FOREST DEPARTMENT SARAWAK

Towards a Sustainable Forest Management for a Progressive Sarawak

Proceedings of Knowledge Sharing During Movement Control Order

20-24 APRIL 2020

Forest Department
SARAWAK

All enquiries should be forwarded to

Director of Forests
Forest Department Sarawak
Level 15, East Wing,
Bangunan Baitul Makmur II,
Medan Raya, Petra Jaya,
93050 Kuching,
Sarawak.

Tel: 082-495111
Fax: 082-495200
Email: webmaster@forestry.sarawak.gov.my

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Foreword from

Permanent Secretary
Ministry of Urban Development and Natural Resources (MUDeNR)

Assalamualaikum and salam sejahtera,

First of all, I would like to thank Forest Department Sarawak for inviting me to the knowledge sharing session and for organising a very good and significant event for us. This is a good opportunity for us to update ourselves on information, programs and activities done by Forest Department Sarawak. With this opportunity, I would like to also express my gratitude to all participants during the knowledge sharing session, especially to participants from outside Sarawak and members from the forest industries.

The purpose of this knowledge sharing session was to exchange experiences and information on matters regarding the core functions of Forest Department Sarawak such as sustainable forest management, forest landscape restoration, forest research and many more. The presentations during the knowledge sharing provided abundant materials for a productive exchange of ideas. We hope this knowledge sharing proceedings will be able to assist field workers, decision makers, government officials and other interested parties to better understand the approaches taken by Forest Department Sarawak and some of the challenges that it has encountered and will face in the future. In summary, all the papers have been very enlightening because they touch on various areas of importance in the forest sectors.

The Ministry of Urban Development and Natural Resources (MUDeNR) is pleased to have participated in this knowledge sharing session and its accomplishment. Our Ministry is committed to the promotion of our forest policies and initiatives, and also expect to contribute to this process by helping to disseminate information presented in the knowledge sharing session.

I would also like to congratulate the Director of Forests and his officers for preparing the video conferencing platform for us to execute this program. My sincere thanks and appreciation also to those involved for taking great efforts in organising this program and making it a great success. Finally, I hope all of us have gained some benefits from this knowledge sharing session.

Thank you.

DATU SR.ZAIDI BIN HJ MAHDI
Permanent Secretary
Ministry of Urban Development and Natural Resources (MUDeNR)

Preface from

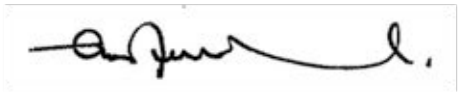
Director of Forests
Forest Department Sarawak

This Proceedings gather the papers presented at the knowledge sharing session organised by Forest Department Sarawak from 20 – 24 April 2020 during the Movement Control Order (MCO) imposed by the Malaysian Government due to the Covid-19 pandemic with the theme *Towards a Sustainable Forest Management for a Progressive Sarawak.* It was held online through the Zoom video conferencing platform and was attended by officers and staff from the Ministry of Urban Development and Nature Resources Sarawak (MUDeNR), Forest Department Sarawak (FDS), Sarawak Timber Industry Development Corporation (STIDC), Sarawak Timber Association (STA), Harwood Timber Sdn. Bhd. and various other stakeholders. It was also attended by participants from the Sabah Forestry Department, Forest Department of Peninsular Malaysia and Forest Research Institute of Malaysia (FRIM). Representatives from National Institute for Environmental Studies (NIES) and Kyoto University, Japan also attended the last two sessions of the knowledge sharing.

Twelve papers were presented during the five-day session and these papers were compiled into this proceedings for dissemination to all participants and stakeholders as references. The papers contributed the most recent knowledge, initiatives and the way forward by Forest Department Sarawak in various fields in managing our forest resources (natural and planted) sustainably. This proceedings will become an excellent reference not only for forester, but also for the general public. I believe this will be an impetus to stimulate further studies and research in the future.

This knowledge sharing session represents the efforts of many people. First of all, I would like to record my sincere gratitude to all the presenters for accepting our invitation, contributing greatly and making the knowledge sharing session informative and productive. I am honoured and privileged to serve the best recent developments in the field of forestry in Sarawak to you through this exciting program during this unprecedented event. The knowledge sharing would not be possible without the excellent papers contributed by the authors. I thank everyone for your contributions and participation. I would also like to record my appreciation to the FDS Video Conference Committee in making this session run smoothly. Last but not least, to the editors of this proceedings for their hard work in reviewing the papers.

Thank you.



DATU HAMDEN BIN MOHAMMAD
Director of Forests
Sarawak

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PERMANENT FORESTS OF SARAWAK: STATUS, ISSUES AND CHALLENGES

Madeline George Pau and Noraini Johari

Constitution and Conservation Division, Forest Department Sarawak

ABSTRACT

Permanent Forests (PFs) means all forests reserves, protected forests, communal forests, Government reserves and planted forests in the state (section 2, Forests Ordinance 2015). This sharing session highlights on the overview of Permanent Forests of Sarawak, the interesting facts about our PFs, where we are in achieving our 6 million ha target, what are the issues and challenges in constituting, managing, monitoring and retaining our PFs. It also touches on the way forward and the *new normal* in engaging with various stakeholders in achieving our target as well managing the existing PFs in a more holistic manner.

Keywords: Permanent Forests, Constitution.

INTRODUCTION

Permanent Forests (PFs) means all forests reserves, protected forests, communal forests, Government reserves and planted forests in the state (section 2, Forests Ordinance 2015).

The provision to constitute forest reserves and protected forests is under section 7 of the Forests Ordinance 2015, whereas the power to constitute communal forests is under section 30 of the same ordinance. The process of constitution of forest reserves and protected forests is attached as **Appendix 1.**

The Sarawak Land Use Policy Statement has targeted six (6) million ha of area to be constituted as PFs. This constitutes 48% of total land mass of Sarawak. As of 2019, a total of **3,964,880** ha had been gazetted as PFs. However, due to the needs for development as well as for conservation, the total gazetted area for PFs keep decreasing as a result of excision exercise. Furthermore, the constitution of new areas taking longer times and faced many challenges.

INTERESTING FACTS ABOUT SARAWAK'S PERMANENT FORESTS (PFs)

First Permanent Forest

The first PFs gazetted in Sarawak was Sg. Semenggoh Forest Reserve or known as Semenggoh Forest Reserve which was gazetted on 15 November 1920. It was a valuable research forest and arboretum. This forest researve however was revoked on 17 February 2000 and gazetted into Semenggoh Nature Reserve for the purpose of conservation. Semenggoh

Orangutan Rehabilitation Centre which situated within the nature reserves is home to a colony of semi-wild orangutans who are trained and used to human encounters.

Certified Forest Management Units (FMUs) within PFs

To date ten (10) FMUs have been certified in Sarawak with the area of 955,766 ha. All of these FMUs are located either fully or partially within PFs. The following Table 1 and Figure 1 shows the list of certified FMUs in Sarawak.

Table 1: Certified FMUs in Sarawak

No.	FMU	Total Area Certified (ha)	PFs overlapped with FMUs
1.	Anap-Muput FMU	83,535	Anap PF and Mukah Hill PF
2.	Ravenscourt FMU	117,941	Limbang PF
3.	Kapit FMU	149,756	Balleh PF
4.	Linau FMU	72,685	Bahau PF and Linau PF
5.	Bahau-Kahei FMU	45,035	Bahau PF and Linau PF
6.	Ulu-Trusan FMU	92,751	Limbang PF
7.	Raplex FMU	63,993	Mujung Merirai PF
8.	Melatai-Para FMU	49,524	Balleh PF
9.	Pasin	132,151	Balleh PF and Katibas Bangkit PF
10.	Gerenai FMU	148,305	Tapang Baiong PF and Nakan Kelulong PF
	Total	**955,676**	

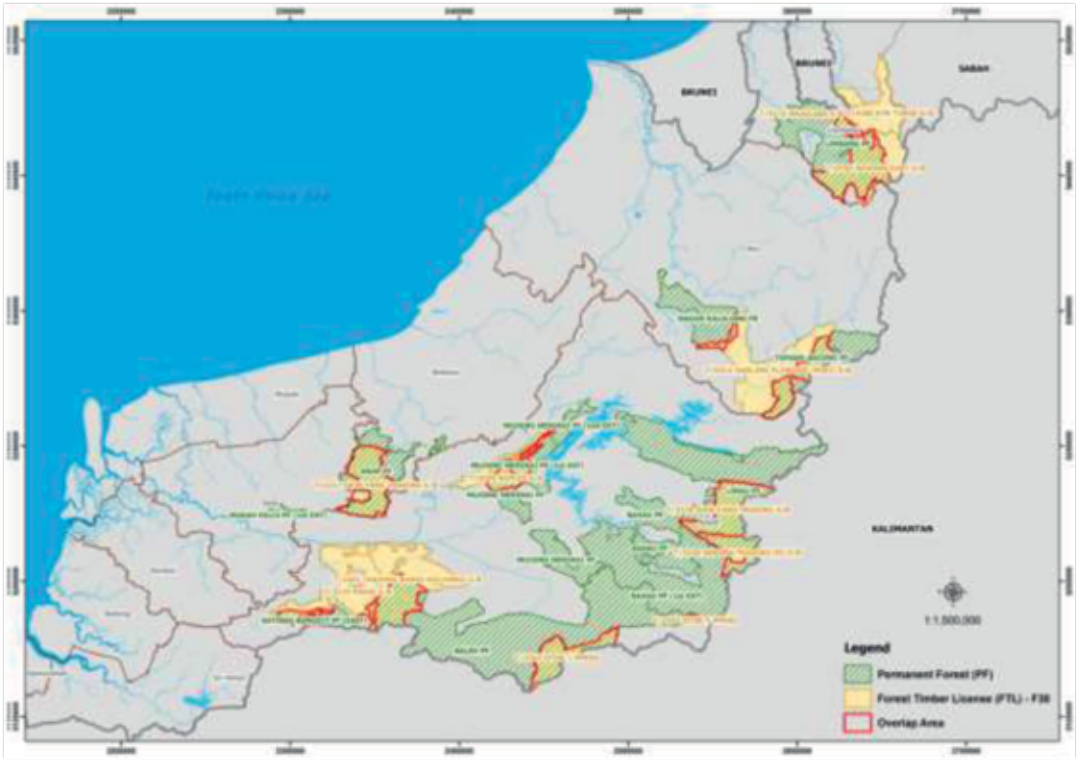

Figure 1: Map showing certified FMUs

Remaining Peat Swamp Forests

According to Forest Department's record, a total of 73 PFs are having peat swamp forests within its area (Figure 2). Out of these, 33 are within forest reserves, 22 within protected forests and 18 within communal forests. The size of area is about 168,846 ha ha.

Figure 2: Map showing distribution of Peat Swamp Forests within PFs

Revenues generated from PFs for the past 10 years

For the past 10 years, log productions from PFs had generated revenues (royalty, premium and cess) cumulatively RM 5.68 billion (Figure 3). In terms of production volume, it shows a downward trend from 10,151,816 m^3 in 2010 to 4,074,254 m^3 in 2019 (Figure 4). This trend indicated that the commercial stocking of PFs in Sarawak is decreasing after more than four (4) decades of timber extraction.

Various efforts are taken by the state government to ensure that PFs are managed in a sustainable manner such as mandatory forest management certification of the long-term forest timber licenses by the year 2020, embarking on Forest Landscape Restoration (FLR) and ensure that sensitive area within PFs such as water catchment areas and habitat for wildlife are conserved and managed accordingly.

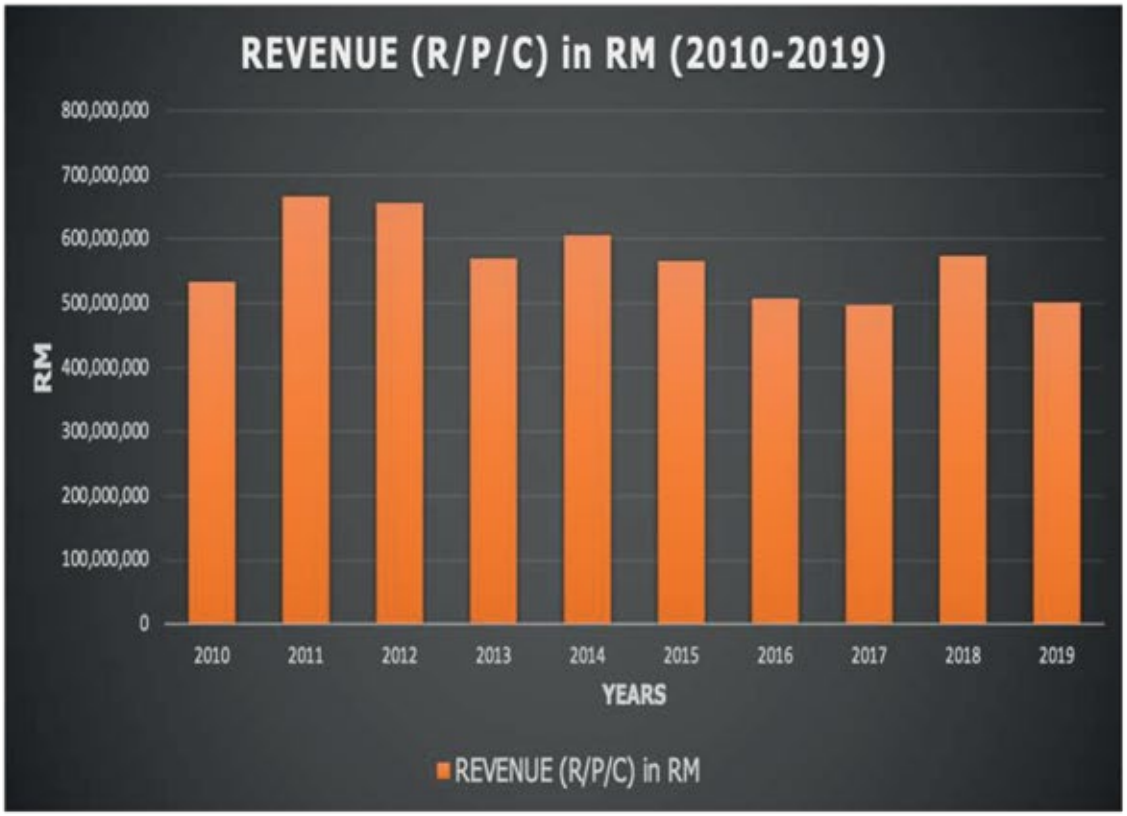

Figure 3: Graph showing revenues generated from PFs from 2010 to 2019

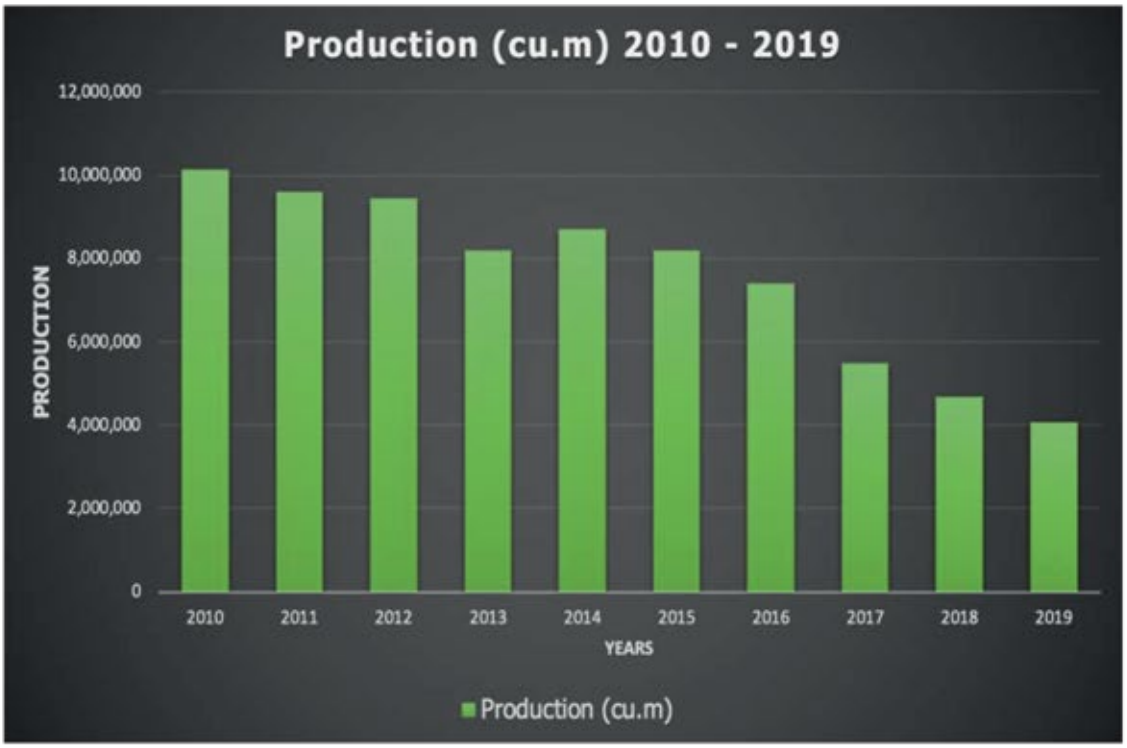

Figure 4: Graph showing Log Productions (m^3) from PFs from 2010 to 2019

Division (Administrative Division) with the Most PFs

A division with the greatest number of PFs is Miri i.e 27 PFs whereas Kapit Division is having the biggest PFs area totalling 2,241,845 ha. The following Table 2 shows the number and size of PFs in various divisions within Sarawak:

Table 2: Number and Size of PFs in various Division within Sarawak

No.	Division	Size (Ha)	No. of PFs
1.	Kuching	21,303	7
2.	Samarahan	18,486	10
3.	Serian	5,250	7
4.	Sri Aman	1,686	3
5.	Betong	8,898	4
6.	Sarikei	4,880	7
7.	Sibu	122,111	21
8.	Kapit	2,241,845	24
9.	Mukah	65,947	13
10.	Bintulu	421,708	17
11.	Miri	801,027	27
12.	Limbang	248,552	10

DISTRIBUTION OF PFs

PFs located all over the state with the concentration in the interior part of Sarawak as shown on the map below (Figure 5).

Figure 5: Location of PFs (green line) in Sarawak

A total of 116 PFs had been gazetted which covering an area of 3,964,880 ha. Out of this, 44 are protected forests, 42 forests reserves, 18 communal forests and 1 is Government Reserve.

POTENTIAL PFs

Forest Department has identified and put up 19 areas with the size approximately 600,000 ha for initial gazettement of PFs in Sarawak. However, due to focus given to constitute more area for Totally Protected Areas in the past, effort to gazette more PFs was temporarily put off. Besides, objections by local communities were among the factors that hindered the pursuance of gazettement of PFs.

A clear delineation of function between Forest Department Sarawak and Sarawak Forestry Corporation in early 2020, enable the department to focus and pursue the constitution of PFs. The areas identified as potential PFs will be further analysed and reviewed to ensure no land use conflict that could possibly disrupting and delaying the process of constitution.

ISSUES AND CHALLENGES

The constitution of PFs as well as managing, monitoring and retaining of gazetted PFs are always a challenge and an arduous task. The followings are some of the issues and challenges faced by the department.

Justification to constitute PFs

PFs are often perceived as areas licensed out to big timber companies for purpose of timber production. Even though this perception is mostly true in the case of protected forests and forest reserves, however not all PFs are under licensed area. This perception resulting in resistance by the communities especially when an area was identified to be gazetted as PFs.

Reduction of PFs area due to revocation and excision

Over the years, due to the need for development and conservation, substantial areas of PFs had been either revoked or excised. Based on the department's gazettement record, a total of 1,084,703 ha had been excised from PFs while total cumulative area ever gazetted as PFs was **5,647,719** ha. As at 2019, the total area under PFs is 3,964,880 ha and this area is expected to be further reduced once the data cleaned up is completed especially for areas which were already officially excised for Provisional Lease and direct conversion to TPAs.

The department needs more than 2 million ha of area to be gazetted to achieve a 6-million-hectare.

Encroachment into PFs especially settlements and PL boundary

As discussed in the previous section, competition for other land uses is a constant challenge not only for gazzetting new PFs areas but also the existing areas under PFs. This is especially true in PFs adjacent or bordering plantation and settlements.

Areas within PFs that are being occupied by the local communities be it for settlement or cleared for shifting agriculture often caused conflict between them and the authority or licence holders. This conflict if not addressed or resolved can affect the effort in Forest Management Certification as well as effective management of PFs.

Funding for constitution and boundary works

In the past years, focus was given to constitute TPAs as compared to PFs. Therefore, allocation for constitution works were mostly for TPAs. This resulting in insufficient funding for constitution works as well as boundary demarcation and boundary cleaning for PFs. Physical/field work such as dialogues, boundary demarcation and boundary cleaning are implemented by Regional Forest Offices (RFOs) throughout Sarawak. These RFOs required fund from headquarters which normally channelled through sub-warrant by Constitution and Conservation Division.

Uncertainty due to Covid-19 pandemic

The Covid-19 pandemic is definitely disrupting the department's plan particularly constitution and maintenance of PFs. The 2020 work plan needs to be reviewed accordingly to determine the priority activities.

WAY FORWARD

To address the above issues and challenges, the followings could be considered:

Enhance participation of local communities in co-management of PFs

Local communities could participate in the co-management of PFs such as Forest Landscape Restoration, community-use forest management and boundary maintenance. By involving them, it could benefit the communities and, in a way, could change the perception on PFs i.e. not only areas for logging operations.

Replacement policy for unavoidable excision of PFs

The unavoidable excision of PFs area is proposed to be replaced in order to maintain the area under PFs. This proposal had been discussed with the Ministry of Urban Development and

Natural Resources but further discussion is needed to work out the practical mechanism and strategy.

Enhance the usage of technologies and engagement with local communities

To boost up the monitoring of PFs especially in the interior area of Sarawak, the usage of technologies such as hyperspectral could also be enhanced. Aerial surveillance has been proven to help in early detection of encroachment into PFs.

To address the issues of conflict due to illegal settlements and clearing within PFs, the department could consider issuing "permit to use" to control and subsequently prevent more encroachment and clearing of PFs for shifting agriculture.

Embark on collaboration project especially with FMUs for boundary marking

Collaboration projects could also be considered in carrying out boundary demarcation and boundary maintenance works particularly for PFs that bordering FMUs or other areas such as TPAs or plantations. This strategy could assist the department to share the responsibility in areas with common boundaries.

To prioritise and relook at activities after lifting of Movement Control Order (MCO)

In view of MCO, the department needs to relook at the work plan 2020 in order to prioritise and make some adjustment to ensure priority activities could be carried out as best as possible.

CONCLUSION

The Permanent Forests of Sarawak had and always been benefited the people of Sarawak be it for revenues generation, providing job opportunities through forest and forest related operations, source of non-timber forest products such as food, medicinal/pharmaceutical resources etc as well as its function in providing the ecosystem services i.e. water catchment, source of oxygen and carbon sequestration, renewable energy etc.

Therefore, it should be managed in a sustainable manner to ensure that it will continue to provide the ecosystem services to human kind and wildlife. All issues and challenges faced in managing and maintaining the PFs should be addressed in a tactful manner taking into consideration concerns by all affected stakeholders. The effort to gazette more areas also needs to be intensified to achieve the 6-million-hectare target of PFs as set by the State Government.

ACKNOWLEDGEMENTS

We would like to express our gratitude to YBhg. Datu Hamden Haji Mohammad, the Director of Forests for giving us the opportunity to participate and present this paper in the Knowledge Sharing Session, Mr. Jack Liam and Mr. Abg Ahmad Abg Morni, Deputy Director of Forests for their guidance and efficiently moderating the session, Mr. Mohd. Basri Mahidin @ Mohiden for providing maps and data on PFs, Mr. Semilan Ripot and Ms. Hasanaliza Bujang Abdillah for providing data on revenue and production and Ms. Lelawati Othman for information and reference on historical data of PFs.

Finally, a big thank you to Tuan Haji Happysupina Sait, Mr. Phillcaine Pilla, Mr. Mohammad Firdaus Bohari and Mr. Vincent Wong Thian Fook for efficiently coordinating the knowledge sharing session during Movement Control Order through Zoom Meeting, Facebook and Youtube platforms.

WE HAVE NOT WON YET, BUT WE HAVE NOT FAILED EITHER - FOREST MANAGEMENT CERTIFICATION IN SARAWAK

Ricky Jonathan Alek and Wira Azizi B. Kader

Planning and Management Division, Forest Department Sarawak

ABSTRACT

The State Government of Sarawak had regulated a policy for all long term Forest Timber Licenses (F30) to obtain Forest Management Certification (FMC) by year 2022 in order to ensure the perpetuity and sustainability of forest resources in Sarawak. The requirements under the FMC shall strengthens the Sustainable Forest Management (SFM) in Sarawak by (i) advocating responsible forestry, (ii) self-regulatory and (iii) embracing comprehensive approach which balance economic, environment and social aspects. Challenges and gaps such as land and social issues, as well as limited skilled and technical capacities will continue to be addressed through capacity building and continuous engagement with various stakeholders. Besides awareness, this sharing session will also provide enlightenment for Forest Department Staff on where we are now, our direction and provide updated certified area in Sarawak as of April 2020.

Keywords: Sustainable Forest Management, Forest Management Certification, technologies, engagement of stakeholders.

BACKGROUND

Sustainable Forest Management (SFM) is a key component of sustainable development agenda of the Sarawak Government. It requires adherence to such principles as balance between ecological, economic and social dimensions of sustainability, strong consensus among stakeholders, a cross-sectoral approach and partnerships.

The need for SFM had since reflected in the Statement of Forest Policy of Sarawak 1954, where sustainability of the forests, safeguarding the environment and the local communities were very much emphasized. Forest Management Certification (FMC) is a tool to drive SFM in Sarawak. This paper will elaborate the background and progress of FMC in Sarawak as of April 2020.

As a way forward, Sarawak will continue to strengthen its forest management for the benefit of present and future generations.

CURRENT SCENARIO OF LOGGING IN SARAWAK

In this section, it shows the past and present practices in graphics to comprehend an improvements of timber harvesting through Reduce Impact Logging (Figure 1, Figure 2 and Figure 3).

Figure 1: Conventional logging (2 years after harvesting)

Figure 2: RIL Logging (Immediately after harvesting)

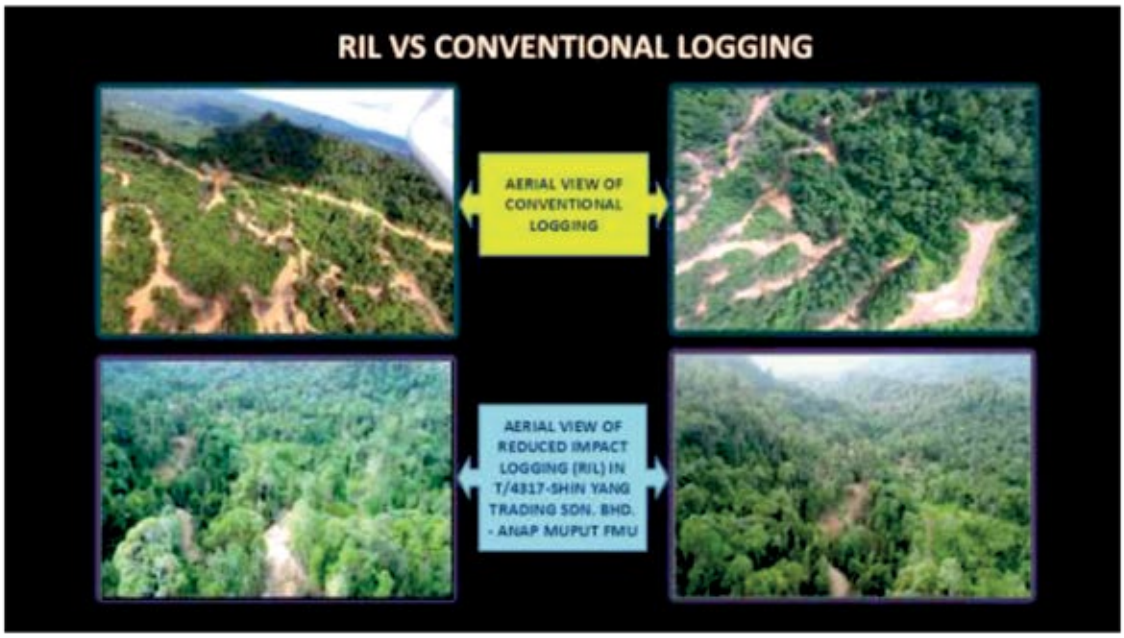

Figure 3: RIL versus conventional logging

OVERVIEW OF FMC

FMC strengthen SFM by ensuring all three pillars i.e Environment, Economic and Social is addressed.

Definition of FMC

Forest Management Certification is "Confirmation of compliance of forest management practices with an agreed set of rules", expressed in form of Principles, Criteria, Indicators & Management Specifications (Verifiers).

Chronology of FMC

Since 2009, the first announcement on FMC was made by the Minister for Resource Planning and Environment during his winding up speech on 16th November 2009, encouraging timber operators to obtain FMC for their licence area. In June 2013, the Minister for Special Functions stated that the State Government wants concession areas within the Heart of Borneo to obtain Sustainable Forest Management (SFM) certification by 2017. On 15th August 2013, this commitment was reiterated by the Minister for Resource Planning and Environment where he directed the six major timber operators including STIDC to certify at least one of their licence areas.

The YAB Chief Minister of Sarawak and Minister for Resource Planning and Environment in his speech during the SFM Seminar on Forest Certification (Natural Forest) on 20th August 2014 announced that Sarawak will grant long term licence tenure of 60 years to Forest Management Unit, FMU(s) on condition that they obtain and maintain forest management certification. Long term licence tenure is one of the incentives to the licence holder. The longer period of the licence tenure is important to ensure the FMU holders can maintain and

manage the residual stand for future crops. The security of tenure is one of the main principles for certification. The long term tenure is logical in view of the high cost of investment involved to implement forest management certification.

On 2nd April 2015, YAB Chief Minister and Minister for Resource Planning and Environment approved policy direction on forest management certification as follows:

(i) Forest Management Certification is the major commitment to maintain and enhance the good image of forest management in Sarawak.

(ii) Licence tenure for the certified area (FMU) to be reviewed and can be extend up to sixty (60) years. As announced during the Seminar on Forest Management Certification (Natural Forest) on 20th August 2014, the 60 years tenure will be granted as an incentive to the certified FMU. In order to enjoy this incentive, the timber licensee must obtain the forest management certification for their area. The Forest Management Plan which is incorporating the requirement for forest management certification shall be produced by the Licensee/ FMU Holder. The Forest Management Certification Licence Condition (FMCLC) will be imposed once the Licensee/ FMU Holder had obtain the certification. The Licensee/ FMU Holder shall maintain the forest management certificate for the whole period of the agreement. Failure to comply with the condition shall cause their licence to be terminated.

(iii) The forest Department will be the lead agency to drive forest management certification in Sarawak and should prepare action plan as well as develop relevant guidelines and procedures for the implementation of the forest management certification in Sarawak.

(iv) The forest management certification scheme shall be international recognized such as Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC) Schemes or Malaysian Timber Certification Scheme (MTCS). Certification under any other schemes should be approved by Director of Forest.

On 13rd September 2017, the State agreed to make forest management certification mandatory for all long-term forest timber licences to obtain forest management certification by 2022. The requirement on FMC was re-emphasized during DUN sitting in November 2017 and the Malaysian Forestry Conference in August 2018.

Why Forest Management Certification?

Due to the market demand for timber from certified forest and growing concern on sustainable supply of timber to downstream industries, there is an urgent need for sustainability of the forest to balance between fulfilling Sarawak's economic needs, ensuring adequate environmental protection and meeting the needs of the communities. The FMC supports the Sarawak Government commitment in sustainable forest management. It is an important tool to promote and achieve SFM as well as providing a conducive trading environment for tropical timber.

The FMC shall further enhance Sarawak's image and commitment in SFM especially in ensuring good governance and sound forest management practices, combating illegal logging and community development through compliance as required in international standards criteria. The proposal for areas ≥ 25,000 hectares (ha) for FMC had taken into account the economic viability and requirement for environmental protection and social responsibility of the license area.

The FMC requires securing certified forest area from mass forest conversion to ensure clear, substantial and secure long-term conservation, economic and social benefits of the licence area. Therefore, it is proposed for non-issuance of provisional lease from certified forest to avoid withdrawal of the certificate. The tenure of 60 years was proposed to enable the licensee to properly plan, manage and maintain residual forest stands for future crops. It also considers the high investment of implementing FMC as well as to promote towards self-regulating approach by the FMU owner.

International forest management certification schemes are preferred to promote SFM in Sarawak as well as to gain confidence among international buyers that requires timber from certified forest management areas as well as timber legality requirement. It also will improve Sarawak's export opportunity and strengthen our market growth.

PROGRESS OF FOREST MANAGEMENT CERTIFICATION IN SARAWAK

As of April 2020, there were 10 FMUs being certified with a total area of 955,676 ha and 5 FPMUs (Forest Plantation Management Unit) certified with a total area of 67,341 ha. The locality of all the FMUs certifed are shown in Figure 4. Detail list of certified FMUs are shown in Table 1 and list of certified FPMUs in Sarawak is shown in Table 2.

Figure 4: Locality of certified FMUs in Sarawak as of April 2020.

Table 1: List of certified FMUs in Sarawak

No.	Forest Timber Licence No.	FMU	Timber Group	Area (Ha)
1.	T/4317	Anap Muput FMU	Shin Yang	83,535
2.	T/0294	Ravenscourt FMU	Samling	117,941
3.	T/3491	Kapit FMU	Ta Ann	149,756
4.	T/3228	Linau FMU	Shin Yang	72,685
5.	T/3236	Bahau Kahei FMU	Jaya Tiasa	45,035
6.	T/0280 & T/9115	Ulu Trusan FMU	Samling	92,751
7.	T/0560	Raplex FMU	Ta Ann	63,993
8.	T/3433	Melatai Para FMU	STIDC	49,524
9.	T/3135	Pasin FMU	Ta Ann	132,151
10.	T/0413	Gerenai FMU	Samling	148,305
		TOTAL		**955,676**

Table 2: List of certified FPMUs in Sarawak

No.	Licence for Planted Forest	FPMU	Timber Group	Area (Ha)
1.	LPF/0006	Lana FPMU	Samling	9,393
2.	LPF/0019	Masama FPMU	Shin Yang	11,946
3.	LPF/0018	Penyuan FPMU	Shin Yang	15,261
4.	LPF/0014	Segan FPMU	Samling	10,800
5.	LPF/0009	Marudi FPMU	Samling	19,941
		TOTAL		**67,341**

As of 15th April 2020, there are 4.62 million ha of PEFC-MTCS Certified Forest consisting of 18 FMUs and 6 FPMUs in Malaysia. (MTCC Website, https://mtcc.com.my/certified-forests/). As of April 2020, there are five (5) FMUs have undergone stage 2 audit and result is still pending. Table 3 shows the list of FMUs have undergone Stage 2 audit.

Table 3: List of FMUs that have undergone Stage 2 audit

No.	Forest Timber Licence No.	FMU	Timber Group	Area (Ha)
1.	T/3400	Gaat Mengiong FMU	STIDC/Billion Venture	66,190
2.	T/3361	Mujong Melinau FMU	RH (Subur Tiasa)	41,696
3.	T/3342	Danum FMU	Shin Yang	200,384
4.	T/3476	Entulu-Melatai FMU	WTK	55,112
5.	T/3190	Belaga Balui FMU	STIDC/KTS	63,443
		TOTAL		**426,825**

With a total of 1,005,060 ha, another 12 FMUs have their Forest Management Plan approved by the department which have not progressed into Stage 1 audit.

FMC POLICY DIRECTION

All the works on FMC could have not materialized without the presence of political commitment. FMC has managed to gain the support from the State and being articulate in a form of policy paper. *POLICY DIRECTION ON FOREST MANAGEMENT CERTIFICATION IN SARAWAK* was approved by YAB Chief Minister on September 2019. As outlined below, there are 11 agendas that has been approved in order to guide the implementation of FMC in Sarawak:

(1) FMC is a major commitment to maintain and strengthen good governance and reputation of forest management in Sarawak.

(2) FMC is mandatory for all long term forest timber licences to obtain forest management certification by 2022.

(3) Minimum area for certification is 25,000 ha.

(4) Long term forest timber licences with less than 25,000 ha, the following conditions may apply;

a) Volume control to be used as FMC mechanism,

b) Consolidate license areas within the same group of companies or different licenses (with mutual agreement), and

c) Encourage group certification.

If above condition is not fulfilled, the licence shall not be renewed upon expiry to allow for natural regeneration.

(5) Failure to maintain Forest Management Certification, 2 years grace period to be given for re-certification before administrative measures is taken by the authority. No harvesting shall be allowed during the period.

(6) Overlapping areas between forest timber licence and licence for planted forest within the same group (not planted before 2010) to be reverted to forest timber license.

(7) Unplantable areas within licence for planted forest (LPF) are required to be reverted to forest timber licence or to be gazetted as totally protected area.

(8) No issuance of provisional lease over certified areas to avoid withdrawal of certification. This is in line with Principle 6.10 of Malaysian Criteria and Indicators for Forest Management Certification under Malaysia Timber Certification Scheme (MTCS).

(9) Licensees that manage to obtain FMC may be given a 60 years tenure as an incentive, provided that they maintain the certificate for the entire period as in the Timber Licence Condition (Forest Management Certification). Failure to comply with the condition shall cause their licence to be terminated.

(10) Failure to obtain FMC by 2022 may result in the suspension and termination of the forest timber license.

(11) The licensees shall follow internationally recognized forest management certification scheme such as the Malaysian Timber Certification Scheme (endorsed by the Programme for the Endorsement of Forest Certification, PEFC) or the Forest Stewardship Council (FSC). Other forest management certification schemes shall be subjected to the approval by Director of Forests.

ISSUES AND CHALLENGES

From the observation gained during the implementation process the challenges can be categorized as follows:

(i) Adequate skilled manpower. Limited skill and technical know-how,
(ii) Reduction in log production & revenue,
(iii) Control of annual harvesting (1 Coupe Year),
(iv) Increase implementation cost (auditing fee, capacity building, ground preparations, data collection and etc.),
(v) Willingness to accept policy and changes (Attitude). A change of mindset,
(vi) Migration from conventional logging to Reduced Impact Logging (RIL) and
(vii) Land and social issues.

WAY FORWARD

As a way forward, listed below are the requirement to ensure the smooth implementation of FMC in the state. There are as follows:
(i) Continuous engagement with relevant stakeholders,
(ii) Enhance capacity building,
(iii) Use of up-to-date technologies,
(iv) Intensify R&D to support decision making, and
(v) Received full support from Forest Department's staff.

CONCLUSION

Despite the tight timeline given to get all long term forest timber licenses certified, mounting labs, consultations & paper work, site supervision, our tireless efforts as a team deserve a fair recognition. Hence, *we have not won yet, but we have not failed either.*

FOREST LANDSCAPE RESTORATION (FLR) IMPLEMENTATION IN SARAWAK: INITIATIVES AND WAY FORWARD

Zarina Shebli

Restoration and Industrial Forest Division, Forest Department Sarawak

According to the "Guidelines On The Restoration Of Degraded Forests (ITTO, 2002), Forest Landscape Restoration (FLR) is widely promoted as a solution to the global loss and degradation of the world's forests and as a contribution to the sustainable development through restoring the ecological, social and economic values and functions of degraded landscapes. Forest Landscape Restoration plays a major component in restoring functional forest ecosystems within landscapes so that forests can co-exist and subsist in a landscape mosaic together with other land uses, thus address the wider issues of encroachment, local disputes and habitat management of endangered species. It is essential to ensure that Sarawak's forest remains vibrant and its complex eco-system could carry out its natural functions.

Keywords: Forest Landscape Restoration, ecosystems, forests, development, implementation

INTRODUCTION

International Union for Conservation of Nature (IUCN) definition of Forest Landscape Restoration (FLR) is an ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes. FLR is not just about forestry, trees and planting sites, it requires integration with other land-uses, delivery of a broader range of societal benefits, and a vision for a better management of landscape where restoring a whole landscape to meet future needs and to offer benefits and land uses over time.

FLR is widely promoted as a solution to the global loss and degradation of the world's forests and as a contribution to the sustainable development through restoration of the ecological, social and economic values and functions of degraded landscape. FLR is not a new concept in Sarawak as the state has been looking into FLR since 1920's and it was proactively conducted in 1980's and 1990's. The objectives of FLR in Sarawak is to enrich logged-over areas with high value timber species especially on degraded areas to ensure the forests remain vibrant and are able to carry out its natural functions which is to elevate livelihood of forest-dependent communities, and to reduce pressure on natural forests by shifting timber production towards plantation of indigenous fast-growing species.

Sarawak's forest cover is about 63% of its total land area which contributes to 44% of Malaysia's forest cover.

Based on the latest satellite images, Sarawak has a total of 763,563 hectares (ha) degraded area, comprising 50,037 ha in Totally Protected Area (TPA); 67,628 ha in non-licensed area within PFE; 476,528 ha under within licensed area (Licence for Planted Forest (LPF) and

Forest Management Unit (FMU) within PFE; and 169,370 ha within the other area under potential PFE (Figure 1).

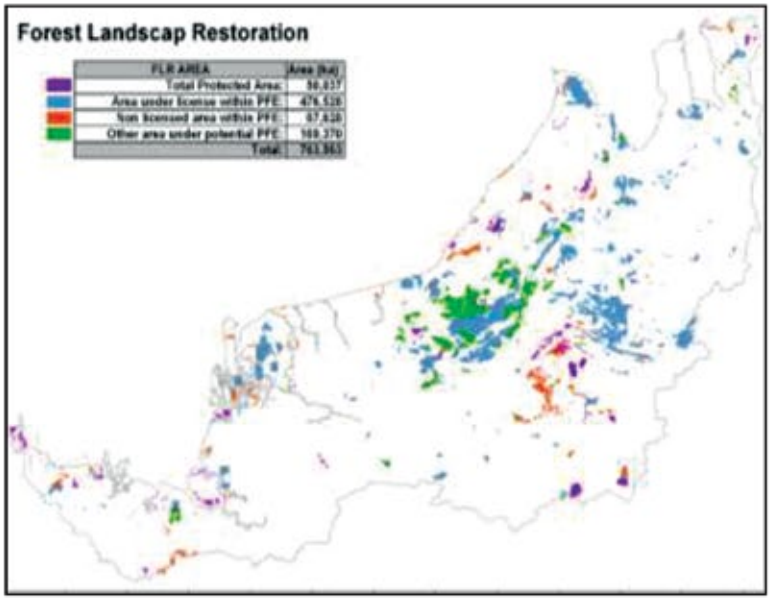

Figure 1: Map showing the degraded areas in Sarawak

Sarawak Chief Minister, YAB Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari bin Tun Datuk Abang Haji Openg had announced on March 7, 2019 that Sarawak's State Government is committed to implement FLR, forest landscape restoration will be one of the state government main focus onwards, with the aim to enrich the logged-over areas with high value timber species, targeting degraded areas within permanent forest estates. This approach will definitely ensure that Sarawak's forest remains vibrant and its complex eco-system could carry out its natural functions. FLR Implementation in Sarawak was then officially launched on June 15, 2019 at Sabal Agroforestry Centre by the Sarawak Chief Minister.

Prior to this, Director of Forests has circulated a circular to all the forest timber license holders and FMU Holders whereby they are required to carry out enrichment planting within their licensed area. The enrichment planting program should use the indigenous or local species with the total number of trees planted should be equivalent to the trees harvested. The licensees are also required to establish their own forest trees nurseries to carry out enrichment planting and restoration of degraded or cleared areas within their licensed area.

INITIATIVES TAKEN

Few initiatives were taken since 2018 in order for the project to be successfully implemented which are guided by three main initiatives; to revive forest tree nurseries all over the state, establishment of a temporary nursery, supply of planting material and planting activities/programmes (Figure 2). In reviving nurseries, three locations were selected; Sarawak Tree Improvement Centre (STIC) at Sibu has been revived in February 2018,

followed by Sabal Agroforestry Centre (SAC) at Sabal in April 2018, and Forest Research Station (FRS) at Sg. Sebubok, Niah in February 2019 (Figure 3).

A new nursery was then established at Kelesa Camp, Ulu Baram. The establishment of this new nursery was a result of a collaboration effort between the Forest Department Sarawak and forest timber license by Samling.

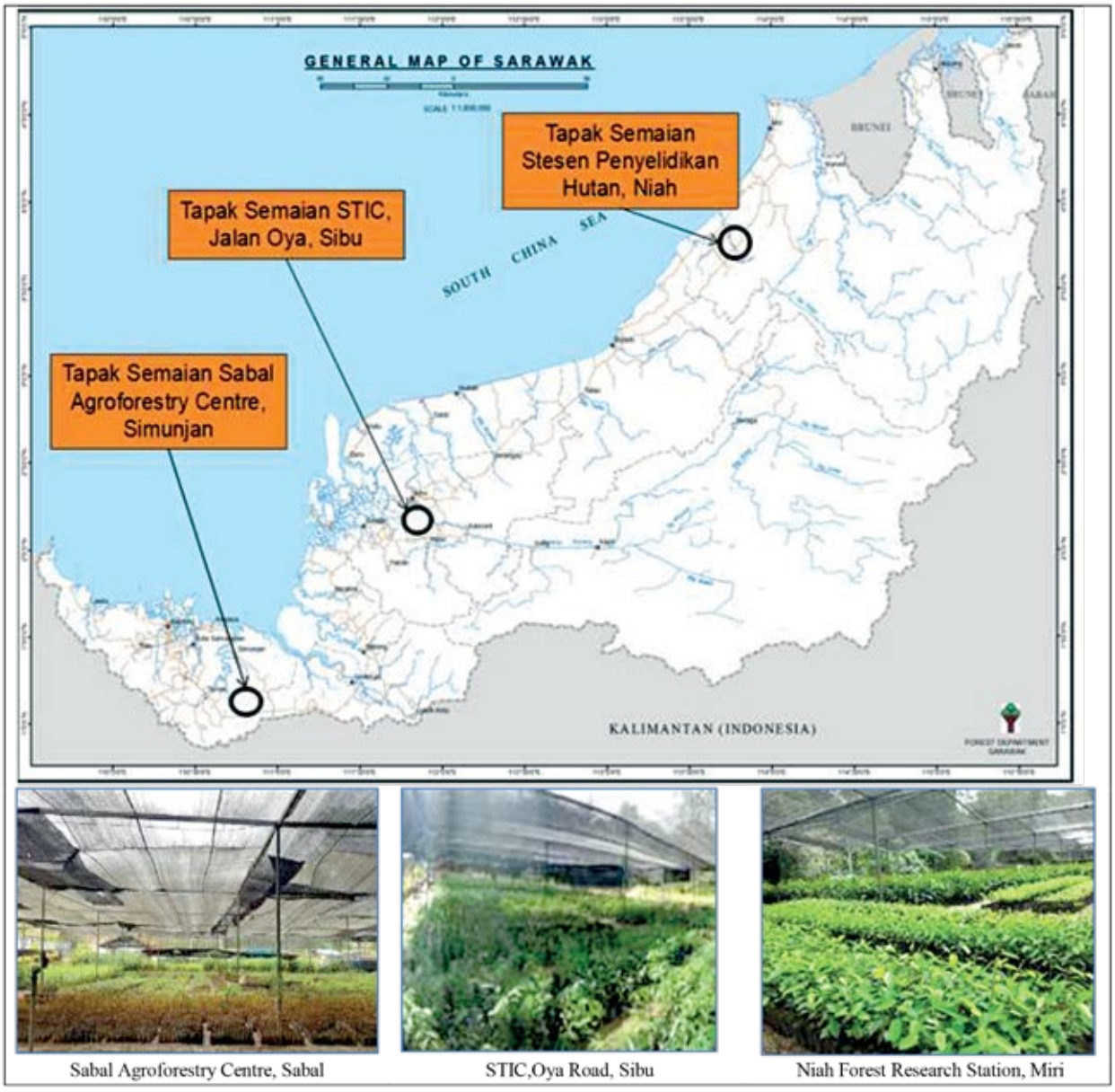

Figure 3: The three (3) locations of the revived forest tree nurseries

Figure 4: Forest seeds and seedling's collection activities by FDS staff and local communities

The planting material initiative includes collecting indigenous tree species, Non Timber Forest Product (NTFP) species, herbal and medicinal plants. The seeds and wildings were collected by forest department staffs with the collaboration with local communities surrounding the areas and some were purchased from the local communities (Figure 4). During the mass fruiting season of dipterocarp species in January 2019, most of the seeds collected and purchased from the local communities were *Shorea macrophylla*, *Shorea agentifolia, Dipterocarpus oblongifolius, Dryobalanops lanceolata*, etc.

Based on 2019 data, a total of 382,579 seeds and wildings were collected from 15 different locations throughout the year and to date, a total of 173,791 planting materials are ready to be planted and 45,309 were distributed for planting in 2019 (Figure 5).

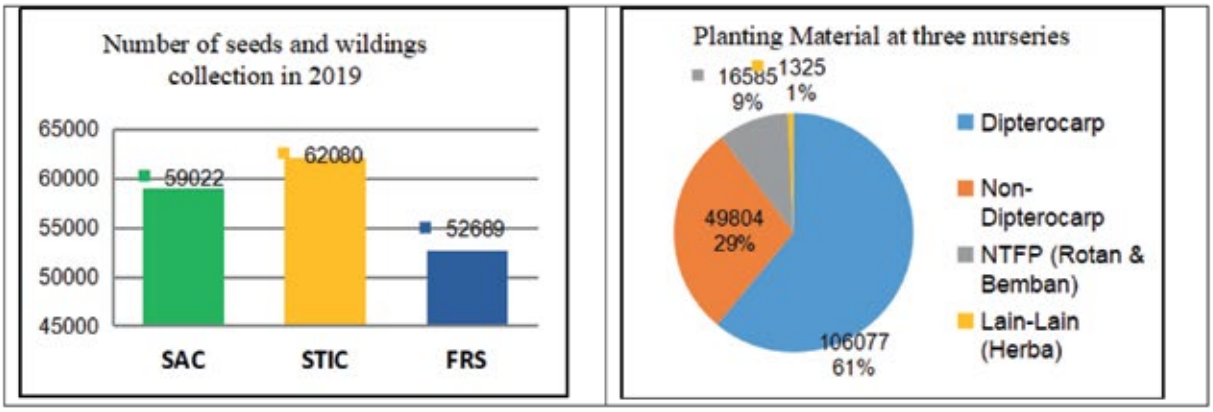

Figure 5: Number of seeds and wildings collection in 2019 and planting material ready to be planted in 2019

On the planting programme, a few planting activities has been carried out during the past year which include Forest Fun Run which was carried out in 2019 at four regions (Kuching, Sibu, Bintulu and Miri) in conjunction with the 100 years' celebration of FDS. Few planting collaboration programs were also conducted with Japan Malaysia Association (JMA), AEON, PBSM (Red Crescent), Sime Darby, Fuji Xerox, Samling and etc.

The third and final initiative for planting aspect which includes seedlings distribution to various stakeholders such as local communities, government and private agencies, non-governmental organization (NGOs) and schools (Figure 6).

WAY FORWARD

In order to ensure the planning of FLR runs smoothly in 2020, few measures were taken into account with several steps are planned accordingly. One of the planning is the formation of FLR Task Force or working group. The FLR Task Force was formed in January 2020 which consists of seven divisions of working group that include secretariat, research and development (R&D), nursery management (planting material), technology (aerial surveillance) & data management, planting, maintenance & monitoring, communication, education & public awareness (CEPA) and lastly promotion, publicity & event management.

The second measure is on the nursery management which will be focusing on existing nurseries at Sabal, Oya and Niah. The management effort includes upgrading facilities such as barrack, potting shed, piping system, procurement of vehicles such as lorries and 4-wheel drive and machineries such as soil shredder, soil mixture and others. Planting material such as indigenous tree species and NTFP, seeds and wildings collection, in house buy from local communities are also one approach in nursery management. A site for the proposed nursery at Kayangeran FR, Lawas was cleared in December 2019 until January 2020.

Figure 6: Photos show planting activities in collaboration with various agencies and organizations

The third measure for the future plan of the project is by identifying potential planting sites. The focus areas are PFE (forest reserve, protected forest & communal forest) Non FMU, and state land such as private land, ex mining area, buffer zone (oil palm plantation etc), school

area, park, communal area, water catchment etc. Another alternative of planting sites within PFE (Non-FMU) and State land will also be explored by identifying potential sites through the application of aerial surveillance technology by the Forest Technology and Geospatial Division (FTG); checking boundary demarcation & checking by Conservation and Constitution Division (CCD) and Regional Forest Office(s) and lastly conducting dialogues session with local communities/stakeholders, social forestry division and regional forest offices.

The fourth effort will be on the planting and monitoring that will be coordinated by Reforestation and Industrial Forest Division (RIF) and will be implemented by the respective regional forest offices (RFOs) in order to cater for planting 200,000 seedlings by PFE outside FMU area and 100,000 seedlings by stateland such as private land, ex-mining area, school compound, buffer zone (oil palm plantation etc), school area, park and green area, communal area and water catchment. Again, this shows a proactive and an enhanced collaboration between the government and private agencies, locals and international organisation and others. Initially, there are roughly eight divisions all around Sarawak (Kuching, Sri Aman, Sarikei, Sibu, Kapit, Bintulu, Miri and Limbang) that are identified as potential FLR areas.

The fifth approach is through intensifying R&D such as conducting research in the nursery, integrated pest and diseases management, tree regeneration study, monitoring and data gathering and establishing provenance trial for indigenous plant species that will be implemented concurrently. The sixth approach is through Communication, Education and Public Awareness (CEPA) Programmes which include various activities such as conducting workshop to create a standard module for CEPA Programmes; CEPA Tour-Briefing on FLR to the target group such as students, local communities, relevant stakeholder; IN-situ Education Project such as gallery, botanical garden, and lastly 'One Student, Five Trees' campaign. One of the examples of the activity that had been conducted was the forestry gallery project at Sekolah Kebangsaan Abang Haji Matahir, Sarikei on March 2019.

Lastly, the Promotion and Publicity & Event management of FLR Programmes that will be focusing to reach out to the community through website, social media, television, local newspapers, bulletin and others. Apart from these, events, workshops, conferences, seminars will also be held progressively for the sake of better and greater input for the project.

CONCLUSION

In a nutshell, FDS's role is very crucial to lead, plan, manage, implement, and coordinate FLR and to bring all the relevant stakeholders such as the government and private agencies, including local, national, and international organisations, government and private higher learning institution (IPTA, IPTS) local communities, NGOs to collaborate together. Beside that, various aspects such R&D, advanced technology, CEPA and others need to be integrated as one of the mechanisms and tools that have to be improved from time to time to cater for the needs of the FLR programs. The facilities, equipment, and infrastructures will also need

to be upgraded and improve continuously to ensure sufficient effectiveness and efficiency of FLR implementation.

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ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded and Secondary Tropical Forests. International Tropical Timber Organization. 2002. ITTO Policy Development Series No 13.

SARAWAK FOREST RESOURCE INVENTORY PROJECT AT HEART OF BORNEO (HoB) SARAWAK

Ahmad Ashrin Mohd. Bohari, Ajmal Asraff Ibrahim, Grace Eza Jikim, Mohammad Azwan Hamidon and Abdul Raffar Abdul Razak

Planning and Management Division, Forest Department Sarawak

ABSTRACT

This paper explains the purpose of forest inventory and its importance in producing a sustainable and effective forest management. It also brief on the types of forest inventories practiced by countries in the world including Sarawak, the background of the Forest Inventory project in Sarawak and its implementation objectives in Sarawak. Furthermore, this paper also share on the status of implementation of Sarawak Forest Resource Inventory Project currently being implemented in Sarawak (under the 11th Malaysian Plan), methodologies, project areas, field data collection work by Department staff, challenges, the underlying issues and the sharing of preliminary results or data obtained. The Forest Department's plans for future implementation of the Sarawak Forest Inventory project under 12th Malaysian Plan also mentioned in this paper.

Keywords: Forest inventory, Forest resources, Heart of Borneo, Sarawak, 11th Malaysian Plan

INTRODUCTION

According to Merriam-Webster's (n.d), the term inventory in general is defined as a complete itemized list of current assets such as property, goods in stock, records or a survey of natural resources in a particular place or area. According to Food and Agriculture Organization of the United Nations (FAO) forest inventory is defined as a structural collection of data for forest resources available within the particular area. Forest inventory is carried out by using sampling techniques due to cost and time limitations. Forest inventory are conducted to evaluate the current status of the forest and the latest and accurate information or data is crucial for Sustainable Forest Management planning and strategies used for decision makers and forest managers to make decisions and at the same time to enhance the ecological conservation and social benefits.

There are several types of forest inventories as stated by FAO (2007) that have been practiced by worldwide countries including Sarawak which are consist of three (3) types:

i. **National Forest Inventory (NFI)** also known as **Forest Resource Inventory (FRI)**
   It was designed to provide bird's eye view of the forest resources and to monitor the macro-changes at national or regional (state) levels on a continuing basis (e.g.: every 10 years) in terms of forest quantity, quality and functions.

ii. Forest Management Inventory (FMI)

The management level used for sustainable forest management planning purposes at specific area such as Permanent Forest Estate (PFE), Forest Management Unit (FMU) or Concession area.

iii. Forest Operational Inventory (FOI)

Operational level - at micro level/detail inventory for purposes of development or timber harvesting / extraction purposes.

The last FRI in collaboration with FAO was done in 1969 – 1972, covering a total area of 1.2 million ha of virgin Mixed Dipterocarp Forest. The objectives were mainly to estimate timber stocking and species distribution for timber industry development in Sarawak at any particular time.

Since 2016 - 2018, FRI was conducted by collaborating with Forest Research Institute of Malaysia (FRIM) within HoB area with an area about 2.1 million ha for FRI Phase 1. In this era, the objectives of FRI became broader. The parameters collected were beyond the timber interest including biomass contents, carbon stocking, medicinal plants and the existence of wildlife.

In 2019 - 2020, FRI Phase 2 is under way and still continuing collaboration with FRIM to cover HoB extension area (0.565 mil ha). HoB was chosen due to their importance for biodiversity conservation, people's welfare and economy development. Both FRI Phase 1 and 2 project are under 11th Malaysian Plan.

Future FRI in Sarawak which is FRI Phase 3 project (2021 - 2025), planning under 12th Malaysian Plan was planned to cover all Permanent Forest Estates (PFEs) areas in Sarawak (estimated of 4.6 mil ha). The idea was to integrate advance technology of Remote Sensing (RS) with field collected data to enhance quality of information or data.

OBJECTIVES AND SCOPE

Objectives of Sarawak Forest Resource Inventory Project:

i. To provide the latest forest resources information at state level for sustainable forest management planning and decision making,
ii. To provide information on forest growth & yields analysis in Sarawak,
iii. To estimate the volume and forest stand by diameter class with wood type/group, and also potential area for production, and
iv. To estimate carbon stocking in Sarawak forest area.

Scopes of Sarawak Forest Resource Inventory Project:

i. To produce current map of land uses within the project area,
ii. To develop an inventory design,
iii. To classify forest types within the project area,
iv. To stratify and map the forest strata,
v. To assess resources, identify status and quantify biophysical elements of all strata,
vi. To conduct training and refreshment courses for staffs of FDS, and
vii. To produce forest resource inventory report.

PROJECT AREA

The project started in HoB area with an area of 2.1 million ha for FRI Phase 1 and 0.565 million ha for Phase 2 before extended to the entire forested area in Sarawak. Figure 1 shows the project area for Sarawak Forest Resource Inventory under 11th Malaysian Plan. Area with yellow colour is representing the Sarawak FRI Phase 1 in original HoB area (2,124,551 ha) while area with red-brownish colour (cover from Batang Ai to Tanjung Datu) representing Sarawak FRI Phase 2 in HoB Extension area (565,251 ha).

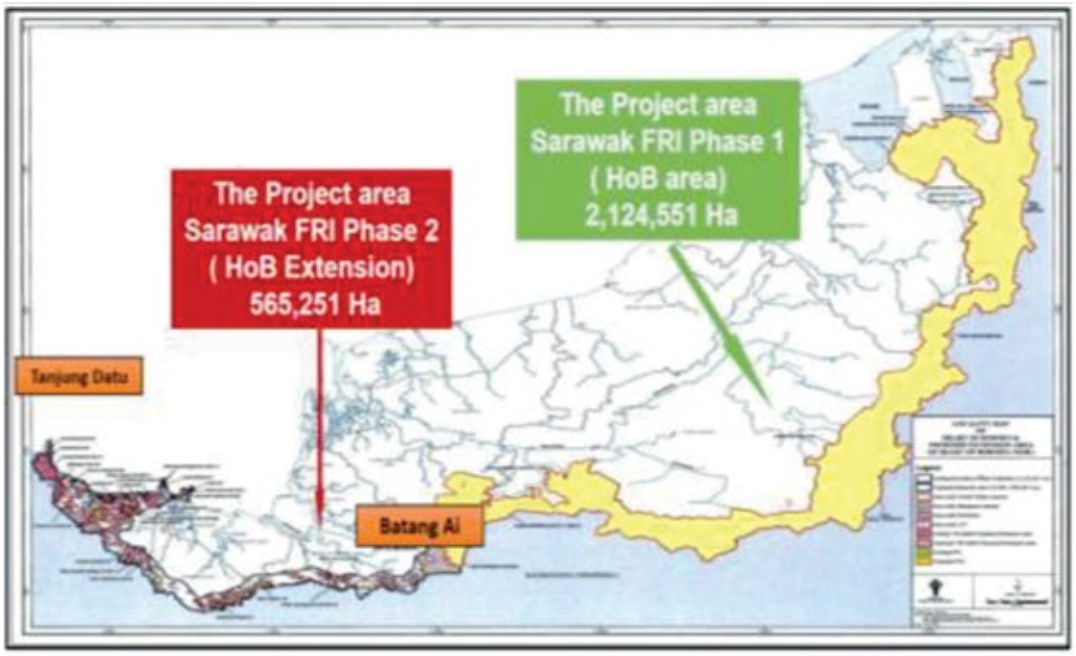


Figure 1: The Sarawak Forest Resource Inventory Project Area for Phase 1 and Phase 2 located in HoB and HoB Extension area

METHODOLOGY

Before initiating a research, a framework is constructed to provide clear direction as well as to allows better visual and understanding before conducting the FRI. The Framework of FRI within HoB area has been classified into several level as follows:

i. Land acquisitions,
ii. Strata development,
iii. Locate sampling points,
iv. Field data collection, and
v. Data analysis.

REMOTE SENSING APPROACH

In order to deliver the project successfully, the methodological approach used for the FRI need to be effective in all aspects such cost (cost reduction), time (shorter time) and labour (less manpower) without affecting the accuracy of the final result. Thus, some ground measurement information were used by integrating it with remote sensing technology. To produce a forest resource map that cover the HoB area, a method needed to be developed for data integration. One data should provide the accuracy and the other should provide a complete coverage. As such, the accuracy of the FRI data can only be achieved by doing ground measurement for the biophysical characteristics of the forest. Whereas the usage of remote sensing enables us to produce large scale maps that will provide us with complete coverage.

FOREST STRATIFICATION

Satellite imaging are used to classify the forest types and land use classes to provide stratification of forest within the HoB area. Forest stratification will influence the sampling design and the sampling intensity of the forests. For this project, four (4) levels of stratification are involved as shown in Table 1:

Level 1: Demarcation of HoB area within Sarawak,
Level 2: Stratification of forest and non-forest,
Level 3: Classification of forested area based on land elevation, and
Level 4: Detailed classification of forested area - based on forest canopy density.

Table 1: The four (4) level of forest stratification used for the FRI phase 1

Level 1	Level 2 (Physical)	Level 3 (Physical)		Level 4 (Physical and/or management)		No. of Strata
Locality (HoB)	Forest Cover	Forest Types	Lowland Dipterocarp (<300m)	Canopy density/basal area/ volume	Low Density (<33%)	1
					Medium Density (33 - 67%)	1
					High Density (> 67%)	1
			Hill Dipterocarp (300-750 m)	Canopy density/basal area/ volume	Low Density (<33%)	1
					Medium Density (33 - 67%)	1
					High Density (> 67%)	1
			Upper Hill Dipterocarp (750 - 1200 m)	Canopy density/basal area/ volume	Low Density (<33%)	1
					Medium Density (33 - 67%)	1
					High Density (> 67%)	1
			Montane Forest (> 1200 m)	-	-	1
			Kerangas Forest	-	-	1
	Non - Forest	Other Land-cover	Agriculture land (including shifting agriculture) Settlement Plantations Infrastructure Water Body Others		**TOTAL STRATA**	11

A few strata are proposed for FRI phase II located from Batang Ai, Sri Aman area towards Tanjung Datu, Lundu:

i. Montane Forest (in Phase 1, Montane Forest has no Forest Canopy Density Classification),
ii. Kerangas Forest,
iii. Peat Swamp Forest, and
iv. Mangrove Forest.

The strata are proposed as such due to the diversity of land use within the HoB Extension area as compared to FRI Phase 1. Table 2 shows the summary of the proposed data for phase 2 based on four (4) level of forest stratification.

Table 2: The Summary of proposed data for phase 2

Level 1	Level 2 (Physical)	Level 3 (Physical)		Level 4 Forest Canopy Density	(%)
Locality (Project Area)	Forest Cover	Forest type	Montane forest	Low	< 33
				Medium	33 - 67
				High	>67
			Kerangas Forest	Low	< 33
				Medium	33 - 67
				High	>67
			Peat Swamp Forest	Low	< 33
				Medium	33 - 67
				High	>67
			Mangrove Forest	Low	< 33
				Medium	33 - 67
				High	>67

Besides the physical characteristics of the forests, administrative aspects are also taken into account as there are a few concessionaires with active-license for logging within the HoB area.

SAMPLING DESIGN

Stratified Random Sampling Design

The area of HoB area are divided into regular grids measuring 10km x 10km (10,000 ha). It is unnecessary for the grids to cover HoB area entirely due to irregular shape of the boundary. The grids are used to facilitate the sampling design as well as the sampling unit for inventory work purpose.

Sampling Unit

The size of the sampling unit is represented by the grid. This inventory is covering 10% sampling of the project area. The sampling units are distributed evenly throughout the project area but accessibility factors also need to be considered. Thus, ground survey is done before conducting field data collection to enable systematic planning and also rational decision making by taking the 3 aspect (cost, time and manpower) of project effectiveness into concern.

Sampling Plot Design

As location of sampling are identified prior to the fieldwork, it is vital to design the sample plot which is also influenced by the forest strata, topography, environmental factors and road accessibility within the area. This is to facilitate the movement, increase work efficiency as well as to reduce the risk of incidents during the fieldwork.

Sampling Plot Design in Mixed Dipterocarp Forest

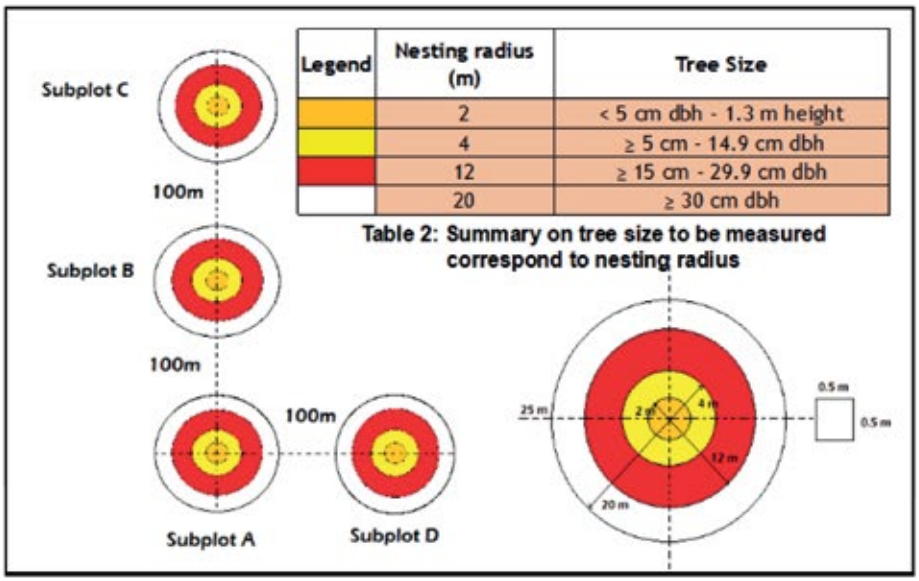
The sampling design in this project is a modification according to the standard operating procedure (SOP) that has been developed by Winrock International (Waler *et al*., 2012), which follows the IPCC standard (IPCC 2016).

Figure 2 shows a cluster comprises of four (4) circular subplot with a distance of 100m with each other and each subplot contain smaller nests inside. The biggest nest measures 20m in radius, followed by 12m and 4m respectively. Whereas in 2m nesting radius, only saplings are measured. The size of the trees are measured per nesting radius side is summarised in Figure 2.

A cross transect measuring 25m in radius are used to measure lying deadwood. However, standing deadwood are measured within the 20m nesting radius are measured. At the end of

the transect, a square clip plot of 0.5m x 0.5m are plotted for non tree vegetation (NTV), litter and soil sampling. Other plants such as bamboo, palm and lianas are also recorded.

Clustering of subplots at each sampling unit is recommended for natural forest areas and especially areas that have been selectively logged. The designation of the sampling system is to ease data collection.



Legend	Nesting radius (m)	Tree Size
	2	< 5 cm dbh - 1.3 m height
	4	≥ 5 cm - 14.9 cm dbh
	12	≥ 15 cm - 29.9 cm dbh
	20	≥ 30 cm dbh

Table 2: Summary on tree size to be measured correspond to nesting radius

Figure 2: Sampling plot design for Mixed Dipterocarp Forest developed from Winrock International (Waler *et al*., 2012)

Sampling Plot Design in Peat Swamp Forest

Centre for International Forestry Research (CIFOR) Working Papers 221 on the Protocols for the measurement, monitoring, and reporting of structure, biomass, carbon stocks and greenhouse gas emissions in tropical peat swamp forests (JB Kauffman *et al.,* 2016) has provided a suitable approach in order to accurately measure, monitor and report species composition and structure as well as above-ground biomass and carbon stocks of tropical peat swamp forest ecosystem. Standing live and dead trees are measured in six plots each with a 10m radius with centres located at equal distances apart from the main transects. The plot radius could be increased or decreased depending on the tree density and the structure of the forest. The purpose of the plot design is to achieve optimal shape, size and sampling intensity to accurately describe the ecosystem properties.

Figure 3 shows each cluster comprises of six (6) circular subplots with 10m radius to measure trees with DBH > 5cm. Whereas in 2m radius is to measure saplings (trees DBH<5cm) and the 12m cross transect is used to measure lying deadwood and standing deadwood are measured within subplots with 10m nest radius. The size of the trees are measured per nesting radius side are is summarised in Figure 4. The distance between every subplot is 50m which makes a total transect line of 250m. Similar with Mixed Dipterocarp Forest, 0.5m x 0.5m square clip plot are plotted for NTV, litter and soil sampling.

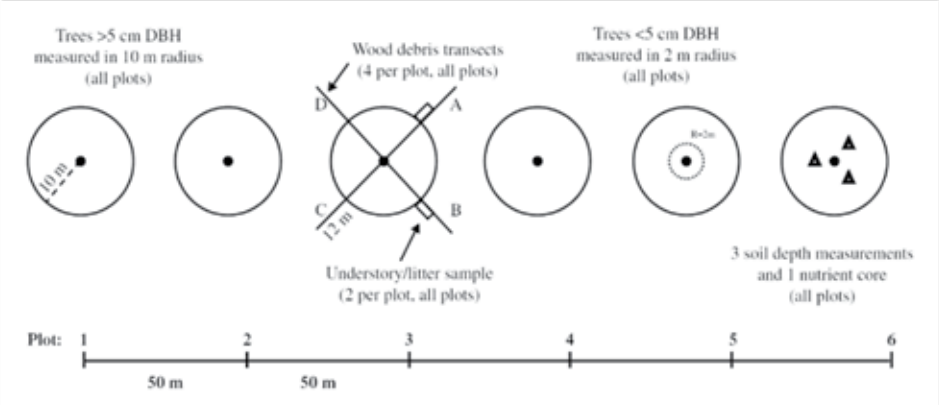
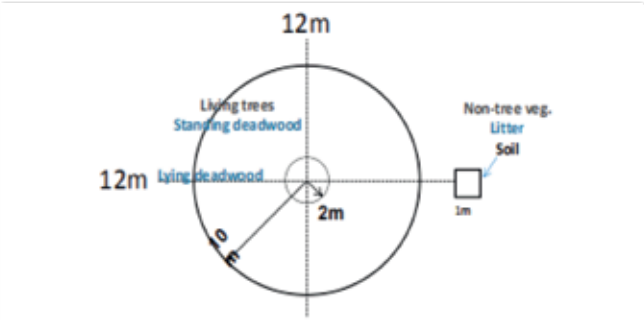


Figure 3: Sampling plot design for Peat Swamp Forest



Nest Radius (m)	Tree size, DBH (cm)
2	< 5
10	≥ 5

Figure 4: The size of the trees are measured per nesting radius side in peat swamp forest

Sampling Plot Design in Mangrove Forest

CIFOR Working Paper 86 of Protocols for the Measurement, Monitoring, and Reporting of Structure, Biomass and Carbon Stocks in Mangrove Forests (Kauffman *et al.*, 2012) stated that the design for layout of mangrove forest has taken tidals elevation gradients relationship into consideration. Thus, this design is recommended due to its linear plot arrangement as well as easier to observe and compare the variation of vegetation along the gradient from the edge and towards the upland.

Figure 5 shows a nested plot design that are recommended for mangrove forest. Each cluster comprises of six (6) subplots with radius of 7m and smaller subplots with radius of 2m. Trees with DBH > 5cm are measured within the larger radius whereas 2m radius subplot are for seedlings and trees with DBH < 5cm. The 12m cross transect are to measure lying deadwood and standing deadwood are measured within subplots with 7m nest radius. Whereas the square clip plot 0.5m x 0.5m are to plot for NTV, litter and soil sampling as shown in Figure 6. The distance between each subplot is 25m thus the total transect line is 125m.

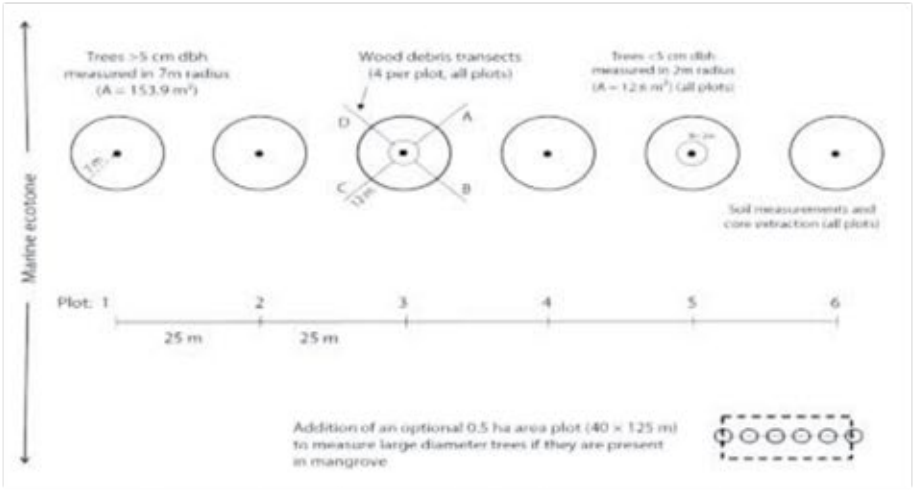
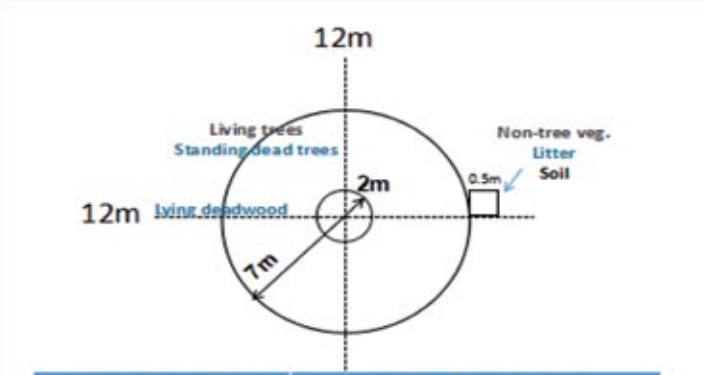


Figure 5: Sampling plot design for mangrove forest



Nest Radius (m)	Tree size, DBH (cm)
2	< 5
7	≥ 5

Figure 6: The size of the trees are measured per nesting radius side in mangrove forest

ASSESSMENT OF CARBON STOCK

A carbon pools is a capacity system which accumulate or release carbon in mass unit, MG C. Table 3 shows measured carbon pools in (i) above-ground biomass comprises of living vegetation, deadwood and litter and (ii) below-ground biomass comprises of root biomass and soil carbon.

In this FRI, this assessment is conducted by plotting a square clip plot with 0.5m x 0.5m size. The clip is located at the end of the transect line and usually 25m (mixed dipterocarp forest) and 12m (peat swamp and mangrove forest) outside the centre of the plot.

Soil samples are also extracted with 30m depth at the same square clip plot after NTV and forest litter data are recorded. Whereas for soil bulk density, iron coring is used and the soil will be extracted by placing the iron coring in 15cm depth vertically from the ground. Then,

all the collected samples will be labelled, weighed, recorded and brought to the lab for drying process.

Table 3: Descriptions of the measured carbon pools

Terrestrial carbon	Pools	Description
Aboveground	Living vegetation	Woody stains, sapling, non - tree vegetation (NTV)
	Deadwood	Standing deadwood Lying deadwood
	Litter	Dead leaves Dead twigs
Belowground	Root biomass	
	Soil Carbon	

Physical factors such as elevation, slope and aspect, soil type, vegetation type, precipitation, drainage and disturbance history, rural population density, distance from transportation networks or settlements and distance to deforested land or forest edge influence the value of carbon stocks within an area.

PRESENCE OF FAUNA

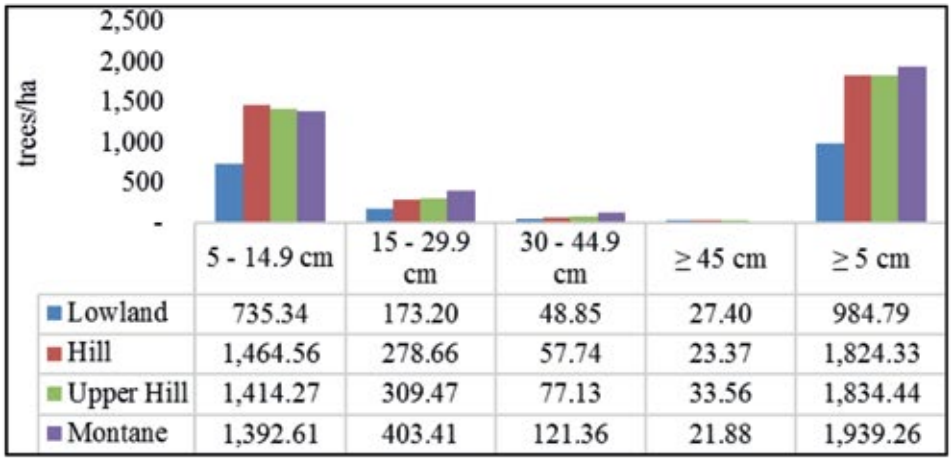
The presence of wild animals in the sampling unit should be reported by all members in the FRI team. Distinct tracks such as footprints, dropping, broken branches and twigs, tree debarking and obvious claws on tree bark or by sound are observed and recorded.

DELIVERABLES

The deliverables and overall contents Forest Resources Inventory Report produce the output such as latest forest stratification map for forest of Sarawak and HoB Extension area, information on Non Timber Forest Product, information on timber stocking in HoB, produce data such as tree height, timber volume, tree species, stand border and basal area that can be applied for state-wide FRI Project in near future for forest management activities in Sarawak, information on carbon stocking and produce geo-spatial data processing laboratory for RS Forest Inventory Equipment to support forest inventory works and sustainable forest management planning.

RESULTS

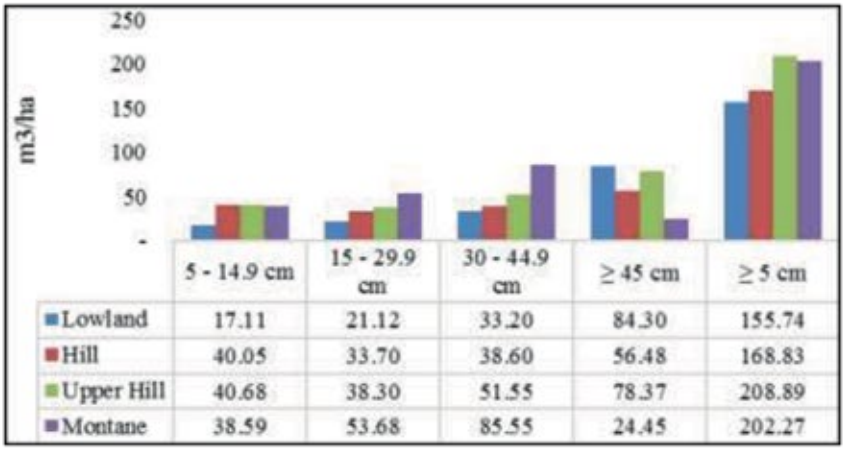
The table bar-chart in Figure 7 shows the results on stand density based on trees per hectare on lowland, hill, upper hill and montane forest. The stand density increasing with the increment of altitude from lowland to montane forest. Montane forest has the highest number of trees (1,939/ha, followed by upper hill (1,834 trees/ha) and hill forest (1, 824 trees/ha). However, the difference is small between these forests. Lowland forest has shown significant difference with the other forest types. The tree density for lowland forest is estimated at around 985 trees/ha.



	5 - 14.9 cm	15 - 29.9 cm	30 - 44.9 cm	≥ 45 cm	≥ 5 cm
Lowland	735.34	173.20	48.85	27.40	984.79
Hill	1,464.56	278.66	57.74	23.37	1,824.33
Upper Hill	1,414.27	309.47	77.13	33.56	1,834.44
Montane	1,392.61	403.41	121.36	21.88	1,939.26

Figure 7: Stand density (trees/ha) based on diameter classes in each forest type

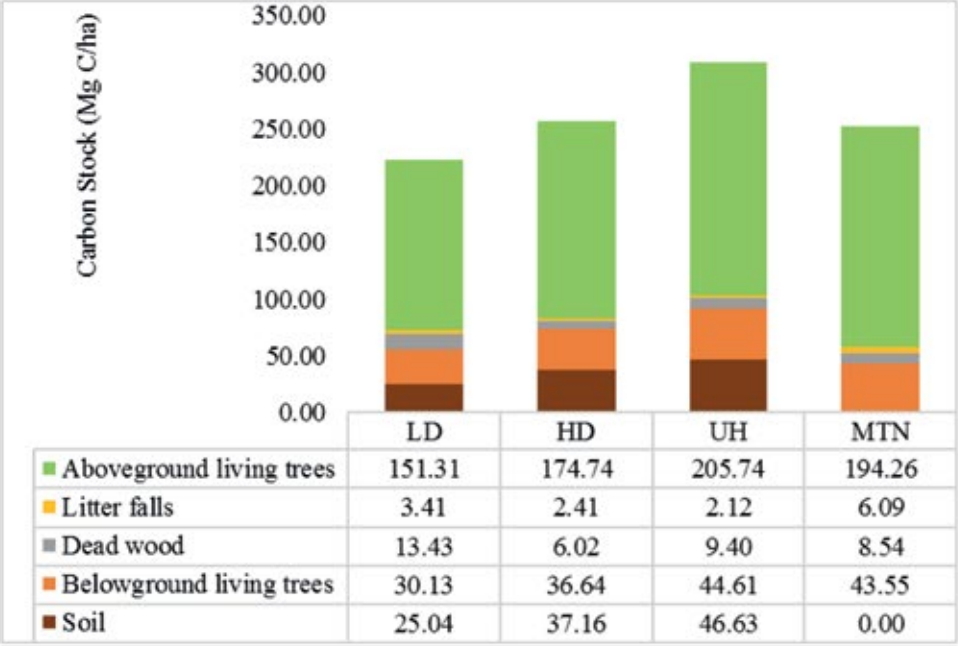
Figure 8 shows the results on total volume per hectare based on diameter classes in each forest type. The total volume per hectare in upper hill forest has the highest total volume per hectare (208.89 m3/ha), follows by montane forest (202.27 m3/ha), hill forest (168.83 m3/ha) and lowland forest (155.74 m3/ha) respectively. In general, total volumes per hectare is increasing with the increment of altitude (for trees with DBH 5 to 44.9 cm). However, the total volume per hectare for trees with diameter class of 45cm and above in montane forest drop significantly to 24.45 m3/ha.



	5 - 14.9 cm	15 - 29.9 cm	30 - 44.9 cm	≥ 45 cm	≥ 5 cm
Lowland	17.11	21.12	33.20	84.30	155.74
Hill	40.05	33.70	38.60	56.48	168.83
Upper Hill	40.68	38.30	51.55	78.37	208.89
Montane	38.59	53.68	85.55	24.45	202.27

Figure 8: Total volume per hectare based on diameter classes in each forest type

Figure 9 shows a significant differences of carbon stock among forest types in the project area. The upper hill dipterocarp forest has the highest carbon stock as compared to the other forest types. The carbon stock in this area are influenced by large trees composition and coarse woody debris in the forest floor.



	LD	HD	UH	MTN
Aboveground living trees	151.31	174.74	205.74	194.26
Litter falls	3.41	2.41	2.12	6.09
Dead wood	13.43	6.02	9.40	8.54
Belowground living trees	30.13	36.64	44.61	43.55
Soil	25.04	37.16	46.63	0.00

Figure 9: Carbon stock within all forest types

Figure 10 shows data that was collected based on observation at each sample plot. There are 40 non-timber species recorded.

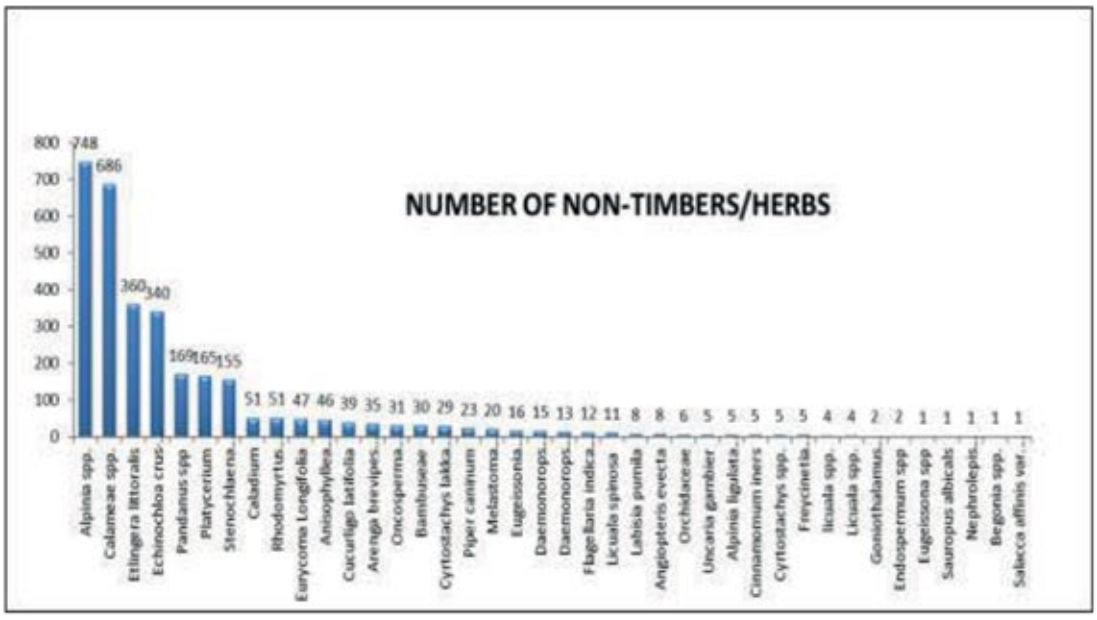


Figure 10: The number of non-timbers/herbs recorded in each sample plot

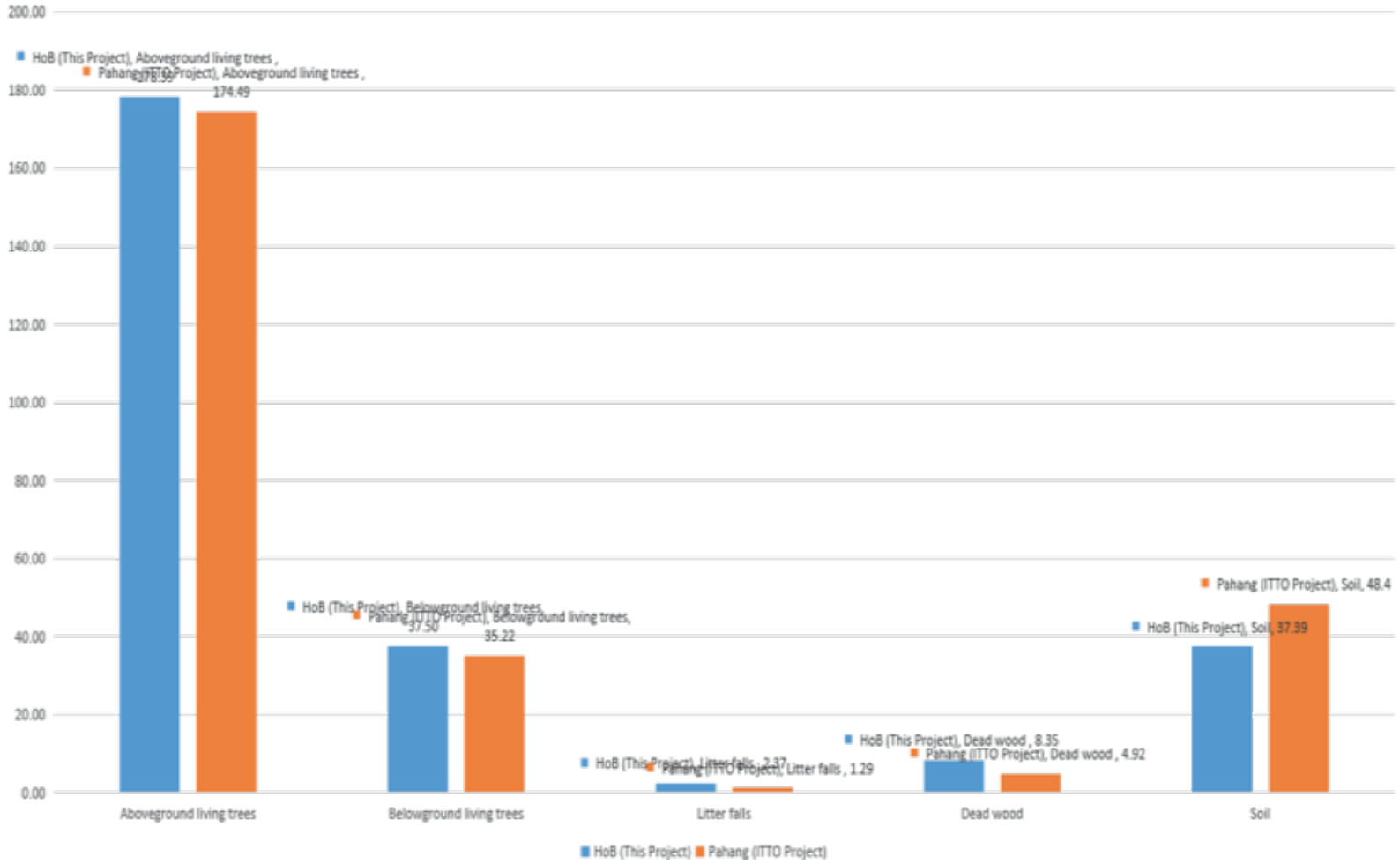


Figure 11: The comparison of carbon stock between HoB Sarawak and Pahang, Peninsular Malaysia

Table 4 shows the data on fauna species. These data collected by using the same method as non-timber resources data which by doing manually observation within plot and grid towards indicator such as scratches, foot print, sound, smell, and dunk. Forty-three (43) species of fauna are found and recorded.

Table 4: The fauna species found and recorded

No.	**Local Name**	**Scientific Name**	**Strata**	**WLPO (1998)**	**IUCN Status**
1.	Teledu	*Mydaus javanensis*	HD		LC
2.	Beruang	*Helarctos malayanus*	HD/LD	P	VU
3.	Burung Gagak	*Corvus brachyrhynchos*	UH		LC
4.	Landak	*Hystrix brachyura*	UH	P	VU
5.	Burung Chilin	*Platylophus coronatus*	UH		
6.	Burung Murai Batu	*Copsychus malabaricus*	UH/HD/LD		
7.	Helang	*Haliastur indus*	UH/HD		LC
8.	Ayam Hutan (Sepidan)	*Lophura ignita*	UH		NT
9.	Burung Hantu	*Ninox scutulata*	HD	P	LC
10.	Burung Betitir	*Geopelia striata*	HD		LC
11.	Burung Keruak	*Amaurornis phoenicurus*	HD/LD/UH		LC
12.	Burung Bubut	*Centropus sinensis*	HD		LC
13.	Berok	*Macaca nemestrina*	HD	P	VU
14.	Tupai Pinang	*Callosciurus notatus*	HD	/	LC
15.	Burung Pipit Merah	*Amandava amandava*	LD		LC
16.	Burung Tiong Batu	*Eurystomus orientalis*	LD/HD		LC
17.	Burung Enggang	*Bucerotidae*	UH/HD	TP	LC
18.	Burung Kuncit	*Dicaeum trochileum*	LD		LC
19.	Burung Tajai	*Helmeted hornbill*	LD	TP	CR
20.	Burung Madu	*Colibri thalassinus*	LD		LC
21.	Pelanduk	*Tragulus* sp.	LD		
22.	Burung Cuit	*Cisticola juncidis*	LD		LC
23.	Burung Entu Mendu	*Pityriasis gymnocephala*	LD		NT
24.	Cikada	*Tibicen linnei*	HD		
25.	Burung Kelicap	*Cinnyris jugularis*	UH/HD		LC
26.	Burung Merbah	*Setornis criniger*	UH/HD		VU
27.	Babi Hutan	*Sus barbatus*	HD/LD/UH		VU
28.	Burung Belatuk	*Picidae*	HD/UH/LD	/	

29.	Kijang	*Muntiacus* sp.	UH/LD/HD	
30.	Burung Merbah Beringin	*Alophoixus ochraceus*	UH	LC

CONCLUSION

In conclusion, the results show normal tree density, basal area and volume for production forests. Thus, these data are acceptable. Most of the forest within the project area are regenerating with evidences from large number/stocking of small trees. Further recommendation are needed to enhance forest regeneration by having a restoration and enrichment planting programme. The advantageous to develop new volume table equation for Sarawak especially for logged over forest.

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ROYALTY ASSESSMENT FOR SUNKEN TIMBER

Semilan Ripot, Joshua Deri, Hasanaliza Bujang and Pamela James Daim

Revenue and Data Management Division, Forest Department Sarawak

ABSTRACT

There are three criteria that need to be considered to define sunken timber, i.e. 1) logs, trees and timber extracted from under water/river basin; 2) felled trees that have sunk /submerged to the riverbed; and 3) logs that sunk during water transportation and submerged during flood and construction of the Hydroelectric Power Plants. The method to royalty assess these sunken timber is by using the "Log Tapering Conversion Table", a new mechanism adopted in royalty assessment of timber. Besides that, the sunken timber will be graded into four (4) categories namely, solid logs, having hollow, having both hollow and cordwood, and totally cordwood. The expected volume to be harvested at three (3) river basins (Baram, Kemena and Rajang) is about 80,000m^3 which is equivalent to RM 4 to 6 million of projected revenue to the State government. Therefore, it is important to determine the right methodology of royalty assessment for sunken timber in order to optimize the wood waste and at the same time to increase revenue to the State government.

Keywords: Sunken logs, logs, timber

INTRODUCTION

Timber production is among the major income contributors to the State of Sarawak. It contributed about 4% of the overall major revenue source which is top 5 in ranking behind Sales Tax, Royalty of Oil and Gas, Dividend and Interest (SFS, 2020). However, this percentage value is decreasing from 12% (RM600 million) in 2018 to 4% (RM427 million) triggering an alarm for the need to search for new sources of revenue through re-engineering in the forest industry.

Utilizing of wood waste is no longer new to the timber industry. One type of wood waste that has high market value is sunken timber. The unique feature from sunken timber is producing a variety of aesthetic timber products such as epoxy which is becoming more popular among furniture lovers. Besides that, other high value products such as fire resistant doors and glulam are also highly used in construction industries.

Sunken timber has many definitions depending on the state and condition. In Sarawak, sunken timber is defined by two categories, namely 1) logs, trees and timber extracted from under water/river basin and 2) felled trees that have sunk /submerged to the riverbed. The sunken timber are mostly without bark, showing the logs anatomy. Due to long exposure under the waterbed, some are vulnerable to sea borer's attack. The logs that had been

attacked by marine borers gradually loses its colour and strength. The main characteristic for the sunken timber is Green Weight Density which is about 1,365kg/m^3. Besides that, the log strength is lesser compared to fresh logs extracted from terrestrial forest areas.

Every forest produce extracted are assessed through the royalty marking process. At present, for natural logs, the 10% logs presented for re-measurement verification for royalty marking need to be laid out by the licensee. This method of assessing royalty was developed by Forest Department Sarawak in 1980s based on volume derived from cylindrical formula {[π x mid-length diameter $(cm)^2$ x length (m)]/40,000} for each log. In order to layout the 10% logs presented for royalty assessment, the licensee need a bigger flat area which is time consuming, not environmentally friendly and very costly. Since the wood condition of the sunken timber extracted is not as good as freshly cut timber, a new mechanism is needed to royalty assess accordingly with less cost but high accuracy. Therefore, a method using "Log Tapering Conversion Table" will be adopted to assess the timber. This method of assessing the volume of logs allows work to be carried out in robust conditions (e.g. logs on the barge) and at various stages of checking by other related agencies especially for the verification of log under the Chain of Custody (CoC).

ROYALTY ASSESSMENT PROCESS OF SUNKEN TIMBER

The royalty assessment procedure for sunken timber is different from the ordinary SOP for log assessment extracted from the forest. The grading components in each single log are not present in the SOP assessment for logs extracted from the forest. The main reason is that each single sunken log may comprise four (4) grade categories with different royalty rates as explained in paragraph 2.1. The objective of the procedure is to standardize the practice for assessment of royalty for sunken logs. The procedure spells out the responsibilities of the licensees and the officers who carry out the royalty assessment. This includes:

(a) Responsibilities of the licensee in royalty assessment of sunken timber, and
(b) Responsibilities of the Forest Officer in royalty assessment of sunken timber.

Sunken Timber Grading

Sunken timber will be grading based on Sunken Timber Grading Table (Percentage). From the table, hollow percentage will be determined to categorize the timber. There are four (4) categories that have been identified to grade the logs, namely:

a) Solid logs,
b) Having hollow,
c) Having both hollow and cordwood, and
d) Totally cordwood.

The method used in categorizing and grading the logs is by using the "Sunken Timber Grading Table". The sunken timber will be measured and graded by category in accordance to Standard Operation Procedure (SOP).

Sunken Timber Grading Table (Percentage)

Sunken Timber Grading Table has been developed (Appendix 1) taking a factor on the percentage of volume of defect against gross volume of each log to categorize sunken timber. Percentage of defect hollow is determined by diameter (hollow defect and mid-length diameter log). The percentage is used in calculating the total Royalty amount of the timber. Figure 1 shows on how to use the table and derive the percentage for royalty assessment. The grading percentage will be transferred to the column "grading sound logs' of royalty specification of Sunken Timber.

LOG GRADING IN PERCENTAGE (%) FOR SUNKEN LOG HAS DEFECT DIAMETER (HOLLOW)														
Mid Length Diameter (cm)	Defect Diameter (Hollow) -cm													
	21	22	23	25	27	29	31	33	35	37	39	41	43	45
35	64.0%	60.5%	56.8%	49.0%	40.5%	31.3%	[illegible]	11.1%						
36	66.0%	62.7%	59.2%	51.8%	43.8%	35.1%	25.8%	16.0%	5.5%					
37	67.8%	64.6%	61.4%	54.3%	46.7%	38.6%	29.8%	20.5%	10.5%					
38	69.5%	66.5%	63.4%	56.7%	49.5%	41.8%	33.4%	24.6%	15.2%	5.2%				
39	71.0%	68.2%	65.2%	58.9%	52.1%	44.7%	36.8%	28.4%	19.5%	10.0%				
40	72.4%	69.8%	66.9%	60.9%	54.4%	47.4%	[illegible]	31.9%	23.4%	14.4%	4.9%			
41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	42.8%	35.2%	27.1%	18.6%	9.5%			
42	75.0%	72.6%	70.0%	64.6%	58.7%	52.3%	[illegible]	38.3%	30.6%	22.4%	13.8%	4.7%		
43	76.1%	73.8%	71.4%	66.2%	60.6%	54.5%	48.0%	41.1%	33.7%	26.0%	17.7%	9.1%		
44	77.2%	75.0%	72.7%	67.7%	62.3%	56.6%	50.4%	43.8%	36.7%	29.3%	21.4%	13.2%	4.5%	

Figure 1: Log grading in percentage (%) for sunken log has defect diameter (hollow) e.g. Mid-length: 41 (cm), Diameter Defect (hollow): 31 (cm) = 42.8%

Category A: Solid logs

Under Category A (Solid logs), the sunken logs are almost without hollow i.e.the logs are still in good condition although the colour and strength are slightly different (Figure 2). Estimated about 15% from 80,000m^3 of sunken logs are found in this category.

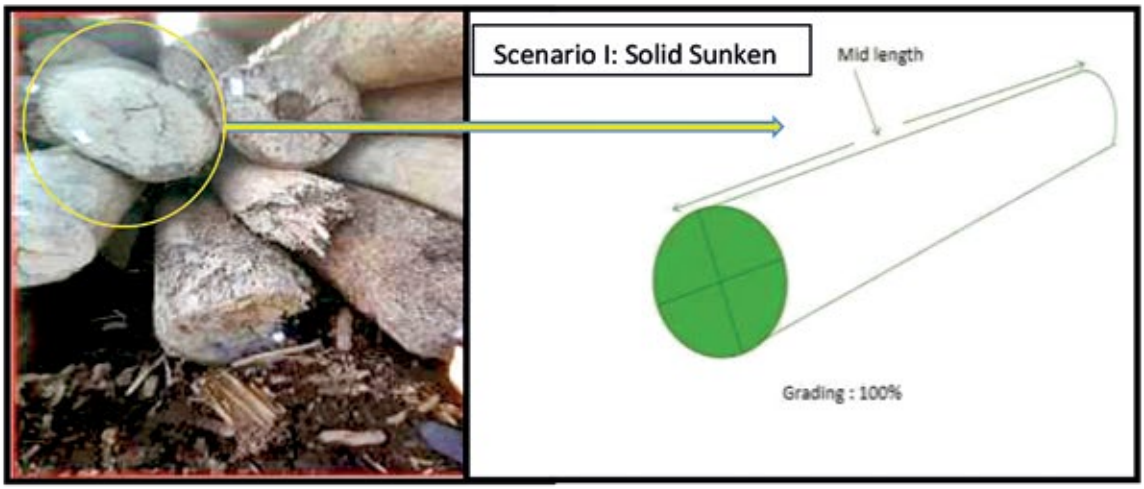

Figure 2: The figure shows the condition of the logs and grading in Category A

Category B: Having Hollow

Under Category B, the sunken timber have hollow defect as shown in Figure 3. The hollow percentage can be quantified by using the grading table. Estimated about 25% from 80,000m^3 of sunken logs are found in this category.

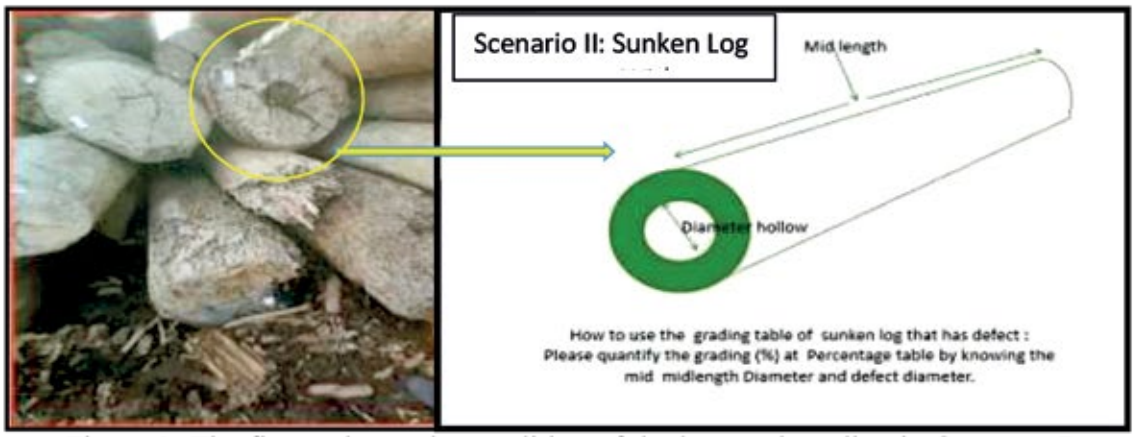

Figure 3: The figure shows the condition of the logs and grading in Category B

Category C: Having Hollow and Cordwood

In Category C, sunken timber is graded when the condition of the timber has hollow defect and at the same time has cordwood portion as shown in Figure 4. Estimated about 40% from 80,000 m^3 of sunken logs are found in this category.

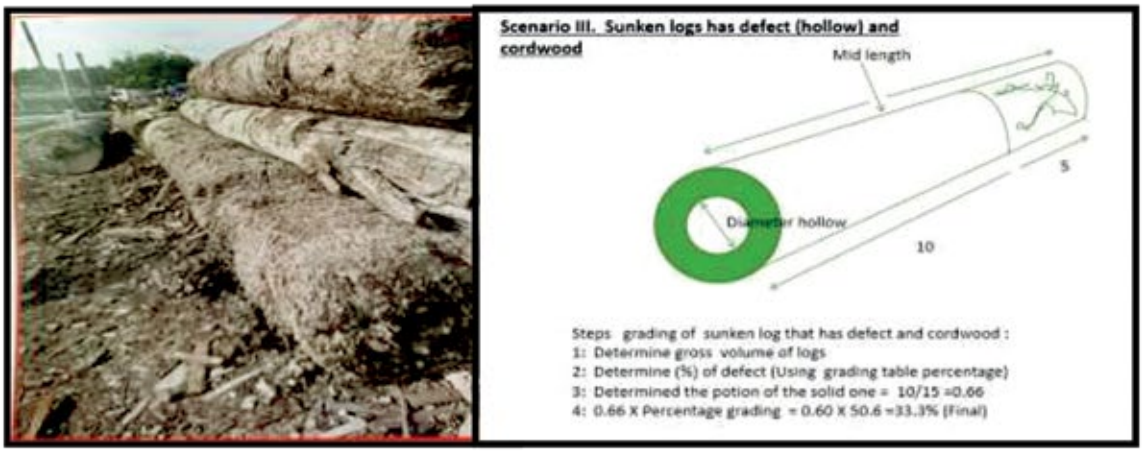

Figure 4: The figure shows the condition of the logs and grading in Category C

Category D: Totally Cordwood

In category D, sunken timber is graded under cordwood where the condition of the timber is total defect (log attacked by marine borer) as shown in Figure 5. Estimated 20% from 80,000 m^3 of sunken timber are found in this category.

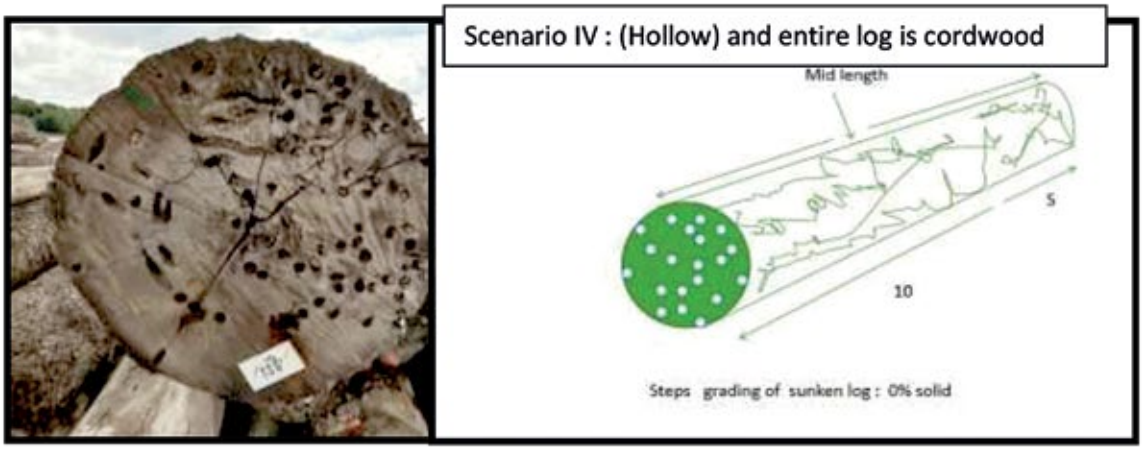

Figure 5: The figure shows the condition of the logs and grading in Category D

Process and Procedures on Royalty Assessment for Sunken Timber

This process and procedure is only applicable for assessing single pieces of sunken timber either to be assessed in log /cordwood form or both. The purpose of this SOP is to ensure that all sunken timber extracted in the confined riverine are accurately and orderly assessed for royalty due to the State Government. This process and procedure has been approved by Director of Forests and will be adopted once the licensees are ready.

Figure 6: Documentation on Process and Procedure on Royalty Assessment for Sunken Timber (Appendix 2)

Log Tapering Conversion Table

New research findings on "Log Tapering Conversion Table" (Figure 7) to be used in the revenue assessment and royalty marking of sunken logs in order to determine the mid-length diameter of the log by measuring diameter at bigger-end. This Log Tapering Conversion Table has been developed and recognized during the *"Konvensyen Kumpulan Innovasi dan Kreatif Perkhidmatan Awam Peringkat Negeri Sarawak"* by Semilan *et al.* (2018).

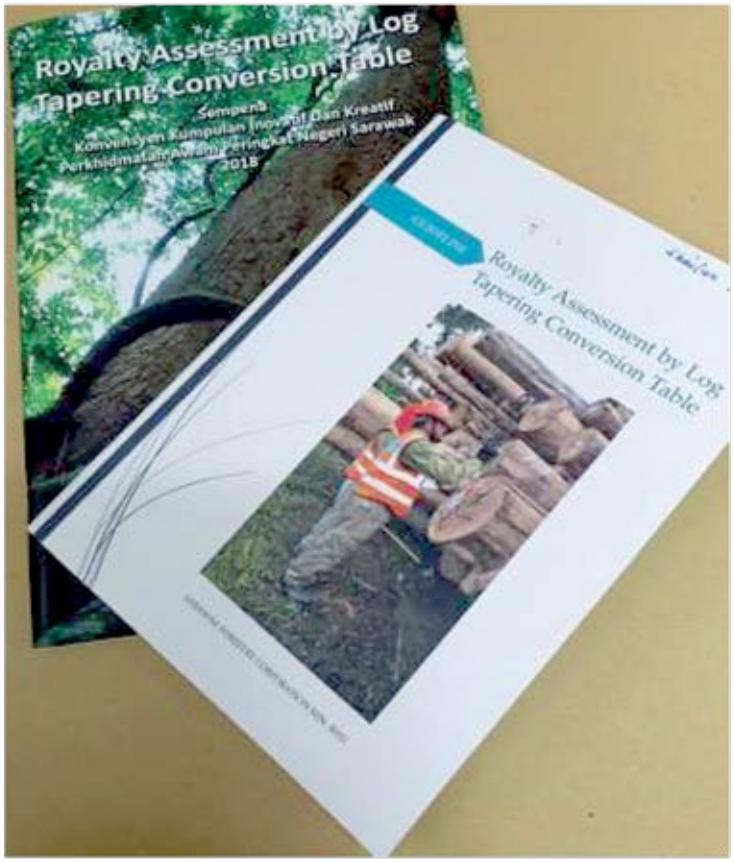

Figure 7: Write up on Log Tapering Conversion Table by Ripot *et al*. (2018)

Royalty Assessment Calculation

Formula to calculate royalty assessment using Excel Document had been formulated by Semilan Ripot (2020). An example on how to calculate royalty assessment for sunken timber is as in Figure 8.

Lincensee Standard Letter Head
(Company name, Address, Telephone, & Fax Number)

ROYALTY SPECIFICATION HEADER

Account No:	MIRI	Batch No:	3/06/2008
Licence No:	PXPX	Sheet No:	1
Name of River Basin:	Baram	Date:	bb/dd

No	Log Serial	Species (4 letter code)	Sunken Timber Dimension				Grading of sound log (%)	Sound Portion Sunken Log		Cordwood		Total Royalty (RM)
			L (m)	DBE (cm)	DML (cm)	Gross Volume (m3)		Volume of sound portion	Royalty (RM65/M3)	Volume (m3)	Royalty RM5/tonne or RM6.85/M3	
1	MXXX	MRTX	27	50	55	7.1498	45	3.2174	209.13	3.9324	26.84	235.97
2						0.0000		0.0000	0.00	0.0000	0.00	0.00
3						0.0000		0.0000	0.00	0.0000	0.00	0.00
4						0.0000		0.0000	0.00	0.0000	0.00	0.00
5						0.0000		0.0000	0.00	0.0000	0.00	0.00
6						0.0000		0.0000	0.00	0.0000	0.00	0.00
7						0.0000		0.0000	0.00	0.0000	0.00	0.00
8						0.0000		0.0000	0.00	0.0000	0.00	0.00
9						0.0000		0.0000	0.00	0.0000	0.00	0.00
10						0.0000		0.0000	0.00	0.0000	0.00	0.00
11						0.0000		0.0000	0.00	0.0000	0.00	0.00
12						0.0000		0.0000	0.00	0.0000	0.00	0.00
13						0.0000		0.0000	0.00	0.0000	0.00	0.00

Figure 8: Royalty Specification Form e.g. Diameter Mid-length (55cm), Length (27m), Grading (45%) = RM235.97

CONCLUSION

Ground research shows that that there is an abundance of submerged logs amounting to 15,000m^3 in Batang Baram, 25,000 m^3 in Batang Kemena and 40,000 m^3 in Batang Rejang ready to be tapped as a new source of revenue for the government. Since the logs have been submerged at the base of the river, the log taxonomies are different from freshly cut timber. In this connection, this friendly SOP for royalty marking of sunken logs is to be introduced with the aim for both licensees and the government to be able to benefit from it. It is expected that through the industry, the government able to collect revenue through Royalty, Premium and Cess (RPC) amounting to RM 4 - 6 million.

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HEART OF BORNEO (HoB) INITIATIVE IN SARAWAK

Salina Haji Hamdi

International Affairs Division
Forest Department Sarawak

ABSTRACT

This paper will present progress on the implementation of HoB Initiative Sarawak chapter. This initiative is a State initiative and Forest Department as secretariat reporting and compiling all reports on programmes, projects or activities implemented by various government agencies, private sectors and non–government organizations. Heart of Borneo (HoB) Initiative is a voluntary transboundary cooperation between Brunei, Indonesia and Malaysia with one conservation vision and with a view to promote people's welfare, ensuring the effective management of forest resources and conservation of a network of protected areas, productive forests and other sustainable uses. This Declaration was signed and jointly issued by the representative from the three (3) countries on 12 February 2007 in Bali, Indonesia. The institutional framework that governed the implementation of HoB Initiative is by the 3 levels committees i.e. Trilateral Level, National Level and State Level. At the State level the HoB State Steering Committee is the highest platform to discuss and decide on HoB direction while technical matters would be discussed at the Technical Working Group meeting. HoB Initiative has been allocated with a special funding under Malaysian Plan starting from mid-term review of RMK-9 by the federal Government. Until January 2020, Forest Department had received RM35.4 million (Mid-term of RMK-9 to RMK-11). In Sarawak, HoB area has been extended from 2.1 million ha to 2.68 million ha. Its implementation is guided by Project Implementation Framework (PIF) based on 5 pillars. The paper highlighted some of the programmes, projects and activities implemented by various stakeholders such as by government agencies, private sectors and non-government organisations. Collaboration projects with various international bodies, corporate bodies and higher learning institution were also listed. Issues and challenges in implementing the initiative and way forward for Sarawak to pursue the initiative were briefly discussed.

Keywords: HoB Initiative, conservation, sustainable development

INTRODUCTION

Background of HoB Initiative

Heart of Borneo (HoB) Initiative is a voluntary transboundary cooperation between three countries Brunei, Indonesia and Malaysia with aims at conserving and managing the contiguous tropical forest in the island of Borneo while enhancing sustainable development that improves the welfare of those living on the island. The HoB Initiative between the three ASEAN nations cooperation was officially launched in Brazil on 27 March 2006. On 12 February 2007 the representative from the three countries, signed and jointly issued a Declaration in Bali, Indonesia as shown in Figure 1 and Figure 2.

In view of the global concerns and controversy about the tropical forest development, the long-term objective of the HoB Initiative, as enshrined in the Bali Declaration, *"With one*

conservation vision and with a view to promote people's welfare, we will cooperate in ensuring the effective management of forest resources and conservation of a network of protected areas, productive forests and other sustainable land-uses".

Figure 1: Signing ceremony of HoB Declaration in Bali, Indonesia

DECLARATION ON THE HEART OF BORNEO INITIATIVE
Three Countries, One Conservation Vision

We, the Governments of Brunei Darussalam, Indonesia and Malaysia, recognizing the importance of the Island of Borneo as a life support system, hereby declare that:

- With one conservation vision and with a view to promote people's welfare, we will cooperate in ensuring the effective management of forest resources and conservation of a network of protected areas, productive forests and other sustainable land-uses within an area which the three respective countries will designate as the "Heart of Borneo (HoB)", thereby maintaining Bornean natural heritage for the benefit of present and future generations, with full respect to each country's sovereignty and territorial boundaries, and also without prejudice to the ongoing negotiations on land boundary demarcation.
- The HoB Initiative is a voluntary trans-boundary cooperation of the three countries combining the stakeholders' interests, based on local wisdom, acknowledgement of and respect for laws, regulations and policies in the respective countries and taking into consideration relevant multilateral environmental agreements, as well as existing regional and bilateral agreements / arrangements.
- We are willing to cooperate based on sustainable development principles through research and development, sustainable use, protection, education and training, fundraising, as well as other activities that are relevant to trans-boundary management, conservation and development within the areas of the HoB.

To support this Declaration, we, the three countries will prepare our respective project documents incorporating the strategic and operational plans, which will form the basis for the development of our road map towards realizing the vision of the HoB Initiative.

Done at Bali, Indonesia on the twelfth day of February, two thousand and seven in three original copies.

For the Government of His Majesty the Sultan and Yang Di-Pertuan of Brunei Darussalam	For the Government of the Republic of Indonesia	For the Government of Malaysia
YB. Pehin Dato Dr. Awang Haji Ahmad bin Haji Jumat Minister of Industry and Primary Resources, Brunei Darussalam	**H.E. Mr. M. S. Kaban** Minister of Forestry, Republic of Indonesia	**YBhg. Dato' Seri Azmi bin Khalid** Minister of Natural Resources and Environment, Malaysia

Figure 2: Declaration of the HoB Initiative

HEART OF BORNEO (HoB) AREA

In Sarawak, the HoB covers an area of 2.689 million ha over a contiguous block along Sarawak's boundaries with Kalimantan and with Sabah and Brunei as shown in the Figure 3 below. The original size was 2.1 million ha and was expanded in 2018. The HoB initiative is fully in line with existing policies by both state and federal government.

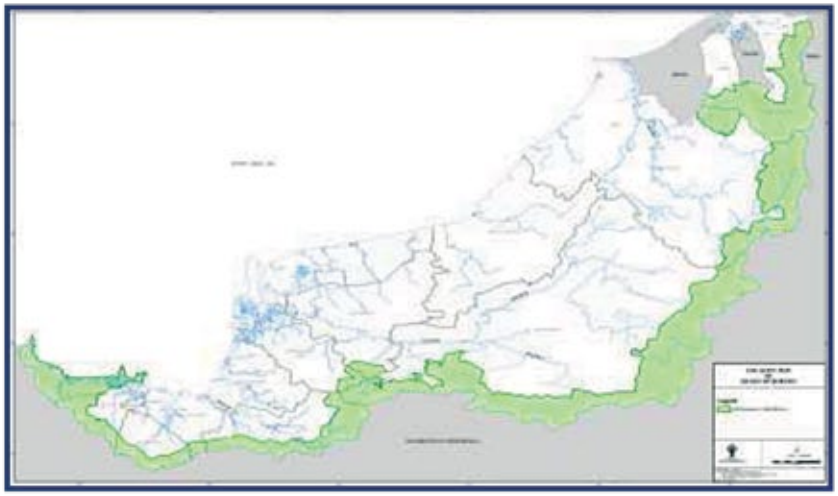


Figure 3: Map of HoB area

There are different land use in the stretch of HoB area with more than 50% are still covered with forest. HoB area are also the watersheds and mainly water sources for six (6) hydro-electric dams under the SCORE Project, Sarawak. The hydro-electric dams are Batang Ai Dam, Bakun Dam, Murum Dam, Ulu Baram Dam, Limbang Dam and Balleh Dam. Figure 4 and Table 1 below showing the land use distribution within the HoB area.

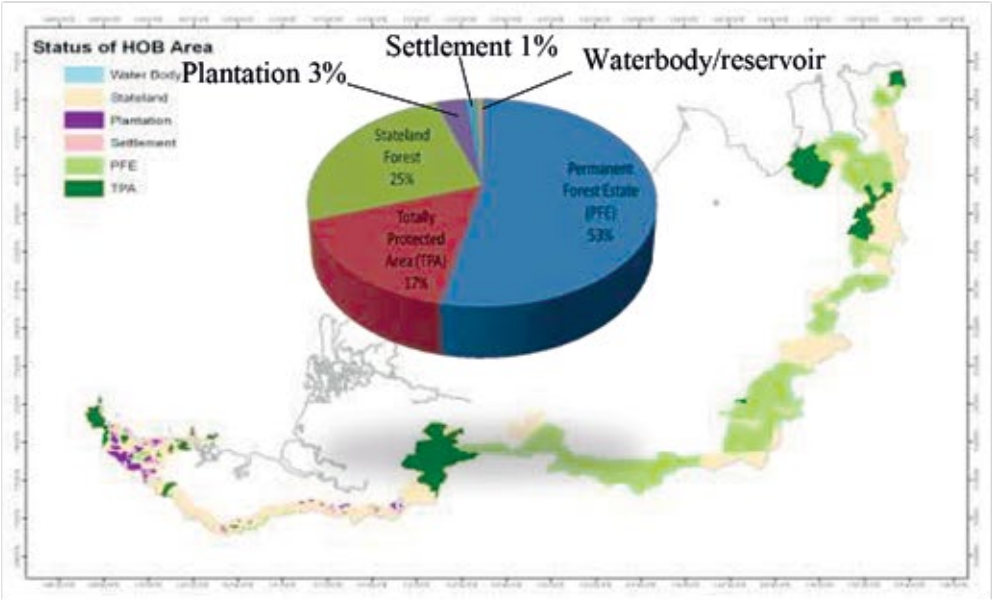


Figure 4: Map of land use distribution within HoB Area

Table 1: Land use distribution within the HoB area (ha)

No.	Landuse	Area (ha)	Remarks
1.	Permanent Forest Estate (PFE)	1,431,736	33% of total PFE in Sarawak 53% of total PFE within HoB
2.	Totally Protected Area (TPA)	441,240	50% of total TPA in Sarawak
3.	Stateland Forest	681,127	
4.	Plantation	89,206	
5.	Settlement	32,340	
6.	Waterbody / Reservoir	14,155	
Total		2,689,804	

INSTITUTIONAL FRAMEWORK

There are three (3) levels in the institutional structure guiding the implementation of HoB Initiative as shown in the Figure 5 below.

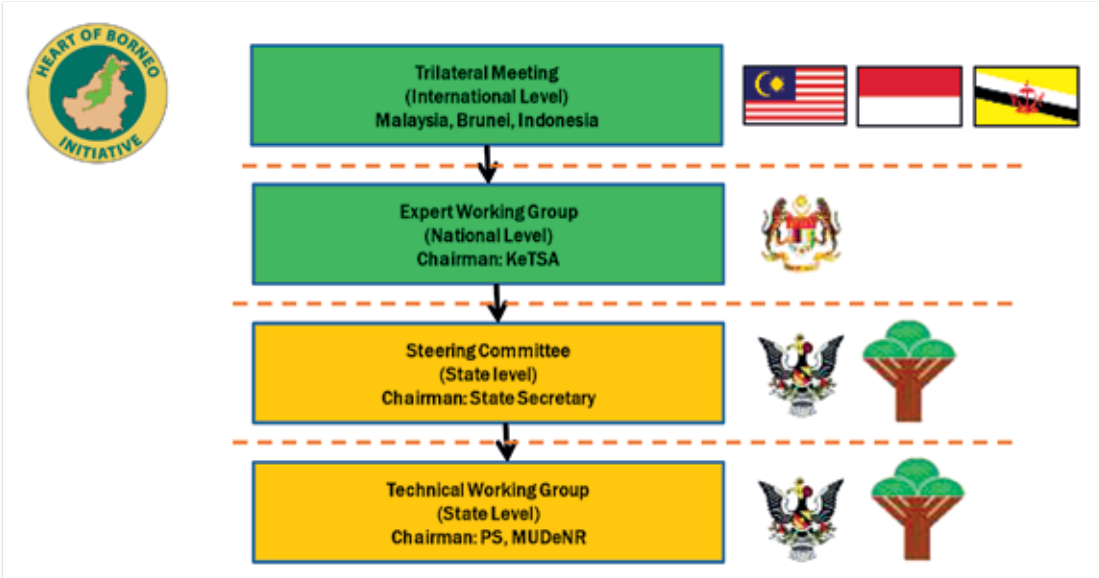


Figure 5: Institutional Framework of HoB

At the trilateral level, it is consists of three member countries namely Malaysia, Brunei and Indonesia and will meets once a year.

Ministry of Energy and Natural Resources is the focal point for HoB initiative in Malaysia. The implementation of the HoB Initiative is by Sabah and Sarawak Government through their respective Forest Department as shown in Figure 6.

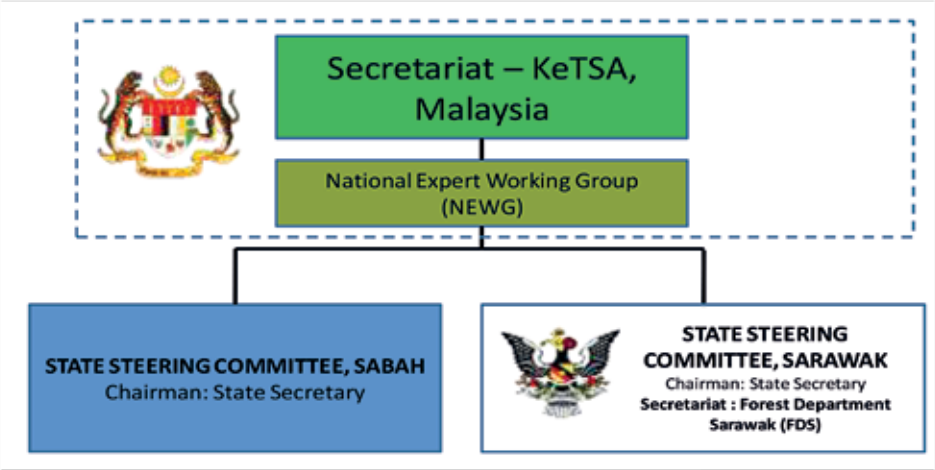


Figure 6: Institutional Framework of HoB in Malaysia

At the State level there are two committees that looking after the implementation of HoB Initiative i.e. State Steering Committee and Technical Working Group. State Steering Committee for both Sabah and Sarawak will be chaired by the respective State Secretary.

In Sarawak, members of the State Steering Committee and its Term of Reference (TOR) is as in Appendix 1. The TOR for State Steering Committee was endorsed in 2008 by State. The membership of this committee will be reviewed if there is a change in ministries and state agencies. The Permanent Secretary of Ministry of Urban Development and Natural Resources, Sarawak is the chairman for HoB Technical Working Group (TWG). The members of the committee and the TOR as in Appendix 2. In general, the task of TWG is to advise the State Steering on the technical aspect of the initiative be it from the government agencies, private sector or NGOs and detail as been listed out in the TOR. The number of meeting is as and when required. Forest Department Sarawak was tasked as secretariat for the implementation of HoB Initiative for Sarawak. Table 2 below shows series of Trilateral l Meeting conducted in the three (3) countries.

Table 2: Series of Trilateral Meeting

Date	Meetings
18-20 July 2007	HoB First Tri-Lateral Meeting in Brunei
4-6 April 2008	2nd Trilateral Meeting in Pontianak Indonesia
5-6 October 2009	3rd Trilateral Meeting in Kota Kinabalu, Sabah
20-22 April 2010	4th Trilateral Meeting in Bandar Seri Begawan, Brunei Darussalam
21-22 September 2011	5th Heart of Borneo Trilateral Meeting in Novotel Hotel, Balikpapan, Indonesia

24-26 September 2012	6th HoB Trilateral Meeting in Pullman, Kuching
September 2013	7th Trilateral Meeting, Brunei Darussalam,
December 2014	8th Heart of Borneo Annual Trilateral Meeting (T8) at Palangka Raya in Central Kalimantan
11-12 Ogos 2015	9th Heart of Borneo Annual Trilateral Meeting in Sandakan
5-7 September 2016	10th Heart of Borneo Annual Trilateral Meeting in Brunei Darussalam
11-12 October 2017	11th Trilateral Meeting in Tarakan, North Kalimantan, Indonesia
27-29 September 2018	12th HoB Trilateral Meeting , Miri Marriott Resort and SPA, Miri
24-26 September 2019	13th Heart of Borneo Trilateral Meeting in Brunei Darussalam

Since the signing of Bali Declaration, Sarawak had collaborated with KeTSA hosting the Trilateral Meeting in Sarawak in 2012 (Figure 7) and 2018 (Figure 8) for the 6th and 12th Trilateral Meeting respectively.

Figure 7: 6th HoB Trilateral Meeting in Pullman

Figure 8: 12th HoB Trilateral Meeting in Marriott Resort and SPA, Miri

HEART OF BORNEO PROJECT FUNDING

The Federal Government has allocated a fund under the Midterm Review of the 9th Malaysian Plan (RMKe-9) to fund the Heart of Borneo project. The fund focuses on collecting data using hyperspectral technology and also through field surveys. In the 10th Malaysian Plan, the data collection activities continued through scientific expeditions and research programs. In addition, projects that involve local communities were also carried out.

The existing cost for the implementation of Heart of Borneo project for 11th Malaysian Plan (RMKe-11) amounted to RM 26,240,000 mainly for the establishment of HoB Interpretation Centre in Lawas as well as for conservation works.

As of January 2020, total allocation received from the Federal Government for the Heart of Borneo Initiative in Sarawak since 2008 is as shown in the Table 3.

Table 3: HoB Funding Allocation

RMK	ALLOCATION	EXPENDITURE	(%)
RMK-9 (2006-2010)	5,964,800.00	5,824,141.11	97.64
RMK-10 (2011-2015)	3,500,000.00	3,372,359.45	96.35
RMK-11* (2016-2020)	25,939,010.00 (2016 – 2020)	22,237,442.50	85.73
*Cost approved under RMK11: RM 26,240,000.00 for 2016 - 2020			

PROJECT IMPLEMENTATION FRAMEWORK (PIF)

As required in the Bali Declaration, the three countries need to prepare their respective project documents incorporating the strategic and operational plans, which formed the basis for the development of the road map towards realizing the vision of the HoB Initiative.

The National Project Document for Malaysia was prepared by KeTSA while Sarawak had developed its Heart of Borneo Project Implementation Framework in 2009 (Figure 9) which becomes a guiding document for the implementation of the HoB Initiative in the State. It was prepared by a Team of Consultant with specified fields of expertise appointed by State Government. It consists of 7 chapters looking at the various aspects such as physical environment, agriculture, forest resources, biodiversity, local communities and ecotourism as detailed in Table 4 below including proposing 32 project ideas addressing the HoB Strategic Plan of Action. The Heart of Borneo Sarawak Project Implementation Framework was endorsed by the Majlis Mesyuarat Kerajaan Negeri on 24th October 2013.

Realising that it had been a decade HoB Initiative had been implemented by Sarawak, a revisit to the PIF was initiated by Forest Department Sarawak and conducted with the participation of stakeholders in 2019 and the outcome of the proceeding had outlined a number of suggestions as to enhance the HoB initiatives:

i. Support from Federal and State Government on dedicated funding to implement projects/ activities according to HoB pillars by various agencies
ii. To establish HoB spatial database system along with infrastructure to support development of the system
iii. To include HoB in Integrated Land Use Study for Sarawak.

iv. To promote HoB Branding especially in tourism and agriculture products

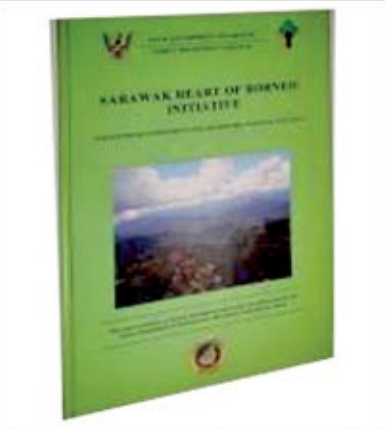


Figure 9: Sarawak HoB Initiative PIF

Table 4: Description of Sarawak HoB Initiative PIF

Chapter	Description
Chapter I - Introduction	Briefly describes the objective of the HOB Initiative, and the consultants appointed together with their respective terms of reference.
Chapter II - Physical Environment	Document the existing physical environment e.g. terrain, geology, drainage pattern, climatic condition in the area, assessment of mineral potential and utilisation of land resources in the Sarawak sector of the HoB.
Chapter III - Agriculture	Describes the agriculture development and activities, assessment and mapping of areas with agricultural potentials and discuss cultivation of suitable crops land practices as well as the training needs in this sector.
Chapter IV - Forest Resources	Provides information on forest types, current status of land under the PFE, TPAs, logging licenses, logged over areas, logging roads etc, logging operations, forest industries, information on forest workers and forest management issues to promote sustainable management and certification.
Chapter V - Biodiversity	Describes the biodiversity in HoB area particular referring to the TPAs which located in HoB. It also discusses the problem of law enforcement due to : remote locations and difficult access, shortage of manpower, local dependence on forests and lack of awareness on conservation.
Chapter VI - Local Communities	Describes and discusses the socioeconomic situation of the inhabitants of the area, the problems faced by the local communities such as lack of infrastructure, increasing scarcity of wild protein and water resources, limited suitable land for farming, lack of basic amenities and social services, limited opportunities to earn a living and lack of manpower due to rural-to-urban migration.
Chapter VII -	Gives account of the unique features in the area and assesses its

Ecotourism	ecotourism potential. It discussesthe constraints in ecotourism development in the HoB area.
Chapter Vlll - Project Ideas	The final chapter gives the list of Projects Ideas identified in this study.

PROGRAMMES, PROJECTS AND ACTIVITIES IMPLEMENTED UNDER HOB INITIATIVE

This section will highlights some of the programmes, projects and activities carried out by various Divisions in Forest Department Sarawak as well as other stakeholders such as Sarawak Biodiversity Centre (SBC), Department of Agriculture (DOA) and Natural Resource and Environment Board (NREB), Malaysian Palm Oil Certification Council (MPOCC), State Planning Unit (EPU), Chief Minister Office and World Wide Fund for Nature (WWF).

The implementation of HoB initiative is guided by the PIF which focusing on 5 pillars namely:
1. Sustainable Forest Management
2. Eco-tourism Based on Culture, Adventure and Nature (CAN)
3. Conservation of Biological Diversity
4. Sustainable Landuse/Agriculture
5. Community-based/Rural Poverty Eradication Program

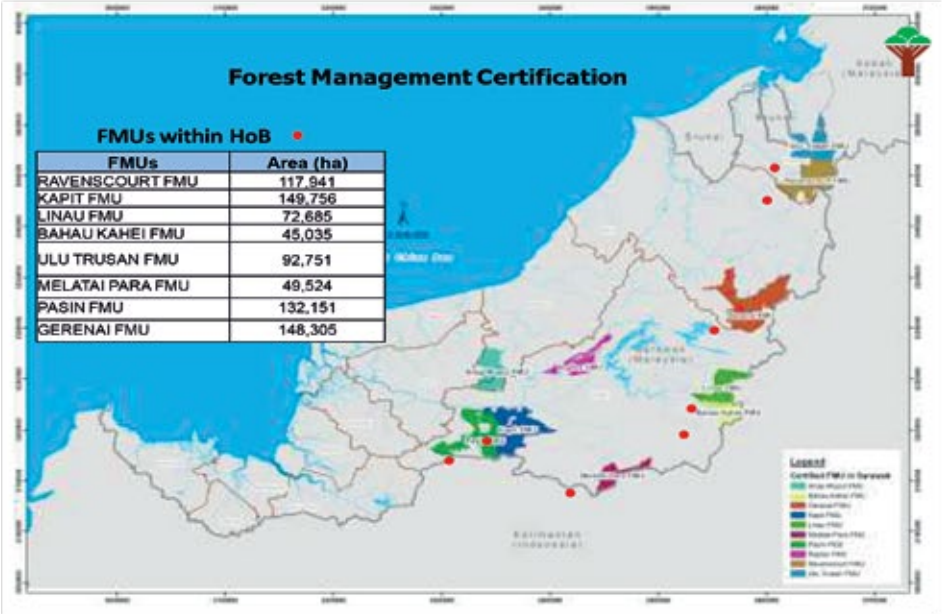
These 5 pillars reflecting the conservation and sustainable development principles of HoB initiatives and the programmes, projects and activities implemented will be according to the pillars.

Pillar 1: Sustainable Forest Management (SFM)

Sarawak is fully committed to Sustainable Forest Management and regards it as one of the key tools to improve forest management standard and practices currently been adopted and utilised in the management of Sarawak forest. In this regards, initiatives under SFM will be focusing on maintaining the balance between forest used and environmental protection.

Forest Management Certification (FMC)

As of now, there are ten (10) Forest Management Units in Sarawak have been awarded with Certificates for Forest Management (Natural Forest) under Malaysian Timber Certification Scheme (MTCS) which is recognized by Programme for Endorsement of Forest Certification (PEFC) covering an area of 955,676 ha with eight (8) FMUs is within the HoB area. Figure 10 below shows the locality map of the certified Forest Management Units within the HoB.



FMUs	Area (ha)
RAVENSCOURT FMU	117,941
KAPIT FMU	149,756
LINAU FMU	72,685
BAHAU KAHEI FMU	45,035
ULU TRUSAN FMU	92,751
MELATAI PARA FMU	49,524
PASIN FMU	132,151
GERENAI FMU	148,305

Figure 10: Locality of FMUs certified within HoB

Many more FMUs are expected to be certified within this year. The SFM pillar of HoB is in line with the State Government Policy to have all our long-term forest timber licences to be certified by 2022.

Apart from coordinating with the licence holders in getting their FMUs to be certified, Forest Department also conduct CEPA programme especially awareness on SFM and Forest Management Certification (FMC) for the community in the licence area. The awareness programme was carried out through road shows to various FMUs such as Ravencourt, Pasin, Ulu Trusan in collaboration with the licence holders with the aims to enable the communities to learn what is SFM and FMC all about as well as their common ground are.

Figure 11: Road show for communities on SFM and FMC at Ravenscourt FMU and Ulu Trusan FMU (Lawas)

Environmental Compliance Audit (ECA)

Contributing to the pillar initiative toward achieving SFM is the collaboration conducting a pilot project on Environmental Compliance Audit (ECA) in forest sector between Natural Resources and Environment Board (NREB) and Sarawak Timber Association (STA) with eight (8) timber companies in Sarawak. A Memorandum of Understanding (MOU) was signed. The eight companies are Daiken Sarawak Sdn. Bhd. (forest plantation), GP PUSAKA Sdn. Bhd. (forest plantation), Interglobal Empire Sdn. Bhd. (natural forest), Jaya Tiasa Holdings Berhad (natural forest), Ravenscourt Sdn. Bhd. (natural forest), Shin Yang Forestry Sdn. Bhd. (forest plantation), Subur Tiasa Holdings Berhad (natural forest), Tanjong Manis Holdings Sdn. Bhd. (natural forest). The pilot projects intend to prepare the industries for full implementation of the Natural Resources (Audit) Rules 2008, a rule made under Section 18 (q) of the Natural Resources and Environment Ordinance 1993 (Borneo Post Online, 8 November 2017).

This collaboration marks the milestone towards environmental stability in Sarawak while the implementation of NRE (Audit) Rules 2008 is the way forward for the forestry and timber industry in advocating the principles of sustainable development for the benefit of the present and future generations. (Borneo Post Online, 8 November 2017).

ECA is conducted based on the EIA Approval Terms and conditions issued by NREB to the project proponent. It is conducted by trained environmental auditors. Internal ECA is conducted by internal auditors of the companies while External ECA is conducted by registered external environmental auditors appointed by NREB. All the 1st and 2nd batch pilot project of four (4) FMUs within HoB area comprising of Linau FMU, Kapit FMU, Entulu-Melatai FMU and Ravenscourt FMU have trained environmental auditors to conduct IECA. Figure 12 shows activities conducted on the pilot project ECA for the 1st and 2nd batch (Source: NREB).

Figure 12: Activities on the pilot project ECA

Pillar 2: Ecotourism based on Culture, Adventure and Nature

Initiatives under Ecotourism based on Culture, Adventure and Nature (CAN) will be focusing on developing the eco-tourism involving the local communities to promote conservation and enhance socio-economic well-being of the people. There are various

initiatives that had be organized by Sarawak on ecotourism based on CAN as Sarawak is one of the places in Malaysia that provides the best avenues for the activities.

HoB Highland Eco Challenge III by FORMADAT

Alliance of the Indigenous People of the Highlands of Borneo (FORMADAT) an Non-Governmental Organization (NGO) had organised HoB Highland Eco Challenge III from 27 June 2019 – 10 July 2019. It is a cross border adventure along Sarawak, Sabah and Kalimantan within the HoB. It aims to promote the purity of the Highlands in its history, nature and culture hence be an ecotourism adventure with a difference (Source: WWF).

Eco Challenge comes with activities that bring participants through the footsteps of the ancestors of the Highland peoples and an appreciation of the wonders of the natural environment. So the concept of treading lightly, "take nothing but photographs, leave nothing but footprints", is core to the organisers and participants This is in line with the green ecotourism, a key focus area in the HoB Initiatives by promoting tourism destination within HoB area using HoB Branding (Source: WWF).

Figure 13: Activities of the HoB Highland Eco Challenge III

Community Empowerment in educational and community based tourism at Rumah Manggat in Ulu Sg Menyang, Batang Ai

Ulu Sungai Menyang one of the High Value Conservation Forest which is valuable for its orangutan habitat. Orangutan occur throughout the area. Local communities coexist with the orangutan and have done so for a long time. Many communities have folklore related to orangutan which forbids the disturbance of the species. The communities already benefit by generating valuable income through ecotourism directly related to orangutan viewing.

Activities in community empowerment in educational and community based tourism at Rumah Manggat in Ulu Sg Menyang, Batang Ai is one of the various initiative that had been undertaken by Forest Department Sarawak. Through this activities, the community are able to generate side income through tourism activities such as homestay program and also through the transport provision, guiding, support staff and handicraft sales. Figure 14 shows the cultural based activities at Rh Manggat where the visitors taking part in the show.

Forest Department plays a role by promoting the program to various government agencies, private sector, association, and NGOs for their participations. Their participation will in indirectly contributing toward conservation effort for orang utan in the area. To name a few, visitors participated in the program are from the UNIMAS, UiTM, Jabatan Perhutanan Semenanjung Malaysia, Institute Pendidikan Guru Kampus Batu Lintang and Politeknik Kuching. Figure 15 showing the visitors at Rh Manggat.

Figure 14: Visitors participating in the cultural activities

Figure 15: Visitors to Rh Manggat, Ulu Sungai Menyang

Establishment of HoB Interpretation Centre

Establishment of HoB Interpretation Centre in Kayangeran Forest Reserve in Lawas mark a milestone for Forest Department Sarawak in raising the awareness and educating the public and tourist on environment and forestry. This centre will serve as one stop centre for the purpose in the Northern part Sarawak. The establishment of this centre is the physical component for project implemented in 11th Malaysian Plan with a total cost incurred amounted to RM9,754,957.15 and schedule to be completed by year 2020. Figure 16 and Figure 17 below shows the front view of the building and building under completion stage respectively. The centre will be equipped with interacting gallery and forest nursery for restoration programme in the northern part of Sarawak.

Figure 16: Front view of the building

Figure 17: Building in the stage of completion

Upgrading Ecotourism Facilities in the Periphery of TPA

HoB Initiative is a rebranding of the initiatives that Forest Department Sarawak had been helping the community living in periphery of TPA. Forest Department Sarawak had been providing assistance especially in repairing and upgrading some of the facilities to support ecotourism activities in their area as well as living condition for the communities. Figure 18 and Figure 19 below shows some of the upgrading facilities activities carried out by Forest Department Sarawak.

Figure 18: Improvement of jungle trail for ecotourism at Rh Ninting, Ng Jambu, Ulu Delok

Figure 19: Mini microhydro for water supply at Rh. Manggat

Pillar 3: Conservation of Biological Diversity

The forests of the HoB are some of the most biologically diverse in the world, possessing a high number of endemic species across all groups of plants and animals and lies the many important existing conservation areas of TPAs (Freezailah. et) that are found in Sarawak. Under conservation of biological biodiversity, the initiatives under taken will be focusing on effective management of Totally Protected Areas within the Heart of Borneo areas.

Increase number of Totally Protected Areas (TPA) within HoB Areas

Under Pillar 3, Sarawak initiatives is focusing on effective management of Totally Protected Areas within the Heart of Borneo areas. In 2018, State Government had approved for the expansion area earmarked for HoB from 2.1 million hectare to 2.69 million ha as shown in Figure 20 below. The earliest areas earmarked for HoB initiatives was divided into three (3) regions that is the Northern Region which comprised of Miri & Limbang Division, the Kapit and Belaga District of Kapit Division represented the Central Region, and lastly the Southern Region, areas that covered Sri Aman, Sarikei and Sibu Division as well as Song District of Kapit Division. As a result of the expansion, the HoB areas will be covered up to the Western Region of Sarawak from Batang Ai, Sri Aman Division to Serian Division and Kuching Division which covers Bau, Lundu and Kuching District. The map below shows the latest areas earmarked for HoB Initiative in Sarawak.

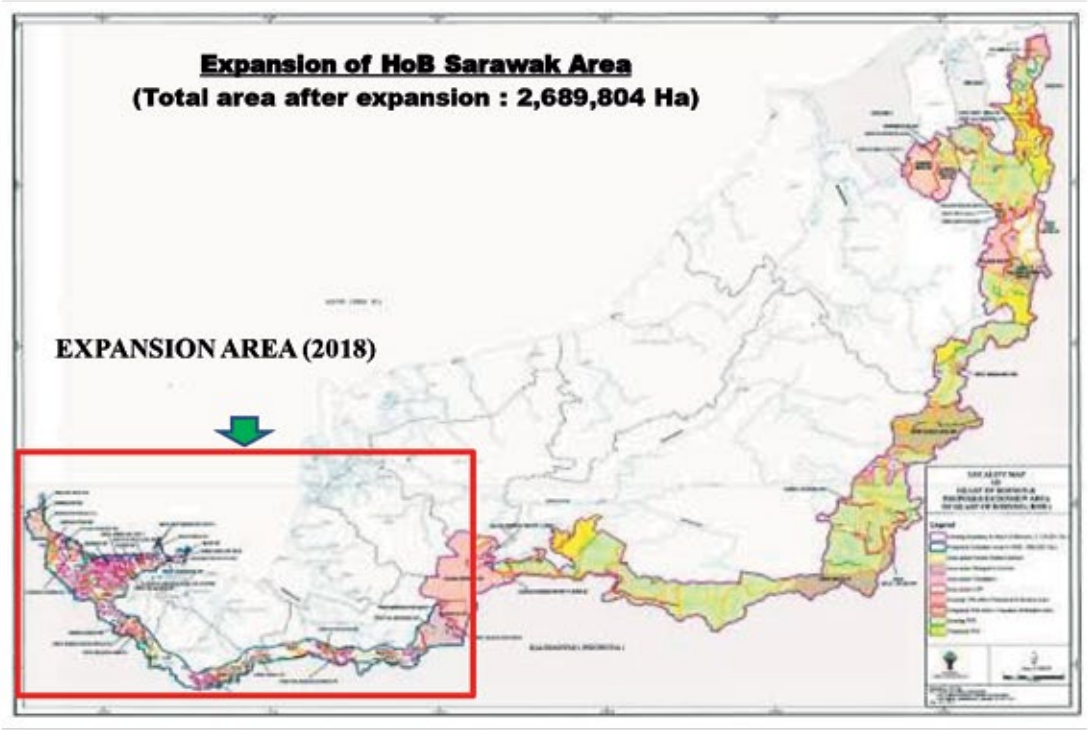


Figure 20: Map showing the expansion of HoB Sarawak Area

This expansion resulted more Totally Protected Areas fall within HoB landscape which contributed better linkage between the TPAs to enhance the conservation effort in biological diversity. Among the TPAs that falls within the expansion areas are Gunung Apeng National Park in Serian District, Bungo Range National Park in Bau District, Gunung Gading National Park and Gunung Pueh National Park in Lundu District, Tanjung Datu National Park & Samunsam Wildlife Sanctuary in Sematan Sub-District and lastly Kubah National Park, Kuching Wetland National Park, Santubong National Park and Bako National Park in Kuching District.

Since the implementation of HoB Initiative in 2008, Sarawak had gazetted 19 totally protected areas (TPA) within the HoB area which consists of 15 national parks (new and extension), one wild life sanctuary and three nature reserves. Forest Department Sarawak are in the process of proposing 18 more new TPAs to be gazetted and propose an extension to the existing TPAs.

With the expansion of the HoB area, the totally protected areas that falls within the HoB had increase from 342,830 ha in 2008 to 528,429 ha in 2018 covering the overall size of the TPAs with 441,240 ha is within HoB boundary.

However, the implementation of conservation initiatives within this area need to take into consideration the existing policies and development corridors of the State Government.

Series of Scientific Expeditions

Contributing to initiative under the Pillar 3, Forest Department Department had conducted a series of scientific expeditions to various area within HoB involving participants from various research and higher learning institutions, NGOs as well as participants from HoB member countries. Seminar on the scientific expedition was conducted with seminar paper and Coffee Table book was published to document findings of the expeditions. The series of expeditions are:

1. Lanjak Entimau Scientific Expedition, 2008
2. Paya Maga Scientific Expedition 2010
3. Ulu Mentawai Scientific Expedition, 2012
4. Long Banga Scientific Expedition, 2016
5. Tama Abu Scientific Expedition, 2017

Figure 21: Paya Maga 2010 "The Pristine Highland"

Figure 22: Mentawai 2012 "The Lush Rainforest in Northern Part of Sarawak

Figure 23: Tama Abu Scientific Expedition Seminar

New species such as ***Zingiber tun jeanne abdullah*** and new records for Borneo, ***Entoloma nigriensis*** **(Africa Distribution)** were discovered and documented from the expeditions.

Figure 24: *Zingiber tun jeanne abdullah*

Figure 25: *Entoloma nigriensis*

The latest scientific expedition conducted by Forest Department Sarawak is to Kelingkang Range in 2019 with the aims to collaborate with local community on conservation effort and to collect samples and documenting flora and fauna of the area.

Figure 26: Staff from Research Development and Innovation Division participated in the Kelingkang Range Scientific Expedition

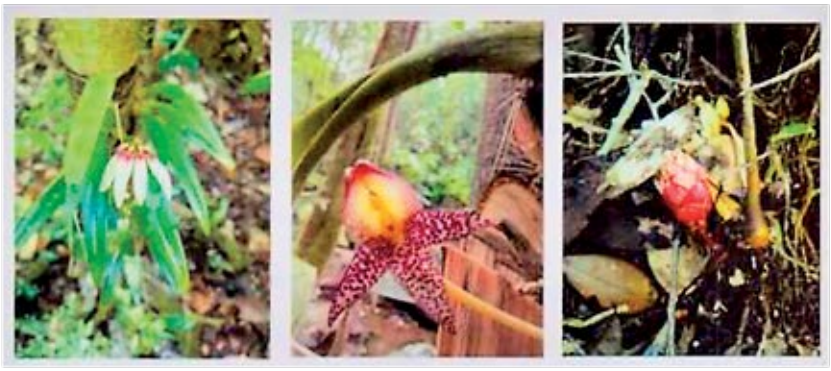


Figure 27: Wild orchids and gingers of Kelingkang Range

Research on Wildcats at Gunung Pueh National Park and Usun Apau National Park

Forest Department Sarawak had conducted a study on Wildcats ecology at Gunung Pueh National Park and Usun Apau National Park (Figure 28) focusing on behaviour and habitat (home range) as well as looking into the relation between species (Wildcats) and food source. This is one of the conservation effort on wildcats population in the areas. Forest Department Sarawak had put up the proposal under 12th Malaysian Plan to the federal government requesting allocation to continue with the study and to come up with the propose ecotourism plan for the area. Apart from that, additional allocation was requested to finance the study on wildlife trade-off in the Gunung Pueh National Park.

Figure 28: Camera Trap of Wildcat at Usun Apau

Pillar 4: Sustainable Land use/Agriculture

HoB initiatives under sustainable land use/agriculture will be focusing on sustainable development of rural communities through wise management of natural resources and agriculture.

Certification of Palm Oil Plantation in Sarawak

Promoting green economy through certification is another key focus areas under HoB Initiatives. One of the commodities going through the certification is the palm oil plantation. Palm oil production is vital for the economy of Malaysia, which is the world's second-largest producer of the commodity after Indonesia. As of 31 July 2019, a total of 814,282 ha or 51.78% of the total oil palm planted area (1,572,477 ha) in the Sarawak have been certified under Malaysian Sustainable Palm Oil (MSPO). Out of 814,282 ha certified, 788,590 ha and 25,692 ha are areas planted from the plantation sector and independent smallholders respectively. There are 226,417 ha areas planted under independent smallholders in Sarawak (Source: MANRED).

Oil palm industry in Malaysia in general and Sarawak in specific uses sustainable practices to ensure that the environment and biodiversity are not harmed by cultivation of the crop through the adoption of Good Agriculture Practices (GAP). To inculcate the GAP, awareness was conducted on farmers/community and MSPO awareness programme was also conducted on Independent Smallholders. Figure 29 below shows the MSPO awareness programme conducted in Lundu District (Source: MANRED)

Figure 29: Awareness programme at Lundu District

Fisheries Management - Tagang System

Forest Department was collaborating with Department of Agriculture in implementing fisheries management, Tagang System especially for community living in the periphery of our Permanent Forest Estate (PFEs) and TPAs at various locality such as at Sungai Lidong, Lawas Sungai Adang, Bario, Nanga Sumpa, Batang Ai, Nanga Delok, Batang Ai, Ulu Engkari, Batang Ai to ensure sustainable supply of fish to the community. Figure 30 shows the fish yields harvested from the tagang system in Ulu Engkari.

Figure 30: Yield from Tagang in Ulu Engkari

Sustainable Agriculture - Planting of world's premium variety pineapple at Pandang Pan, Bau

Venturing of agropreneur in Padang Pan, Bau in the planting and production of MD2 pineapple fruit is another initiative toward realizing sustainable agriculture for the community.

Figure 31: Launching on the first harvest of MD2 pineapples (world's premium variety pineapple) planted in Kampung Pan in Bau at pineapple farm owned by Pineapple agropreneur David Disam, recipient of myGAP certification on pineapple planting (New Sarawak Tribute, 2019).

Pillar 5: Community-based/Rural Proverty Eradication Program

One of the objectives of the HoB is focusing on the welfare of rural communities through effective management of Totally Protected Areas, production forests and agriculture. Numerous settlements are located within the timber production forests, but outside of the totally protected areas. There is increasing recognition that active participation of the local communities in conservation and development efforts is undoubtely a central feature for the success and sustainability of any conservation programme. The local communities should thus be considered as an important and major stakeholder in the HoB Initiative.

Non Timber Forest Product (NTFP) Development Programme

Forest Department Sarawak is also actively implementing various activities for the Non Timber Forest Product (NTFP) Development Programme such as workshops, technical training, courses and study tours to enhance knowledge and skills of the community in NTFP making, as well as to expose them to new ideas, creativity and diversity in the production of NTFP. The Department are currently collaborating with Sarawak Energy Berhad (SEB) and Kraftangan Malaysia on the programmes.

Figure 32: Course for dried flower craft making in Ulu Baram

Non Timber Forest Product (NTFP) Carnival

Besides enhancing through capacity building on the development of NTFP products for the local communities, Forest Department is also organizing the NTFP Carnival with the main objectives as follows:

1. To showcase, promote and market the products by local entrepreneurs within the HoB project site,
2. To support local-made product and boost community's income through promoting and selling their NTFP products, and
3. To foster business networking between community and consumers/corporate buyers.

Forest Department had been organising the carnival since 2016 involving the NTFP entrepreneur from the local communities. In 2019, international participants from Indonesia, Nepal, Philippines, Cambodia and Laos were also participating in the carnival. Pictures below (Figure 33) showing the booth of the participant show-casting the NTFP products during the carnival.

Figure 33: NTFP Products at NTFP Carnival 2019

Production of Menyang Gaharu Tea at RH Manggat in Sg Menyang

In an effort providing alternative livelihood for the communities and reduced the dependency of the communities on forest surrounding the Ulu Sg Menyang Conservation Area, Forest Department Sarawak is engaging a smart partnership with WWF, Syarikat Aquilaria Plantation (Sarawak) Sdn. Bhd., and local community implementing Gaharu Agronomy. This engagement indirectly supporting the Ulu Sg Menyang Orang Utan Action Plan. The project involves empowering community at Rh Manggat in Ulu Sg Menyang in

the planting of gaharu tree (Picture 41) for production of Menyang Gaharu tea. The sale of Menyang Gaharu tea (Picture 39 & 40) produced will provide a side income for community apart benefiting from the homestay and other tourist program under the education and community based tourism that had been discussed in Pillar 2 of the HoB.

Figure 34: Gaharu tea produced from Ulu Sg. Menyang

Figure 35: Sorting of Gaharu leaves after harvesting

Figure 36: Gaharu tree ready for harvesting

Tagang System by Department of Agriculture (DOA)

Under the community based rural proverty eradication programme, Department of Agriculture (DOA) is establishing the tagang system with the collaboration from communities in the programme areas. This program is a fisheries management system is to ensure sustainable stok of fish for the community involved. It was adopted from Sabah and was initiated in 2006 at Lond Tuyo in Lawas. As of 2019, there are 126 existing Tagang system in Sarawak as shown in Table 5 at 31 various localities as shown in Figure 37 below (Source: DOA).

Figure 37: Map of tagang localities in Sarawak

Table 5: Tagang established in Sarawak

YEAR	TOTAL
2005	4
2006	12
2007	10
2008	1
2009	0
2010	4
2011	11
2012	13
2013	8
2014	4
2015	12
2016	6
2017	9
2018	19
2019	13
TOTAL	126

Table 6 : Locality of Tagang Project by DOA in Sarawak (Sources : DOA)

Tagang Projects within the Heart of Borneo Initiative					
No	**HOB Pillars**	**Division**	**Location**	**River**	**Reg. Date**
1.	Community - based / Rural Proverty Eradication Program	Kuching	Kpg. Semedang Penrissen	Sg. Sarawak Kiri	2007
2.			Kpg. Tringus	Sg. Pideae (Sg. Sarawak)	2013
3.			Kpg. Bako	Sg. Tabo, Bako	2015
4.			Kg. Danu	Sg. Sarawak Kiri	2015
5.			Kg. Sadir	Sg. Sarawak Kiri	2017
6.			Kpg. Suba Buan	Sg. Pideae	2018
7.			Kpg. Sebako, Lundu	Sg. Sebako	2018
8.			Kpg. Segong (Adis Buan)	Sg. Adis Buan	2007
9.		Serian	Kpg. Terbat, Mawang	Sg. Kedup	2006
10.			Kpg. Senah Rayang	Sg. Sungan	2013
11.			Tema Mawang & Tema Penggal	Sg. Batang Kayan	2014
12.		Sri Aman	Rh. Along , Batu Lintang, Undop, Sri Aman	Sg. Entebar	2005
13.			Rh. Story, Abok Pulau Pantu	Sg. Abok Pulau	2006

14.			Ulu Engkari (ITTO & Forest)	Ulu Sg. Engkari, Lubuk Antu	2011
15.			Rh. David Ujan, Spaya	Nanga Spaya, Ulu Engkari	2012
16.			Rh. Sunok, (Rh. Weslle Bakak) Nanga Stamang	Nanga Stamang, Ulu Engkari	2013
17.			Nanga Entalau Ulu Skrang, Engkilili	Nanga Entalau	2017
18.			Lubok Tabau, Sg. Ulu Skrang, Engkilili	Lubok Talau, Sg. Ulu Skrang	2017
19.			Nanga Seladong, Ulu Skrang, Engkilili	Ng. Seladong, Ulu Skrang	2018
20.		Sarikei	Rantau Limau	Sg. Ulu Kanowit	2012
21.		Sibu	Rh. Austin KIlat, Ulu Ngemah	Sg. Pang, Ulu Ngemah	2015
22.		Miri	Kpg. Pa'Dalih, Bario	Sg. Kelapang	2010
23.			Long Peluan	Sg. Kelapang	2012
24.			Kg. Pa' Mada, Bario	Sg. Kelapang	2015
25.			Kg. Ramudu, Bario	Sg. Kelapang	2015
26.		Limbang	Kpg. Long Tuyo, Lawas	Sg. Berayong	2005
27.			Kpg. Long Lidung	Sg. Tengoa	2006
28.			Kpg. Long Kerebangan	Sg. Trusan	2008
29.			Kpg. Long Lutok	Sg. Tengoa	2013
30.			Tagang Long Kumap, Ba'kelalan	Sungai Kumap	2015
31.			Long Muda, Buduk Nur, Bakalalan	Sungai Muda	2017

Traditional Knowledge Documentation Programme and Research & Development (R&D) Programme

Sarawak Biodiversity Centre (SBC), through Traditional Knowledge (TK) Documentation Programme and Research & Development (R&D) programme with the community as well is contributing to the Pillar 5 of HoB initiatives. The programmes is facilitating the documentation of fast disappearing traditional knowledge on the usage of these biological resources that have been utilized by indigenous communities. Figure 38, Figure 39 and Figure 40 shows the activities with communities during the TK programmes (Source: SBC).

Figure 38: Plant collection involving local community during a Traditional Knowledge (TK) workshop with Saban Communit at Long Banga, Marudi

Figure 39: Discussion with community on TK Documentation Project with Lun Bawang Community at Long Tuyo, Lawas

Figure 40: Indigenous elder describing plant to SBC officer with Lun Bawang Community at Long Tuyo, Lawas

LITSARA Project

LITSARA Project in Bario is another project by SBC under the Pillar 4, a community based programme that can uplift the livelihood of the communities and reduced the dependency of the communities on forest. SBC undertake the signing of Benefit Sharing Agreement (BSA) (Picture 45) on the project with five indigenous communities (the Bidayuh of Kpg Kiding, Padawan; the Lun Bawang of Long Telingan and Long Kerebangan, Lawas; and the Kelabit of Pa'Ukat and Pa'Lungan) on 20th March 2019 as shown in the picture below (Source: SBC).

Figure 41: Installation of distillation unit by community, Pa'Lungan, Bario

Figure 42: Benefit Sharing Agreement Signing Ceremony

Rural Service Centre Programme

Rural Service Centre Programme as shown in the pictures below, a joint collaboration programme between the various government agencies with Miri Resident Office and Telang Usan District Office especially for the Penan community with the objectives:

1. Awareness and towards developing a progressive rural communities.
2. Bring the basic services direct to the rural communities through the opening of services counter
3. Foster a close relationship between the rural communities and the Government in particular and the Penan community in General to promote awareness on Government Policies and programmes.

Figure 43: Activity during the awareness programme with the communities (Source: State Planning Unit, JKM)

LIST OF COLLABORATION PROJECTS BY FOREST DEPARTMENT SARAWAK

List of collaboration projects within HoB landscapes:

1. Copenhagen Zoo, Denmark on the conservation and management of wildlife protected areas in the areas of technology transfer and capacity buiding for our researcher;
2. SEB on NTFP Development in replenishing the raw source of NTFP for the community in Murum and Tagang system in Batang Ai;
3. APFNet, community based project with the community of Penan in Kpg Bahagia and Kelabit in Long Napir in the conservation of SFM of Sg Medihit watershed area in Limbang ;
4. WWF, a pilot community based SFM project with the Penan at Kuba'an Puak FMU Baram;
5. WWF, a community based SFM project on Gaharu Agronomy with Iban community at at Ulu Sungai Menyang Conservation Area;
6. FAO, a Gap Assessment of Reduced Impact Logging Guidelines to support SFM in Sarawak; and
7. ITTO, on Transboundary Biodiversity Conservation Area in Lanjak Entimau Wildlife Sanctuary (LEWS) and Pulong Tau National Park.

The ITTO projects and APFNet had been concluded but other projects in the list above are still ongoing and some new projects coming up for implementation.

ISSUES AND CHALLENGES IN IMPLEMENTING HoB INITIATIVE IN SARAWAK

Forest Department Sarawak face issues and challenges in implementing the projects and activities under the five (5) pillars of HoB Initiative, as listed below.

1. Balance between Conservation and Development

   How to balance between conservation versus the need for development, this issue is not unique to all country. The necessary changes need to undertake which will require breaking out the usual confined lanes of conservation and development. Holistical approach are needed in order to find a viable sustainable path forward in a win win situation such through Free prior Inform Consent (FPIC), Benefit Sharing (ABS), etc.

2. Funding for the HoB Initiatives

   Sourcing funding for other pillars that is not under Forest Department Sarawak jurisdiction such agriculture and tourism is another issue. Fund need to be sourced and channelled to other government agencies to enable the agencies to be engaged in implementing the activities that contribute to the pillars. The involvement of Department of Agriculture and Ministry of Culture, Adventure, Cuture, Nature, Sports and Youth is crucial to contribute under Pillar 2 and Pillar 3 respectively.

3. Community Engagement and Participation

   Area earmarked for HoB Sarawak is located in the hinterland. With this regard, access to the area is very challenging. Furthermore, dealing with indigenous people with different economic status poses a challenge when come to engagement and to get them participate in projects and activities.

4. Lack of knowledge and skill

   Lack of knowledge and skill not only to the community but also to officers implementing the project/activities hinders the successful implementation of the project/activities. In this regards, capacity building in areas such as ECA, NTFP, Tagang System, etc are been conducted to the communities and project officers. The awareness on HoB Initiative among the stakeholders and community are also lacking which pose a challenge to implement the initiatives. In this regards, the awareness programme on overall HoB Initiative, SFM, FMC, GAP etc. is crucial to ensure smooth implementation of the initiative.

WAY FORWARD HoB INITIATIVE IN SARAWAK

1. Enhance Stakeholders Collaboration

   Currently, the reporting of the HoB initiatives is mainly by Forest Department Sarawak as secretariat to the initiative on its programme, projects and activities implemented within HoB areas. However, some of the pillars are are not under the jurisdiction of Forest Department Sarawak which requires engagement from other government agencies, private sector and NGOs to contribute to the programmes, projects and activities they implemented within the HoB areas. Their engagement is crucial to ensure that the State could fulfil the commitment toward other pillars such as agriculture, ecotourism and community development poverty eradication of HoB Initiative.

2. Cross Sectoral Implementation

   HoB Initiative should be seen as the state's initiative and the implementation of activities/projects within the area should be integrated and in tandem with the state government current policies and initiatives. Multiple landuses within the HoB Landscape which certainly also requires the cross-sectoral collaboration among the stakeholders

   The Sarawak Heart of Borneo saddle within the state's hinterland which is the headwaters of the major rivers in the state. It is critical for us to manage this area on a sustainable development's approach. In fact the state government promotes the coordinated development and management of water, land and related resources through integrated watershed management in order to maximize economic and social welfare and equity without compromising the sustainability of vital ecosystems and the environment. This includes green energy such as micro-hydro power, solar energy and technologies which turn waste into raw materials for generating energy or other useful products. In this regard, Sarawak to take the advantage to use the HoB brand, to promote the State of Sarawak's effort in sustainable development agenda.

   Sarawak should also leverage on HoB brand to explore new source of revenue to the State through carbon trade or promoting tourism in the state. All relevant agencies should put their hands together in promoting tourism in HoB area.

3. Use HoB branding in seeking fund

   In addition, the stakeholders be it a government agencies, private sector and NGOs are encourage to use HoB branding in seeking funding for collaboration with international bodies/institutions as HoB Initiative is world known effort in the conservation of tropical forests in the Island of Borneo. The HoB Declaration is supported under important regional and international agreements such as Association of East Asian Nations (ASEAN), Brunei, Indonesia, Malaysia, Philippines East Asia Growth Area (BIMP-EAGA), Asia-Pacific Economic Cooperation (APEC), and the United Nations Convention on Biological Diversity (UNCBD) (Source: WWF).

As Forest Department Sarawak had been allocated with a fund by Federal Government to implement the HoB Initiative, other government agencies in Sarawak playing a main role in contributing to the pillars also need to seek funding using HoB Initiative as it is a State initiative in specific and Malaysia in general in order to enhance their collaboration in the initiative.

4. Highlighting restoration programme within HoB areas
Forest Department Sarawak had embarking on restoration programme since 2018 with objective to restore degraded forest areas including areas within the HoB. This programme contributing to HoB Initiative under various pillars and will be highlighted in the State HoB Initiative Report.

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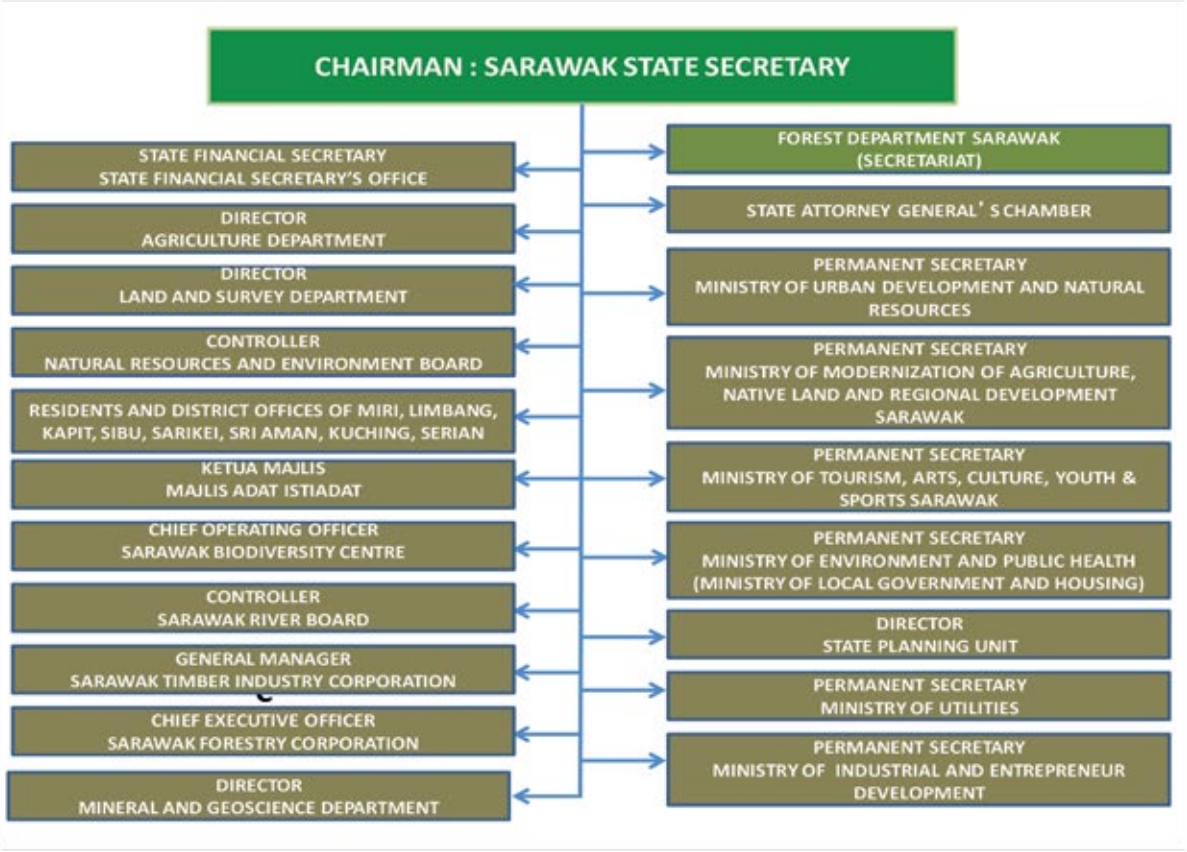
Appendix 1

Sarawak State Steering Committee

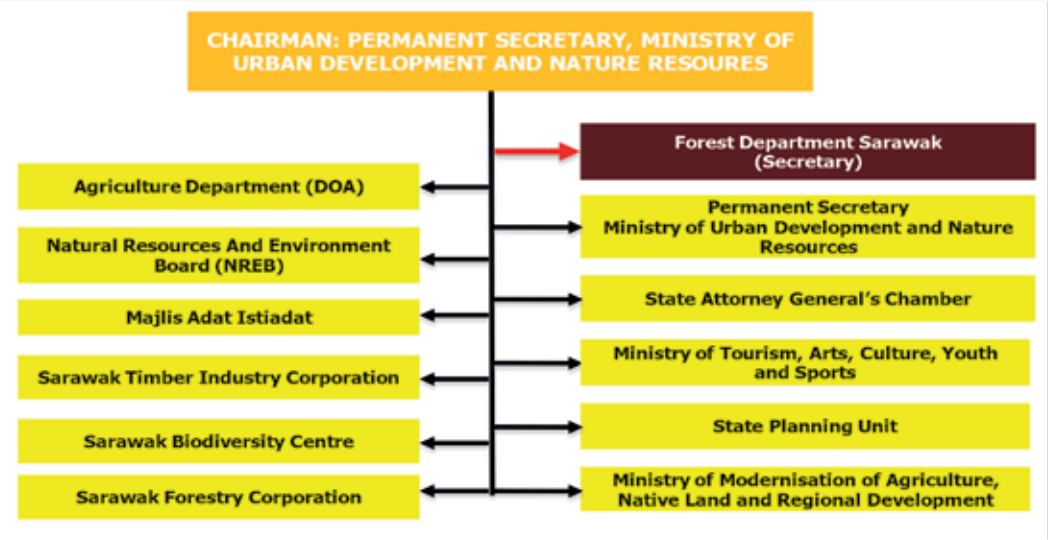


Term of Reference (TOR) for State Steering Committee

- To set directions of the HoB initiative to meet the requirements of the State Government's overall development agenda in tandem with its land use policy, legislation and institutional framework
- To endorse and approve project proposals submitted by Technical Working Group (TWG) before they can be forwarded to the Federal Authority
- To meet at least once a year

Appendix 2

HoB Technical Working Group (TWG).



Term of Reference (TOR) for HoB Technical Working Group (TWG)

- To study and identify the boundary and the different types of land use to be included in the HoB based on the following criteria:

❑ Connectivity (contiguous forests)
❑ Totally protected Area (TPA) boundaries
❑ Permanent Forest Estate (PFE) boundaries
❑ Divisional/District boundaries
❑ High conservation value area
❑ Long term forest concessionaries boundaries
❑ Plantation boundaries
❑ Existing forest cover

- To study, formulate and recommend the different "treatment" for the different types of land use within the HoB boundaries
- To study the project idea notes (PIN) submitted by WWF Malaysia, and propose a detail "ingredient" (contents) of a comprehensive project document (as proposed by Sarawak) on the HoB Initiative
- To identify, study and recommend the State's priorities for conservation and sustainable development in the HoB area
- To provide the necessary inputs and assist in the preparation of the project document
- To study and finalise the project document to ensure that the HoB initiative is in line with the State's overall development agenda and that its implementation is done within our existing legal and institution frameworks
- To study the declaration and ensure that it readily reflects and incorporate the interests and sovereignty of the state; and
- To regularly report to and advise the State Government on all matters concerning the HoB initiative.

PELAN ANTIRASUAH ORGANISASI (OACP)

Shamsul bin Bojeng

Unit Integriti dan Ombudsman Negeri, Jabatan Ketua Menteri

LATAR BELAKANG

Persidangan Menentang Rasuah Pertubuhan Bangsa-Bangsa Bersatu atau *United Nations Convention Against Corruption* (UNCAC) merupakan satu-satunya instrumen memerangi rasuah di peringkat antarabangsa. Malaysia telah menandatangani UNCAC pada 9 Disember 2003 semasa Hari Anti-Rasuah Antarabangsa dan mengesahkan keanggotaan pada 24 September 2008. Artikel 71 UNCAC menghendaki negara anggota untuk melaksanakan langkah antirasuah bertujuan untuk mencegah rasuah, penyelewengan, kebocoran maklumat dan penggubahan wang haram.

Sejajar dengan komitmen tersebut, Malaysia telah menubuhkan Institut Integriti Malaysia (IIM) pada 23 April 2004. IIM merupakan sebuah badan yang bertanggungjawab menyediakan perkhidmatan perundingan mengenai integriti, antirasuah dan tadbir urus di Malaysia. Pada hari yang sama, Pelan Integriti Nasional (PIN) yang menggariskan secara terperinci rangka kerja untuk menanam dan memupuk budaya integriti dalam masyarakat demi mewujudkan masyarakat bermoral dan beretika tinggi juga telah dilancarkan.

Usaha ini tidak berhenti di situ sahaja, pada 28 Januari 2010 pula, Kerajaan Malaysia telah melancarkan Program Transformasi Kerajaan atau lebih dikenali sebagai GTP1.0 dengan meletakkan tumpuan kepada usaha memerangi rasuah sebagai salah satu Bidang Keberhasilan Utama Negara (NKRA). Ia bertujuan untuk menangani isu rasuah dengan memperkuat sistem perolehan kerajaan seterusnya meminimumkan peluang perlakuan rasuah bagi tempoh 2010-2012. Selepas itu, usaha ini diteruskan dengan pelancaran GTP2.0 pada 2012 bagi tempoh 2013-2015 yang bertujuan untuk mencapai sasaran negara untuk menghapus rasuah. Inisiatif yang diperkenalkan di bawah GTP1.0 telah ditambahbaik melalui pemantauan yang lebih berkesan.

Menyedari usaha bagi menghapuskan rasuah ini harus diteruskan, Kerajaan Malaysia telah melancarkan Pelan Antirasuah Nasional (NACP) 2019-2023 pada 29 Januari 2019. Ia merupakan dokumen utama Kerajaan Malaysia yang menggariskan tindakan menyeluruh dan bersepadu dalam memerangi rasuah habis-habisan demi merealisasikan sebuah negara berintegriti dan bebas rasuah. Menteri di Jabatan Ketua Menteri (Integriti dan Ombudsman) mewakili kerajaan negeri Sarawak telah menerima dokumen NACP tersebut daripada kerajaan pusat sebagai komitmen kerajaan negeri menjayakan agenda integriti. Arahan YAB Perdana Menteri Siri 2 No. 1 Tahun 2019 telah dikeluarkan bagi memantapkan pelaksanaan NACP.

Pelan ini akan menjadi rujukan utama dalam rangka menjadikan Malaysia negara yang dikenali kerana integritinya bukan kerana korupsi. NACP mengandungi enam Bidang Keutamaan dengan 115 inisiatif yang telah dikenalpasti yang mana 22 inisiatif dikategori sebagai Keutamaan Strategi. Inisiatif 2.1.5 dan 6.2.1 mewajibkan sektor awam dan Badan

Berkanun, Syarikat Milik Kerajaan (SOEs), Syarikat Terhad dengan Jaminan (CLBG) dan sektor swasta yang dikawal selia oleh badan kawal selia untuk membangunkan Pelan AntiRasuah Organisasi (OACP).

PELAN ANTIRASUAH ORGANISASI (OACP)

Pelan AntiRasuah Organisasi (OACP) merupakan satu dokumen dasar antirasuah di peringkat organisasi. Dokumen ini bertujuan untuk menangani permasalahan dan kelemahan governans, kelemahan integriti dan kelemahan antirasuah dalam organisasi.

Tempoh pelaksanaan OACP ialah tiga tahun atau lima tahun. Ia tidak semestinya sama dengan tempoh pelaksanaan NACP iaitu 2019-2023.

OACP hendaklah merangkumi aspek governans, integriti dan antirasuah serta melibatkan semua bidang dan aktiviti yang ada di dalam organisasi. Ianya mengandungi empat bab utama iaitu pengenalan, memperkasakan usaha pencegahan rasuah, tadbir urus dan akhir sekali adalah rumusan.

Pengenalan kepada OACP

Pada bab pertama ini ianya akan menceritakan latar belakang sesuatu organisasi, analisis data salah laku di organisasi, punca utama rasuah dan salah laku dan akhir sekali ianya akan menyenaraikan bidang-bidang berisiko di sesebuah organisasi tersebut.

Memperkasakan Usaha Pencegahan Rasuah

Pada bab yang kedua pula, ianya akan mengandungi penyataan keperluan OACP dalam konteksual kepada kerangka sesebuah organisasi, kerangka OACP-Organisasi dan juga strategi dan inisiatif di bawah bidang keutamaan yang telah digariskan berlandaskan Pelan Anti Rasuah Nasional (NACP).

Tadbir Urus

Bab yang ketiga dokumen OACP ini akan memaparkan maklumat seperti pengenalan kepada tadbir urus, Prinsip-prinsip tadbir urus yang didokong, mekanisme pelaksanaan OACP yang dirancangkan dan yang terakhir adalah mekanisme penyelarasan pemantauan dan penilaian.

Rumusan

Bab terakhir dalam dokumen Pelan AntiRasuah Organisasi (OACP) ini akan mengandungi ringkasan atau pendapat terakhir yang mengandungi informasi berdasarkan analisis-analisis yang telah dijalankan, mekanisma-mekanisma yang telah dirancangkan serta maklumat-maklumat berkaitan yang diperolehi daripada bab-bab sebelum ini. Ia juga merangkumi fakta, pendapat, alas an, dan juga harapan terhadap sesuatu yang dirancangkan.

PROSES PEMBANGUNAN OACP

Komitmen Pengurusan Tertinggi Organisasi

Pembangunan OACP ini pertama-tamanya hendaklah mendapat kelulusan daripada Ketua Jabatan sebagai penyataan komitmen Pengurusan Tertinggi terhadap Pelan Antirasuah Organisasi yang bakal dibangunkan.

Pada Mesyuarat Jawatankuasa Anti-Rasuah Negeri (JAR-SARAWAK) Bilangan 1 Tahun 2020 menegaskan setiap Ketua-Ketua Jabatan adalah bertanggungjawab kepada aspek pembangunan dan penyelarasan OACP seperti berikut:

i. Menyelaras pembangunan dan pelaksanaan OACP,
ii. Menentukan sekretariat penyelaras OACP di peringkat organisasi,
iii. Melantik Jawatankuasa Pembangunan OACP,
iv. Memperuntukkan sumber kewangan, tenaga dan logistik,
v. Memberi autoriti kepada Jawatankuasa Pembangunan OACP untuk melaksanakan keterlibatan, perbincangan, semakan kajian dan penelitian terhadap segala kelemahan, dan
vi. Pematuhan pelan dan pemantauan terhadap pencapaian pelaksanaannya.

Jawatankuasa Pengurusan Tertinggi Organisasi (JPTO)

Jawatankuasa Pengurusan Tertinggi Organisasi (JPTO) hendaklah ditubuhkan selaras dengan pembangunan OACP dan ianya hendaklah dipengerusikan oleh Ketua Jabatan atau Timbalan Ketua Jabatan atau pegawai yang paling kanan dalam sesebuah organisasi yang dipertanggungjawabkan untuk menyelaras dan memastikan pembangunan OACP ini mengikut perancangan yang telah digariskan.

Sekretariat Penyelaras OACP Organisasi (SP-OACP)

Sehubungan dengan pembangunan OACP organisasi, JPTO hendaklah melantik Sekretariat Penyelaras OACP (SP-OACP). Sekretariat ini berperanan untuk memastikan keberkesanan Jawatankuasa Pembangunan OACP dan memberi khidmat nasihat mengenai pelaksanaan OACP organisasi masing-masing. Sekretariat ini juga berperanan untuk memantau, menilai dan melapor pencapaian OACP kepada JPTO.

Jawatankuasa Pembangunan OACP (JP-OACP)

Jawatankuasa Pengurusan Tertinggi Organisasi (JPTO) juga dikehendaki menubuhkan Jawatankuasa Pembangunan OACP (JP-OACP). Jawatankuasa ini diurus setiakan oleh Unit Integriti (UI) dalam organisasi masing-masing.

Ahli-ahli JP-OACP ini terdiri daripada pegawai yang mempunyai pengalaman dalam governans, integriti dan antirasuah atau pada pertimbangan JPTO mempunyai pengalaman yang sesuai untuk menganggotai jawatankuasa tersebut. Pegawai Integriti Bertauliah CeIO)

atau Ketua Unit Integriti (KUI) boleh dipertanggungjawab untuk mempengerusikan JP-OACP.

Jawatankuasa ini berperanan membangun dan melaporkan terus perkembangan pembangunan OACP kepada JPTO sekurang-kurangnya sebulan sekali.

Sebelum bengkel pembangunan OACP diadakan, JP-OACP hendaklah menganjurkan sesi pra-bengkel bertujuan untuk mengumpul *hard data/literature review* yang berkaitan bagi proses analisis data semasa bengkel OACP. Data-data ini boleh didapati melalui informasi daripada Suruhanjaya Pencegahan Rasuah Malaysia (SPRM), informasi daripada seksyen disiplin jabatan, laporan audit daripada Jabatan Akauntan Negara mahupun unit audit dalam dan juga aduan-aduan lain yang berkaitan.

Bengkel Pembangunan OACP

Terdapat lapan langkah dalam Pembangunan OACP. Langkah-langkah tersebut adalah:

a) Mendapatkan kelulusan Ketua Jabatan,
b) Analisis Data (*Soft Data/Hard Data/Literature Review*),
c) Menentukan konteks/status isu rasuah,
d) Mengenalpasti risiko rasuah,
e) Menentukan bidang keutamaan untuk ditangani,
f) Menentukan logik senario - *scenario planning,*
g) Mendraf strategi, pelan tindakan dan OACP, dan
h) Menentukan kaedah pemantauan dan penilaian (Kaedah M & E iaitu *Monitoring & Evaluation*).

Selaras dengan arahan pembangunan OACP ini, Pihak Institut Integriti Malaysia (IIM) yang merupakan peneraju dan pakar rujuk akan dijemput sebagai pemerhati sepanjang sesi bengkel bagi memastikan mutu bengkel dan OACP yang disediakan selaras dengan piawaian yang telah ditetapkan.

Draf OACP

Draf OACP hendaklah dikemukakan kepada semua ahli JPTO dan mana-mana pihak yang ditetapkan oleh JPTO untuk pandangan dan penelitian. Semua maklum balas diambil kira dalam penyediaan draf OACP sebelum dikemukakan kepada JPTO untuk pembentangan.

Pembentangan Draf OACP Kepada JPTO

Draf OACP yang telah dikemaskini hendaklah dikemukakan dan dibentangkan dalam mesyuarat JPTO untuk pertimbangan dan kelulusan.

Kelulusan Daripada JPTO

Sebelum draf OACP didokumenkan sebagai dokumen rasmi OACP sesebuah organisasi, ianya perlu mendapat kelulusan daripada Jawatankuasa Pengurusan Tertinggi sesebuah Organisasi (JPTO).

Hebahan dan Pemakluman OACP

Dokumen OACP organisasi hendaklah diedarkan kepada warga organisasi untuk rujukan dan panduan pelaksanaan.

Ianya hendaklah disiarkan dan dimuatnaik dalam laman sesawang organisasi tertakluk kepada keperluan dan keputusan pihak JPTO bagi memudahkan capaian oleh semua warga dan umum.

Organisasi yang telah membangunkan OACP dikehendaki untuk mengadakan sesi penerangan di semua peringkat sama ada ibu pejabat mahupun cawangan.

Pelaksanaan dan Pemantauan OACP

Peringkat Organisasi
Bagi memastikan OACP dilaksanakan, Jawatankuasa Pengurusan Tertinggi sesebuah Organisasi (JPTO) hendaklah memastikan:

a) Unit Integriti kementerian, pentadbiran bahagian, jabatan dan badan-badan berkanun negeri memantau, menilai dan melapor pencapaian OACP,
b) Pelan tindakan dilaksana mengikut tempoh sasaran yang telah ditetapkan,
c) Koordinasi dan keterlibatan bersama jabatan, bahagian, agensi, di dalam dan luar organisasi bagi memastikan pelan tindakan dapat dilaksanakan dengan lebih berkesan,
d) Pematuhan sepenuhnya OACP oleh semua warga organisasi dan pihak berkaitan,
e) laporan pencapaian pelaksanaan OACP dibentangkan dalam Mesyuarat JAR jabatan pada setiap suku tahun, dan
f) Laporan pencapaian pelaksanaan OACP hendaklah dihantar kepada Sekretariat Penyelaras OACP Negeri (Unit Integriti dan Ombudsman Negeri) untuk tujuan rekod dan pemantauan, dua minggu sebelum Mesyuarat Jawatankuasa Anti-Rasuah Negeri (JAR-SARAWAK).

Peringkat Negeri
Unit Integriti dan Ombudsman Negeri (UNION) dilantik sebagai Sekretariat Penyelaras OACP Peringkat Negeri (SP-OACP Negeri). SP-OACP Negeri bertanggungjawab untuk memantau pelaksanaan komitmen OACP bagi setiap Kementerian, Pentadbiran Bahagian, Jabatan dan Badan-Badan Berkanun Negeri.

SEMAKAN SEMULA DAN PEMBAHARUAN OACP

Penilaian dan semakan semula terhadap keberkesanan OACP hendaklah dilaksanakan sekurang-kurangnya sekali sebelum pertengahan penggal pelaksanaan. Sebagai contoh, sekiranya jangkamasa OACP adalah untuk tiga tahun (2020-2022) bermula Jan 2020, maka tarikh penilaian adalah sebelum Jun 2021 manakala sekiranya jangkamasa OACP adalah untuk lima tahun (2020-2024) bermula Jan 2020, maka tarikh penilaian adalah sebelum Jun 2022. Ini bertujuan untuk memastikan strategi dan pelan tindakan yang dirangka sesuai dan berkesan dalam menangani isu integriti, governans dan rasuah. Walaubagaimanapun, dokumen OACP ini boleh dikemaskini dari semasa ke semasa mengikut keperluan.

KESIMPULAN

Kerajaan Malaysia telah melancarkan Pelan Antirasuah Nasional (NACP) 2019-2023 yang merupakan dokumen utama Kerajaan yang menggariskan tindakan menyeluruh dan bersepadu dalam memerangi rasuah habis-habisan demi merealisasikan sebuah negara berintegriti dan bebas rasuah.

Pelan AntiRasuah Organisasi (OACP) merupakan satu dokumen dasar antirasuah di peringkat organisasi. Dokumen ini bertujuan untuk menangani permasalahan dan kelemahan governans, kelemahan integriti dan kelemahan antirasuah dalam organisasi.

Pelan ini berfungsi sebagai panduan dan rujukan kepada semua pihak yang terlibat dalam usaha memantapkan governans, integriti dan antirasuah sesebuah organisasi.

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CONTINUOUS MONITORING AND SURVEILLANCE (COMOS)

Affendi Suhaili, Zarifah Zainal Abidin, Nur Hulida Ahmad, Meliza Mohd Rizan, Mohd Basri Mahidin and Jayneeca Lawen

Forest Technology and Geospatial Division, Forest Department Sarawak

ABSTRACT

With 63% of Sarawak under forest cover, the Forest Department Sarawak has leveraged on the use of technology in conforming to sustainable forest management practices. The continuous monitoring and surveillance (COMOS) was initiated in 2019 as a means to combat illegal logging and ensure compliance to sustainable logging practices by integrating satellite based monitoring, aerial surveillance and web based data dissemination to cater for tactical planning of the field operations and also as a management tool for monitoring the outcome of the enforcement intervention activities.

Keywords: Forest, Continuous Monitoring, Surveillance, Illegal Logging

INTRODUCTION

Sarawak is one of the states in Malaysia that has vast forest cover, comprising of 12.4 million ha or 63% of the land area in the state. The state's forest cover plays a pivotal role in the nation's international commitment in ensuring at least 50% of the country land mass would be maintained as forests.

As such, the state government through Forest Department Sarawak (FDS) is emphasizing on enforcement as parts of its measure in ensuring that the state's forest are sustainably managed. With impeding factors such as accessibility, rugged terrain and logistics, FDS has leveraged on the use of technology to ensure a more efficient enforcement operations in the state. One of such is the adoption of remote sensing technology and ICT as part of the COMOS initiative (Figure 1).

Figure 1: The COMOS initiative that adopts the use of remote sensing technology and ICT for the continuous monitoring and surveillance of the state's forest area as implemented by FDS. It covers areas that under Production Forests, logging and also Industrial Plantations, Totally Protected Areas (TPA's) such as national parks, wildlife sanctuaries and reserves and also any logging related activities within the state land

This initiative aims to increase the effectiveness of enforcement operation by emphasizing rapid response through tactical information being provided to the field crew. In addition, it also provides a means to analyze the patterns and effects of intervention actions taken by FDS and other enforcement agencies on cases involving illegal logging activities. This will ensure that subsequent measures taken, and enforcement activities are executed in a more effective and transparent manner.

Continuous Monitoring Stage

One of the main functions of the COMOS initiative is the continuous monitoring of the forest areas. This is carried out by stages (Figure 2) where the initial monitoring is implemented using Earth Observation Satellites System which can provide a broad overview of land use (such as logging) activities.

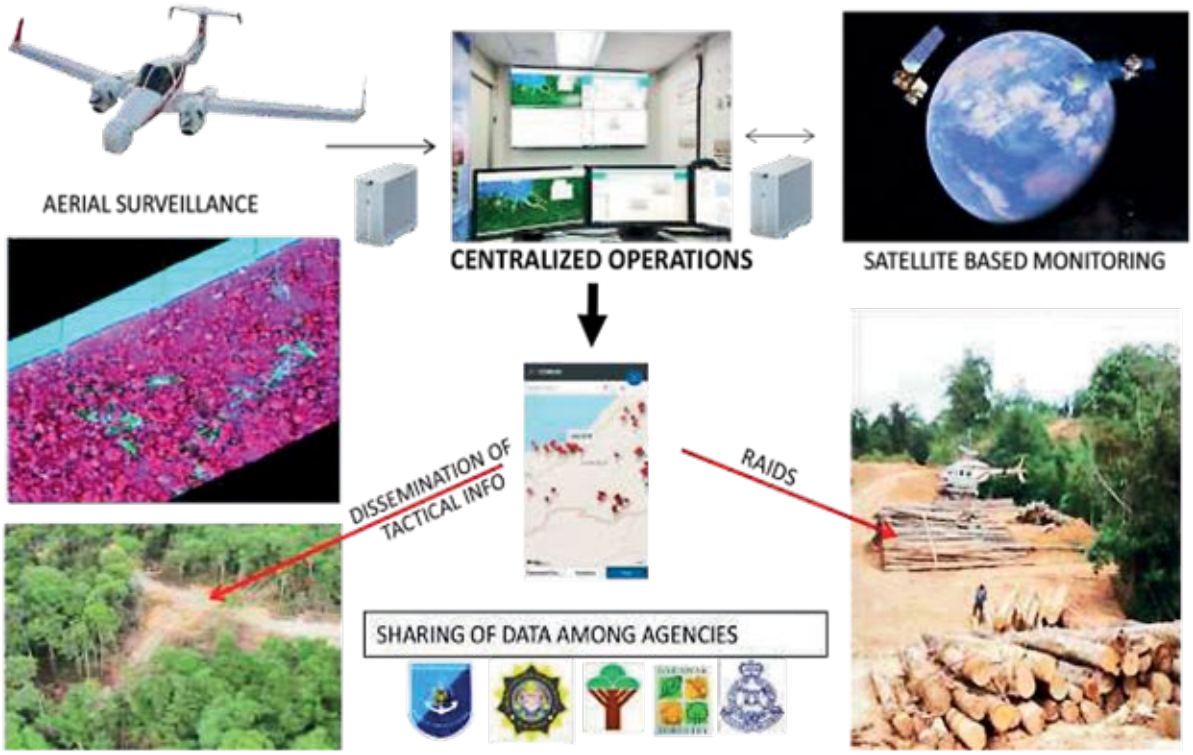

Figure 2: Workflow for the COMOS initiative starting from satellite monitoring and aerial surveys up to the dissemination of tactical information to the field operative @ raiding team

The satellite data analysis is performed at the central command and control facility on a daily basis to cover the forest areas within the Permanent Forest Estates (PFE) and the Totally Protected Areas (TPA). The control center will then verify the status of the land use (through air surveys and thorough document search) within a defined area to confirm if logging operations conducted at the targeted locations complies to the license specification or permit issued by the department. This involves temporal analytics to detect active logging sites and define them into spatial topologies that would be subsequently verified based on the land use status of each respective location.

Dissemination of Tactical Information to the Field Operative

For dissemination of the tactical information to both the field operative and management, a mobile application platform is adopted as it is seen to be the most effective method to distribute information *en masse*. Tactical information is disseminated on a weekly basis, whereas statistical analysis and trends are summarized into a dashboard and also distributed via the mobile application for management planning and strategy development (Figure 3).

Figure 3: Tactical information will be relayed to the field officer while the dashboard provides the viewer with important information as a result from the operation that has been performed

Tactical information provided to users in the field includes the type of the offence, license status and information on the forest reserve for each location (strike point) and the points are shown on the map with their relative coordinates location. Hence, this enables the field officer to evaluate the most effective method in executing the operations either by land, river or air (helicopter). These locations could then be incorporated in mobile mapping applications (on-line and off-line) that would navigate the raiding team to the site. The on-line version would enable the user to render on-line satellite base maps whereas the off-line version incorporates user defined base maps.

Intervention Implemented in COMOS

The concept of the mobile applications is based on intelligence information that is subsequently reported to the committee members on illegal logging operation within the department headed by the enforcement division and chaired by the Director of forest. Committee decisions will then be translated into an integrated action plan (such as OPS RENGAS) from the enforcement division (PED) and any regional forest office that are involved. Aerial raid-based task force (Figure 4) will act as the front liner by conducting raids and detaining timbers, assets and offenders on site for further action taken by the enforcement operation committee.

Figure 4: Special task force that will perform aerial raids based on tactical information provided through COMOS

CONCLUSION

The COMOS initiative implemented by the Forest Department Sarawak has significantly improved the effectiveness of the enforcement operations in the effort to curb illegal logging activities and ensure compliance to the logging standard and procedures in Sarawak. Adaptation of ICT technology and remote sensing in environmental conditions has increased accessibility and efficiency of the department to monitor forest areas for the whole Sarawak.

COMBATING ILLEGAL LOGGING IN SARAWAK: AN UPDATE

Suliman bin Hj. Jamahari and Mohammad Nor Firdaus bin Hj. Sariee

Preventive and Enforcement Division, Forest Department Sarawak

BACKGROUND

Sarawak is the largest state in Malaysian Federation with a total landmass of 12.4 million hectares. The management of forest in Sarawak covered the area of the Permanent Forest Estate (Protected Forest, Forest Reserve and Communal Forest). The Forest Department Sarawak (FDS) was established in 1919 and the key agency in managing forest resources in Sarawak to ensure forests is managed sustainably in Sarawak for over 100 years.

With a total of 8.04 million hectares or 63% forest cover, the biggest challenge of ensuring Sustainable Forest Management (SFM) implementation is to curb illegal logging activities. The issue of illegal logging in Sarawak has long been raised in the mass media, affecting the Sarawak's timber global market. As a result, the state government is afflicted by economic, social and environmental consequences.

The directive to curb the activity has been carried out aggressively by the late Chief Minister Pehin Sri Datuk Patinggi Tan Sri Dr. Haji. Adenan Haji Satem through the setting up of the State Task Force on Illegal Logging (STFIL) in 2015. The effort has been intensified through ongoing land operations, water and air monitoring activities.

The Forest Department Sarawak's commitment leads the law enforcement agencies to combat illegal logging in Sarawak under the Sarawak Socio-Economic Transformation Plan (2016-2030); in which compatible with the department's vision is to be globally recognized in sustainable forest management and the mission is to manage and develop forest resources for socio-economic and environmental sustainability. To fulfil this commitment, one of the key functions of the department is to enforce the Forests Ordinance, 2015 and the Forests Rule, 1973 which have been drafted from time to time, in line with the State Forestry Policy, 1954.

Illegal logging contributes directly to climate change, accounting for significant share of global carbon emissions. The illegal trade of timber is worth billions of dollars every year.

Criminal groups exploit high-value endangered wood species, such as rosewood and mahogany, they launder illegally sowed wood through plantations and agricultural front companies, and they illegally log in protected areas, on indigenous lands or outside concession boundaries.

Crimes can occur at every point in the supply chain – from harvest and transportation, to processing and selling. They are often linked to other illegal activities such as document fraud, corruption and money laundering.

FUNCTIONS OF PREVENTIVE AND ENFORCEMENT DIVISION

Preventive and Enforcement Division has been assigned directly under the Director of Forests in the Department's organization structure, and responsible to:

- Plan and carry out preventive action including land, river and air monitoring, mill checking and conducting awareness program,
- Gather, analyze intelligence information, to plan, supervising, monitoring and carrying out enforcement operations based on public complaints regarding on offenses under the Forests Ordinance, 2015,
- Plan and lead inter-agencies operation with other enforcement agencies such as Royal Malaysia Police (PDRM), Suruhanjaya Pencegahan Rasuah Malaysia (SPRM), Sarawak Timber Industry Development Corporation (STIDC), Sarawak Forestry Corporation (SFC) and others to curb illegal logging in Sarawak,
- Supervise the registration, investigation management and updating the completion process of Investigation Paper under the Forests Ordinance, 2015,
- Assist the State Attorneys General's Office (SAG) to carry out prosecution of forest offenses under the Forests Ordinance, 2015, and
- Facilitate the disposal processes of seized items.

ENFORCEMENT MANAGEMENT

Enforcement on illegal logging at the Forest Department Sarawak has been carried out at various levels. The enforcement structure is as follows:

- Prevention and enforcement initiatives at the Forest Department Sarawak are led by the Director of Forests, ensuring enforcement offences are carried out under the provisions of the Forests Ordinance, 2015 (Cap.71),
- In line with the Sarawak Chief Minister's directive to curb illegal logging within the state, a special committee on State Illegal Logging Task Force chaired by YB Datuk Amar Haji Awang Tengah bin Ali Hasan, Minister of Urban Development and Natural Resources II was formed and involving various government agencies, statutory bodies and representatives from timber industry. The special committee was formed to set a direction in combating illegal logging, officially on April 1st, 2015,
- The Illegal Logging Action Committee (ILAC) is under the State Illegal Logging Task Force chaired by the Permanent Secretary, Ministry of Urban Development and Natural Resources (MUDeNR). The committee is responsible on forest enforcement activities monitoring and discussing raised issues and challenges at the ministry level,
- The Forestry Prevention and Enforcement Working Committee (JKPPH) was also established at the Forest Department Sarawak to monitor the preventive and enforcement on the ground activities, chaired by the Director of Forests. The committee members are among Regional Forest Officers along the state,
- Special Forces under MUDeNR, led by YBhg. Commander of the East, Lt Gen. (B) Datuk Stephen Mundau to coordinate all Illegal Logging Eradication Operations labelled as OP RENGAS. OP RENGAS brings together a number of enforcement agencies to form a special team focused on Search, Strike and Seize,

- The existing Standard Operating Procedure (SOP) is being reviewed to ensure effective and efficient implementation on enforcement compliance on the ground. The review involved various parties including the SAG and coherent with the latest directives from the Ministry,
- A Legal Officer has been appointed in the Forest Department Sarawak to enable all the department's enforcement officers to obtain Forests Ordinance, 2015 related advice quickly and effectively,
- The intelligence information and complaints are sourced including strategic intelligence, patrols, public complaints, social media and newspapers. In October 2016, the 1-800-88-7777 hotline was officially launched and parked at PED office. The line operates 24 hours, whereas two (2) employees are assigned during office hours, while after office hours the complaints will be recorded automatically.

OPERATION TO COMBAT ILLEGAL LOGGING IN SARAWAK

The Forest Department Sarawak (FDS) enforcement team are working across the entire timber supply chain to combat illegal logging in the state. We had identified modus operandi and routes, enhancing intelligence and coordinating inter-agencies operations and investigations that narrow down targeted individuals or companies involved in forest offenses.

FDS also conducted extensive training and capacity building for enforcement officers particularly on intelligence, investigation, weapon handling etc. In 2019, FDS has rebranded all operations under FDS as OP RENGAS that will cover land, aerial and river operations. The latest technology application is part of FDS's initiative to increase the enforcement capacity of OP RENGAS in the state.

Aerial Operation – Continuous Monitoring and Surveillance (COMOS)

The Continuous Monitoring and Surveillance (COMOS) method is a new digital technology initiative developed by FDS specifically for detecting and disseminating tactical information on early-stage illegal logging activities for enforcement teams. It enhances the effectiveness of enforcement actions by saving time, cost and more accurate information.

The aerial operations team will be deployed to the points identified by the COMOS. This operation also supported by land and river teams under OP RENGAS. Based on the data provided by COMOS, most of illegal logging activities occurred in areas where they are poorly managed and open for agricultural development.

River Operation – Forest Checking Station

The department has re-activate all Forest Checking Stations (SPH) located at strategic locations in Tanjung Manis, Kuala Tatau, Kuala Kemena and Kuala Baram to make sure logs transported from respective areas is from legal sources. The SPH also plays an

important role in monitoring mills and sawmills along the rivers. The operations are 24 hours and 7 days a week.

Road Block and Mobile Monitoring

Field operations initiatives such as logpond inspections and mills inspections are carried out continuously. Roadblocks were held continuously including static mobile blockade using Mobile Operation Unit (MOU) to monitor logging trucks operated in the area and also as a centre to record and report any suspicious activities direct to war room for further action.

ACHIEVEMENTS

Table 1 shows forest offences recorded under Forests Ordinance, 2015 for the past 6 years until May 2020. The number of cases recorded has gradually decreased after the set up of State Task Force on Illegal Logging (STFIL).

Table 1: Number of Investigation Papers (IP) recorded under Forests Ordinance, 2015 (2015 - 29.05.2020)

YEAR	No. of Investigation papers
2015	208
2016	113
2017	144
2018	125
2019	184
2020 *as of 29/05/2020	26

However, in 2019, the number of offences increased compared to 2018 due to aggressive inter-agencies operations conducted and effective intelligence by using high technology - Continuous Monitoring and Surveillance (COMOS) which provide accurate and fast information on illegal logging.

Table 2: Number of cases recorded in Regional Forest Offices based on offenses category in 2019

CATEGORIES OF OFFENSES UNDER FORESTS ORDINANCE, 2015				
	2019			
Regional	**Illegal Logging**	**Smuggling**	**Other Offenses**	**Total**
Kuching	9	12	4	25
Sri Aman	12	1	6	19
Sibu	36	1	5	42
Sarikei	22	2	0	24
Kapit	38	0	5	43
Bintulu	15	1	0	16
Miri	5	1	5	11
Limbang	1	3	0	4
Total	138	21	25	184

While in 2019, 75% of illegal logging and other forest offences recorded occurred in central region in Kapit and Sibu. This indicated that Forest Department Sarawak will focus more OP RENGAS inter-agencies in Kapit and Sibu Division for the next few years.

Since 2015, a total of 23 cases have been filed for prosecution which involved 24 suspects and many companies. FDS has won 10 cases with 19 suspects were found guilty and prisoned and/or compounded whereas 3 cases are still on-going which involving 7 accused person and 2 companies.

As FDS has been assigned with a Legal Officer to lead on prosecutions and advices started end 2019, there will be more good investigation papers to be charged in court in the near future, and any past court case(s) will be used as focal reference to improve the quality of Investigation paper writings and Investigation Officer's credibility and skills to become prosecutor.

ISSUES AND CHALLENGES

In combating illegal logging in the state, FDS undergo challenges due to vast area covered, difficult terrain and accessibility, inadequate logistics, facilities and personnel safety equipment. However, the department has initiated to countermeasure these issues.

Basically, the difficulties and challenges are depending on chain of command integrity, efficient handling of situational and risk management, the level of hard skills and soft skills of the staff, and the most important is the department should provide complete needs, technical trainings and welfare for the staff during their duty. Some are as follows:

Safety of Ground Staff

Due to high risk work from natural accidents or attacks, the staff should have complete Personal Protection Equipment (PPE) to ensure their life security and safety during field operation. In term of communication, the limitation of communication coverage in rural or remote area might cause the important information recorded in a long time. For that, the need of satellite phone is crucial.

Safety of Seized Item

The location of the seized item in most cases is very far from access road. The difficulties occurred by the enforcement officer to monitor the seized item security until the investigation process is completed. Other than that, based on records, to inspect the perishable seized items like logs and short logs that floating through the river need proper logistics to relocate seized items at the secure and observant area.

Directive SOP Changes and Endorsements

Enforcement's Standard Operation Procedure amendments at some time depending on situation, especially when other agencies reported the forests offences. In most cases, forest

offences handled by them create dispute regarding on different preference, practices, and code of conduct. As a consequence, the SOP that unofficially endorsed will be long discussed in meetings, out of standard practices among Regional Forest Offices and will create chaos to the decision made in the end. The enforcement SOP should be reviewed meticulously by focal person in the department and accelerate endorsements from the director and SAG's office accordingly to get pure standardised practice throughout the state and inter-agencies related.

Media Coverage on False Statements

Most of media coverage on any forest offence or logging activities that has been reported by other agencies in the news was not endorsed by the Director of Forests. As a result, the news was not accurate and the worst situation, they claim on false statements due to misinterpreted and wrong conclusion. In a long run, the public who digested the info will interpret the news wrongly and might spread out more fake news to someone else. FDS should come out with new SOP to inter-agencies on data sharing and protection.

MOVING FORWARD

To strengthen the capacity of current preventive and enforcement operational activities on illegal logging eradication, Forest Department Sarawak is in the direction as following actions:

- PED will enhance more collaborative programs on monitoring with other division in FDS especially on SFM/FMU and research.
- As a preventive measure, FDS will promote more public closure on awareness campaigns on illegal logging through mass media and strategic engagements with the newspapers company, influencer in social media, integrated sharing information through talks, dialogues and exhibitions.
- To enhance effective intelligence and operations, multiply the frequency of aerial surveillance on forest cover by helicopter, and improve technology capabilities (e.g. Diamond Reviewer Jet, COMOS, hyper spectral etc.)
- To ensure the optimum capacity on the ground enforcement and monitoring activities, FDS will propose on hire purchase of additional logistics and transports especially 4x4 vehicles, scramblers, boats and drones. For large transporting ship is proposed on rental basis.
- To improve on conducive working environment and facilities in remote area, FDS will initiate infrastructure projects to strengthening the Forest Checking Stations building conditions and duplicate more One Stop Compliance Centre (OSCC).
- To empower the fortified FDS's enforcement entity, the state has endorsed the appointment positions of 140 vacant as Assistant Law Enforcement Officers and Forest Law Officers.
- To improve the effective surveillance on the licensees activities, creation of vehicle tracking system (VTS) for all vehicles, ships and barges involved in logging operations will be enhance based on current TEAMS project.

- FDS will launch Investigation Paper Tracking System (IPTS), whereas all documentation of IPs will be digitalised and recorded for easy access and records, especially tracking on repeated offenses, case status, and Investigation Officer's progress monitoring.

CONCLUSION

Illegal logging in Sarawak is under control with an estimated about 0.5% to 2.0% of all forest logging operations. The use of technologies and digital systems are the game changer in combating illegal logging in Sarawak. It is very effective in providing accurate intelligence information and early detection of suspicious illegal logging activities.

In addition, the implementation of inter-agency operation between enforcement agencies in the state is the key success in this battle. FDS would like to acknowledge the agencies involved, such as Unit Keselamatan dan Penguatkuasaan Negeri (UKPN), Sarawak Forestry Corporation (SFC), Pasukan Gerakan Am (PGA), Polis Diraja Malaysia (PDRM), Sarawak Timber Industry Development Corporation (STIDC), Suruhanjaya Pencegahan Rasuah Malaysia (SPRM), Sarawak River Board (SRB), Polis Marin, Department Land and Survey and other relevant agencies for their excellent cooperation and support during operations conducted.

Finally, FDS hope that with good team spirit and planning, the goal of zero illegal logging in all Forest Management Unit will become a reality in Sarawak by the year 2025 (FDS Strategic Plan 2021-2025).

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RESEARCH IN PLANTED FOREST - INDUSTRIAL FOREST RESEARCH CENTRE

ShekLing Pang, Millicent Abdullah, Annya Ambrose, Rohanie Bohan, Sabrina Aslan Joe, Norsyarina Welman, Princilla Leong and Erica Medina Abdullah

Restoration and Industrial Forest Division, Forest Department Sarawak

ABSTRACT

Sarawak State Government has embarked on industrial forest since year 1997 to ensure the timber industry has adequate supply of raw materials. Industrial forest is an essential component in the strategic development plan to ensure sustainable forest management policies are achieved in Sarawak. It is a long-term strategy to supplement timber production for wood-based industries in the state and to relieve pressure from natural forests. Industrial Forest Research Centre (IFRC) or previously known as Sarawak Forest Tree Seed Bank is located at Semengoh, Kuching. This is a research centre that focus on different fields of R&D related to industrial forest, e.g. tree breeding, genetics, pest and disease, nursery and silviculture practices and etc, with the ultimate aim to produce high quality planting materials to support Sarawak License Planted Forest (LPF). In this paper, a brief introduction on the research work in IFRC will be covered.

Keywords: Industrial forests, high quality planting materials, tree improvement

INTRODUCTION

Establishment of commercial forest plantation is seen as a solution to meet the increasing global demand for wood and at the same time to reduce the degradation on natural forest caused by logging (Fenning and Gershenzon, 2002). The global industrial forests are only accounted for about 7% of all forests but able to produce 46.3% or 770.2 million m^3 of the global round wood (Payn et al., 2015). There is projection indicated that industrial forests could increase production to 75% of the global industrial round wood demands by 2030 (FAO, 2015) Hence, to increase the wood production and to reduce the pressure on natural forest are becoming the most compelling reasons for the establishment of industrial forest plantation composed of fast-growing tree species with short rotation cycle (6-8 years).

Industrial forest is an essential component in the strategic development plan to ensure sustainable forest management policies are achieved in Sarawak. It is a long-term strategy to supplement timber production for wood-based industries in the state. In addition, it will relieve pressure from natural forests. Timber productivity from the industrial forests is estimated at 25-30 m^3/ha/yr, which is comparatively much higher than the natural forests which is only 2.0-2.5 m^3/ha/yr. Therefore, in the future, an estimated annual production of 10-15 million m^3 of timber could be realized and this is sufficient to cater for the industry needs.

Sarawak Government has set a target of one million ha of industrial forest by year 2020. A total of 43 licenses for industrial forest has been issued with total gross area of 2.5 million ha. However, the progress has not been encouraging. As of 31 December 2019, the total area planted is only 453,475 ha. The main species planted are *Acacia*, Batai, *Eucalyptus*, Kelampayan and other species. In view of the slow progress of the industrial forest establishment, the Government has reset the target timeline to achieve one million ha by year 2025. Various discussions have been conducted by the authorities to identify the problems and issues contributing to the slow rate of the establishment of industrial forest. Among them are the lacking of R&D support and high quality planting materials.

Industrial Forest Research Centre (IFRC) or previously known as Sarawak Forest Tree Seed Bank (Seed Bank) is located in 12 Mile, Semengoh Forest Reserve, Kuching. The nursery of 0.6 ha at IFRC was established in year 1926 and served as a seedling production area to raise both indigenous and exotic seedlings for trial planting. In 2001, the station was converted to Seed Bank and the new administrative building was officiated by YBhg. Dato' Suboh bin Mohd. Yassin on 12 May 2007. The main objective of the establishment of Seed Bank was to preserve forest genetic diversity by seed banking. The functions of the IFRC now have been expanded to conduct R&D related to industrial forest and providing technical support for our licensees.

R&D activities in IFRC are all focused on tree improvement with the ultimate aim to produce high quality planting materials to support our licensees. Tree improvement refers to the application of forest genetics principles within a given silviculture system for the purpose of improving the genetics quality of the forest. It is a continual process of selection, testing and breeding, to increase the degree to which specific desired traits are expressed in each successive generation. Various tree improvement programmes conducted worldwide have shown increment of tree volume by 10-25%, contribute to a better return of investment and shorter rotation period compared to the unimproved planting materials (Jansson et al. 2017). In IFRC, we have 5 units focus on different aspects of R&D, e.g. tree breeding, forest health, nursery and silviculture management, seed technology and biotechnology.

RESEARCH UNIT

Tree Breeding Unit

IFRC has initiated a R&D programme to evaluate and to select the suitable species and good performing genetic materials for operational deployment for each LPFs right after the factors contributing to the slow progress of industrial forest establishment have been identified. Under this R&D programme, Memorandum of Understanding has been sealed with the 'Big 6' in the timber industry as well as other LPF holders to establish state-wide trial plots focusing on four main species namely *Acacia*, *Eucalyptus*, Batai and Kelampayan. Over 650 seedlots representing orchards and collection sites across South-East Asia, China, Australia and South Africa have been obtained and planted in the trial plots. To date, the

IFRC research team has established a total of 43 taxa-seed source trials and 13 progeny trials throughout the State. Some preliminary information on the suitable species, best performing seed source and best performing progeny for each respective LPFs has already been identified. In addition, a total of 20 taxa-seed source trials has been converted into seed production areas (SPAs) for future supply of high quality planting materials to respective LPFs. This R&D programme is entering the 4th year. Periodically assessments for height and DBH are still on-going.

Forest Health Unit

This unit is responsible to provide technical services and supports to LPFs holders on diagnosis and identification of insect pest and pathogenic organisms isolated from various diseased plant parts and to provide advice on the control and mitigation measures through chemical control, biological control or integrated pest and disease management control. The research work under this unit is focused on three study areas, which are forest pest, forest pathology and seed health screening. Under these areas, the researchers are studying on the biology, and epidemiology of forest pest and diseases pathogens, surveillance of forest health status to determine the pests and diseases incidence and its severity as well as collection of insect for species identification. Apart from that, the research team is also actively involved in the study on plant-microbe interactions for the development of bio-fertilizers/ biocontrol agent, which is an alternative pest and disease control, such as *Trichoderma* in controlling root rot in *Acacia mangium*. In order to comply with Clause 13, Part V (Control of Seed Quality) of the Forest (Nursery) Rules 2017, a seed health laboratory was established in year 2016. Researchers will conduct seed health inspection to observe and detect any presence of pests or pathogens on all imported seeds. The Forest Health Unit overall is pivotal to ensure the healthy state of the State's industrial forests in producing maximum volume productivity of its trees.

Nursery and Silviculture Management Unit

The main function of this unit is on the seedling production to support research needs, reforestation and restoration, as well as forest plantation programme upon request by LPFs. The size of IFRC nursery is about 0.6 ha, equipped with media preparation facility, propagation facility, seedling shed and hardening area, the nursery is able to produce up to 150k seedlings. Apart from producing planting materials to support different types of planting and research activities, the nursery also produces planting stocks for sale to public and private companies at minimal charges. Major species raised in the nursery including indigenous forest tree species (dipterocarp and non-dipterocarp species), fast-growing industrial forest species (*A. mangium*, *E. pellita*, Kelampayan and etc), as well as ornamental tree and potted plants for indoor and outdoor decoration. The Nursery and Silviculture Management unit is also responsible to provide nursery training to other government agencies and LPFs upon request. Research functions of this unit including

study on nursery practices, development of macro-propagation methods, study on the effect of different silviculture practices, soil analysis and site-species matching. The researcher is currently working on vegetative propagation on selected candidate plus trees identified from tree breeding group, establishment of fertilizer trials and reviewing SOP on nursery practices.

Seed Technology Unit

Seed Technology Unit in IFRC is important for the preservation of forest genetic diversity through seed banking, which include seed collection for selected indigenous tree species and seed import for exotic tree species. This unit is also responsible to assist the LPFs and researchers in importing different types of seeds upon request. Once received, the seed will be registered and undergo testing on germination rate and moisture content. Routine testing on stored seeds are also carried out and recorded periodically to ensure the viability of the seeds. This unit has successfully developed post-harvest handling methods for fruits collected from different indigenous tree species. In terms of research work, the researcher is studying on the seed germination, moisture content as well as optimum storage condition and duration for various forest tree seeds. Besides, to comply with Forest (Nursery) Rules 2017, the Seed Technology Laboratory also involved in seed viability screening for all imported seeds. This unit is currently assisting Agriculture Research Centre, Semengoh in storing of paddy seeds. In the future, Seed Technology Unit in IFRC will be looking into the application of cryopreservation method for recalcitrant seeds as an alternative way for the conservation of genetic materials.

Biotechnology Unit

Forest biotechnology covers a very broad area of study in forestry, e.g. tissue culture, genetic engineering, biotic and abiotic stress resistance, lignin modification, polyploidy study, marker-assisted selection, QTL mapping and etc (Kumar et al. 2015). The current Biotechnology Unit in IFRC consisted only Forest Genetics Laboratory (FGL) as Plant Tissue Culture Laboratory is placed under other division after restructuring. FGL has been actively involved in diverse projects since its establishment in 2007. The main function of this unit is to development molecular markers to assist tree breeding activities. Tree breeding in its traditional form is based on the phenotypic selection of superior trees within segregating populations derived from crosses. There are numerous difficulties, poor juvenile-mature trait correlations, genotype x environment (GE) interactions, high-cost for phenotypic selection, time-consuming and laborious particularly in the selection of complex traits. These difficulties have encouraged interest in marker-assisted selection (MAS) to accelerate breeding through early selection and to predict the presence of desired traits using molecular markers. Under the collaboration initiatives with UNIMAS, a few important milestones have been achieved:

1. Genetic diversity information on some indigenous fast growing species,

2. Simple Sequence Repeat (SSR) and Expressed Sequence Tag-SSR (EST-SSR) marker development for Kelampayan,
3. Establishment of Kelampayan genomics database, and
4. Single Nucleotide Polymorphism (SNP) marker development for marker-assisted selection of Kelampayan.

The researcher is currently applying the markers for the selection of candidate plus trees.

ISSUES, CHALLENGES AND THE WAY FORWARD

Research is of vital importance for assisting the Sarawak State Government in achieving the target of one million ha of industrial forests by 2025. Through research on tree improvement, high quality improved planting materials with better characteristics, particularly with better growth, higher yield and better health can be realized. This will help to solve some of the issues facing by our LPFs in the plantation establishment. However, there some issues in IFRC that might becoming hindrance in achieving the research aim. The first is the lacking of expertise and manpower especially in the field of tree breeding and soil study. We need an experienced tree breeder to design a proper breeding strategy, conduct research planning and provide guiding on scientific data analysis. Soil analysis and site-species matching is important for matching the right soil type with the suitable species. The lacking of researcher in this field will give negative impact of the whole R&D programme. A clear and consistent direction from the higher level is also crucial in the R&D planning as tree improvement programme is a long term research programme, any changes in the decision making will affect the research activities.

In order to overcome the issues and challenges, strategic research planning is needed so the researchers in IFRC are still able to conduct high quality R&D work despite the limited resources. To solve the issues on lacking of expertise, IFRC plans to build more collaborative R&D programmes with renowned research centres, higher-learning institutions, LPFs and other divisions within the department like Research Development and Innovation Division (RDID) and Forest Technology and Geospatial Division (FTG). For instant, IFRC has approached Centre for Forest Biotechnology and Tree Improvement in Yogyakarta, Indonesia to establish a joint research collaboration in tree improvement in Sarawak. Secondly, researchers will have to explore into the application of technology such as Light Detection and Ranging (LiDAR), as a tool for routine plot assessment work to reduce the dependence on manpower. Innovation research methodologies to shorten the breeding process like marker-assisted selection need to be continued and expanded. There is also a planning on the application of genetic methods for a disease identification in the future. Last but not least, capacity building for all researchers and supporting staff are equally important and is seen as a sustainable way to strengthen skills and knowledge, to enhance the capability, to improve competency and problem solving capacity.

CONCLUSION

Sustainable development of industrial forest is crucial to meeting the increasing wood demand and to reduce pressure on natural forests in Sarawak. Industrial forests consisted of fast growing timber species will be a profitable long-term investment with the deployment of high quality planting materials, adequate pest and disease management, proper site-species matching, intensive silviculture support and clear management objectives. Industrial Forest Research Centre is a rebranding of the previous Sarawak Forest Tree Seed Bank for a better positioning of Forest Department Sarawak at the forefront of research and knowledge related to industrial forest in Sarawak. This is a better representation of the high quality R&D work carried out at the IFRC, which focused in the problem solving for industrial forest from the aspect of biotechnology, tree breeding, pest and disease, and silviculture practices. In addition to assist in achieving one million ha by 2025, the improved wood will also be available for the processing of higher value timber products. It is estimated that with high quality planting materials, an optimum productivity of 10-15 million m^3 of wood can be produced annually. This will ensure sustainability of our forests and contribute to timber royalty and cess to the State.

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FOREST RESEARCH IN STRENGTHENING SUSTAINABLE FOREST MANAGEMENT IN SARAWAK

Mohizah Mohamad, Paulus Meleng, Halipah Bujang, Noorhana Mohd Sapawi, Aurelia Dulce Chung, Nur Bazilah Ismail, Habibah Salleh, Haniza Razali, Bibian Diway, Ling Chea Yiing, Vilma Bodos, Siti Hanim Sahari and Linna Chieng

Research, Development and Innovation Division, Forest Department Sarawak

ABSTRACT

This paper compiles the importance and way forward of Research, Development and Innovation Division (RDID) to achieve the departments vision '*To be globally recognized in sustainable forest management (SFM)*'. Research activities in RDID has been indirectly supporting the implementation of sustainable forest management in Sarawak. The Sarawak Herbarium has been the center of reference not only to researchers all over the world but also to all the stakeholders in logging industry. Sarawak Timber Association (STA) have been using Sarawak Herbarium as one of their venue for plant identification courses for the logging operator trainee. The research strategy of RDID in order to strengthen sustainable forest management is to identify areas where increased knowledge is needed in line with the RDID functions. Data collections in Permanent Sample Plots will be intensified. More High Conservation Value Areas (HCVA) will be identified to conserve and maintain the biological diversity in the forest. Study on forest ecosystem including soils and water are very important for tree growth study. Documentation of plants, fungi and insects will be resumed to enhance our comprehensive collections.

Keywords: sustainable forest management, Forest Management Unit, herbarium, Permanent Sample Plots

INTRODUCTION

This paper is written for the virtual knowledge sharing seminar during the Movement Control Order (MCO) due to Covid-19. Research, Development and Innovation Division (RDID) is strengthening the role of Forest Department Sarawak (FDS) in sustainable forest management. FDS pledged to be recognized globally in sustainable forest management. Therefore, the objective of this paper is to describe and discuss the role of forest research in strengthening SFM.

Traditionally forest management has been focusing on optimizing timber production by doing silviculture treatment to ensure certain species composition and stand structure are contained. All growth and yield studies in silviculturally treated area have shown that total volume production cannot be increased but they can produce higher merchantable timber and stand stability. Besides focusing on the yield, the management is also concern to reduce the risk of disturbances such as forest fires, wind throw, drought and biotic disturbances such as insect and fungi attack, animals browsing and debarking. Such events determine the survival status of trees and stands and also change the biomass allocation patterns.

SUSTAINABLE FOREST MANAGEMENT

What is sustainable forest management (SFM)? First of all, we need to know the meaning of sustainable forestry. Sustainable forestry is the practice of regulating forest resources to meet the needs of society and industry while preserving the forest health. A global definition for Sustainable Forest Management is sustainable use and conservation of forests with the aim of maintaining and enhancing multiple forest values through human interventions (Anderson *et al*., 2005). It is the guiding principle of national and international regulations aiming at economically, environmentally and socio-culturally sound knowledge-based management of forest ecosystems. The idea of SFM was developed from the UNCED Forest Principles and defined at the Helsinki MCPFE 1993 (Resolution H1; MCPFE 2000): "stewardship and use of forests and lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions at local, national and global levels, and that does not cause damage to other ecosystems".

For the past two decades SFM has become a key term in describing the relationship between economic, social and environment. Previously forest management was heavily focusing on the economic profit, however today conventionally three pillars of sustainability are identified (Figure 1).

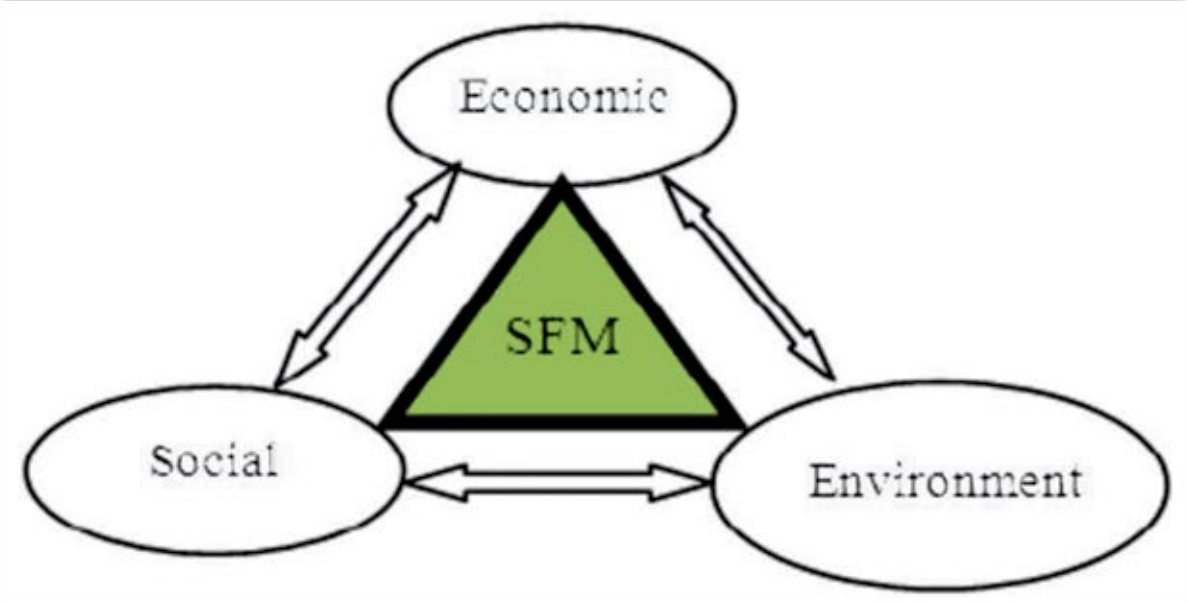

Figure 1: The three pillars of sustainable forest management (Siwar *et al*., 2010)

The first pillar is on economic: the capacity of the forests to attract investment and support economically viable forest uses in the present and the future is undiminished. The forest is not used beyond its long-term capacity for production of wood and non-wood forest products.

The second pillar is on environment: Environmental (natural) sustainability defined as the long-term maximum use of a natural resource for raw material and energy, the capacity to decompose material, and exploitation of living organisms. Forest use protects biodiversity (ecosystems, species, genes and ecological processes) and the capacity to maintain ecosystem processes and services such as watershed protection, pollination, protection against mudslides, aesthetic beauty, carbon storage, etc.

The important properties of ecological sustainability are (1) maintained plant biomass productivity, (2) maintenance of self-organising potential of biodiversity, (3) maintenance of physical stability of the soil (carbon storage positive or balance in the long-term perspective, stable soil structure and erosion control), (4) maintenance of ground water quality and quantity, (5) maintenance of nutrient resources (no long-term depletion of absorbed stores of base cations – balance between in- and output; and (C/N ratio constant – implying that long-term nitrogen storage is not greater than the rate of long-term carbon storage) and (6) no accumulation of heavy metals or other substances harmful to organisms

The third pillar is on social: Social (or socio-cultural) sustainability defined as an inherent stability of social organization and its components, the minimum requirements for system resilience to system oscillations, individual rights, limitations and duties for sustainability. It defines necessary gradient and driving forces necessary for society to remain stable, but still respecting individual integrity.

These include (1) the rights of indigenous peoples and local communities are respected and protected, (2) forest workers are healthy, safe and their rights are protected (e.g., freedom of association, right to bargain, child labor, forced labor, equal remuneration and non-discrimination, (3) local communities, including indigenous peoples, benefit economically from forest management and (4) sites of religious, spiritual, archaeological, historic as well as of aesthetic and recreational value are preserved.

Therefore, SFM means to promote management practices that are ecologically, economically and socio-culturally sustainable, and which generate or maintain benefits for both present and future.

FUNCTIONS OF RESEARCH, DEVELOPMENT & INNOVATION DIVISION

Forestry has a tradition of having well designed long-term field experiments, inventories and monitoring activities. These form an essential base for analyses of present and future problems and their solutions. From a research perspective it is important to maintain or establish national forest inventories to monitor the forest conditions in Sarawak. An important data source is the long-term field experiments. The establishment and continued maintenance were one of the reasons why long-term ecological research plots have been established throughout Sarawak and these data sources represent the longest documented data records about tropical forests. The challenges of doing research is to integrate the basic

and applied study, natural and social sciences. The research strategy of RDID in order to strengthen sustainable forest management is to identify areas where increased knowledge is needed in line with the RDID functions.

Functions of RDID are divided into three components namely:

i. Research and development of forest resources
   a. Planning, implementing and monitoring research on forest resources and conservation
   b. Research and documentation of botanical, anatomical, entomological and mycological collections
      - Collecting reference samples of plants, insects and fungi
      - Processing samples into voucher specimens
      - Identification of specimens according to international standards
   c. Identification services of forest resources
      - Upon request by public and other relevant agencies
   d. Conservation of rare, endangered and threatened species
   e. Conservation and development of forest resources germplasm
   f. Propagation of non-timber forest resources through tissue culture and seed propagation
   g. Wood testing and uses of wood products
      - Provide services on wood testing
      - Provides services on wood identification

ii. Research on Forest environment and ecosystem
   a. Study on soils, water and forest environment
      - Study on types of soils
      - Study on water in the FMU vicinity
      - Study on selected forest environments
   b. Documentations on soils profiles, characteristics, water properties, and forest environments to support SFM
   c. Study on forest ecology, population, density and species distribution
   d. Provide technical advices on soils, water and forest environment

iii. Reference collection and database management
   a. Managing and maintenance of collections in Herbarium, Insectarium, Fungarium dan Xylarium based on international standard
   b. Managing the forest research information center and data compilation
   c. Promote, publish and disseminate forest research information
   d. Strengthen the networking with global research institutions
   e. Database management

RESEARCH PROJECTS

Research projects are carried out based on the needs of the department to manage the forest sustainably. The followings are the research projects that are in progress:

Reference Collections

Sarawak is one of the mega diverse regions in the world. Its vast biodiversity attracts researchers from all over the world to discover and learn about its flora and fauna. Research involving documentation of Sarawak biodiversity has dated way back in 1854 with the arrival of Alfred Russel Wallace.

Forest Department Sarawak started with botanical collections in 1921 and in 1975, Forest Department expand the reference collection with additional on fungi, and entomological collections. Currently, there four main reference collections are Herbarium (300,000 voucher plant specimens), Xylarium (16,000 wood samples) located at TRTTC, Fungarium (5,000 wet and dry fungi specimens) and Insectarium (500,000 dry and wet insect specimens)

Sarawak Herbarium (SAR)

Herbarium is a store of reference material that contain collection of preserved plants (dried form), used for botanical research. In the herbarium, plants are identified, named and classified, resulting in detailed studies of particular group of plants. The herbarium collection also served as reference on history plants diversity and its distribution to evaluate change in forest dynamic over period of time caused by natural and human interventions.

Sarawak Herbarium was established with the completion of the herbarium building located at Jalan Badruddin, Kuching in March 1961. In 1996, Sarawak Herbarium has moved to the current location that is Research, Development and Innovation Division, Forest Department Sarawak (Figure 2). During the initial period of its establishment, the Sarawak Herbarium had successfully reclaimed and reorganized a few thousand specimens which were previously found scattered in a few herbaria in Sabah, Brunei and Singapore. The collections grew to a total of about 60,000 in 1966 and 85,000 in 1974. Currently the Sarawak Herbarium's collection is one of the largest in Malaysia, containing around 300,000 plant specimens overall. These specimens contain a wealth of information about plants that have been collected over a decade. The oldest type specimen stored in the Sarawak Herbarium is Melastomataceae from species *Ochthocaria ovata* collected in 1890 and *Cyanandrium rufum* (TYPE specimen) collected in 1895 (Figure 3).

Overall functions of the Sarawak Herbarium are; to make authentic collection of all Sarawak plants, to preserve plant materials of historical values, to carry out basic research and provide results through publications, to provide supporting facilities for the study of related sciences such as botany, taxonomy, ecology and Silviculture, to provide data and

information for sustainable forestry management and planning and to provide awareness on biodiversity conservation to the public.

The process of entering data into a computerized database (BRAHMS: Botanical Research and Herbarium Management System) is ongoing (Figure 4). Data entered in BRAHMS, as in 2019 is approximately 130,000 specimens from 336 families, 3,088 genera and 9,518 species.

Figure 2: The Sarawak Herbarium

Figure 3: (A) The oldest specimen *Ochthocaria ovata* and (B) the oldest Type specimen *Cyanandrium rufum,* found in the herbarium

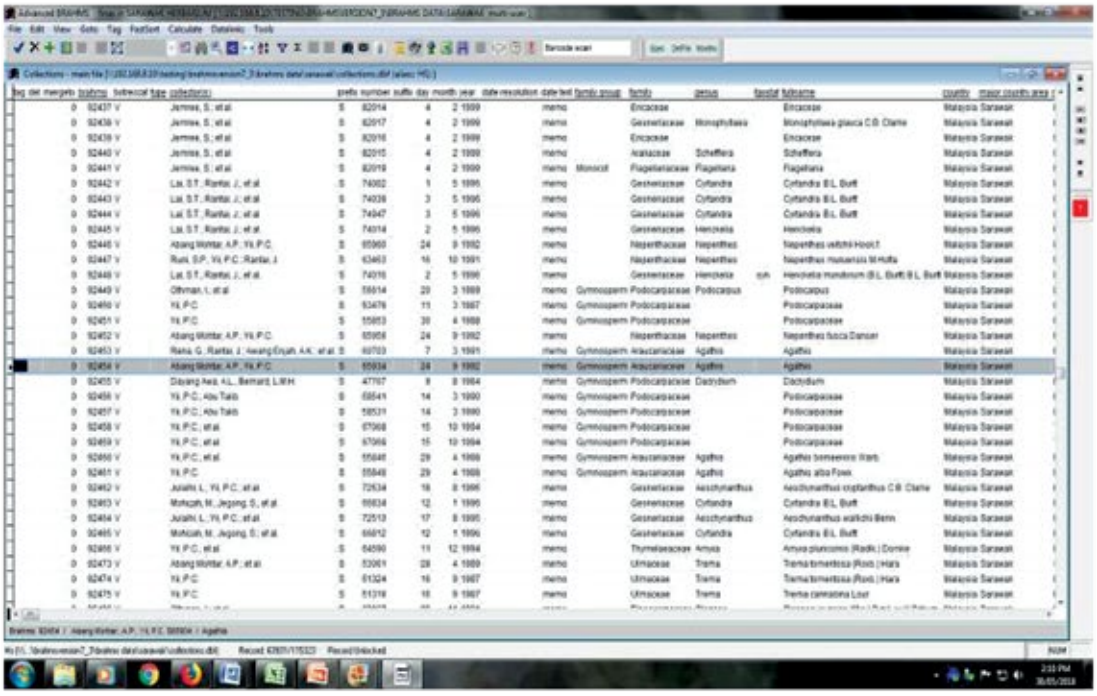

Figure 4: Screenshot of the BRAHMS database

Xylarium

Sarawak is home to about 3,000 timber species. For research and documentation purposes, wood specimens are collected in a xylarium, or a wood library. Sarawak Forest Department's xylarium, located at Timber Forest Research Centre (TFRC), was founded in 1956 and previously known as Timber Research and Timber Training Centre (TRTTC). Up to date, it housed a total collection of 16,000 wood samples (88 families, 361 genera and 1573 species) (Figure 5).

Figure 5: Woods samples in Xylarium at Timber Forest Research Center

Fungarium

Sarawak Fungarium was established in 1976 under forest pathology unit. Most of the work during that time was research on plants disease especially on *Acacia mangium* and at the same time doing collection on macrofungi. In 2011, Forest Pathology unit was renamed as Mycology unit until today and plant pathology is no longer being part of the research activities. Sarawak Fungarium houses reference collection of fungi which includes an estimated of 6000 dried and wet specimens from 61 families and 154 genera (Figure 6). This collection is one of the important collections in Sarawak that hold the untold story of fungi biodiversity in Borneo and Sarawak to be precise. Among these specimens there is a Type

specimen of *Spongiforma squarepantsii* from the family Boletaceae collected in Lambir Hills National Park in 2011.

Figure 6: Fungi collections in the Fungarium

Insectarium

Insectarium is a place where insects specimens are kept, exhibited and studied. As of now, the entomology reference collection has more than 500,000 wet and dry specimens including the Rajah Brooke's Birdwing, which is endemic to Borneo and protected in Sarawak (Figure 7).

Figure 7: Insects collections in the Insectarium

Establishment of Long-term Ecological Research Plot – Lambir 52-ha plot

The 52-ha plot in the Lambir Hills National Park of Sarawak was established through the joint effort of scientists from the United States, Japan and Malaysia. The United States was represented in the collaborative effort by the Harvard Institute of International Development led by its Director, Professor Peter S. Ashton; Japan was represented by a number of universities (including Ehime University, Kyoto University, Osaka City University, and Tokyo University) led by Professor Kazuhiko Ogino (previously of the Ehime University but now with the University of Shiga Prefecture), while Malaysia was represented by the Forest Department of Sarawak led by Dr. Lee Hua Seng.

Establishment of the plot started in November 1990, the prime movers at that stage were Professor Takuo Yamakura of Osaka City University and Ernest Chai of the Silviculture Research Office of the 50 ha, the same as for earlier plots at BCI and Pasoh. However, as initial Forest Department of Sarawak. The size of the Forest Dynamics Plot at Lambir was to have been demarcation failed to cover certain soil types, the plot was realigned a further two ha. Rather than disregard the two ha already demarcated, it was decided to include them as part of the plot. As a result, the size of the plot became 52 ha.

The specific objectives of the plot are to provide a conventional comparative view of composition and growth and yield in Sarawak's lowland dipterocarp forest, to investigate the spatial pattern of regeneration on the two different soil types and great topographic diversity that is included within the Lambir Forest; and to provide a baseline of information on tree populations that could serve supplementary projects such as the studies of phenology and reproductive biology pursued by the team from Kyoto University

Work in the plot included, (a) demarcation of boundary and 20 m quadrats and topographical survey (b) mapping – during which all living individuals 1.0 cm diameter and above were tagged, their position plotted and diameters measured. Dead trees were also measured for size and the gaps they caused in the canopy mapped (c) identification – where all living stems were identified as far as possible to the species level (herbarium specimens were collected for confirmation of identification and (d) soil sample collection for chemical analyses and the estimation of seed bank.

Currently, Centre for Tropical Forest Sciences (CTFS) is now known as Forest Global Earth Observatory (ForestGEO). ForestGEO is a global network of forest research sites and scientists dedicated to the study of tropical and temperate forest function and diversity (Figure 8).

Table 1 is database status of Lambir 52-ha plot. Number of individuals in the plot during initial census is estimated at 347,000. And the number increases by the 5th census. Data can be requested from: https://forestgeo.si.edu/explore-data.

Table 1: The database status of Lambir 52-ha Plot

Census	Year	Data Status
Census 1	1991-1992	completed
Census 2	1997	completed
Census 3	2002-2003	completed
Census 4	2007-2008	completed
Census 5	2016-2018	in progress of data screening

Figure 8: Locality of research sites in ForestGeo global network.

The Establishment of Permanent Sample Plot Network in Sarawak

Lacking of information on timber resources can directly impact the State's government to achieving Forest Management Certification which is a key tool for Sustainable Forest Management standard. The information is necessary to make decision on rate of harvest (Criteria 5.6), to protect and balance the ecological function (Criteria 6.3), to comply with Criteria 8.2 on obtaining data for growth and yield and evaluating changes in flora composition. For this reason, the State government through Ministry of Urban Development and Natural Resources has granted the project under RMK11 in 2017 to Sarawak Forestry Corporation Sdn. Bhd. In 2019, the project was handed over to Forest Department Sarawak. As longer period of times and often more than 5 years is required to monitor tree growth and observe recovery process in tree composition after harvesting, Forest Department Sarawak has proposed for continuation project under the RMK12.

Collaborating with the National Institute for Environmental Studies in Japan, it is the Department desire to achieve the project main objectives which are to evaluate timber stocking from Permanent Forest Estate confined to Forest Management Unit Areas, to develop growth and volume model for projection of future Annual Allowable Cut (AAC) and to review the current harvesting cycle and cutting limit. The project will be implemented in various components such as establishment, assessment and monitoring of

plots; mapping forest structure through LiDAR technology; data analysis and development of equation; capacity building and delivery of results. By integrating ground data from long term monitoring PSP plot and LiDAR technology, the scientific analysis, results and information will be more accurate and precise.

At the end of the project, a comprehensive tree growth database will be established and made available to support other management and conservation initiatives, a growth and volume projection model developed, harvesting cycle and cutting limit will be reviewed and which overall will strengthen the sustainable forest management strategies in the State.

Over the period of 3 years since the project started, totalling 25 plots of 1 ha each were established in 9 FMUs (Figure 9). More than 14,000 trees were enumerated and documented. Current database comprises of tree size and species composition data. Continuous monitoring enabling more data to be collected in the future.

Figure 9: Locality of PSP established in FMUs in Sarawak.

High Conservation Value Area in Forest Management Unit

Forest plays a major role in Malaysia, not only it brings economic importance but also for the balance of ecosystem and social that provides to people and nature. Sarawak contributes the most forest cover for Malaysia, thus it is vital that the forests are being well managed and its significant value is protected. The outstanding significance of biologically, ecologically, social or cultural values are known as high conservation values. Malaysian Timber Certification Scheme (MTCS) includes the concept of High Conservation Value Forest (HCVF) as one of the nine principles determining how forest should be well managed and assessed following Malaysian Criteria & Indicators (MC&I Natural Forest) for Forest

Management Certification. In Malaysia, the Malaysian Toolkit for High Conservation Value Forest (WWF 2009) has been specifically designed for that purpose. As it is developed in accordance to national development of standards by the forestry regulatory authorities and stakeholders, Forest Department Sarawak adopted the Toolkit for the identification and management of High Conservation Value Area (HCVA) in Sarawak.

There are six HCV attributes to be identified (Table 2), and if there is any, it is to be manage and monitor. Under forest management certification requirement, all long-term forest timber licenses are required to identify any HCV attributes occurring within their forest management units, and to manage and monitor them in order to maintain or to enhance the values in identified forest areas. Maintenance of HCVA is one of the most difficult certification requirements to be undertaken without the expertise of the component required for the HCVA. Therefore, Forest Department Sarawak is embarking on the research in intensifying the HCVA in forest management unit. The research study is not only to ensure forest activities does not have negative impacts of the identified HCV but also to have collaboration with the forest managers and timber industries, as well as to provide recommendations to manage the HCVA accordingly to forest policy and standards.

Table 2: Types of HCV defined by Forest Stewardship Council

HCV	**Element**
1	Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values • Protected areas • Threatened and endangered species • Endemic species • Critically temporal use
2	Forest areas containing globally, regionally or nationally significant large landscape level forests
3	Forest areas that are in or contain rare, threatened or endangered ecosystems
4	Forest areas that provide basic services of nature in critical situations • Forests critical to water catchments • Forests critical to erosion control • Forests providing barriers to destructive fire
5	Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health)
6	Forest areas critical to local communities' traditional cultural identity

Research in Rare, Threatened and Endangered (RTE) for non-tree species

According to new University of Arizona-led research "Almost 40% of global land plant species are categorized as very rare, and these species are most at risk for extinction as the climate continues to change". Non tree species are always over-looked by the authorities during certification processes as these plants have fewer commercial values when compared with timber species. Under the Wild Life Protection Ordinance 1998, all epiphytic *Lycopodium* species, orchid species, *Begonia* species, *Aeschynanthus* species, *Crytandra* and *Didymorcarpus* species are categorized as Protected Plants. Under the Malaysian Criteria and Indicators (MC&I) for Natural Forest 2012, Wild Life Protection Ordinance (1998) is one of the verifiers for Criterion 6.2 under Principle 6. Hence it is critical to do assessment on these plant groups in FMU areas by Collaboration between Forest Managers and Forest Deparment Sarawak in research activities to identify the RTE species present in the FMU areas; to recommend conservation and management activities; and to creates awareness between forest workers and local communities regarding the RTE species. The study sites for this project focus in PSP plots established under the PSP Network Project and will be funded by the project as part of contribution towards sustainable forest management.

Through these surveys, Forest Managers are able to know the existence of the RTE species in their area and to be included into their future harvesting planning in order to safeguards and protect the RTE species (Figure 10). The documentation and records of RTE species are also important data for researchers to do Global or Regional Red List Assessment for The International Union for Conservation of Nature's (IUCN) Red List of Threatened Species.

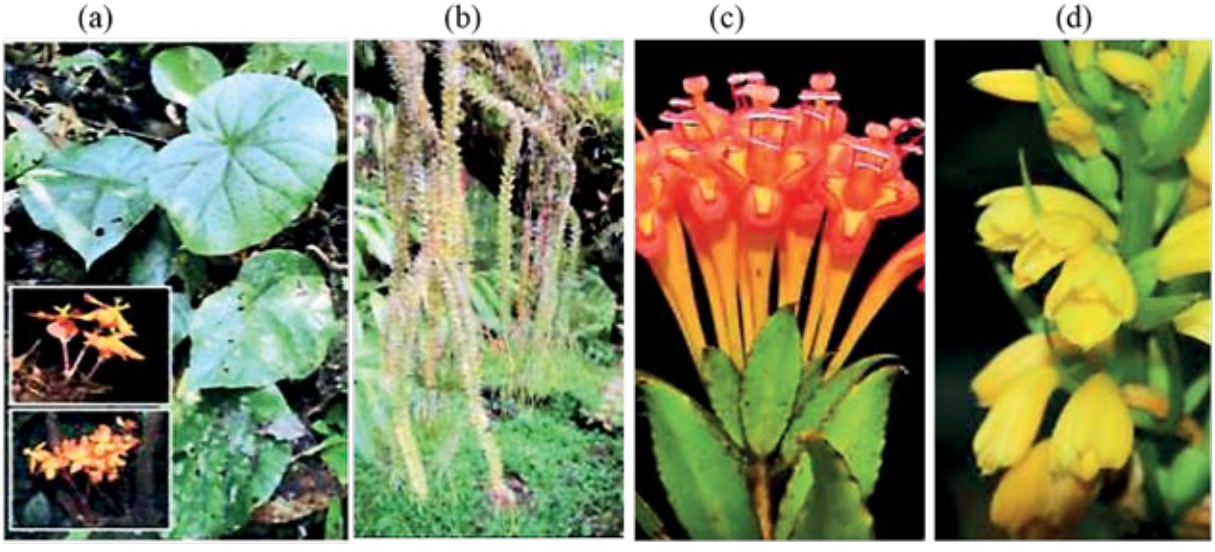

Figure 10: Rare, threatened and endangered non-timber species; (a) *Begonia calcarea*; (b) *Lycopodium phlegmaria*; (c) *Aeschynanthus speciosus*; and (d) *Neuwiedia veratrifolia*

Maintenance and monitoring of Ramin Trial Planting Plot in Bukit Lima N.R, Sibuti WS and Maludam NP

Gonystylus bancanus (Ramin) is subject to anthropogenic pressure therefore actions taken to ensure long term survival and longevity of this species. The improvement of this species can be achieved by providing action plan through conservation activities such as *Ex-situ* conservation of Ramin through trial planting. Currently there are 3 trial planting plots of Ramin established in Bukit Lima Nature Reserve (Sibu), Sibuti Wildlife Sanctuary (Miri) and Maludam National Park (Betong). The size of each of the trial planting plot is 1 hectare with the shape of equal square sizes 100 m x 100 m except the plot in Sibuti WS which is 50 m x 100 m due to unsuitability caused by the existing vegetation. Ramin seedlings were planted at 5 m x 5 m intervals.

Establishment of Permanent Ecological Research Plots in the Existing and Proposed Totally Protected Areas (TPAs)

The major component of this project is the permanent plot establishment within the selected TPA's. These plots will provide the platform for researchers and institutes to continue on conducting detailed research studies. The selected TPAs are Gunung Gading National Park, Maludam National Park, Proposed National Park Kelingkang Range, Samunsam Wildlife Sanctuary, Bako National Park, Gunung Mulu National Park and Lambir Hills National Park. The studies conducted within these plots are on environment mostly on soil classification, soil properties and water qualities, floristic studies on tree inventories and herbaceous plants and fauna studies mostly concentrate on insects.

The objectives of this project are to establish permanent ecological research plot for biodiversity studies such as flora, fauna diversity and environmental studies (soil, water etc), to document flora, fauna and environmental information contained within each area and to provide capacity building of local researchers to increase their skills through implementation of research in forestry related activities.

Outputs are (i) successfully established 13 permanent ecological research plots. Each plot is the size of 1 ha with layout of 100 m x 100 m, (ii) each plot is assigned with signboards to indicate the entrance leading to plot, and (iii) published a handbook on titled "Establishment of Permanent Ecological Research Plots in Sarawak" based on the establishment method used for this project.

Non-detriment Findings Report on *Gonystylus bancanus* (Ramin)

An assessment on *Gonystylus bancanus* in the Permanent Forest Estates (PFEs) and Totally Protected Areas (TPAs) of Sarawak is necessary for providing the information on the current status of Ramin in the wild essential in determining the annual harvest quota for *G. bancanus*. This data collected will give indicate on Ramin population stand and abundance

as required for the Non-Detriment Finding (NDF) report for *G. bancanus* and will contribute to the conservation and sustainable management of this species.

Biodiversity Research and Conservation Management in Selected Habitats and Forest Landscape

Biodiversity studies of flora and fauna are important to gather the information that can be used for genetic conservation and species. The project is focus on biodiversity research and conservation of several types of forest; limestone forests, mixed-dipterocarp forests and peat swamp forest found in Sarawak. The selected and identified forest areas and their habitats will be known to be protected and listed under permanent forest management (Sustainable Forest Management). Climate change is threats to the forest ecosystem as well as the human activities (eg. Over-collecting, logging and habitat destruction activities).

Therefore, conservation is crucial to ensure the preservation of flora and fauna. There are two (2) mini projects which are still on-going namely monitoring of wild orchid in selected limestone forest and the study of Rafflesia. The main objectives were to record the recent populations and the distributions of those species in conservation areas of the selected forests in Sarawak as well as to record their morphological characteristics for taxonomy studies. Hence, research is conducted in order for well understanding the population and characteristics of certain species for conservation purposes.

Bamboo Tissue Culture

Bamboo has been identified as a potential non-timber forest product to serve as alternative raw materials to timber. It is generally known that Bamboo is one of the fatest growing plants in the world. With a gestation period of three to five years, bamboo can be a sustainable resource for various industries including furniture manufacturing and construction.

As a member of Sarawak Bamboo Industry Development Technical Committee (SaBIDTech) under the State's Sarawak Bamboo Framework (2020-2030), we have been embarking on bamboo tissue culture since 2019, working on micropropagation of *Dendrocalamus asper.* Besides *D.asper*, we proposed additional two species of interest to be included in our study, i.e. *Dendrocalamus giganteus* & *Gigantochaloa atter* under the 12th Malaysia Plan research project.

Project scopes include hedge garden set up, workable micropropagation protocols establishment for the selected species and field planting trial study. Collaboration with renowned experts and/or universities will also be initiated to fast-track the R&D work.

CONCLUSIONS

Sustainable forest management is very important in managing the Sarawak forest to maintain the one of the economic resources to ensure the continuous development in the future. Every aspect in forestry is contributing to the wellness of Sarawak forests. Forest Department pledged to be globally recognized in SFM, therefore every divisions in the departments should contribute and be treated equally. Cooperation among all officers and staff are expected and no finger pointing or blaming each other is tolerated. RDID is one of the divisions that is supporting SFM through research and development projects. RDID needs first to be strengthen for it to contribute in strengthening SFM for Sarawak.

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SOCIAL FORESTRY: STATUS, CHALLENGES AND WAY FORWARD

Azahari bin Omar

Social Forestry Division, Forest Department Sarawak

ABSTRACT

About 69% of the 2.79 million of Sarawak population (2018) depend entirely on forest resources for food, handicrafts, home materials, medicine, cemeteries and clean water sources. Social forestry in Sarawak began in the 1990s with the agroforestry project in an area deforested by shifting agriculture. The social forestry programmes in Sarawak focused on 5 key components namely (i) communication, education, public awareness (CEPA) and consultation (ii) community development projects (iii) community service works (iv) communal forest management, and (v) forest restoration programs. Government policy, accessibility, funding, logistics, communications, coordination and land conflict are among the issues and challenges that need to be addressed to succeed in a social forestry program. The development of social forestry will have a significant impact through effective CEPA programs, project monitoring, social forestry policies, and active involvement of stakeholders and secure funding allocation. Long term programmes should be imposed to encourage active community involvement in sustainable forest management, promote social forestry to other sectors and help in reducing global climate change.

INTRODUCTION

About 13 percent of Malaysia population is dependent on forests while in Sarawak about 69% population especially the indigenous people with a high dependency on the forests as the sources of food, housing materials, handicraft materials, medicinal plants, clean water supply and their income. The development of social forestry in Malaysia is a result of increasing awareness and recognition that the rural poor living within the adjacent to the forests have been sustaining themselves with forest resources for many generations. In the early 1990s, Forest Department Sarawak initiated special social forestry projects through agroforestry to uplift the living standards of the rural people on the barren area left by shifting cultivation.

SOCIAL FORESTRY

In 1978, the Food and Agriculture Organisation initially define Community Forestry as any situation which intimately involves local people in a forestry activity. It embraces a spectrum of situations ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growth of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities.

The term social forestry first came to prominence in the 1976 report of the National Commission of Agriculture in India, in which it was used for a programme of activities to encourage those who depended on fuel wood and other forest products to produce their supplies, to lighten the burden on production forestry. The term is now accepted as referring to programmes "specifically aimed at influencing the social actor able to perform the expansion" (Cernea, 1999).

In Sarawak contact, social forestry is defined as the community involvement in sustainable forest management for socio-economic, cultural and environmental needs with the cooperation of the stakeholders.

The main objective of Social Forestry in Sarawak is to preserve and conserve natural resources through the involvement of the community, to improve the quality of life for the communities living inside and adjacent to the Permanent Forest and Totally Protected Areas, to enhance forest product and non-forest timber product by establishing the cottage industry and to establish amenity forest for ecotourism through forest conservation.

SOCIAL FORESTRY PROGRAMMES

Sarawak have 5 main components for implementation their social forestry programmes through (i) Communication, Education and Public Awareness (CEPA) program and consultation (ii) community development projects (iii) community service works (iv) communal forest management, and (v) forest restoration programs. These five (5) components are the guideline in implementation in planning, implementation, managing and developing social forestry programmes in Sarawak. These programmes provide the communities in Sarawak more opportunities to explore, learn, and gain knowledge and skills. This knowledge and experiences gave and help them in meeting their needs especially on socio-economic, cultural and environmental needs through sustainable management of forest resources with the cooperation of relevant stakeholders.

Four social forestry strategies for 2021-2025 has been developed based on socio-economic needs. The core strategic comprised of policy, legislation and governance, financial instrument, awareness and human resources development and forest resources utilisation.

Among the projects that been implemented and in progress in Sarawak through social forestry are forest restoration and agroforestry projects with the communities, community development projects like new houses for Penan community, suspensions bridge, Tagang System, Non-timber forest products carnival, handicraft projects, capacity buildings on handicraft making, carpenter, guide, homestay program and electrical wiring and study tours. These social forest programmes have been highlighted in the forms of pictures attached.

Communication, Education and Public Awareness programmes on the importance of forests and environmental education were conducted in selected schools as well as in the community's areas live inside and adjacent to the permanent forests.

The existing programmes (1st quarter of 2020) still in progress are shown in Table 1. Due to Covid-19 outbreak, the CEPA programmes in three schools will be continued after the decision made to reopen schools by the Ministry of Education.

Table 1: Achievement and Program/Activities Social Forestry in 1st Quarter year 2020

	Program/Activities	**Location**
1	Maintenance work (weeding and Fertilisation) of *Aquilaria* spp. (Gaharu)	Nanga Juk
2	Planting of Jambu Air Sapling with communities	Rh Mangat, Ulu Menyang, Batang Ai.
3	Distribution of 17,000 fish various species for Tagang System	Rh Mangat, Ulu Menyang, Batang Ai.
4	Collection of 38,000 *Aquilaria* spp. sapling with communities	Rh Mangat, Ulu Menyang, Batang Ai.
5	Collection of 2,000 bemban wildings for planting stocking at Sabal Agroforesty Centre.	Rh Bada, Rh Jaong, Rh Patrick, Ulu Engkari.
6	Survey and dialogues on CEPA program to 3 schools at Kuching (SK Biawak, SK Stunggang Melayu, SK Bumiputera, SK Telaga Air, SK Temenggung, SK Buntal,SK Santubong & SK Demak)	Kuching

Table 2 showed the achievements of rehabilitation and restoration of degraded area part of social forestry programmes throughout the year 2019 in Sarawak.

For the year 2020, some project will be continued after some sectors are open and movement between district or division is allowed due to Covid-19 outbreak after the government imposed Movement Control Order with effective by 18 March 2020.

Table 2: Rehabilitation and Restoration of Degraded Forest Area in the year 2019

Bil	**Location**	**Implementation Date**	**Quantity**
1	Ulu Mujok, & Ulu Kanowit, Julau	8-13 January	24,500
2	Sabal Agroforestry Centre	7-15 January	3,000
3	Ulu Landeh, Semenggok and Kubah NP	16-30 January	20,000
4	Ulu Mujok, Julau	29-30 January	50,000
5	Ulu Mujok, Ulu Kanowit, Ulu	28 January-4 February	30,000

	Engkari		
6	Ulu Menyang	4-6 February	20,000
7	Ulu Baram	11-25 February	133,390
8	Batang Ai, Lubok Antu, & Sabal Agroforestry Centre	9-11 February	50,000
9	Ulu Sungai Adis, Bau and Matang	4-14 Mac	13,618
10	Ulu Landeh, Sabal and Sibu	26 Jun- 16 Julai	24,871
11	Sabal Agroforestry Centre	10-15 September	2,374
12	Ulu Sungai Landeh, Padawan	14-21 November, 27-28 November	10,091
	Total Area		**382,579**

ISSUES AND CHALLENGES

The implementation of the social forestry programme is based on the request by communities and the funding available. There is a lack of coordination between agencies in social forestry programme implementation. Creating a task force for each project carried out will provide greater coordination and convenience for project monitoring purposes.

There also no specific policy for social forestry. The existing new Sarawak forest policies 2019 just recently approved by the government on 19 December 2019. Social and Urban Forestry is under thrust 8 of the policy where the social forestry programme is beneficial to the communities that depend on forests as a source of livelihood. These can be done through eco-tourism, education and training.

There is a lack of public awareness and publicity about the importance of social forestry. This will invite global concern about the involvement of indigenous people in the management of forest in Sarawak. This due to lack of promotion and publicity of social forestry programmes in Sarawak to the global.

Before the social forestry activities can be implemented, documentation about social forestry related to customs, culture and belief of the indigenous people should be keep documented and as a reference in future projects.

Lack of community involvement especially young people due to mostly the old people and senior citizens left and stay at longhouses or villages. There are no jobs or business opportunities offered bythe villagers so that young people do not move to the city in search of jobs.

Due to villages located at rural area, the accessibility is the main problem and it takes a few hours or days to reach the villages and it involved long time and high cost to implement the

social forestry projects. Very hard to market social forestry product due to market inaccessibility and the existing social forestry generate limited revenue to the government.

Secure allocation and continuous funding either from government or private sectors can sustain the social forestry programmes and the objectives can be achieved. The outbreak of pandemic virus Covid-19 also gave high impacts on the progress of Social Forestry projects or programmes for the year 2020.

WAY FORWARD

The existing social forestry projects have been carried out through the consultation process with the communities. The program can proceed if both parties the communities and the implementation agencies agreed with the proposal. The communities have the rights to cancel the projects if they think it does not benefit them. To reduce conflicts between the community and the Forest Management Unit holder, it is compulsory to establish a task force or committee to handle any problems related to the communities. Social forestry has been used as an approach to deal with land conflicts through dialogues and meetings.

Proposal to amend the Forests Ordinance, 2015 to fix in the agroforestry and commercialise activities inside the communal forest. The communities will fully benefit from the establishment of communal forest and it needs change by the time. The department will monitor the activities and the development inside the communal forest based on existing laws.

Collaboration with other agencies needs to be enhanced with a secure allocation either from government, private sectors or non-government organisation. The Forest Management Unit should play important roles in the establishment of the Community Representative Committee in efforts to sustainable forest management in Sarawak as one of requirement for certification.

Establishment of policy for social forestry is a must as a guideline or mechanism in implementing programmes or projects to the communities live near the permanent forests.

Promotion and publicity of social forestry in Sarawak should be done to show that the government concern and responsibility for the wellbeing of the communities live near the forests. It can be done through participation in the related conferences, workshops or events, website, social media and roadshows.

CONCLUSION

Factors like sufficient of budgets allocation, policy and legislation, free, prior and informed consent (FPIC) from communities and government supports are the successful keys in implementation of social forestry programmes in Sarawak. Cooperation and commitment by

other agencies and Forest Management Unit holders by providing technical, logistics and funding also can help in reducing the high cost of the implementations of social forestry programme, especially in rural areas.

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APPENDIX 1

Figure 1: Joint Project Forest Department Sarawak and Sarawak Energy Berhad (SEB): Enhancing Sustaining the Community Livelihood and Food Security in Murum Resettlement with the community

Figure 2: Establishment plot and replanting of rattan and *Aquilaria* spp. at Murum Resettlement Scheme (Long Luar, Long Menapa and Long Singu)

Figure 3: Community Projects Programmes: Tagang System (Rh Manggat, Ulu Menyang, Ulu Mujuk and Ulu Engkari)

Figure 5: Construction of bridges Long Lidong and Sg Adong

Figure 6: Construction of Penan house at Ba' Medamot

Figure 7: Collection of seeds and saplings for forest rehabilitation and restoration

Figure 8: Construction of mini dam for clean water

FOREST DEPARTMENT SARAWAK
Level 11-15, Bangunan Baitul Makmur II,
Medan Raya, Petra Jaya,
93050 Kuching,
Sarawak, Malaysia.