Blue Roots Fund

Investment Thesis: *Facilitating sustainable large-scale shrimp production and exports through an associated mangrove system, financed by the Blue Roots Fund, and supported by local expertise and blue carbon credits*

Excel model and references

Challenge: global mangrove losses

Fisheries and aquaculture are crucial for global food security, especially for feeding the growing world population. **Aquaculture is driving the increase in aquatic livestock,** projected to reach 106 million tons by 2030. Within the industry, **shrimp farming represents one of the fastest growing segments**, with total production volumes of 5.6 million metric tons in 2022.

However, the **Food and Agriculture Organization (FAO) emphasizes the need for sustainable growth**, as the previous aquaculture expansions have proved to be harmful for the environment. Indeed, 38% of global mangrove losses are driven by mangrove conversion into shrimp ponds.
Such negative impact is particularly pronounced in Indonesia, hosting a staggering 22% of world's mangrove spanning over 4.1 million hectares. Despite mangroves' vital role in carbon storage, with 3.4 billion tons of carbon stored by Indonesian mangroves, the country has experienced a distressing 40% loss of mangroves in the last three decades due to shrimp farming – a lucrative industry with exports reaching 250.71 thousand metric tons valued at over USD 2.2 billion in 2021.

Mangrove forests form vital ecosystems, serving as natural filters and storing carbon at a rate 5x greater than terrestrial forests, with the potential to retain it for millennia. Beyond their ecological significance, mangroves act as natural shields against climate-related disasters, absorbing flood impact, and reducing tsunami wave heights by 5%-35%. Moreover, **mangroves are crucial habitats for biodiversity**, enhancing food security and providing the potential to introduce 60 trillion young, edible, and commercially valuable fish and invertebrates per year to coastal waters, according to the FAO.

Consequently, striking a **balance between aquaculture expansion and environmental preservation by integrating mangroves in the production system** is not only critical for environmental sustainability but also for securing the long-term resilience and productivity of coastal ecosystems.

Key Details

	First Stage	Scale Up
Investment vehicle	Private Debt	Private Debt
Asset Class	Climate Solution	Climate Solution
Fund Size	USD 6 m	USD 25 m
Restoration target	280 ha	1100 ha
Management Fees	1.0%	1.5%
Lifespan	15-20 years	15-20 years
Target IRR (gross)	13.0%	13.0%

Investors

	Reasons for investing	Potential investors
Financial investors	› Hedge carbon risk › Diversification	Swiss Re, Amundi
Multinational companies	› Generate carbon credits › Act on biodiversity issues	NVIDIA, Chevron
Indonesian shrimp exporters	› Generate carbon credits › Certify suppliers	PT. Panca Mitra Multiperdana, Indokom Seafood Group, BMS Food, Sekarbumi

Our solution: transforming shrimp production

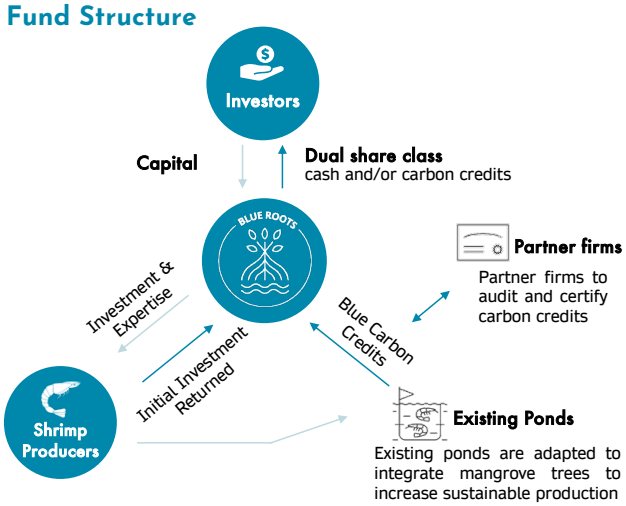
Blue Roots Fund addresses the dual challenge of increasing shrimp production while restoring mangroves. Diverging from typical restoration funds, we target major shrimp producers and exporters for their high environmental impact and help their transition to sustainable productions.

We facilitate this transformation by **supplying essential capital for integrating mangroves into shrimp production processes** partnering with Conservation International to introduce Associated Mangrove Systems techniques (backed notably by UNESCO-IHE, the Indonesian Ministry of Marine Affairs and Fisheries, and Mangroves For The Future) which help restore greenbelts while protecting and enhancing shrimp production.

Simultaneously, we **offer incentives to encourage producers to adopt these systems**, ensuring that their yields remain unaffected or even improved.

Additionally, we **provide blue carbon credits sourced directly from the integrated sustainable ponds** to offset the considerable carbon footprint of shrimp farming and exports (shrimp production has one of the largest carbon footprints among seafood products, averaging 13kg of CO_2 per kilogram of product – 2x the amount of salmon production).

Fund Structure



Market Assessment and Scalability

First stage | Scale up

First Stage: Blue Roots Fund 1 has strong potential in **Indonesia** due to the importance of shrimp farming for the country (4th largest shrimp exporter worldwide), and the extension of Indonesia's mangroves (22% of global mangroves). In addition, the Indonesian Government and the Asian Development Bank are increasingly pressuring exporters to enhance their sustainability standards (40% of Indonesian mangroves were destroyed to be replaced by shrimp farming ponds).

Scale Up: Blue Roots Fund 2 can expand into similar markets in **Vietnam** and **Thailand**, both presenting similar mangrove ecosystems, climate conditions, and focus on shrimp production. In addition, **Ecuador** is also an attractive scaling opportunity, being the most important marine ecosystem in South America and experiencing a large-scale reduction in its mangroves (19.5 thousand hectares of mangroves lost due to shrimp farms).

Operations and Revenue Generation

- We fund and provide expertise in the **transformation of shrimp ponds to medium and large producers and exporters** in Indonesia.
- To allow for inclusivity in our target countries, **we work in accordance with Islamic Finance principles** and will not receive interest from our initial investment, solely carbon credits.
- The financing instrument includes an embedded **call option after 15 years for the producers** exporting shrimp, allowing borrowers to start repaying the initial investment at their own pace. The instrument expires at the 20th year, and the initial investment must be repaid.
- Once the investee repays part of the initial investment, they start receiving **carbon credits on a pro-rata basis**. As soon as the initial investment is repaid, **all new carbon credits will flow directly to the investee**.

Due Diligence

A **specialized due diligence process will be conducted for each target company** to ensure compliance with human rights, financial and ethical standards.

Investor Returns

Annual dividends will be paid to investors in the amount of the IRR. The payments can be either in cash, or in carbon credit certificates, depending on the share class.

- **Cash share**: suitable for financial investors only interested in a cash return;
- **Blue Carbon Credit share**: suitable for investors and/or companies with heavy carbon footprint seeking opportunities to hedge their carbon risk;

Blue Carbon Credit share's cashflows depend on the price of Blue Carbon Credits in the Indonesian market. At current prices, such projects would yield an **IRR of 13.0%**.
Moreover, the sensitivity analysis presented below shows that the **IRR remains above 5%** even in the case **carbon price drop to USD 9** and a **restoration costs increase by 10%**.

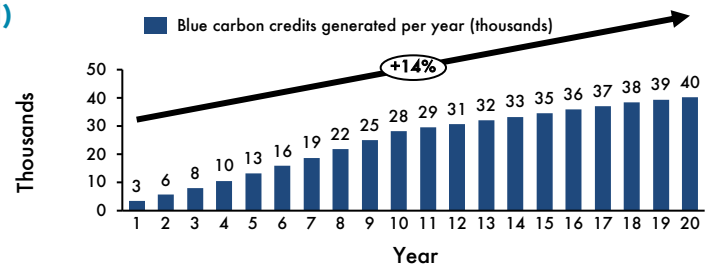
Restoration costs \ Price of blue carbon credits (USD)	9.0	14.0	19.0	24.0	29.0	34.0	39.0
14,103	7%	11%	14%	17%	20%	23%	26%
15,669	6%	10%	13%	16%	18%	21%	24%
17,411	6%	9%	12%	14%	17%	19%	22%
19,345	5%	8%	11%	13%	15%	18%	20%
21,280	5%	7%	10%	12%	14%	16%	18%
23,407	4%	7%	9%	11%	13%	15%	17%
25,748	4%	6%	8%	10%	12%	14%	16%

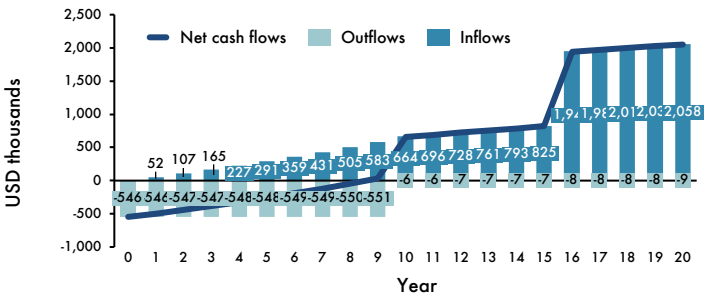
Time Horizon & Cash Flows (per hectare restored)

Each investment has a **time horizon between 15-20 years**. From the 15th year, the investee can pay back their loan at their own pace, with an expiration at the 20th year. This allows for flexibility in their repayment.
The maturity is based on mangroves' natural growth pattern (mangrove trees reach their maximum carbon capture capability after 17 years).
The chart on the side presents a forecast of mangrove trees' carbon absorption per year.

Assumptions

1. Mangroves have 50% of their annual absorption capacity in the first year.
2. There is a linear increase in their absorption rate until maturity at 17 years.
3. The initial investment is paid back by the company over 5 years.
4. Carbon price is assumed to be USD 24 per ton and will constant over the next 20 years.





Financial and Impact Risks	Mitigation Strategy
For Investors: expected returns uncertainty, especially associated with mangroves growth stability	Geographical diversification of targets within each country to lower the probability of exposure to climate disasters.
For the Environment: rising sea level threatens mangroves' life expectancy due to increasing flooding durations	Collaboration with producers and experts (*e.g. Global Mangrove Alliance*) to ensure mangroves have access to regular stream flow to capture sediments and enhance mangroves' resilience to rising sea levels.
Due to target companies' incentives: willingness of producers & exporters to shift production processes	Develop sensitivity analysis of targets' forecasted yields to adverse climate events, to support the necessity of developing a reliable and sustainable infrastructure to safeguard operations. Cooperate with the Global Climate Observing System to leverage satellite information on assets' exposure to climate risk to develop the sensitivity analysis.
Due to unsustainable restoration: targets may cut restored mangrove trees after completion of the project	Each investment contract will include a clause stating that the company must buy an equivalent number of carbon credits emitted throughout the life of the deforested mangroves if the mangroves are ever cut.

Impact Generated through Direct SDG Contributions

Increased water quality: filtered pollutants, trapped sediments, absorbed excess nutrients (**KPIs:** discharged water quality parameters from integrated ponds vs. traditional)

Protection of coastlines against erosion and floods: consequence of the hydrodynamic interactions of mangroves' roots and water flow (**KPI:** Erosion Rate)

Reduced greenhouse gas emissions and mitigation of climate change: due to mangroves' carbon sequestration ability (**KPI:** metric tons of sequestrated carbon per hectare of mangroves)

Improve coastal ecosystems: by allowing local communities to rely on "food baskets" provided by mangroves (**KPIs:** Family sustained/additional income generated from restored areas)