Incentivizing global protection & restoration of mangroves

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Summary

Global Mangrove Trust (GMT) is being established as a Singapore foundation to incentivize the protection of endangered mangrove forests globally. We propose an AI Oracle to Monitor, Evaluate & Reward (MER) forest protection and restoration. *Proof of Impact* tokens are awarded to forest caretakers, and monetized with a smart contract based payments.

Miracles Mangroves

Mangroves are one of Earth's most productive biodiversity nurseries, and a keystone species which keeps the a balance between land and sea. Able to live in saltwater, mangroves are a bioshield which protect coastal communities from storms and flooding. They also filter polluted runoff, which allows sea grasses and coral reefs to thrive.

Fig. 1. Mangroves as keystone species
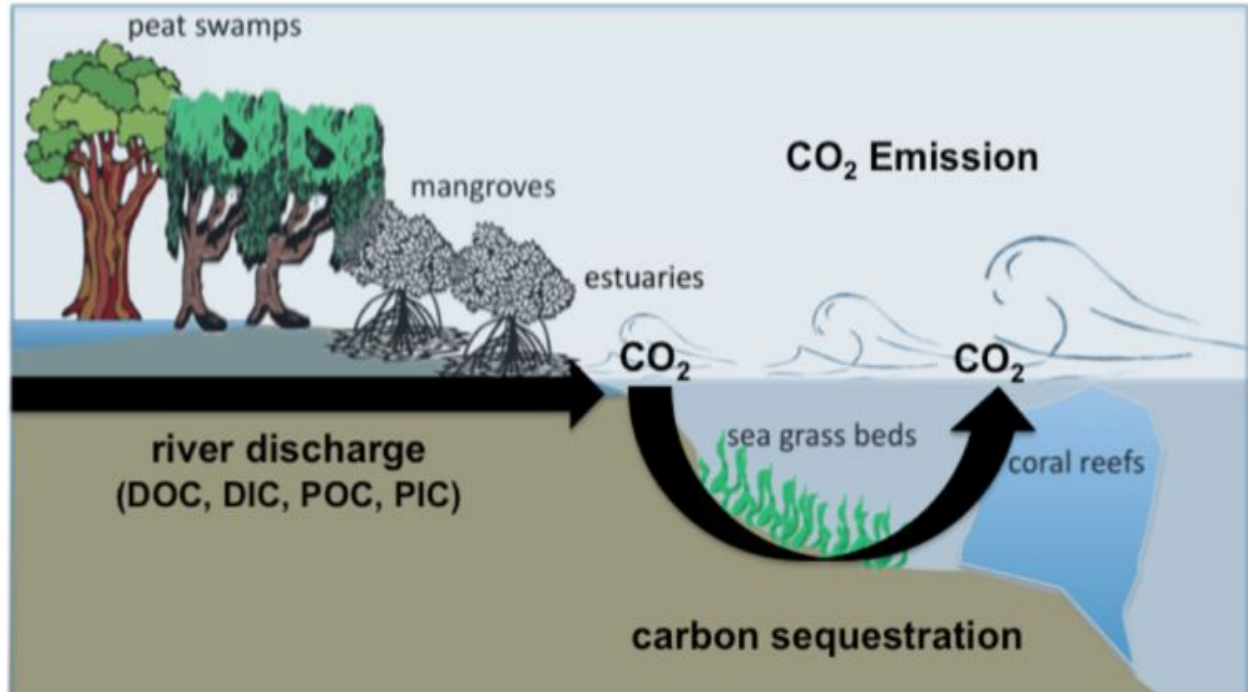
Mangroves and Blue Carbon
Mangroves play a significant role in the oceanic Blue Carbon cycle. Blue Carbon accounts for 83% of the global carbon cycle, mostly concentrated along shorelines where mangroves are a keystone species. Despite their vital role, mangroves have been deforested extensively due to charcoal production, shrimp farming, and coastal development.

Ecosystems impact of mangrove deforestation
Mangrove deforestation triggers a cascading ecosystems collapse. Soil erosion results in loss of arable land, which then smothers sea grasses and coral reefs. The photo of a Burmese pagoda is the sea is a sad case study. The mangrove forest that surrounded the pagoda was deforested to cultivate rice. It did not take long for the sea erode the shoreline. No more rice. No more fish. No more temple. Over the last two decades, Myanmar has lost about 300k Ha to soil erosion due to mangrove deforestation.

Fig 2.: Pagoda roof surrounded by the sea.

We must act now to restore and protect mangroves forests in their current habitat to avoid irreversible ecological tipping points.

Considering that 40% of the world's population today lives in coastal areas, protection from sea-level rise and more frequent and intense storms is crucial. Unfortunately, coastal ecosystems are degrading rapidly. It is estimated that half of the world's mangroves and seagrasses are already gone, and that at the current rate, unprotected mangroves could be gone entirely by 2100. When these systems are lost or degraded, they become a source of greenhouse gases - annual emissions from the loss of blue carbon ecosystems are estimated to be 450 Mt CO2, up to 19% of terrestrial land use emissions. Source: [The Nature Conservancy and XL Catlin Collaborate to Bring Blue Carbon Credits to Market](#)

WIF Mangrove Restoration in Myanmar

Thor Heyerdahl Climate Park in Myanmar, managed by WIF, pioneered community-based mangrove restoration. WIF addresses a root cause of mangrove destruction with community development and education. After WIF failed to reach funding targets through traditional methods, Swiss blockchain startup Lykke helped WIF raise approximately $800,000 with TREE, a mangrove and carbon credit backed token. GMT is now taking the lead to design the next generation tokenized mangrove sponsorship programme.

Barriers to Verified Carbon Units (VCUs)

A major hurdle to the financing of mangrove restoration is the expense and time required to obtain VCUs which can be sold to corporations. After close to two years and 5 PhD's making multiple site visits and writing many reports VCUs have not yet been rewarded. WIF has spent $3.5 million of donor and investor money to plant 3.5 million mangroves, and urgently needs fund to reach its target of 8 million mangroves. The challenges faced by WIF are documented in an upcoming HBS case study authored by GMT founder Dr. Ryan Merrill.

Earth Pulse: A Super Brain (and heart) to award protectors of Earth

On May 5th & 6th the first [Earth Pulse](#) meeting convened to design a technology driven process to monitor earth's biodiversity and award impact. Rather than be tied to 1980;'s type bureaucratic processes, the goal is to apply modern technology to enable the protection of systemically important ecosystems.

- Remote sensing information from satellites, drones, and mobile phones can train an AI Oracle to estimate CO2 sequestration, O2 production, and biodiversity.
- A digital forestry app can advise communities on the best agroforestry techniques, while awarding real time event based *Proof of Impact (POI)* tokens (e.g., *Proof of Planting, Proof of Care, CO2 credits, O2 credits, Biodiversity credits*).

For example, Biodiversity credits may be awarded from mobile phone images that help monitor the various species of birds, insects, and mammals in a mangrove habitat. Task.io has agreed to develop the mobile platform for verifying tasks. Silo.ai makes its AI services available. AI algorithms would be trained by humans verifying images or videos (e.g., "does this look like a healthy mangrove forest with 30 mangroves?").

- POI tokens could then be exchanged for valuable services, such as mobile data plans or microloans.

Mangrove Impact Bond (MIB)

A MIB could be structured to make periodic payouts that correspond to the broad ecosystems services provided by the mangrove forest estimated by the AI Oracle (e.g., CO2 sequestration, O2, Biodiversity Credits, Flood Resilience Credits). MIB could be especially interesting to insurance companies and coastal municipalities to increase flood resilience. A MIB could also be programmed to make automatic payouts to communities protecting the mangroves with every confirmed POI. Alternatively, smart contracts could be triggered to purchase POI tokens, which would imply an appreciating token price and therefore provide a greater incentive to keep achieving positive events.