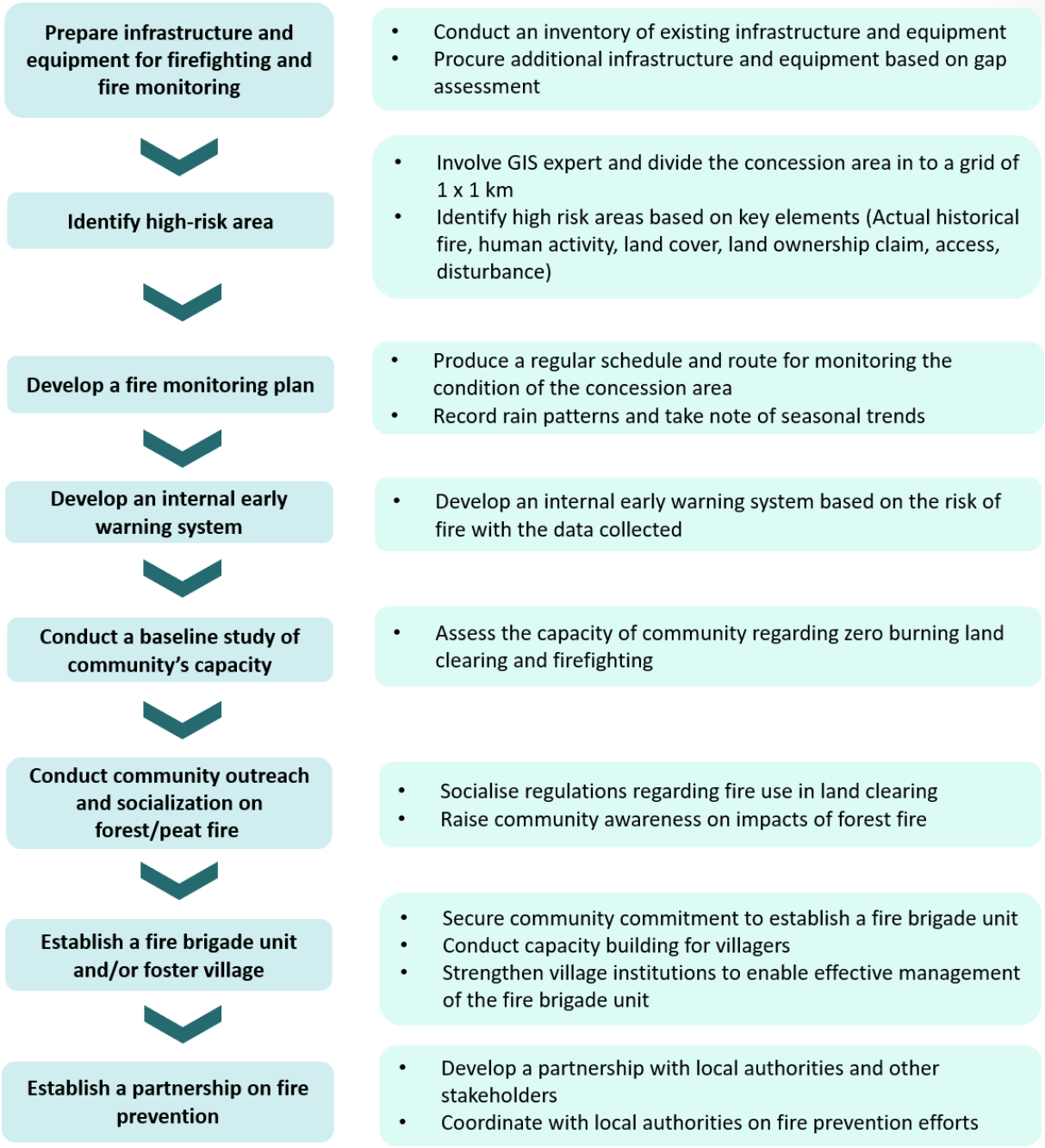


Figure 4.1: Steps to prevent and mitigate fire in the concession and surrounding area

Step 1: Prepare Infrastructure and Equipment for Firefighting and Fire Monitoring

The company needs to ensure that its infrastructure and equipment for firefighting is adequate and ready when required. An inventory of the existing infrastructure and equipment and their condition should be carried out.

The relevant infrastructure and equipment (Adinugroho *et al*., 2005; Parish *et al*., 2019) include:

- Road network allowing access to potential fire prone areas[21]
- Fire towers
- High pressure fire-fighting pump
- Hose – spiral hose, fire hose, nozzle
- Peat injector
- Water container
- Protective gear (fireproof suits, fireproof boots, safety helmets, leather gloves, etc.)
- First aid kit

The company needs to ensure that its infrastructure and equipment for firefighting is adequate and ready when required. An inventory of the existing infrastructure and equipment and their condition should be carried out.

Step 2: Identify High-Risk Area

In identifying high-risk (fire prone) areas, the company needs to use GIS technology to divide the plantation area into a grid of 1 x 1 km and incorporating elements such as:

1) Actual historical fire
2) Human activity
3) Land cover
4) Land ownership claim
5) Access
6) Disturbance

After that, scoring will be required to categorize whether the area is considered as high-risk.

The summary of high-risk identification process can be seen in Figure 4.2.

[21] It is important to recognise that too many roads, especially in peat areas, can increase the risk of fires by drying out surrounding forest. Therefore, road networks should be strategically planned to allow access but minimising fragmentation of forest areas.

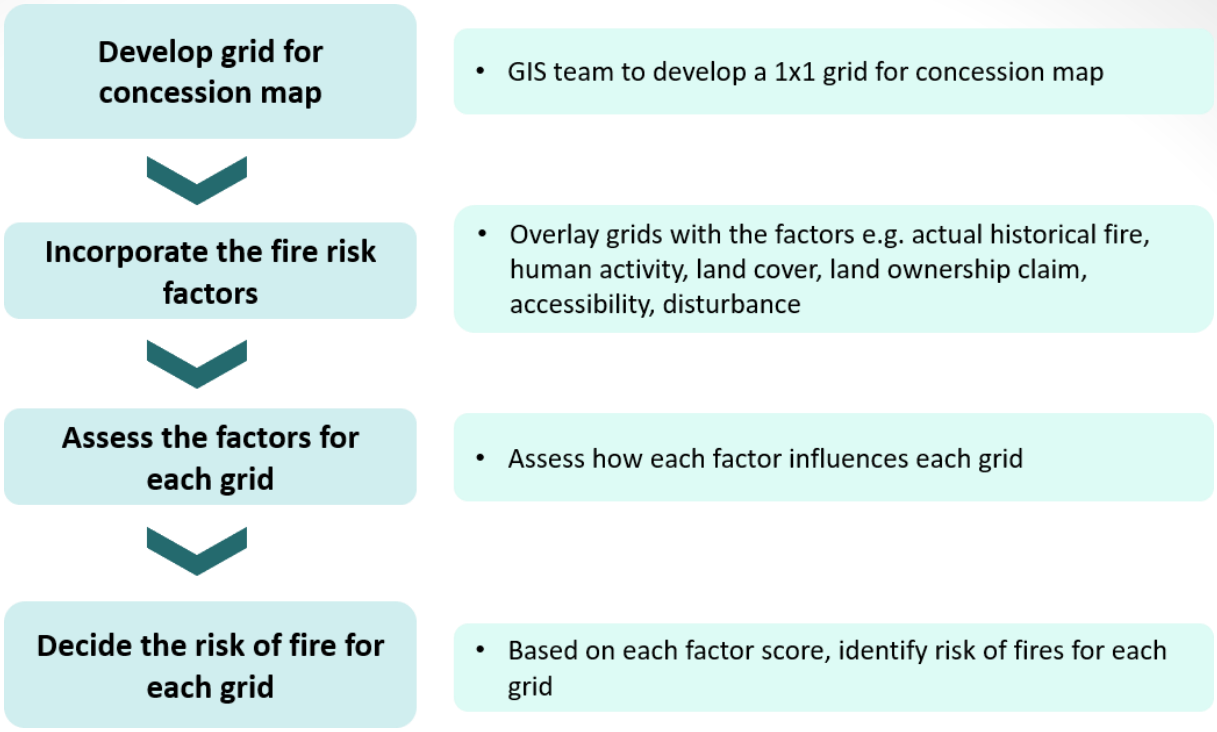


Figure 4.2: Flow chart for high-risk identification

Actual Historical Fire

The company can use publicly available data for fire hotspots provided by NASA to identify hotspot within the concession area. The website is called Fire Information for Resource Management System. The website provides data on historical hotspots which can be used by the company to map the high-risk areas, although depending on the number of hotspots, the company may need to conduct extra GIS analyses to calculate areas with highest density of fires (See box below). The company can also use their own actual historical fire data to develop a high-risk map based on where fires happened in the past.

When mapping these areas, the company should consider why these areas were likely to be prone to fire. E.g., because they are on peat soil; because they are far from wet areas/very prone to drying out; or because they are close to sources of ignition (e.g., community farmland where slash and burn is still carried out). Note that more open scrub areas, logged forest, drained peatland forests are usually more fire prone than tall/closed forest where the canopy and vegetation helps to retain moisture more than in open areas.

Table 4.1: High-risk factor – Hotspot score

Hotspot Number	Score
0	0
1 – 4	1
5 – 8	2
9 – 12	3

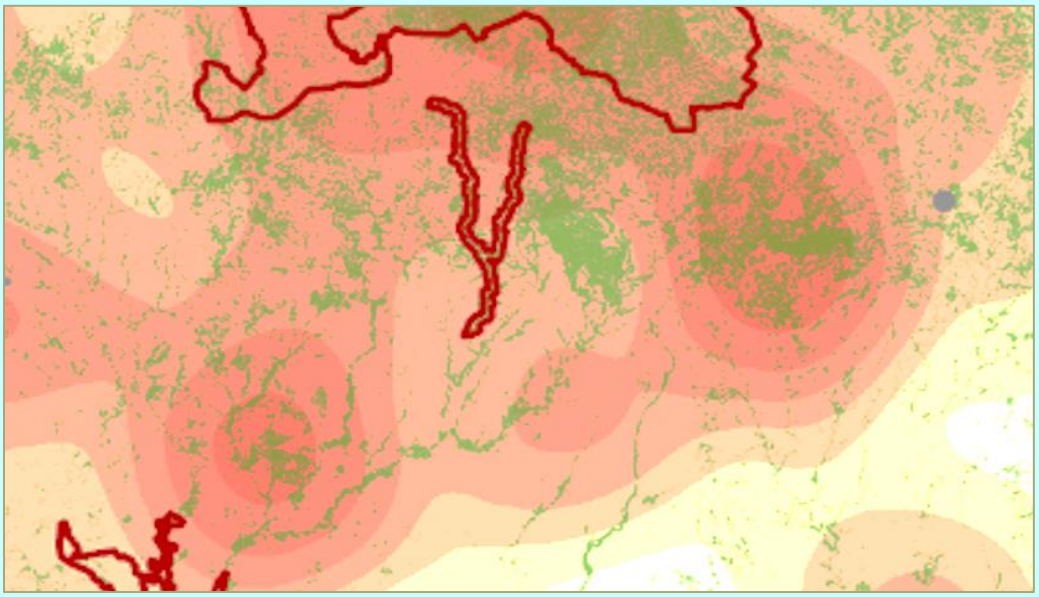
Mapping Fire Hotspot Density using GIS

If NASA FIRMS or VIIRS data is showing a very large number of historic fires it is recommended to conduct further analysis to understand a more accurate and current status of fire risk. A few key steps to doing this include:

i. Filter and download only more recent fires from a time period aligned with current management practices. For example, looking at only the past 3-4 years (though it may be useful to also look at the pattern from extreme years, such as 2015, to give an impression and help prepare for a "worst case scenario".

ii. Filter alerts based on "confidence". This is a field in the shapefile attribute, and it is recommended to only select hotspots with >50% confidence to reduce the inclusion of false positives.

iii. Use tools such as "kernel density" mapping in ArcGIS to produce a hotspot map of areas where fire occurrence has been highest – this is usually easier to interpret than a map with a lot of points. An example is provided below overlaying a hotspot map with forest and boundaries of conservation areas – this shows a few areas where fires have been particularly intense:



Human Activity

After mapping the actual historical fires, another element to be considered in risk mapping is the human activity area. Human activity area mapping aims to map the areas with a high occurrence of human activities. This area can be the village area, or an area where the community usually carries out farming, hunting or fishing activities. The steps are presented as below:

i. Area identification
ii. Transform the area into a single point which represents the middle point of the area
iii. Develop a buffer zone of 5km around the point

Table 4.2: High-risk factor – Human activity score

Grid Percentage of the 5km Buffer	Score
0	0
0 – 25	1
25 – 75	2
> 75	3

Land Cover

The next element for risk identification is land cover. The company needs to identify the land cover surrounding the concession. After land cover identification, the company needs to prioritize scrub as having a higher risk of fire compared to other land cover types.

Table 4.3: High-risk factor – Land cover score

Grid Percentage of Scrub Area	Score
0	0
0 – 25	1
25 – 75	2
> 75	3

Land Ownership Claim

The next element for risk identification is land cover. The company needs to identify the land cover surrounding the concession. After land cover identification, the company needs to prioritize scrub as having a higher risk of fire compared to other land cover types.

Table 4.4: High-risk factor – Land ownership claim score

Grid Percentage of Land Claim	Score
0	0
0 – 25	1
25 – 75	2
> 75	3

Accessibility

Access routes such as roads and rivers lead to high risk for fires due to the use by communities and the company. The transportation activities sometimes become a starting point for fires due to negligence (e.g., throwing of cigarette butts, burning of trash, etc.). After identifying the access routes, the company is recommended to set a buffer area of about 500 m from the access routes and define it as a high-risk area.

Table 4.5: High-risk factor – Accessibility score

Grid Percentage of Buffer 500m	Score
0	0
0 – 25	1
25 – 75	2
> 75	3

Disturbance

Access routes such as roads and rivers lead to high risk for fires due to the use by communities and the company. The transportation activities sometimes become a starting point for fires due to negligence (e.g., throwing of cigarette butts, burning of trash, etc.). After identifying the access routes, the company is recommended to set a buffer area of about 500 m from the access routes and define it as a high-risk area.

Table 4.6: High-risk factor – Disturbance score

Grid Percentage of Disturbance 500m	Score
0	0
0 – 25	1
25 – 75	2
> 75	3

Scoring

To decide whether a particular area is high risk, the company can sum up the scores from the different elements described above and classify the risk category based on the overall score.

Table 4.7: Risk category – Overall scoring

Score	Risk Category
0	Low
1 – 3	Medium
4 – 6	High
> 7	Extreme

Step 3: Develop a Fire Monitoring Plan

The company is encouraged to develop a fire monitoring plan. This plan is expected to produce a regular schedule and route for monitoring the condition of the concession area (Brown & Senior, 2014). The priority areas for monitoring should be those identified as high-risk, and historical fire sites within the plantation (e.g., scrub area, etc.). As mentioned before, the monitoring can be conducted using fire towers, or in combination with technologies such as drone, and/or satellite fire hotspot monitoring. The team responsible for monitoring should also record rain patterns and take note of seasonal trends, e.g., when is the dry season or season when slash and burn farming is usually taking place.

Step 4: Develop an Internal Early-Warning System

Using the data collected by the monitoring team, the company should develop an internal early warning system based on the risk of fire. For example, using proxies as in the number of days without rain as presented in the table below:

Table 4.8: Risk based on days without rain

Risk	Indicator (Days without Rain)
Low	1 – 4
Medium	5 – 8
High	9 – 13
Extreme	> 13

This indicator, then, is usually translated into a warning board as shown in Figure 4.3 (Langer *et al*., 2009).

Figure 4.3: Fire danger indicator in the form of a Warning Board

Step 5: Conduct a Baseline Study of Community's Capacity

Communities are essential stakeholders and should be involved in the fire prevention and mitigation activities. This is due to their proximity to the plantation and because their activities may both contribute to fires whilst equally, they may be most affected by fires / smoke. Before conducting socialization, the company needs to assess the capacity of community regarding zero burning land clearing and firefighting. This step is essential to allocate resources to focus communities or villages if the company is surrounded by various villages. For communities who have an awareness or received training on firefighting, the company is encouraged to set up a community fire brigade. The formation of this voluntary fire brigade is an effective strategy to help the company to prevent and mitigate land fire, not just in their plantation but also in the wider landscape which reduces the risk of fires spreading into the plantation from outside.

There are many examples from companies who have developed their own fire brigade which is usually planned under the foster village program. The fire brigade will help companies to conduct surveillance and monitoring in the surrounding villages, and early eradication of fire which has a potential to spread into the company's area. For more information, see the Fire Free Alliance.

Step 6: Conduct Community Outreach and Socialization on Forest / Peat Fire

As a minimum, the company is encouraged to provide socialization on the current regulations regarding fire use in land clearing. In addition to that, the company is also encouraged to raise the awareness of community regarding the impact of forest fire which can cause serious health problems. This activity includes:

- Making warning signs / banners
- Awareness raising using brochures / poster
- Production of fire calendars However, even better is to actively involve communities in fire monitoring – see next step

Image (Left): Fire control to prevent further outbreak of fire | Indonesia

Image (Right): Awareness talk and training on fire prevention on peat | Indonesia

Step 7: Establish a Fire Brigade Unit and / or Foster Village

The company is also encouraged to develop a fire brigade unit in surrounding villages. If the village does not have Fire Free initiative, it is essential that company assist the village to have one. A Fire Free initiative not only supports the community to prevent fires, but will also help prevent fires from spreading into the company's own plantation.

The first thing that company needs to secure is the community's commitment and approval. This can be done through dialogues aimed at finding a common ground on how to manage fires. The next thing is to secure approval from external stakeholders which are related to firefighting in the region where the plantation is located. In Indonesia, the relevant stakeholders include local police, nearest local firefighting unit, and district's forestry firefighting unit *(Manggala Agni)*.

After that, it is important for the company to arrange for training on fire prevention, eradication, and monitoring for the local community based on the capacity gaps identified in Step 5. The training can be initiated by the company and / or in collaboration with the local firefighting unit.

In addition to capacity building in firefighting, it is also important to strengthen the institutional aspects. In this case, the company can discuss the possibility of developing a fire brigade unit with the village head and / or the tribal chief. Ideally, the fire brigade unit will be acknowledged by the village government and becomes part of the village government organisational unit. After discussing and agreeing in the development of the fire brigade unit, the company and village government can agree on the roles and responsibilities of each party involved, such as who will be the coordinator; the administrative group (e.g., secretary, treasurer, etc.); the operational and logistical group which will handle the equipment maintenance and firefighting operation, and the types of support from provided by the company.

Many villages in Indonesia have already developed their own fire brigade unit and have received training from government unit / NGO regarding firefighting, and have included a firefighting budget into village budgets *(dana desa)*. In support of this, the company is encouraged to develop a communication channel with the village and conduct coordination on fire monitoring to complement the company's own monitoring plan.

Coordination between the company and surrounding communities is essential to achieve the shared commitments to not use fire for land clearing and to apply best practices and the precautionary approach. Coordination can be in a form of sharing knowledge on current regulations on the use of fire for land clearing, zero burning land practices, as well as to provide training. Some companies have developed a program commonly known as Free Fire Village (foster village) to minimize the possibility of fire. This type of initiative is also considered as an effort to strengthen the relationship between the company and surrounding villages.

Step 8: Establish a Partnership with Local Authorities and Relevant Stakeholders on Fire Prevention

Building partnership with relevant stakeholders is important in fire prevention, eradication, and monitoring. Apart from surrounding communities, the company is encouraged to develop a partnership with local authorities such as local firefighting departments, local police department, etc., but also with relevant local NGOs. The coordination with local authorities is important to inform the current activities that have been conducted by the company on fire mitigation and to help on fire investigation. The local authorities can also be involved in the socialization of fire regulations, no burning campaigns and fire prevention trainings. Meanwhile the partnership with local NGOs can focus on the zero burning land cultivation and peat management for communities.

Fire Fighting

Even with a firefighting brigade unit in place, it is important to prepare for all possibilities by having a trained in-house firefighting team in the company, especially if the estate is in fire prone areas, such as on peat. Firefighting is an extremely high-risk activity and needs to be conducted by personnel that have been trained by firefighting experts. This section IS NOT a substitute for formal training, but provides some general guidance, examples of firefighting SOPs and a case study of fire management.

Some general activities to consider include:

- Preparation and training of staff
- Establish contact with authorities to understand protocols should a fire occur
- Develop internal SOPs for firefighting, reporting and evacuation
- Prepare equipment, water sources and evacuation sites

An example of Wilmar's SOP for responding to fires in their HCV areas is also provided below as an example of operational application of this chapter.

Note: *This is only an example and would need to be reviewed and adapted for the local context of each estate.*

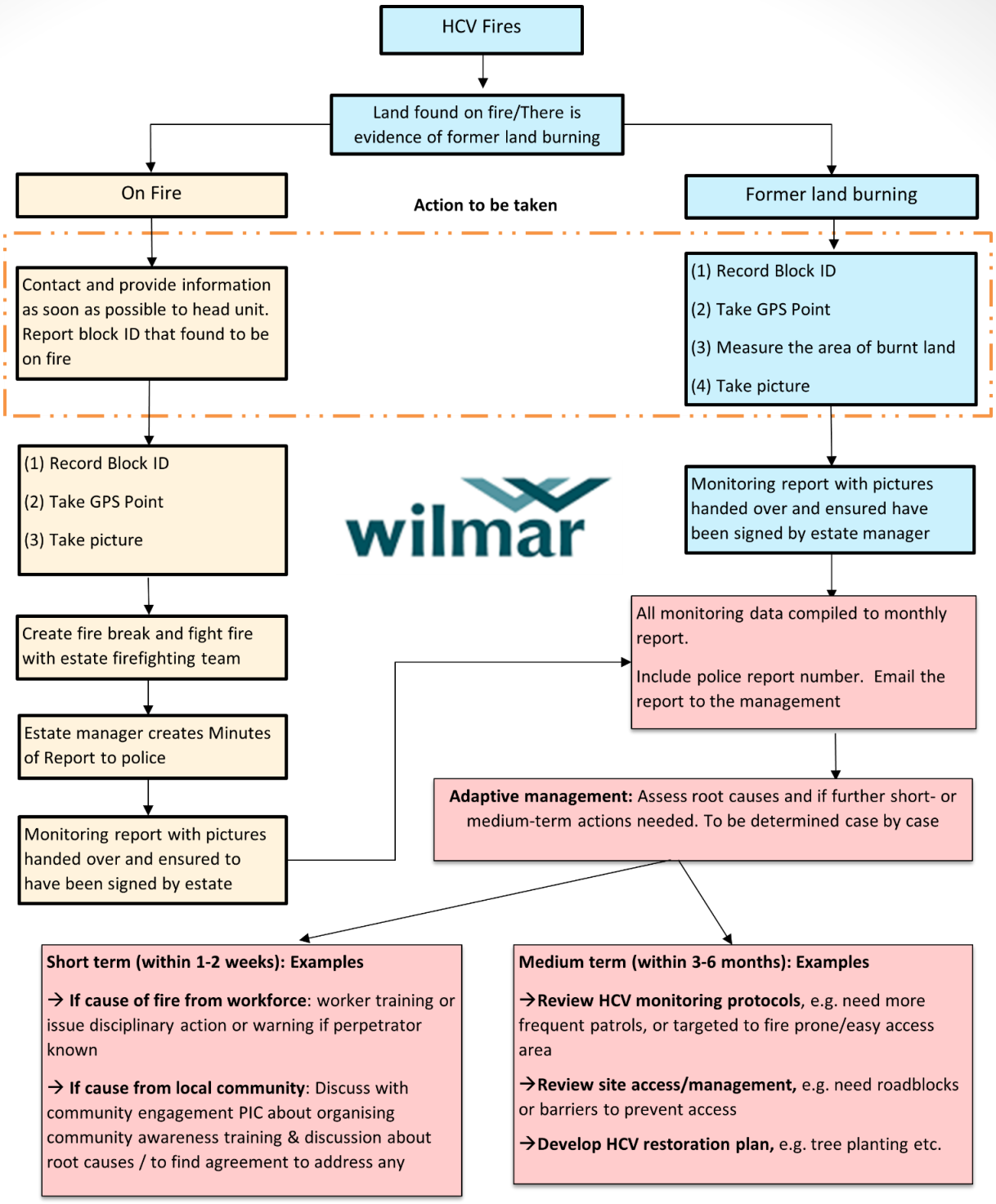


Figure 4.4: Wilmar's SOPs for responding to fires

Case Study

Peat Management and Fire Prevention in PT RHS

Relevant Topics: Fire and Peat Management

Location: PT Rimba Harapan Sakti in Central Kalimantan, Indonesia

Key Stakeholders: Villages of Tanjung Rengas and Permatang Limau

Background:

PT Rimba Harapan Sakti (RHS) was among the companies affected by the great fire of 2015 in Indonesia. A long dry season had increased the risk of fire and led to the fire that occurred within PT RHS. The first occurrence of fire was at the peat area and was identified by Wilmar Central Kalimantan Task Force. Learning from the disaster, Wilmar developed a system that enables to detect fire hotspots in real time.

The IT detection system is supported by a capable firefighter team. PT RHS not only trains staff and field officers, but community members are also provided with training. PT RHS has provided training to two different villages: Tanjung Rengas and Pematang Limau. These villages are now included in Wilmar's "Fire Free Village Programme" which involves the provision of training and firefighting equipment to the villages. Wilmar expects that by raising awareness on fires and providing firefighting training and equipment, the community can minimise the risk of fire occurrence. PT RHS also provides information to the villages if any hotspot is detected in the surrounding areas. In line with Wilmar's commitment and compliance with existing regulations, PT RHS also collaborates with the local Government.

There are indicative peat areas within the HCV area at PT RHS and therefore, these indicative peat areas should be conserved. PT RHS took the initiative to build weirs (water control structure) surrounding the indicative peat areas to avoid water loss. PT RHS regularly monitors the weirs and water levels within the zone. It is important to maintain the water specific levels to avoid the risk of fire in the dry season.

Case Study
(Continued)

Enabling Factors:

- Wilmar's IT division in Jakarta integrates NASA hotspot data and sends it directly over Telegram to the field officer.
- PT RHS regularly organises outreach activities with local communities to prevent fire within community areas.
- In order to join the "Fire Free Village Programme", Wilmar and the participating village must sign an MoU to specify their joint efforts on fire prevention preparedness.

Challenges:

- Managing or preventing peat fires without good water management is very difficult.

Lessons Learnt:

- Prior to using Telegram, hotspot areas were identified by the GIS team in Jakarta who would then send an email to the field officer. This system was not efficient in communicating information during weekends and public holidays.
- It is essential to have a close communication with peat expert and agronomist within the companies on how to mitigate fire from peat area. This includes water management in peat areas.

4.2 Peat Management and Monitoring

This subtopic is intended for palm growers to develop a management and monitoring plan for existing palm oil cultivation upon peatlands. This subtopic addresses key steps on how to manage and monitor the peat condition in existing palm oil cultivation.

The management and monitoring of peatland within the concession area is essential. Not only storing gigantic amount of carbon which helps avoid global warming, peatland is also a home for various endangered species, for example: tigers and bears in Giam Siak Kecil Biosphere Reserve peatland area of Riau Province, Indonesia. In addition to that, peatlands are also storing and regulating water, preventing floods in rainy season and droughts and fire in dry season. Therefore, a company is responsible for:

- Managing or conserving its peat areas
- Following the local regulations and best management practices
- Monitoring the conditions of peat area and the water table
- Socializing the importance of peatland to surrounding villages where the concession is located (Suryadiputra *et al*., 2016)
- Strictly no more new development on peat

This guidance describes the steps on managing existing cultivation on peatlands and is a simplified guidance from RSPO BMP for Plantation on Existing Peat (Parish *et al*., 2019). For a complete information on Peat Management and Monitoring, please refer to the mentioned guidance before. The palm industry's NDPE policy prohibits sourcing FFB or palm oil from companies that develop new plantations on peat, therefore, suppliers are expected to comply with this.

In general, the step-by-step on peat management and monitoring can be seen in Figure 4.5.

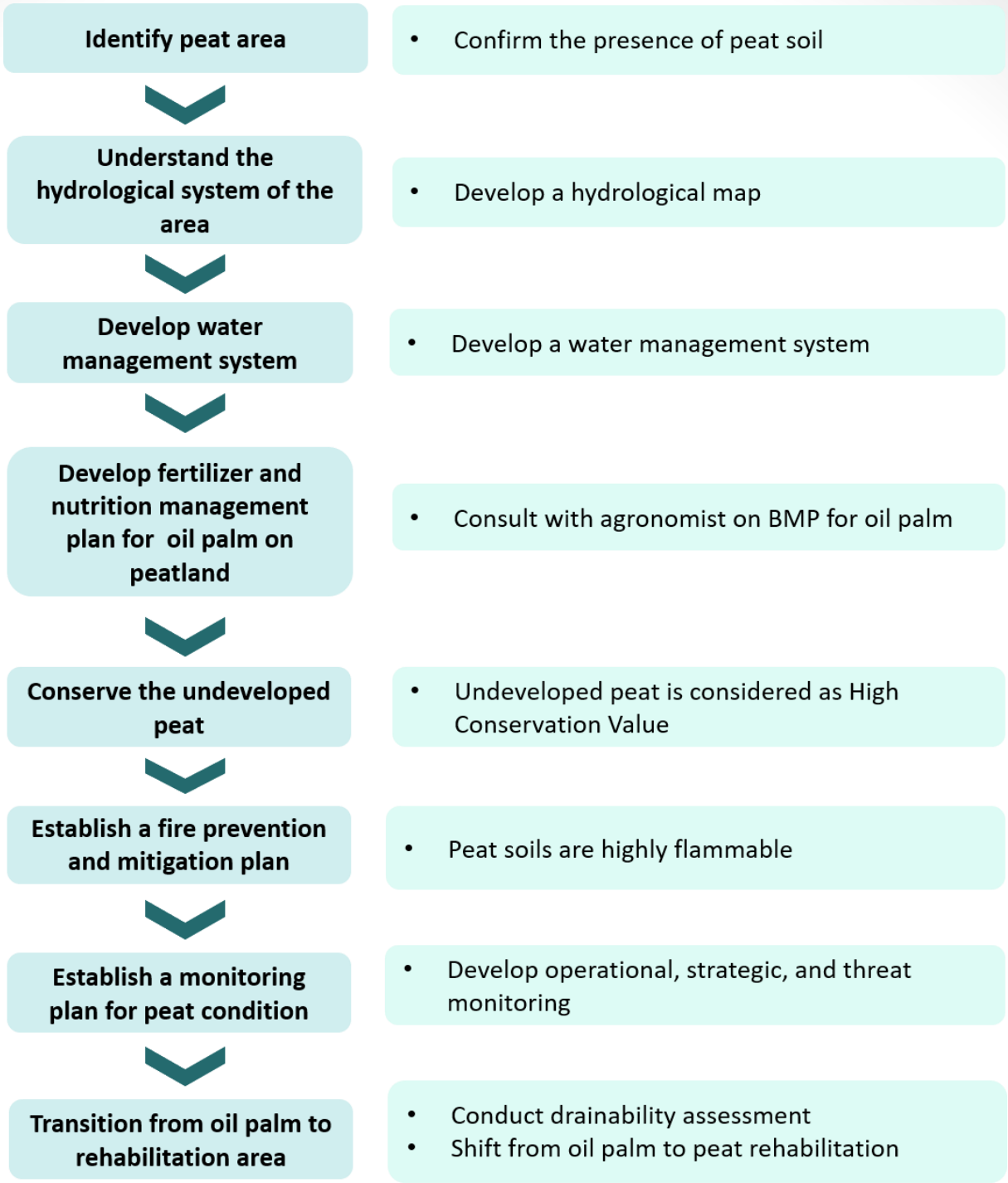


Figure 4.5: Flow chart on peat management and monitoring

Step 1: Identify whether your Area Contains Peat

Companies usually hire a soil expert to conduct a comprehensive study to identify the types of soil within their concession area before starting to develop the area. It is important to identify the type of soil early on as it will affect the cultivation process, fertilizer regime, and the production/performance of the oil palm trees.

Before hiring a soil expert, the company can check some other information to get an indication (not as accurate) of the type of soil, e.g. check with national level publicly available maps of soil or land system (e.g. RePPProT in Indonesia[22], Peat Hydrological Area[23] and Indicative Map of Postponement of Granting New Permits by Ministry of Forestry[24] or Indicative Peat Restoration Map by Peat and Mangrove Restoration Agency in Indonesia[25]; and soil maps available from the Ministry of Agriculture and Food Industries in Malaysia). The relevant maps usually contain the distribution of peat soils and sometimes the depth of peat soils as well. Another way to identify whether the area is covered with peat is through proxies such as natural floral species found in the area (ramin, jelutung, sago, *Shorea balangeran*, or rattan); leaning oil palm trees – if the area is already cultivated with oil palms (see e.g. Suryadiputra *et al*., 2016).

If the surveys indicate that peat is present, the company will need to conserve undeveloped peatland as conservation areas, implement a peat management and monitoring system on both undeveloped peatland and existing plantation on peat.

Step 2: Understanding the Hydrological System in the Area

Understanding the hydrological system is essential in peat management before developing the water management system. The misunderstanding of the hydrological system leading to the introduction of inappropriate drainage could result in irreversible damage. The hydrological system depends on the natural environmental conditions in the area such as climate, natural subsoil, and drainage base.

To understand the hydrological system, the company's GIS expert needs to develop a hydrological map to understand the hydrological flow of the area. The hydrological data will allow for the development of a water management system as described in the next step. Retaining the water aims to reduce the outflow rate and maintaining and/or increasing water storage in the canal body and the surrounding area (Dohong *et al*., 2017).

[22] Land System Indonesia: https://databasin.org/datasets/eb74fe29b6fb49d0a6831498b0121c99/

[23] Peat Hydrological Map: http://webgis.menlhk.go.id:8080/kemenhut/index.php/id/peta/peta-cetak/59-peta-cetak/314-peta-kesatuan-hidrologi-gambut

[24] Indicative Map of Postponement of Granting New Permits: http://webgis.menlhk.go.id:8080/kemenhut/index.php/id/peta/pippib

[25] Peat Restoration Map: https://prims.brg.go.id/

Step 3: Understanding the Hydrological System in the Area

Key components of a water management system are as follows, all to meet one of the primary aims, which is to maintain the water level at around 40 cm below the soil surface:

- Develop and install canal dam or weir (when required) – Ideally, the outlet of the artificial drainage canal network is directly connected to natural drainage, such as rivers and lakes
- Install a water level indicator (e.g., piezometers, etc.) to monitor the water level in the plantation areas on peatland
- Install water observation boards in canal (Parish *et al*., 2019; Suryadiputra *et al*., 2016)

Usually, it is advisable to contract a third-party hydrology expert to advise on the number and placement of the above components, as there are risks of flooding if not done appropriately. It is also essential that water system installations are only conducted after the Free, Prior and Informed Consent (FPIC) of local communities has been sought – due to the risk of water changes affecting community activities. Overall, water management is beneficial to communities by reducing the fire risk and moderating the flow to reduce drought risks – but this should be explained to communities and impacts on existing livelihood activities considered.

Figure 4.6: Inspecting canal dam and water levels
Photo Credit: Gian Fahmi Siregar (Proforest)

Step 4: Coordinate with Agronomist to Develop a Fertilizer and Nutrition Management Plan Appropriate to Peatland

Peat soils are highly acidic due to the high organic matter content. Therefore, palm plantations on peat need targeted fertilizer and soil management regimes to ensure that palms receive the right nutrient balance, and to reduce the risk of chemicals leaching into the water (which is more common in peatlands due to the abundance of near surface water). Therefore, it is recommended to consult an agronomist to develop a tailored fertilizer regime for the specific peat soils in the estate and refer to RSPO BMP for Plantation on Existing Peat (Parish *et al*., 2019).

Step 5: Conserving the Undeveloped Peatland

The company is required to conserve the remaining undeveloped peat areas. As peatland is considered as RTE ecosystem, the company is recommended to maintain and increase the value of the area through actions such as:

- Area mapping and demarcation
- Making a signboard to inform the conservation area
- Conducting community outreach to inform them of the conservation area and the prohibition of the utilization of fire
- Control the drainage and maintain the water table
- If needed, enrichment planting of native species and fruit tree (wildlife food plant)
- Establishing a nursery for seeds and seedlings of the native species and fruit tree (see section 3.2) (Parish *et al*., 2019; Suryadiputra *et al*., 2016)

Usually, it is advisable to contract a third-party hydrology expert to advise on the number and placement of the above components, as there are risks of flooding if not done appropriately. It is also essential that water system installations are only conducted after the Free, Prior and Informed Consent (FPIC) of local communities has been sought – due to the risk of water changes affecting community activities. Overall, water management is beneficial to communities by reducing the fire risk and moderating the flow to reduce drought risks – but this should be explained to communities and impacts on existing livelihood activities considered.

Step 6: Establish a Fire Prevention and Mitigation Plan

See fire prevention and monitoring subtopic (section 4.1). Peat soils are particularly susceptible to fire due to the high organic matter content, which makes them very flammable.

Step 7: Establish a Monitoring Plan for Peat

i. Operational monitoring – this includes the monitoring of water level and fire prevention monitoring (see fire prevention and monitoring subtopic) and developing a schedule on when to monitor. The company supervisors/managers should then also check that staff are following the monitoring protocol.

ii. Strategic monitoring - this includes the monitoring of peat depth, assessing subsidence, monitoring water quality and water levels within the canals.

iii. Threat monitoring - this type of monitoring is more specific to the threat identified, for example:

   a. For fire prevention and monitoring, the company can monitor beyond the concession area by monitoring the practices among the villages and the communities surrounding the concession area

   b. Encroachment/logging monitoring patrols to ensure that the peat area is not cleared/developed or that canal blocks / dams are destroyed

Figure 4.7: Measuring peat depth
Photo Credit: Mike Senior (Proforest)

Step 8: Transitioning from Palm Oil to Peat Rehabilitation Area

Following the RSPO standard, drainability assessment procedures are recommended to be conducted at least five years before replanting to assess the drainability limit for peat (RSPO, 2019). When the result shows that the peat drainage is reaching its drainage base, it is recommended to shift from palm oil to peat rehabilitation. After deciding that the area will no longer be planted by palm oil, the company can formally designate the area to be a conservation area. After that, the company can follow the Step 4 for conserving the peat area (Parish *et al*., 2019; Suryadiputra *et al*., 2016).

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Image: Masting of *Shorea collaris* in the HCV area | Malaysia

About Wilmar

Wilmar International Limited, founded in 1991 and headquartered in Singapore, is today Asia's leading agribusiness group. Wilmar is ranked amongst the largest listed companies by market capitalisation on the Singapore Exchange.

At the core of Wilmar's strategy is an integrated agribusiness model that encompasses the entire value chain of the agricultural commodity business, from cultivation and milling of palm oil and sugarcane, to processing, branding and distribution of a wide range of edible food products in consumer, medium and bulk packaging, animal feeds and industrial agri-products such as oleochemicals and biodiesel. It has over 500 manufacturing plants and an extensive distribution network covering China, India, Indonesia and some 50 other countries and regions. Through scale, integration and the logistical advantages of its business model, Wilmar is able to extract margins at every step of the value chain, thereby reaping operational synergies and cost efficiencies.

As a leading agribusiness group, Wilmar recognises that we have a fundamental role to play in developing quality products required by the world while ensuring we have a responsible and sustainable manner of production. We adopt a holistic approach to sustainability that is fully integrated with our business model.

Guided by the philosophy that our business must enhance stakeholder value while minimizing our environmental footprint, our business practices are aligned with universally acceptable social and environmental standards. Wilmar's No Deforestation, No Peat, No Exploitation (NDPE) Policy underpins our aspiration to make a positive impact and drive transformation across the palm oil industry.

For more information, please visit www.wilmar-international.com/sustainability.

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About Proforest

Proforest is a not-for-profit organisation with global presence that has established itself as a leader in the development and implementation of sustainable production and sourcing of agricultural and forestry commodities, including soy, sugar, palm oil, cocoa, beef and timber.

We support the transition to commodity production and sourcing that delivers positive social and environmental outcomes in the places where commodities are produced. These positive outcomes provide the compass for all our work, including protecting and restoring forests and natural ecosystems, conserving biodiversity, advancing gender equality and respecting human rights.

To drive real change, we believe that companies and other stakeholders need to take action both within and beyond their supply chains. We support this through our consultancy work with companies, through enabling effective collaboration and multi-stakeholder initiatives, and by developing knowledge and capacity building.

Our work in Africa, Latin America, Southeast Asia and internationally reflects the characteristics of the agricultural commodity production and supply chains operating there.

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