



Integrating Blue-Green Economy and Sustainable Business through Mangrove Ecotourism: Case Study of YKAN, East Kalimantan

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Abstract. This study examines the feasibility of alternative livelihoods for mangrove conservation in Tabalar Muara, East Kalimantan, under the Blue Carbon Pilot Project initiated by Yayasan Konservasi Alam Nusantara (YKAN). The project aims to protect mangrove ecosystems from further degradation by promoting sustainable income-generating options, including mangrove honey bee farming and integrated mangrove ecotourism. The assessment uses primary and secondary data collected through stakeholder interviews, market analysis, and financial evaluations, employing methods such as Net Present Value (NPV), Internal Rate of Return (IRR), and Cost-Benefit Analysis (CBA). Results show that both livelihood options are economically viable and environmentally sustainable, with a positive net benefit and potential for long-term conservation. Recommendations include investment in infrastructure, capacity building, and improved market access to support local community participation.

Keywords: *Feasibility Management, Blue Carbon, Alternative Livelihood, Sustainable Development*

1 Introduction

Mangroves are highly productive ecosystems that provide essential services such as shoreline protection, carbon sequestration, and nursery habitats for marine life. Indonesia, with one of the largest mangrove forest areas in the world, has faced significant degradation due to shrimp aquaculture and coastal development. Recognizing the need for conservation, the Blue Carbon Pilot Project, led by Yayasan Konservasi Alam Nusantara (YKAN), seeks to integrate sustainable livelihood practices that benefit both local communities and the environment.

The key challenge lies in developing alternative livelihoods that do not compromise mangrove ecosystems while offering economic benefits to local communities. This study focuses on assessing two livelihood options in Tabalar Muara, Berau District: mangrove honeybee farming and integrated mangrove ecotourism. Both options align with the goals of the blue-green economy, which emphasizes the synergy between economic growth and environmental sustainability.

Assess the economic and environmental viability of mangrove honeybee farming and integrated mangrove ecotourism as alternative livelihoods in Tabalar Muara. Identify the socio-cultural factors that influence the adoption and success of these livelihood options. Provide actionable recommendations for scaling up these initiatives to ensure sustainable mangrove conservation and improved community welfare.

2 Literature Review

2.1 The Blue-Green Economy and Mangrove Conservation

The blue-green economy concept integrates environmental sustainability into economic activities, particularly in coastal and marine areas. A study by Barbier (2012) highlights the importance of mangroves in providing ecosystem services, such as carbon sequestration, which contributes to mitigating climate change. Furthermore, Costanza et al. (2014) emphasize that preserving mangroves also offers direct economic benefits through fisheries, tourism, and non-timber forest products.

Mangrove conservation is essential for both environmental and economic sustainability. Research by Primavera et al. (2012) has shown that integrating mangrove conservation with alternative livelihood strategies can reduce deforestation pressures, particularly when communities have a vested interest in the long-term health of these ecosystems. The Blue Carbon initiative further enhances the role of mangroves in climate regulation, as noted by Duarte et al. (2013), who found that mangroves, along with other coastal ecosystems, serve as critical carbon sinks.

2.2 Feasibility Studies in Sustainable Livelihood Development

Feasibility assessments are essential for understanding the economic and environmental implications of alternative livelihood projects. According to Shiferaw et al. (2011), financial viability, environmental impact, and social acceptance are key criteria for determining the success of sustainable livelihood interventions. This approach has been applied in multiple contexts, including ecotourism and agroforestry projects, where market demand and resource availability play critical roles in determining project feasibility (Jamieson et al., 2004).

Mangrove ecotourism, in particular, has been promoted as a sustainable alternative livelihood that leverages the unique ecological characteristics of mangrove forests. Studies by Clifton (2013) and Gössling (1999) emphasize the dual role of ecotourism in conserving ecosystems and providing economic opportunities to local communities, provided that the necessary infrastructure and training are in place.

3 Methodology

3.1 Data Collection

The data collection process involved a combination of qualitative and quantitative methods, including:

- Interviews were conducted with local community members, YKAN staff, government officials, and ecotourism operators to gather insights on the socio-economic and environmental impacts of the proposed livelihoods.
- Secondary data from local markets and tourism agencies were analyzed to assess the demand for honeybee products and ecotourism services.
- The financial viability of both livelihood options was evaluated using Net Present Value (NPV), Internal Rate of Return (IRR), and Cost-Benefit Analysis (CBA) methods.

3.2 Analytical Framework

The feasibility assessment followed a structured framework, focusing on three key dimensions:

- Technical Feasibility, Analysis of the technical requirements for honeybee farming and ecotourism infrastructure, such as equipment, skills, and capacity.
- Financial Feasibility, Evaluation of the cost-effectiveness and profitability of the livelihoods using NPV and IRR.
- Social and Environmental Feasibility, Assessment of the potential socio-cultural impact and environmental sustainability, including the preservation of mangrove ecosystems.

4 Results and Discussion

In the first steps of this research, a theory of change develops through Focus Group Discussion (FGD). FGD held December 11, 2017 in Coastal Settlement (RT3) Tabalar Muara, at 20.00 Wita in Abdul Salam home with 7 participants target group.

Table 1. List of participant in alternative livelihood meeting discussion

No.	Name	Position
1	Abdul Salam	Chief of Shrimp Farmer Group "Rantau Tarik"

2	Ramang	Finance of Shrimp Farmer Group “Rantau Tarik”
3	Sudirman	Head of “Mandiri” Fishermen Group and Secretary of Village Supervisor Board (BPK)
4	Taggiling	Member of LPM (Community Empowerment Board)
5	Rukmana Paysal	Head of Village Company (BUMK)
6	Richa	Secretary of BUMK and kindergarten teacher
7	Lia	Teacher of SDN 001 Tabalar Muara

Source: Primary data processed by researches

The meeting began with an introduction by Sudirman about the theme of FGD. In this meeting, one participant asks: is there any plan TNC give donation regarding this livelihood. Facilitator answered that it is not about donation, we can't promise anything. This livelihood will be the recommendation of research. All organizations, including the village government, could use this livelihood recommendation to make better welfare for the community.

In facilitating discussion; identifying alternative livelihood began with a quick view about unpromising shrimp pond livelihood. With big capital and many unpredictable factors, shrimp pond activity can be counted in the future. In the last meeting, they agreed to make a small shrimp pond with good harvest.

In case of waiting for this “Green” Shrimp pond model, what should shrimp pond farmers do to stop opening new shrimp ponds? Then start with a question: If the shrimp pond is not promising, or if they want to stop being a shrimp pond farmer, what kind of livelihood do they want or dream?. In the first step of discussion, each of the participants proposes at least 2 alternative livelihoods. The list of alternative dream show in table below:

Table 2. List of alternative livelihood

No	Alternative livelihood Dream
1	Cattle cow farm
2	<i>Pemukat</i> (millennium and Gill Net) fishermen

3	Mangrove ecotourism
4	Mangrove honey bee farm
5	Banana plantation
6	<i>Pegondrong</i> (trammel net) fishermen
7	Chicken farm
8	Dried skin shrimp (udang rebon kering)
9	Grocery store (Sembako)
10	Women empowerment with tailor activity
11	Fiberglass boat maker
12	<i>Pedari</i> (Guiding Barrier) fishermen
13	Duck farm
14	Mangrove cake, syrup, etc
15	Fish powder for feed from fishery waste
16	Crab abon
17	Amplang from crab, fish and shrimp
18	Chili plantation
19	Dried shrimp
20	Dried rice with brown sugar (traditional cake)
21	Palm oil plantation

Source: Primary data processed by researches

From 21 livelihood dream, we make 5 clusters or group, as table below:

Table 3. Cluster of Alternative livelihood

Cluster	Alternative Livelihood
Livestock	Cattle cow farm
	Chicken farm
	Duck farm
Plantation	Palm oil plantation
	<i>Pemukat</i> (millennium and Gill Net) fishermen
	<i>Pegondrong</i> (trammel net) fishermen
Fishery	Dried skin shrimp (udang rebon kering) <i>Pedari</i> (Guiding Barrier) fishermen
	Fish powder for feed from fishery waste
	Crab abon
Mangrove	Amplang from crab, fish and shrimp
	Dried shrimp
	Mangrove ecotourism
Other cluster	Mangrove honey bee farm
	Mangrove cake, syrup, etc.
	Grocery store (Sembako)
Other cluster	Women empowerment with tailor activity
	Fiberglass boat maker
	Dried rice with brown sugar (traditional cake)

Source: Primary data processed by researches

From those cluster and livelihood list, participants finally have 10 rank of alternative livelihood, as table below:

Table 4. Alternatif livelihood rank

No.	Alternative Livelihood in Rank
1.	Palm oil plantation
2.	Cattle cow farm
3.	Mangrove ecotourism
4.	<i>Pemukat</i> (millennium and Gill Net) fishermen
5.	Mangrove honey bee farm
6.	Banana plantation
7.	<i>Pegondrong</i> (trammel net) fishermen
8.	Chicken farm
9.	Dried skin shrimp
10.	Grocery store
11.	Women empowerment with tailor activity

Source: Primary data processed by researches

Participants choose Palm Oil Plantation and Cattle Cow Farm as their new livelihood if they want to stop the shrimp pond (in long term planning). Besides that, Participants choose mangrove honey and mangrove ecotourism as alternative livelihood in the long term while they start to decrease mangrove deforestation and degradation with a new model of “green” shrimp pond. Meanwhile, Banana plantation, and *pemukat* fishermen, becomes medium term planning in alternative livelihood.

Table 5. Alternative livelihood term of planning

Term of Planning	Livelihood Options Option
Short	Mangrove ecotourism
	Mangrove honey bee farm
Medium	<i>Pemukat</i> (millennium and Gill Net) fishermen
	Banana plantation
	Palm oil plantation
Long	Cattle cow farm

Source: Primary data processed by researches

4.1 Feasibility of Mangrove Honeybee Farming

Mangrove honeybee farming in Tabalar Muara shows strong potential as a sustainable livelihood option. Financial analysis yielded a positive NPV of IDR 62,248,505 and an IRR of 67%, making the venture highly profitable. The honey produced in mangrove ecosystems is highly valued in local and regional markets due to its unique flavor and health benefits. Moreover, honeybee farming supports biodiversity by promoting pollination, contributing to the overall health of the mangrove forest. The B/C ratio of 1.25 indicates a solid return on investment, making this a viable long-term option.

4.2 Feasibility of Mangrove Ecotourism

Mangrove ecotourism in Tabalar Muara offers significant opportunities for both conservation and community development. The region’s rich biodiversity and scenic landscapes make it an attractive destination for eco-conscious tourists. The financial analysis projected a net benefit of IDR 150,000,000 over 10 years, with an IRR of 16%. The main challenge, however, is the lack of infrastructure, particularly transport and accommodation facilities. To fully capitalize on the potential of ecotourism, investment in infrastructure development and marketing is crucial. Ecotourism also fosters environmental education and raises awareness about the importance of mangrove conservation, making it a valuable tool for both economic and ecological sustainability.

4.3 Socio-Cultural Acceptance and Challenges

The social acceptance of both livelihoods is high, as community members are eager to transition from shrimp aquaculture to more sustainable alternatives. However, the initial capital required for honeybee farming and the technical skills needed for managing ecotourism ventures remain challenges. Local farmers expressed a need for training and support to ensure the successful implementation of these projects.

Capacity-building programs, such as workshops and field visits, are recommended to equip the community with the necessary skills.

4.4 Technical Aspect

For mangrove Ecotourism Park in Tabalar Muara, a feasible location is available because there is still much area covered with mangrove forest. The main technical aspect in developing an ecotourism destination in Tabalar Muara is access to location, public utility, local community human resources and institutions who will be managed.

Location Access

Tabalar Muara could reach from sea or land route access. For sea route from Tanjung Redeb, the location of mangrove ecotourism could reach by speed boat which is rental. It will spend around 2, 5 hour boat with two machine engines. Meanwhile, for land route, access form Tanjung Redeb could use regular car and spend roughly 3 hour average. Unfortunately, quality of road to Tabalar Muara through land route is not really good. To reach Tabalar Muara, visitor will pass route to Pemapak Lake tourism destination. The road already smooth with asphalt. Tabalar Muara Just around 2 kilometers from Pempapak intersection. This is the advantage of mangrove Ecotourism Park in Tabalar Muara. For village road, most of it quite good with sand and stone. This road will become main road to location access of mangrove ecotourism. Furthermore, village government has commitment and plan to fix the road access to coastal settlement which is being part of mangrove ecotourism area.

Public Utility

Public utilities in Tabalar Muara are adequate to service the tourists in Mangrove Ecotourism Park. For clean water, Tabalar Muara could count on rain water, or Tabalar and Pemapak River to supply visitors' needs. Furthermore, for electricity there is a generator set (Genset) and solar cell that could support visitor needs. Tabalar Muara has a Health Centre Assistant (Puskesmas Pembantu) with one orderly and midwife. In case of an emergency situation, visitors could be sent to the 24 Hour Health Centre in Biatan Sub District which is a 30 minutes trip.

In case on bad situation that need big surgery, visitor could send to Tanjung Redeb by local government speed boat, or send to Talisayan Sub District Hospital which is spend around 1, 5 hour trip. Cellular connection in Tabalar Muara is also quite good in some location for certain operator such as Telkomsel and Ooredoo. The connection could support visitor communication standard need such as call and receive. But for streaming and other internet activities the connection is quite poor. Tabalar Muara also has 3 mosques that can be used for moslem tourist to pray. The mosque is not big, but enough space for about 50 to 100 moslem pilgrims.

Besides that, Tabalar Muara is well known as village with good security. Theft and fights very rare happen in the village. Government village also have Security Unit called "Linmas" and there is one police officer which has duty to make sure the

security of the village. The point is Tabalar Muara mangrove ecotourism park quiet comfort and safety for tourist.

Human Resources and Institutional

Local Human resources will become the most important factor to manage ecotourism. In Tabalar Muara there are not many local communities that have a high level of formal education. But, some of them have good information and understanding about tourism. As labor need in the previous discussion, mangrove ecotourism in Tabalar Muara needs 6 local people that become the workers of this business. This labor will be managed by Government Small Business Enterprise (Badan Usaha Milik Kampung) of Tabalar Muara who also has planned to develop mangrove ecotourism as one of their prospective businesses.

Even though there is big spirit from local community and BUMK board to develop mangrove ecotourism, they still need to upgrade their ability in tourism management, especially in tourist service and financial management. Unfortunately, BUMK as responsible institution don't have much capital to upgrade their management skill. They need to cooperate with Tourism Agency in Berau District to ask technical and financial assistance for it. They have already start learn to managed tourism destination with Pemapak Lake Destination boar in Bapinang Village, which is the neighbor of Tabalar Muara.

Socio Culture Aspect

Tabalar Muara community is dominated by migrants originally from South Sulawesi. But as a migrant generation, the Tabalar Community doesn't have spirit as migrants. They never thought that Tabalar Muara was their foreign country. They always said Tabalar Muara is their homeland. If they want to go to their parent village in South Sulawesi, they call it "Massulawesi". It means they don't go back to their homeland, just visit family.

That's why they are proud to be Tabalar Muara community with all deficiencies and advantages. Mangrove ecotourism that they choose as alternative livelihood is not only about economic reasons. Ecotourism with many visitors coming to their village actually is a proud announcement that they have good and beautiful place. Not only in Derawan Islands, Biduk-biduk or Pemapak Lake which is very near from their village.

Tourism destination dream is more stormy when Bapinang Village creates Pemapak Lake as a destination. Moreover, Pemapak is actually part of the Tabalar Muara village area, according to the Major Decision about Pemapak Lake tourism destination. In a mangrove workshop in Tanjung Redeb, October 2017, Pjs Head of Village, reaffirmed that Tabalar Muara needs a mangrove ecotourism park. Not only because they dream of it, Tabalar Muara mangrove forest had economic and ecological value to expose as one of the best mangrove ecotourism in Berau District. Workshop results strengthen social acceptance of ecotourism in Tabalar Muara. From FGD of alternative livelihood and informal discussions, communities in Tabalar Muara have excellent social acceptance to run ecotourism destinations, including Small Business Enterprise (BUMK). But, the head of the village does not really agree

to choose mangrove ecotourism because he thought that ecotourism is a long term investment which has long profit as well.

4.5 Strength and Weakness

Integrated Mangrove Ecotourism Park in Tabalar Muara has strengths and weaknesses from internal situations. Internal means from community and government which is influential to mangrove ecotourism development as alternative livelihood. The strength and weakness show in table below:

Table 6. Strength and weakness of mangrove ecotourism development as alternative livelihood

Strength	Weakness
1) Mangrove ecotourism in Tabalar Muara is strong in financial aspect with business sensitivity 10% cost increase and 50% revenue decrease	1) There is no land use regulation in the village to ensure integrated mangrove Ecosystem Park in Tabalar Muara.
2) Tabalar Muara has many tourism attractions that could be integrated in mangrove ecotourism tours and packages.	2) Head of the village government is not really optimistic with the mangrove ecotourism business.
3) Community social acceptance of tourism is good with awareness that tourism will increase village revenue and local community income.	3) Land status of mangrove forest in Tabalar Muara susceptible in tenurial conflict between community versus government, or community versus company
4) Ecotourism will be an entry point to arrange land use and tenurial conflict in the Tabalar Muara mangrove ecosystem area.	4) Local community doesn't have awareness of mangrove forest deforestation and degradation threats in Tabalar Muara.
5) Village government has enough money from Dana Desa (DD) dan Alokasi Dana Kampung (ADK) for mangrove ecotourism investment	5) Tabalar Muara don't have experiencing local trainer in ecotourism management
6) Village government has Badan Usaha Milik Kampung (BUMK) who can manage and make sure mangrove ecotourism is sustainable.	6) Badan Usaha Milik Kampung (BUMK) has not enough capital to run mangrove ecotourism business investment.
7) Public utilities in Tabalar Muara adequate to run ecotourism business	7) There is no well source of electricity to support mangrove ecotourism 12 hours activity
8) Land transportation access to mangrove area and coastal settlement is open for motorcycle	8) The road access to the mangrove area is not really good for vehicles, especially for 4 wheels or cars.

Source: Primary data processed by researches

4.6 Opportunity and Threat

Opportunity and threats is an external condition that can influence mangrove ecotourism in Tabalar Muara in all aspects and factors. From opportunity and threat identifying, there are 8 point that will be influence to the success or failure of mangrove ecotourism in Tabalar Muara, show in table below:

Table 7. Opportunity and Threat of mangrove ecotourism

Opportunity	Threat
1) Market of mangrove ecotourism in is competitive because there is only 4 (Batu- batu, Tanjung Batu, Semanting, Batu Putih) existing competitor in Berau, and only one in south coast of Berau route (Batu Putih)	1) Mangrove deforestation and degradation from outside investors for shrimp ponds, palm oil Company, and other land based activities.
2) The growth of tourist visits in Berau is an excellent 47 percent average a year.	2) Road damage from Tanjung Redeb to Tabalar could disturbed number of tourist
3) Berau policy support ecotourism in district medium-term development plan (RPJMD) as one priority activity	3) Mangrove ecotourism in Batu Putih develop some tourism attraction and magnitude like in Tabalar Muara
4) Tabalar Muara location close to Pemapak Lake Tourism Destination, which could be source of mangrove ecotourism visitor	4) Government policy that direct the whole program to push Derawan Island for Berau tourism destination
5) Tabalar Muara location is on the route to Biduk- biduk, one of Berau mainstay tourism destinations.	5) The absence of regular transport for tourism visitor to the route of south cost in Berau make expensive cost too access mangrove ecotourism in Berau
6) Mangrove Tabalar Muara is part of Coastal Conservation Area of Derawan Islands (KP3K) which is fit with mangrove ecotourism activity	6) Ticketing price competition in ecotourism, especially for mangrove ecotourism in Berau.
7) National and Province Government has many program to develop tourism sector in Indonesia	
8) Sales and promotion through web and social media is easy, cheap, and effective	

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- 7) Mangrove ecotourism in Balikpapan, the gate of Kalimantan Timur more growth with complete service and utility
 - 8) The change of village policy after that could decrease village funds, which will use as mangrove ecotourism investment
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Source: Primary data processed by researches

4.7 Alternative Livelihood Selection

Based on discussions of two alternative livelihoods in the previous chapter, this session is to choose one alternative livelihood which is feasible and become community choice in mitigating mangrove deforestation and degradation in Tabalar Muara. From 4 aspects with strong analysis in finance, this research shows Honey bee farm and mangrove ecotourism is good, even excellent in a few aspects.

With simple description analysis honey bee farm and mangrove ecotourism is excellent in the market, because of market demand and competitiveness of this product. Honey and mangrove tourism in Berau is new market demand, and the key player or competitor in Berau or Kalimantan Region still not as many as other districts.

Table 8. Description analysis of two alternative livelihoods

No	Parameter	Honey Bee Farm	Mangrove Ecotourism
1	Market	Excellent	Excellent
2	Financial	Good	Excellent
3	Technical	Good	Good
4	Socio Culture	Good	Good

Source: Primary data processed by researches

Furthermore, in the financial aspect, mangrove ecotourism has a strong point. Not only because of the direct benefit value, mangrove ecotourism supports indirect economic effects to local communities such as local shops and travel services.

Mangrove ecotourism benefits can also support village fund empowerment in the future.

This assumption also has support from local communities who choose mangrove ecotourism as their alternative livelihood. From FGD and informal discussions, and in depth interviews with key stakeholders, mangrove ecotourism can be trusted as the trigger of all economic activities.

Table 9. Tabalar Muara community choose for alternative livelihood

No	Alternative Livelihood	Score	Rank
1	Honey bee farm	20	2
2	Mangrove ecotourism	80	1

Source: Primary data processed by researches

5 Conclusion and Recommendations

The feasibility assessment confirms that both mangrove honeybee farming and integrated mangrove ecotourism are viable alternative livelihoods for Tabalar Muara. These options offer substantial economic benefits, with positive NPVs and IRRs indicating long-term profitability. Furthermore, they contribute to the conservation of mangrove ecosystems by reducing deforestation pressures and promoting sustainable resource use. As noted by Sunaryo & Irkham (2014), promoting green economic activities through conservation initiatives can strengthen local economies while ensuring environmental sustainability. Zainuri, Takwanto, & Syarifuddin (2017) also stress the importance of engaging local communities in mangrove conservation efforts to achieve long-term success.

To enhance the success of these initiatives, it is recommended that YKAN and local stakeholders:

1. Invest in Infrastructure, Develop transportation, accommodation, and other tourism-related infrastructure to support ecotourism growth.
2. Provide Capacity Building, Implement training programs to equip local farmers and entrepreneurs with the necessary skills for honeybee farming and ecotourism management.
3. Expand Market Access, Strengthen marketing strategies for honeybee products and ecotourism services to reach broader regional and international markets.

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