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Abstract

Forests in its totality have been the source of livelihood for humankind under its perfect creation. However, over the years, as modernization for socio-economic development and population pressure came in, most of the natural forests have been degraded and depleted of its original resources. As for the Lubok Antu-Samarahan Communal Forest in Sarawak, with a total area of 259 hectares of Peat Swamp Forest, it was gazetted on 26th February 1962 for the domestic use with rights and privileges given to the Malay community from Kpg. Lubok Antu, Sor, Baru and Reban. Over a period of 59 years, numerous illegal encroachments and local extractions took place resulting in the degradation and not serving the bigger population as per the original purpose. The idea of a commercial agroforestry project was introduced and approved as Project Rakyat on 4th February 2019 by the State Government instead of excising the total area for commercial pineapple plantations as requested by the local community. In this project the locals had formed a cooperative as the main contractor to develop and manage the entire communal forest. This paper explains the agroforestry concept, strategies, mechanisms and challenges in its initial implementation, putting local livelihood and commercial agroforestry into consideration, while at the same time, setting forest landscape restoration as the long-term goals.

Keywords: Livelihood strategies, Communal Forest, Agroforestry, Forest Landscape Restoration

1.0 INTRODUCTION

1.1 Project background

The Lubok Antu – Samarahan Communal Forest (CF) with a total area of 640 acres (259 ha) was gazetted on 26 February 1962 for domestic supply privileges of Kpg. Lubok Antu, Kampong Sor, Kampung Baru and Kampung Reban. However, over the years, the villages and their population that still exist to claim their rights are 31 people from Kpg. Reban, 20 people from Kpg. Lubok Ria Hilir and 53 people from Kpg. Lubok Ria Hulu. The original vegetation of Mixed Swamp Forest trees has been harvested many times, thus being degraded to shrubs and bushes. The locals sent their request for conversion of the CF to a private pineapple plantation but the Ministry of Urban Development and Natural Resources (MUDeNR) upon suggestion by the Forest Department Sarawak (FDS) agreed to restore the CF under the commercial agroforestry (AF) model as a showcase to other communal forests in the State. The Director of Forests has the authority to issue a permit to the community to conduct AF activities, thus the statistic of overall PFE is not reduced as AF is an acceptable model under Forest Landscape Restoration (FLR) internationally. Under the FLR programme using the commercial AF Model, the tree species to be planted are Durian, Ramin, Gelam, Engkabang, Nyatoh and Petai deploying different planting systems, namely strip planting along perimeter area, along the roadside, subplot boundary and intercropping.



1.2 Project Locality

The site is found at the Lubok Antu-Samarahan Communal Forest, Serian District, Sarawak, Malaysia. It is around 15 km from Samarahan City, 30 km from Kuching, the capital of the state of Sarawak, Malaysia. The proposed development is found at Lubok Antu-Samarahan Communal Forest and intersects with the Sabang river. It is around 2 km from Kampung Reban (the nearest Kampung) and 3 km from Klinik Kesihatan Esengei, a public medical center. It is surrounded by many villages within a radius of 6 km, such as Kampung Reban, Kampung Kuap, Kampung Soh, Kampung Segenam, Kampung Raeh Lama, Kampung Serut, Kampung Bedega, and Kampung Sungai Menaul.



1.3 Commercial Agroforestry in FLR

According to IUFRO (2017), Forest Landscape Restoration (FLR) is being widely promoted as a solution to the global loss and degradation of the world's forests and contributes to sustainable development through restoring the ecological, social and economic values and functionalities of degraded landscapes. It seeks to restore a forested ecosystem that is self-sustaining and that supplies benefit both to people and biodiversity. For this reason, the landscape scale is particularly important as it provides the opportunity to balance ecological, social, and economic priorities.

FLR is a long-term or ongoing process of regaining ecological functionality and enhancing human wellbeing across deforested or degraded forest landscapes in biomes with the natural potential to support trees. Restoring a whole landscape "**forward**" to meet present and future needs and to offer multiple benefits and land uses over time.

Agroforestry is a land-use management system in which trees or shrubs are grown around or among crops or pastureland. It starts a chain of events that enhance the functionality and sustainability of the farming system.

AGROFORESTRY CROPPING SYSTEM



Agroforestry Benefits

This intentional combination of agriculture and forestry has multiple benefits, such as:

- a. Greatly enhanced yields from staple food crops.
- b. Enhanced farmer livelihoods from income generation.
- c. Increased biodiversity.
- d. Improved soil structure and health.
- e. Reduced erosion.
- f. Carbon sequestration.

Agroforestry To Enhance Livelihoods -Exploring the potential of agroforestry to enhance sustainability, restore community forests and resilience of degraded landscapes. The restoration of degraded landscapes using agroforestry can enhance livelihoods in rural communities by supplying a variety of food, fodder and tree products, which increase food and nutrition security, generate income and alleviate poverty.

2.0 OBJECTIVES

The main objectives of this agroforestry model are:

- i. To ensure the restoration of forest ecosystems can be implemented and thus provide benefit to the local communities and biodiversity for ecological, social and economic balance.
- ii. To retain permanent forest reserves and protected forests from uncontrolled encroachment in Sarawak, and
- iii. To improve the socio-economic status of the local communities with involvement in commercial agriculture and conservation.

3.0 STRATEGIES

3.1 Workshop Highlights: Outcomes and Findings

Stakeholders' engagement workshop was held on 27th - 28th September 2018, which involved various agencies and stakeholders namely MUDeNR, Serian and Samarahan Residents, Integrated Agriculture Development Area (IADA), Department of Irrigation and Drainage (DID), Department of Agriculture (DoA), Veterinary, Suruhanjaya Koperasi Malaysia (SKM), Federal Agricultural Marketing Authority (FAMA), Sarawak Biodiversity Centre (SBC), UNIMAS, Malaysian Pineapple Industry Board, Agrobank and community leaders to identify options for commercial agroforestry models. The outcomes and findings of the workshop were as follows:

- 1. FLR is an overarching programme ensuring the restoration of a forested ecosystem that is selfsustaining and that supplies benefit both to people and biodiversity, thus providing the opportunity to balance ecological, social, and economic priorities.
- Budget estimate of RM5 million for 2 years (2020 2021) development cost to build 20ft long bridge, 2km main road, 5km bund roads, clearing/under brushing of 640acres, site office, nursery, landscaping, the capital contribution for utilities, study tour, survey/mapping and documentation.
- 3. The workshop showed the mixture of crops, animals and trees as per local community acceptance, priority and zoning as shown below:
 - i. Block Perimeter Planting of Petai/Acacia trees with pineapple MD2 (29.57 ha).
 - ii. Block Perimeter Planting of Petai/Acacia trees with Yam/Keladi/Sweet potato/Ginger (23.98 ha).
 - iii. Inter-cropping of Petai/Acacia trees with Pisang Sekaki and Coffee (15.75 ha and 43.29 ha).
 - iv. Inter-cropping of Petai/Acacia trees with Pinang (27.96 ha).
 - v. Durian trees Plantation (21.49 ha).
 - vi. Goat (under feedlot) and Integrated Bio-composting Plant to conduct composting of biomass for fertilizer.
- 4. The local communities with rights to the Lubok Antu Communal Forest to immediately form Koperasi Lubok Antu Reban Serian Bhd (Lubok Antu Reban Serian Cooperative Bhd) as JV partner (management agent and turn-key contractor) with interested anchor companies.
- 5. The implementation of Lubok Antu CF under the Agroforestry Model can be executed under the National Strategic Thrust of Enhancing inclusiveness, improving well-being for all and pursuing green growth for sustainability and resilience, thus can seek funding under the following programme/projects:

- i. *Desa Lestari Program* under Ministry of Rural Development (KKLW) through IADA Samarahan. The Cooperative has taken part in Pra Desa Lestari Zon Sabah dan Sarawak held from 17th to 20th February 2022 at Kota Kinabalu, Sabah.
- ii. *Taman Pengeluaran Kekal Makanan* by Ministry of Agriculture (MOA) through IADA Samarahan and Pineapple Board.
- iii. Sustainable Management of Peatland Ecosystems in Malaysia (SMPEM) under the Ministry of Water, Land and Natural Resources.

3.2 Design Concepts: Nature Inspired

NATURE is a source of inspiration for design concepts that aim to develop designs that have a balance between nature and its environment. The proposed development of this Lubok Antu Samarahan CF master plan is inspired by the beauty of nature, specifically by the yam leaf shape.





The veins act as structure and circulation



The leaf plane acts as form & a container of space



ADAPTATIONS OF THE LEAF - PHOTOSYNTHESIS

The importance of photosynthesis in the maintenance of life on Earth just as the importance communal forests to nature.

NUTRIENT

Like plants that provide nutrition for humans, this communal forest is also capable of being the "nutrient" that maintains the balance of its natural surroundings.

PLANT BREEDING - PRESERVATION Plant breeding from seeds to create new generation of various kinds of plants as nature assets as well as efforts to preserve them.





BENEFIT FOR OTHERS

Like converting photosynthe output into products useful to peop this communal forest give benefit others, especially its surrounding an (environmentally and economically

MIRCO CELLS

Like micro cells of the photosynthe process, this communal fore contains various types of plants th support sustainability in their area.

PROPOSED LUBOK ANTU-SAMARAHAN CF MASTER PLAN

TOTAL SITE AREA

2,590,805.25 sqm / 259.08 HA / 640.20 acre



Leaf Veins : Road Access

Zones Area

FUTURE VISITOR CENTER : 1.07 HA / 2.66 acre AQUA A GRO ZONE: 12.63 HA / 31.19 acre CIA :ADMIN ,DORM, NURSERY ZONE & INDUSTRIAL ZONE: 2.30 HA / 5.69 acre C1B : 33.42 HA / 82.58 acre C2 : 23.98 HA / 59.25 acre C3 : 12.39 HA / 30.62 acre C4 : 9.10 HA / 22.50 acre C5 : 29.57 HA / 73.07 acre : 43.29HA / 106.98 acre C6 C7 : 15.75 HA / 38.92 acre





Transformation of Lubok Antu Samarahan Communal Forest

4.0 MECHANISMS: IMPROVING LIVELIHOOD

4.1 Agroforestry to Enhance Livelihoods

One of the main objectives of the Commercial Agroforestry Project in Forest Landscape Restoration in Lubok Antu Samarahan Communal Forest is to improve the livelihoods of the communities. This project involves the surrounding Kampungs / rural communities and helps them to improve their livelihoods through socio-economic aspects. The restoration of degraded landscapes using agroforestry can enhance livelihoods and welfare of surrounding local communities by supplying a variety of food, fodder and tree products, which increase food and nutrition security, generate income and alleviate poverty.



Social Economy Impacts

- i. Supplies income sources to improve their livelihood (improve local per-capita income for the local agricultural population).
- ii. Boosting sectoral development enhanced supply chain.
- iii. Opportunity to bring Sarawak products to the world.



Expected Gross Revenue and Employment under commercial agroforestry systems for Lubok Antu Samarahan Communal Forest											
 Type of trees/crops	Employment	Expected Gross Revenue (RM million)									
		2020	2021	2022	2023	2024	2025				
1. Yam (26 ha)	8	1.8	1.8	1.8	0.9	0.4	0				
2. Banana (38ha)	14	0.63	1.25	1.25	0.6	0.3	0.1				
3. Pineapple (60ha)	25	2.2	2.2	1.1	0.5	0.5	0.5				
4. Coffee (43ha)	50	0	0	0.55	0.83	1.1	1.1				
5. Pinang (50ha)	14	0	0	0	1.2	1.2	1.2				
6. Petai (50 ha) interplanted in coffee and pinang	17	0	0	0	2.0	3.0	4.0				
7. Kelulut (700 hives)	6	0	0	0.16	0.16	0.16	0.16				
8. Gelam, Engkabang, Durian & Ramin	6	0	0	0	0	0	0				
TOTAL	140	4.63	5.25	4.86	6.19	6.66	7.06				

Agri. Crop	Anchor Company	Area (Ha)	People Rank	AF Model	Pote Pkinlations&dateg nue (PGR) and other details			
Yam (Keladi)/ Sweet Potato/ Ginger	Pico Food Industry	26 ²		Boundary (3 rows) planting with Petai	PGR =RM1.8m/9 mths onwards. Yam 20,000pts/ha @2kg/pt. Farm price at RM1.80/kg. RM72,000/ha.			
Banana/ Pisang Sekaki with corn & coconut	Banana Tree Sdn. Bhd.	38	3	Gelam, Engkala, Durian, Engkabang, etc.	onwards. 1,100 plants/ha@ 15kg/fruits bunch. 1st harvest after 9 months and thereafter each harvest after 5 mths interval. Farm price @RM1/kg. RM16,500/ha.			
Pineapple/ Nanas MD2	Lembaga Nanas JV / IADA Cluster	60	1	,	PGR =RM2.2m after 1 yr. onwards. 37,000 plants/ha yield 30 ton/ha. Farm price @RM1.20/kg. RM36,000/ha.			
Petai interplanted with Coffee/ Kopi Liberica	Reka Jaya Plantation SB	43	5	Inter-cropping with Gelam, Petai & Engkabang	PGR =RM550,000 by 3rd yr, RM826,000 by 4th yr. & RM1.1m (5th yr) onwards. 800 plants/ha yield dried beans 160kg/ha. after 3rd year with increment to 0.5kg (4th yr) and 1 kg (5th yr). Dried beans price at RM80/kg. RM12,800/ha.			
Goat/ Sheep	Locals	5	6	Feed lot				
Kelulut - 700 hives	Locals	n.a.	7	In coffee & gelam area	PGR =RM158k by 3rd yr onwards. One hive box to yield 1.5kg @ RM150/kg.			
Pinang/ Areca	Capitavest Ventures	50	4	Inter-crop with corn/keledek	PGR=RM1.2m/year by 4th yr. onwards. RM10k/yr/ac. 1 ac=680 trees; 1 tree =21kg/yr. @RM0.70/kg			

Expected Gross Revenue and Employment under Commercial Agroforestry systems for Lubok Antu Samarahan Communal Forest

4.2 As a Sustainable Tourist Development

Farm tourism is the business of attracting visitors to farm areas, generally for educational and recreational purposes while encouraging economic activities that can provide both the farm and community additional income.

Farm tourism is travel that combines rural settings with products of farming operations – all within a tourism experience. Moreover, this activity brings visitors closer to nature and rural activities in which they can take part, be entertained and feel the pleasure of touring.

Farm Tourism Benefits

Benefits to the Farmer

- i. As an opportunity to generate additional income from an existing land base.
- ii. Improve the lives of the farm family.
- iii. Seasonal flexibility.
- iv. As an opportunity to interact with the customer, foster farm-customer partnerships.

Benefits to the General Public - Tourists

- i. Transparency of quality in the products.
- ii. Educational opportunities.
- iii. Back to nature entertainment.

Benefits to the Local Community

- i. Increase sales of local products and services.
- ii. The contributions of community income increase job opportunities.
- iii. Increase the diversity of economic activities and raise awareness of the value of an area.
- iv. Stimulating physical infrastructure developments.

POSSIBLE TYPLES OF ACTIVITIES IN FARM TOURISM



5.0 PHYSICAL DEVELOPMENT

The project was started on 1st August 2020 and completed on 31st December 2021. Phase I of the project with an allocation of 5 million involved physical development which includes a bridge, 2km main

road, 5km bund roads, clearing/under brushing of 640 acres, site office, nursery, landscaping, a capital contribution for utilities, study tour, survey/mapping and documentation.



I-Beam Bridge 38'span x 12' width



M2 Road (1.5 km)



Admin building (24m x 8m/72ft x 24ft) for office, training, product collection & exhibition



M1: Main Access Road (480m) improved materials under UNIMAS-JKR R&D



Bund road (5km length, 3m width)



Solar panel at Admin building



Storage Tank at midway near Lubok Ria Clinic and installation of 8 tanks at the project site



Telecommunication - booster installation at Admin Building



Solar house for supplying electricity to Admin Building workshop and nursery



Nursery and landscaping

6.0 EXISTING DEVELOPMENT

To date, the agency involved in the planting works is IADA, which has planted a total of 5,000 nangchem trees and 10,000 bananas (Pisang tanduk) in 2021 and will implement intercropping planting of longan Kristal and Pisang tanduk in 2022. Meanwhile, HR Fruit Sdn. Bhd. has planted approximately 1,000 fruit tree seedings consisting of mangosteen, guava papaya, banana etc. The villagers have already planted 2,000 D26 pineapple and yams and obtained 42,000 MD2 pineapple seedlings from DoA.

As for Forest Landscape Restoration, a total of 370 Ramin, Nyatoh and Rhu Bukit were planted during the 1RAS 1Pokok program during Earth Day joint organized by the Department of Environment and Sarawak Energy Berhad (SEB) on 19th March 2022.

The benefit and incomes derived by communities from this project are: (i) the implementation of Projek Rakyat either from salary or contract itself; (ii) Lease of land to investors; (iii). Profit earned by investors will be distributed to the community according to the agreement through Memorandum of Understanding (MoU) of the two parties: and (iv) Profit from the community's own garden.



Planting of nangcem and banana by Integrated Development Agriculture Area (IADA)



Planting of yam & pineapple by villagers from Kpg. Lubok Ria Hilir



Various fruits tree planting (papaya, mangosteen, guava, papaya etc.) by HR Fruits Sdn. Bhd

7.0 ISSUES & CHALLENGES

- i. Implementation of agroforestry commercialization versus domestic use spelt out in Forests Ordinance, 2015.
- ii. Covid-19 Pandemic shortage of skilled manpower, building materials, etc.
- iii. Budget constraints, lack of knowledge, skill and business networking.
- iv. Success and sustainability of the project.

8.0 RECOMMENDATIONS

- i. Option 1 Cessation of communal forest and convert it to a planted forest (agroforestry). To be the first one below the 1,000 ha requirement.
- ii. Option 2 Retain as Communal Forest with an amendment to Forests Ordinance, 2015 to insert agroforestry activities.
- iii. Option 3 Retain as Communal Forest with an amendment to the Gazette Notification Schedule 2 (change from domestic to commercially viable agroforestry projects).
- iv. Establishment of a Monitoring and Investment Committee to give advice, evaluate and monitor the sustainability of the project for the long run.

9.0 CONCLUSION

The success of this agroforestry model can be assessed after all the crops, trees and the investors/stakeholder have been there or in place and it takes a long time, at least 5 years to know the results. If the outcome is positive, it will be applied to other Communal Forest in Sarawak according to the suitability of the area with minor change or improvement.

Further financial allocation for the second phase is required to complete this agroforestry model.

Several state laws, policies and regulations need to amend and set up to guide the implementation of this agroforestry project, especially inside the Permanent Forest Estate.