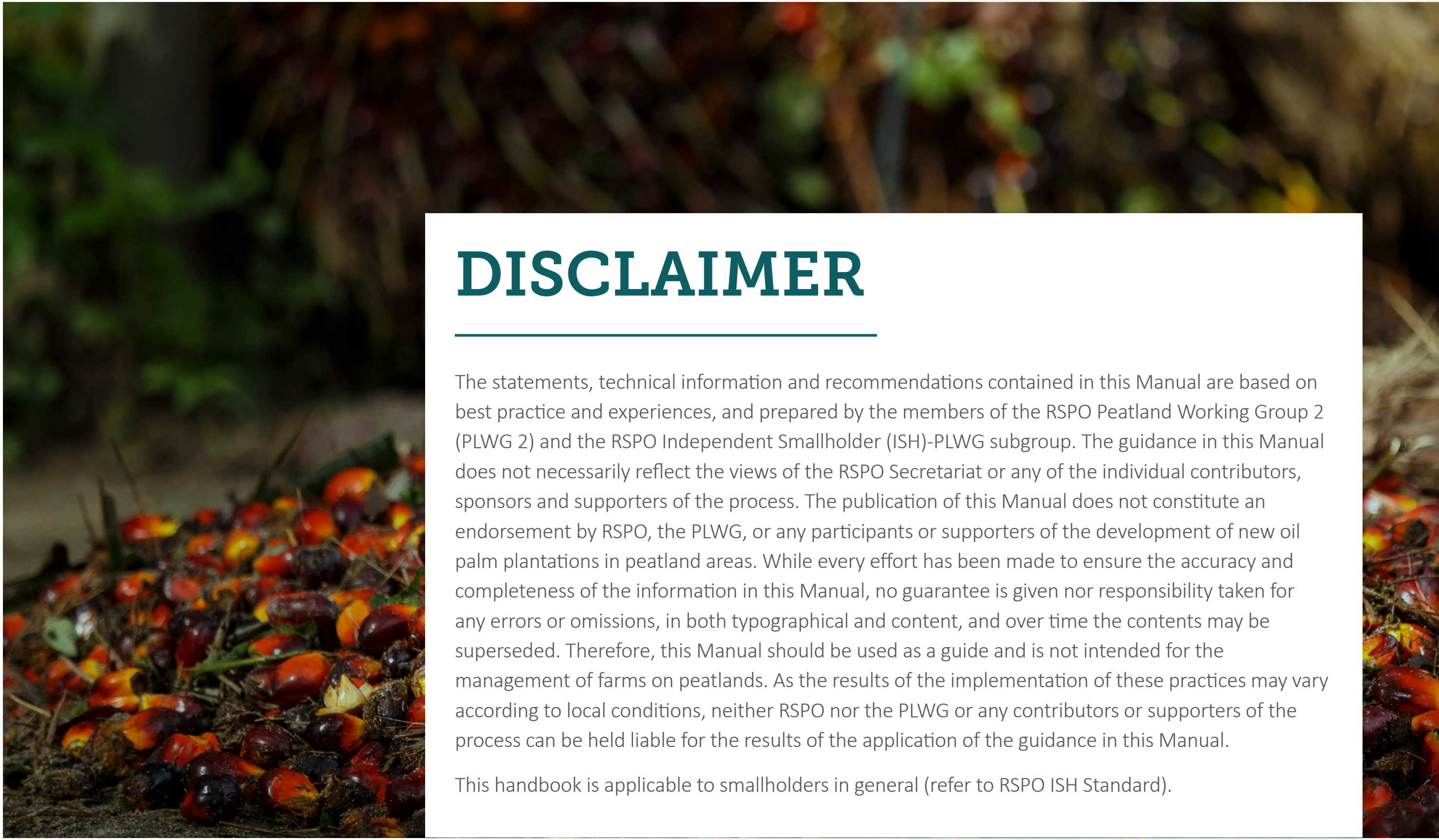
RSPO Smallholder Best Management Practices Manual

for Existing Oil Palm Cultivation on Peat

Chapter 2

Water Management



DISCLAIMER

The statements, technical information and recommendations contained in this Manual are based on best practice and experiences, and prepared by the members of the RSPO Peatland Working Group 2 (PLWG 2) and the RSPO Independent Smallholder (ISH)-PLWG subgroup. The guidance in this Manual does not necessarily reflect the views of the RSPO Secretariat or any of the individual contributors, sponsors and supporters of the process. The publication of this Manual does not constitute an endorsement by RSPO, the PLWG, or any participants or supporters of the development of new oil palm plantations in peatland areas. While every effort has been made to ensure the accuracy and completeness of the information in this Manual, no guarantee is given nor responsibility taken for any errors or omissions, in both typographical and content, and over time the contents may be superseded. Therefore, this Manual should be used as a guide and is not intended for the management of farms on peatlands. As the results of the implementation of these practices may vary according to local conditions, neither RSPO nor the PLWG or any contributors or supporters of the process can be held liable for the results of the application of the guidance in this Manual.

This handbook is applicable to smallholders in general (refer to RSPO ISH Standard).

ACKNOWLEDGEMENT

RSPO would like to thank the members of the RSPO ISH-PLWG subgroup and PLWG 2 for their continued support and contribution to the successful completion of the RSPO Smallholder Best Management Practices (BMPs) for Existing Oil Palm Cultivation on Peat.

Our special appreciation also goes to Koperasi Sawit Jaya and Koperasi Beringin Jaya from Indonesia, and Pertubuhan Tani Niaga Lestari (PERTANIAGA) from Malaysia who participated in pilot testing these BMPs. Their constructive feedback has been a great help in developing the content of this BMP Manual.

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HOW TO USE THIS BMP MANUAL

This BMP Manual was developed with seven Chapters that focus on topics relevant for existing oil palm cultivation on peat.

Along with this BMP, an extract from the RSPO ISH Standard Auditor Checklist is provided in Annex 1 as a guide for certification bodies and it may also be used by Group Managers (GM).

Non-compliances issued to an Independent Smallholder (ISH) group shall be for the non-compliance to the requirement of the RSPO ISH Standard and not against this BMP Manual.

HOW A GM CAN BENEFIT FROM THIS BMP MANUAL

(Across all chapters)

The objective of this Manual is to provide a set of practical guidance on BMPs for GM and/or smallholders to manage existing oil palm cultivation on tropical peat in line with Criteria 4.4 and 4.5 of the 2019 RSPO ISH Standard.

APPLICABILITY OF THIS BMP DURING AUDIT

This BMP Manual was produced as a recommended guidance for ISH with existing oil palm cultivation on peat. This is not to be taken as a compulsory practice and used against certification since ground conditions may vary according to location. It is the role of the GM or smallholders to evaluate the condition of the farm before the implementation of these BMPs.

CHAPTER 2: WATER MANAGEMENT

This chapter explains the importance of water monitoring and management for existing plots of cultivation that are on peat.

02

2.1 OBJECTIVES OF WATER MANAGEMENT ON PEAT

Water management is critical to the management of existing oil palms on peat. The objectives of water management on peat are:

- To remove excess surface and subsurface water quickly during wet seasons and retain water for as long as possible during dry spells.
- To improve growth and yield of oil palm.
- To minimise greenhouse gas (GHG) emissions and environmental and social impacts.
- To minimise the risk of accidental peat fire.
- To minimise peat subsidence and increase the lifespan of a farm that could over time reach an undrainable situation or an acid sulphate soil.

2.2 IMPLICATION OF POOR WATER MANAGEMENT

Too little or too much water in the oil palm rooting zone as a result of poor water management will adversely affect nutrient uptake and consequently FFB yield.

Higher water levels (e.g. <40 cm from peat surface) or waterlogged/flooding conditions may severely reduce yields of oil palm (crop losses), have detrimental effect on farm operation, and incur higher cost to repair damage. Fertiliser input will go directly into the surface or groundwater instead of being taken up by the oil palms. Flooding will increase methane/nitrogen oxide emissions.

When the water level is too low, it can cause irreversible peat dryness, which in turn causes water stress, reduces its fertility, and increases the risk of peat fire.

2.3 RECOMMENDED WATER LEVEL

Most oil palms' feeder roots are concentrated in the top 0-50 cm of the peat; hence, water level needs to be near this zone.

A good water management system for oil palm on peat is one that can effectively maintain an average water level of 60 cm (range 50-70 cm) below the bank in collection drains or 50 cm average (range of 40-60 cm) as measured by a groundwater monitoring well reading.

Figure 1: Water measured at collection drain needs to be in a range of 50 – 70 cm (Credit: Global Environment Centre, GEC)

During droughts, water level can drop 0.5-1 cm per day. In drought-prone regions, water level tends to fluctuate severely and may often fall more than 60 cm below peat surface. It may dip 15-30 cm over a one-month drought, if there is no water input from surface or subsurface flow.

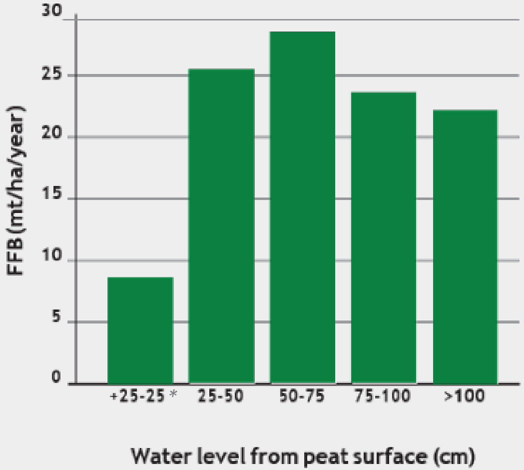

Figure 2: FFB yields (1998 planting) in relation to water levels in a peat estate in Riau Sumatra, Indonesia (Source: Peter Lim, TH Farm 2011)

**Note: This figure refers to water level below peat surface, except the first bar range from 25cm above surface to 25cm below surface.*

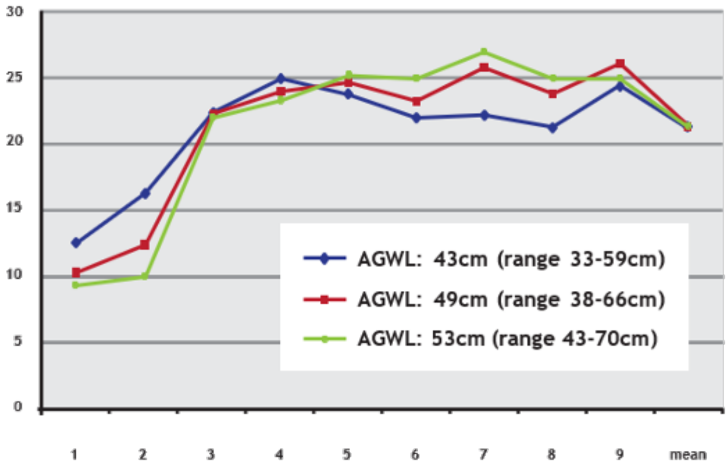

Figure 3: Relationship between average ground water level (AGWL) and yield for three different shallow water tables (Source: Hasnol, et. al., 2010)
**Note: that for younger palms (yr1-4 of harvest) the higher water level generates a better yield.*

With good implementation of water management, yields between 25 and 30 tonnes of FFB/ha/year[1] are possible. Simultaneously, GHG emissions and subsidence can be minimised, and the life of a farm can be extended.

1 Along with other best management practices in place

2.4
SOPS TO MAINTAIN AND MEASURE WATER LEVEL

A well-planned and executed water management system with water control structures should be used for drainage and effective water management in peat areas. Water gates and/or sand bags should be installed/placed at strategic locations along the main and/or collection drains for effective control of the water table at an optimum level.

A cascade of closely spaced control structures is needed to maintain relatively constant, high water levels in the drain during the dry season (Ritzema et al., 1998).

Figure 4: Water control structures
(Credit: Left photo courtesy of Ministry of Environment and Forestry, Indonesia and right photo courtesy of United Plantation Berhad)

It is most appropriate to use natural materials such as wood or sandbags for constructing weirs/stop-offs (Figure 4) and not hard structures like concrete, which will likely sink or fail in peat areas. Weirs or stop-offs should be placed at appropriate intervals to ensure that the drop-off across each weir is about 20 cm (i.e. 5 weirs are needed for a drop of 1 m – with a spacing of 200-400 m between the blocks – depending on the slope (see Figure 5).

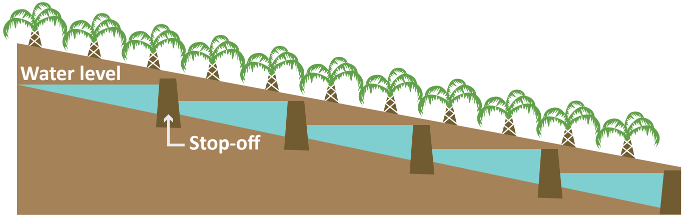

Figure 5: Along each collection drain a cascade of weirs is required with one stop-off or weir recommended for every 20 cm drop in level

The in-field water level is maintained at an average of 40-50 cm below the surface. In order to achieve the water level, water in the collection drain needs to be maintained at 50-70 cm below the peat surface (see Figure 1). To monitor the water table, the setting up of monitoring well in the field and measurement pole at the roadside drains are required.

Figure 6: Optimal water level management at 40-60 cm (in collection drain) results in a yield potential of 25-30 tonnes FFB/ha/year (Credit: Global Environment Centre, GEC)

Drain maintenance must be carried out regularly or when required to keep the drainage system working properly. Poor maintenance of the drainage system can be a cause of flooding in farms in peat area, although it is often a consequence of subsidence relative to the surrounding landscape.

Desilting of drains to required depths is best carried out prior to the rainy season. However, care needs to be taken to avoid cutting drains too deep in peat areas. It is also essential to check and repair all weirs and drop-offs regularly.

Water gates and flap gates need to be maintained at a minimum of every six months to ensure smooth operation.

Bunds are important protective structures in coastal areas to prevent the in-flow of excess or saline water into the fields. Suitable bunding materials are loamy or clayey soils. Clay originated from acid sulphate soil is not recommended as leaching of the acid from acid sulphate soils can have serious environmental impacts. Regular maintenance will minimise bund breakage that will result in flooding and crop losses.

Figure 7: Acid sulphate soil with yellowing due to oxidation of sulphur

Regular maintenance will minimise bund breakage that will result in flooding and crop losses.

Figure 8: Bunds used to prevent in-flow of water into the field. A flooded field will also hinder all estate operations and add to methane/nitrogen oxide emissions.
(Credit: Global Environment Centre, GEC)

2.5 FLOODING RISK ASSESSMENT

2.5.1 DEFINITION

Term	Definition
Flood rephrased from (Mandych, A. F., 2009):	Flood is commonly defined as an overflow of water onto lands that are used or are usable by human, and are not normally covered by water. Floods have two essential characteristics: the inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, stream, lake, or ocean.
Flood in peat (Parish. F et al., 2019):	Intact peat swamps forest stores water and contribute to maintaining the water level in rivers that run through them during dry and wet periods. Intact peatlands can diminish peak flood flows mainly by reducing water velocity and also by providing large areas for storage of flood waters in terms of spatial area, and to a limited degree (depending on how waterlogged the peat already is) through the water-holding capacity of the peat. Drain peat swamps forest/peatland disrupts the hydrology functions and the surrounding ecosystem. Promoting subsidence in the long term and making these areas prone to flooding and no longer become productive land.
Flood in Oil Palm Cultivation on Peat:	Plantations are vulnerable to flooding, which seriously affects productivity. This is partly because of drainage and disruption of peat hydrology systems. Water and flood management is required to maintain natural water regimes and to manage water levels in dry and wet seasons. In the 2018 RSPO Principles and Criteria (P&C), for plantations planted on peat, drainability assessments are conducted following the RSPO Drainability Assessment Procedure, or other RSPO recognised methods, at least five years prior to replanting. The drainability assessments are related to determining the risk of flooding due to reaching the natural gravity drainability limit for peat.
Risk:	A probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action.

Term	Definition
Risk Assessment adopted from ISO 9001 (Quality Management System) and ISO 31000 (Risk Management)	The risk assessment for a certain issue will form the foundation for making a decision about future actions. The decision may be to perform additional analyses, to perform activities that reduce the risk, or to do nothing at all. Risk can be presented in a variety of ways to communicate the results of analysis to make decisions on control risk. For analysis that uses likelihood and severity in a qualitative method, presenting the result in a matrix is a very effective way of communicating the distribution of the risk throughout the work process, activity, or any areas of interest. **Risk formula** **L X S = relative risk** L = likelihood S = severity

2.5.2 INTRODUCTION TO FLOODING RISK ASSESSMENT

Example of Risk Matrix (adapted from ISO standard)

To use this matrix (Table 1), first find the severity rating (Table 4) that best describes the outcome of risk. Then, determine the likelihood row to find the description that best suits the likelihood (Table 3) that the severity will occur. The risk level is given in this matrix the box where the row and column meet.

Table 1: Matrix on risk calculation

	Severity (S)				
Likelihood (L)	**1**	**2**	**3**	**4**	**5**
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5

High	
Medium	
Low	

The relative risk value can be used to prioritise the necessary actions to effectively manage risk (flood).

Table 2: Description of risk level

Rating	Risk Level	Action
15 - 25	High	A HIGH risk requires immediate action to control the risk as detailed in the hierarchy of control. Actions taken must be documented on the risk assessment form, including the date of completion.
5 - 12	Medium	A MEDIUM risk requires a planned approach to control the risk and apply temporary measures if required. Actions taken must be documented on the risk assessment form, including the date of completion.
1 - 4	Low	A risk identified as LOW may be considered as acceptable and further reduction may not be necessary. However, if the risk can be resolved quickly and efficiently, control measures should be implemented and recorded.

Suggestions for Criteria

I. Likelihood

Table 3: Suggestions for descriptions on likelihood

Level	Likelihood	Description
1	Rare	Will probably never happen/recur/ extraordinary case
2	Unlikely	Do not expect it to happen/recur but it is possible to do so
3	Possible	Might happen or recur occasionally
4	Likely	Will probably happen/recur but it is not a persisting issue
5	Almost Certain	Will undoubtedly happen/recur, possibly frequently

II. Severity

Table 4: Suggestions for descriptions on severity

Level	Severity	Description
1	Insignificant	No interruption in operation
2	Minor	Operational interruption for 3 days or less
3	Moderate	Operational interruption between 3 days and 1 month
4	Major	Operational interruption between 1 and 12 months
5	Catastrophic	Permanent loss of service

2.5.3 STEPS TO CONDUCT FLOODING RISK ASSESSMENT

Peat land may be continuously subsided after drainage. When the peat surface gets closer to the natural drainage limit/drainage base, drainage by gravity is not possible and flooding may occur.

Consequently, flood risk of farms needs to be assessed. A simple flood risk assessment can be conducted using the **RSPO ISH Flood Risk Assessment Template (excel file).**

The steps are as follows:

i. Overview and guidance:

- Fill in the details of the group and area on peat (Column A – E). Column F is formulated to generate the total size of plots by group members on peat (hectares).

ii. Risk Assessment Template:

- Fill in the details as required from Column A – H.
- For Columns I and J, refer to the next sheet labelled as 'Risk Profile'. There is information on Likelihood and Severity. Please select the score based on the description that best matches the situation.
- Column K refers to risk score and is formatted with formula to calculate risk score.
- Based on the risk score calculated, Columns L and M will auto populate with 'Description on Risk Level' and 'Proposed mitigation/contingency' for information on action and outcome of risk.

iii. Risk Profile

- There are four tables provided for descriptions on risk level, likelihood, severity and an example of situation with calculation.

2.6
EXAMPLE OF RISK ASSESSMENT EXERCISE AND PROPOSED MITIGATION MEASURES

The assessment should be done on the present situation in order to anticipate risk to happen or already happening. This will allow group managers to create a mitigation plan with measures for present and future directions of the management's decision. Table 5 below shows the proposed mitigation measures to be undertaken according to risk level **(Low, Medium and High)** at three different situations that may be found on the ground.

Table 5: Proposed mitigation measures according to rating

Process	Rating	Risk	Proposed Mitigation/Contingency
Oil Palm Cultivation on Peat	1-4	Low risk Flood/saline intrusion in plantation during wet/dry season. **or** Known flood/saline intrusion in plantation without following seasonal trends for consecutive years.	• No action • Continue replanting programme* • Maintain BMP
	5-12	Medium risk Flood/saline intrusion in plantation during wet/dry season. **or** Known flood/saline intrusion in plantation without following seasonal trends for consecutive years.	• Enhance water management • Postpone replanting programme* • Improve BMP implementation
	15-25	High risk Flood/saline intrusion in plantation during wet/dry season. **or** Known flood/saline intrusion in plantation without following seasonal trends for consecutive years.	• Halt replanting programme* • Adopt alternate land strategy, maybe change management practices and decision to rehabilitate the area

** = If there are ongoing replanting programmes.*

In summary, the three identified situations are:

i. Saline intrusion and high fire risk in plantation during dry season.

ii. Flood in plantation during wet season.

iii. Known flood/saline intrusion in plantation without following seasonal trends for consecutive years.

Suggestions for mitigation measures for flood risk assessment **(Low, Medium and High)** rating with scoring can be found in Table 6.

Table 6: Exercise on assessing flood risk and proposed mitigation measures

Process	Risk	Likelihood	Severity	Rating	Proposed Mitigation/ Contingency
Oil Palm cultivation on Peat (Operation)	Flood/saline intrusion in plantation during dry season.	1	1	1	• No action • Continue replanting programme* • Maintain BMP
	Flood/saline intrusion in plantation during wet season.	3	3	9	• Enhance water management • Postpone replanting programme* • Improve BMP implementation
	Known flood/saline intrusion in plantation without following seasonal trends for consecutive years	4	4	16	• Halt replanting programme* • Adopt alternate land strategy, maybe change management practices and decision to rehabilitate the area

** = If there are ongoing replanting programmes.*

2.7 ALTERNATIVE LIVELIHOOD PLANNING/ SUSTAINABLE LIVELIHOOD OPTIONS

The concept of sustainable livelihoods has a wide generic meaning, encompassing the protection and assurance of the means of livelihood (Singh et al., 2010) for people and society, and the current concerns and policy requirements pertaining to sustainable development. This chapter will provide some relevant alternative livelihood options for smallholders to adopt if there is a necessity to plan alternate land development strategies. The examples of a variety of paludiculture species, fruits, and vegetables can be adopted in the strategies.

PALUDICULTURE

Productive land use on rewetted peatland with crops that are adapted to the high water levels in peatlands is called 'paludiculture'. The Peat Swamp Forest (PSF) species are being used traditionally and there are over 400 species known which have productive use (Giesen, 2015). For centuries, the local populations have used paludiculture techniques to cultivate crops that are native to peatlands, such as *sago* (starch for noodles and cookies), *rattan* (for furniture), *gelam* (for pole-wood and medicinal oil), *jelutong* (for latex), *tengkawang* (illipe nut, for vegetable oil), and purun grass (for thatching and basketry).

(Credit: Global Environment Centre, GEC)

Example 1: Sago Plantation

Sago or *Metroxylon sagu* is an example of potential plant for paludiculture activity. The sago palm can be harvested and its spongy centre or pith of the palm stems can be extracted, grind, and knead in water, and washed a few times before sent to the dryer for extracting starch for flour. Sago flour is used for many food items.

Sago needs periodical inundation for better performance, so it can be planted on slightly drained or even undrained peatland. Sago palms require only negligible maintenance, which makes sago plantations among the most productive systems that can be operated at almost no maintenance cost.

Small-scale sago cultivation without drainage results in a high sago self-propagation rate and high starch content. However, young sago palms require an open canopy, which may increase peat temperatures and could increase carbon dioxide (CO2) emissions. When grown on tidally influenced deep peat, sago produces less starch and takes longer time to mature, approximately 12–17 years, compared to cultivation on shallow peat, where mature trunks are produced within 8–12 years after planting. The poor growth of sago palms on deep peat is likely caused by the lack of nutrients in the peat strata rather than low pH.

Example 2: Jelutong

Jelutong Paya or *Dyera polyphylla* is a native forest tree species in peat and able to grow up to 60 m tall. Jelutong latex is an important substitute for rubber latex for specialised moulding and also for electrical insulation. In the past, it was also an important source of chewing gum.

Jelutong wood has fine texture and creamy white in colour, suitable for panelling and in the manufacture of products such as pencils, matchsticks, model carvings, and other wooden accessories. The latex is obtained by tapping the trunk after 10 years, once a week. The production of latex increases with the maturity of the trees. It can be harvested for its wood after 30 years with a diameter of more than 40 cm.

The community in Kalampangan Village, Indonesia, practises intercropping and rotation of agricultural crops that are planted between Jelutong. They plant various vegetables such as chillies, long beans, eggplants, green leafy vegetable [e.g. sawi and corn].

VEGETABLES

To plant crops on peatlands, proper planning is needed and guidelines are to be strictly adhered to, in particular water management and fire prevention. Cultivation of shallow rooting crops such as ginger, beans, lettuce, tomatoes, cucumber, taro and turmeric that can tolerate acidic and wet environment made planting vegetables crop on peatlands possible to be achieved.

Example 3: Vegetables and fruits

Tomato (Growing Vegetables: Tomatoes. UNH Cooperative Extensions)

A perennial plant in its native tropics, tomato belongs to the nightshade family (Solanacae) and is native to Central and South America. Tomato plants will grow well in well-drained sites that receive full sun for most of the day. The soil pH should be slightly acidic. Excess nitrogen can result in plants with lush, vigorous foliage but little fruit production. Although it is best to determine lime and fertiliser needs from the results of a soil test, a rule of thumb for gardeners lacking test data is to apply 1.13 kg of a complete fertiliser such as 10-10-10 (or the equivalent) per 100 square feet of garden area. Work the fertiliser into the soil about two weeks before planting.

(Credit: Samrizal)

Turmeric[2]

Turmeric is a member of the Curcuma botanical group, which is part of the ginger family of herbs, the Zingiberaceae. Turmeric is widely grown both as a kitchen spice and for its medicinal uses. All curcumas are perennial plants native to southern Asia. They grow in warm, humid climates and thrive only in temperatures above 60°F (29.8°C). The turmeric plant is identifiable by both its characteristic tuberous root and leaves that extend upward from erect, thick stems arising from the root. Turmeric root is actually a fleshy oblong tuber 2-3 in (5–10 cm) in length, and close to 1 in (2.54 cm) wide.

(Credit: Tuti Sarinum)

2 https://www.encyclopedia.com/plants and animals / plants/ plants/ turmeric#:~: text=The%20turmeric%20plant %20is%20 identifiable,in%20 (2.54%20cm)%20wide.

ANNEX 1:
RSPO ISH STANDARD AUDITOR CHECKLIST

Criteria		Indicators		Checklist
4.4	Where smallholder plots exist on peat, subsidence and degradation of peat soils is minimised by use of best management practices. **Do any smallholders within the group have existing plots on peat? If no, SKIP**	**4.4 E**	Group manager confirms presence of peat on existing plots within the group and smallholders on peat commit to using best management practices and minimizing subsidence and degradation of peat soils (Reference 1.1 E, Annex 2).	1. Has the group manager identified the existence of peat within the group members existing plots? 2. How many of the group members have peat on their existing plots? 3. Have the smallholders signed a declaration to commit to using best management practices and minimizing subsidence and degradation of peat soils? 4. Is the group manager aware of best management practices for peat?
		4.4 MS A	Smallholders complete training on best management practices (BMPs) for peat. The group has an action plan to minimise risk of fire, to apply BMPs for plantings on peat and manage a water system in the certification unit.	1. Have smallholders participated in training on best management practices (BMPs) for peat? 2. What are the evidence of training conducted? 3. Who provided the training? 4. When was the training provided? 5. Has the group developed an action plan to minimise risk of fire, to apply BMPs for plantings on peat and manage a water system in the certification unit? 6. What are the fire fighting system available? 7. Can the smallholder demonstrate understanding on the best management practices (BMPs) for peat including the action plan to minimise risk of fire and, manage water system?

Criteria		Indicators		Checklist
4.4	Where smallholder plots exist on peat, subsidence and degradation of peat soils is minimised by use of best management practices. **Do any smallholders within the group have existing plots on peat? If no, SKIP** (Continued)	**4.4 MS B**	Smallholders implement the group's action plan based on best management practices, including fire and water management and monitoring of subsidence rate for existing plantings on peat.	1. Have the smallholders implemented the action plan to minimise risk of fire, to apply BMPs for plantings on peat and manage a water system in the certification unit? 2. What are the evidence of implementation of the action plan ? 3. What are the fire prevention and control systems available ? 4. How are the smallholders monitroing subsidence rate for existing plantings on peat ? 5. How are the smallholders monitoring the water levels for existing plantings on peat ?
4.5	Plots on peat are replanted only on areas with low risk of flooding, saline intrusion as demonstrated by a risk assessment. **Do any smallholders within the group have plans for replanting plots that are located on peat? If no, SKIP**	**4.5 E**	Smallholders commit to provide information on all plans for replanting and commit that replanting will only be in areas with low risk of flooding and saline intrusion (Reference 1.1.E, Annex 2).	1. Have the smallholders signed a declaration to commit: • to provide information on all plans for replanting and • that replanting will only be in areas with low risk of flooding and saline intrusion. 2. Has the group manager collected and compiled information on replanting by group members?

Criteria		Indicators		Checklist
4.5	Plots on peat are replanted only on areas with low risk of flooding, saline intrusion as demonstrated by a risk assessment. **Do any smallholders within the group have plans for replanting plots that are located on peat? If no, SKIP** (Continued)	**4.5 MS A**	Smallholders with plots on peat complete training on identification of future risks of flooding associated with subsidence and alternate land development strategies.	1. Have smallholders with plots on peat participated in training on identification of future risks of flooding and alternate land development strategies? 2. What are the evidence of training conducted? 3. Who provided the training? 4. When was the training provided? 5. Are the smallholders aware of the risk associated with subsidence? What are the identified risk associated with subsidence? 6. Have alternate land development strategies been identified?
		4.5 MS B	Prior to replanting on peat smallholders complete a risk assessment related to flooding associated with subsidence and, where there is high risk, present a plan that includes alternate land development strategies, preferencing alternative livelihood planning.	1. Is there replanting on peat by the smallholders in the group? 2. Has a risk assessement related to flooding associated with subsidence been carried out prior to replanting ? 3. What was the risks identified in the risk assessement ? 4. For high risk area, is there a plan that includes alternate land development strategies, preferencing alternative livelihood planning ? 5. Is the group manager aware of replanting activities (on peat) by group members ?

ANNEX 2: RECOMMENDED SOP FOR FIRE PREVENTION AND CONTROL PLAN

(Adapted version courtesy of Standard Operasional Prosedur Pemadaman Kebakaran Lahan, KUD Makarti No.23/SOP-KUD-MKRSM/IV/2019)

When encountered the risk of fire, there are several steps that can be taken towards fire prevention and control:

1. Should there be fire hotspot detected, the flames should be stopped immediately with basic equipment.
2. The group members shall report to the Internal Control System of the group or Fire Emergency Unit should the basic equipment is not enough to quench the flames.
3. The Fire Emergency Unit will immediately report to the Fire Agency or related agency.
4. All group members are responsible to quench the flames and conduct the evaluation.

ANNEX 3:
RECOMMENDED TABLE/SOP FOR WATER LEVEL MONITORING

(Adapted version courtesy of ISH Group 1 Asosiasi Petani Sawit Swadaya Amanah No.022/ DOK/ SOP/ APSSA/2020 dated 12 February 2020)

1. Maintain the water level by establishing drainage channels and installing modest dams to monitor the water level.
2. Modest dam is established at specific points; specifically, main outlet and the cost will be borne by the smallholder group.
3. The high point of water level on the modest dam will be monitored every one month.
4. In order to monitor the water level, the drainage channel will be set as a water level measurement tool, which is made by PVC pipe. The length of the PVC pipe shall be 2 m (1.5 m above the collecting channel surface and the rest (50 cm) should be rooted in the soil.
5. The measurement on the modest dam will be set as 0 from the soil surface.
6. The measurements in the PVC pipe (0 cm, 10 cm, 30 cm, ...150 cm) should be marked in red with a white base color and the optimum measurements (60 cm and 80 cm) should be marked in black.
7. The material of the modest dam should be waterproofed and used as a cantilever (such as bamboo) and placed in a sand sack.
8. The High Conservation Value (HCV) team identifies the location points to establish the modest dam.
9. The modest dam will be constructed once the request has been approved by the group manager.
10. Once the modest dam has been constructed, the HCV team will evaluate the effectiveness of the dam and monitor the water level every month.
11. Install the subsidence stake from the iron pipe to monitor the decrease of water level.
12. The HCV team identifies the location points from the installed subsidence stack.
13. The result shall be reported to the group manager to get approval for establishing the modest dam.
14. The subsidence stack will be constructed once the request has been approved by the group manager.
15. Once the subsidence stack has been constructed, the HCV team will evaluate the effectiveness of the dam and monitor the water level every month.

REFERENCE

Community Engagement in Peatland Restoration: Free, Prior, and Informed Consent (FPIC), News from the Landscape, USAID. Retrieved from https://www.lestari indonesia.org/en/community-engagement-peatland-restoration-free-prior-informed-consent-fpic/

Clause 6.1, ISO Quality Management System 9001:2015

Giesen, W. (2015). Utilising non-timber forest products to conserve Indonesia's peat swamp forests and reduce carbon emissions. Journal of Indonesian Natural History Vol 3 No 2: 10-19

International Society of Soil Scince – IUSS. 1930. Report to The Subcommission for Peat Soils of The International Society of Soil Science. Washington D.C., USA, U.S. Bureau of Chemistry and Soils

Mandych, A. F. (2009). Classification of floods. Water Interactions with Energy, Environment, Food and Agriculture-Volume II, 218.

Paramananthan, S. 2016. Organic Soils of Malaysia: Their characteristics, mapping, classification and management for oil palm cultivation. MPOC, 156 pp.

Parish, F., Lew, S.Y., Faizuddin, M. and Giesen, W. (Eds.). 2019. RSPO Manual on Best Management Practices (BMPs) for Management and Rehabilitation of Peatlands. 2nd Edition, RSPO, Kuala Lumpur.

Sideman, B. (2016). Growing Vegetables: Tomatoes. UNH Cooperative Extensions.

Singh, P. K., & Hiremath, B. N. (2010). Sustainable livelihood security index in a developing country: a tool for development planning. Ecological Indicators, 10, 442e451.

Ritzema, H.P., Mutalib Mat Hassan, A. and Moens, R.P. 1998. A New Approach to Water management of Tropical Peatlands: A Case Study from Malaysia. Irrigation and Drainage Systems 12 (1998) 2, p.123-139

Wüst, R. A., & Bustin, R. M. 2004. Late Pleistocene and Holocene development of the interior peat-accumulating basin of tropical Tasek Bera, Peninsular Malaysia. Palaeogeography, Palaeoclimatology, Palaeoecology, 211(3-4), 241- 270.

RSPO is an international non-profit organisation formed in 2004 with the objective to promote the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders.

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