



A lesson-learn of large scale land-base carbon credits for long-term funding mechanism of community based mangrove restoration and livelihoods development in Northern Sumatra, Indonesia

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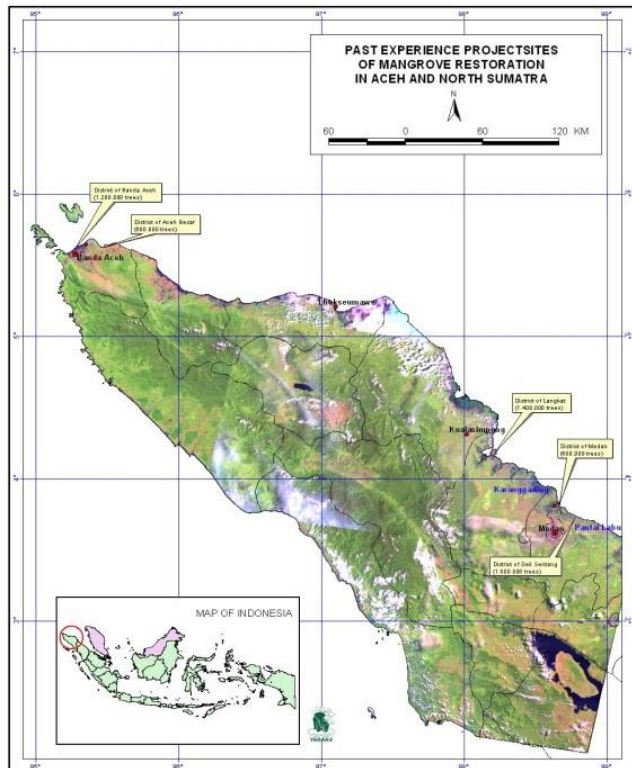


Our mission: to increase an environmental carrying capacity of mangrove ecosystem for natural disaster risk reductions, local livelihoods improvement and climate change mitigation and adaptation

WHAT WE HAVE DONE ?

The mangrove ecosystem in Indonesia has highest and rapid biodiversity threat for intensive shrimp ponds, palm oils and human settlements. What's currently lacking is long-term funding mechanism to empower local communities directly involve in sustainable mangrove protection program.

Starting on July 2011, Yagasu has conducted the first land base carbon credit program in Indonesia on mangrove restoration funded by the investor of Livelihoods Fund, the consortium of multinational companies: Danone, Schneider Electric, Credit Agricole, Hermès International, Voyageurs du Monde, La Poste Group, CDC Climat, Fermentich, Michelin and SAP-Germany.



This project is the first land-based carbon credits on forestry sector in Indonesia and the third mangrove carbon project in the world after Senegal and India. The program was signed for 20 years and the first phase of project payment is for 10 years contract. The investor will receive the carbon credits from mangroves planted by the local communities and the carbon credits will be not for trade.

Yagasu research & monitoring activities:

1. Managing Carbon and Biodiversity Research Unit (CBRU) of mangrove ecosystem:
2. Conducting Climate, Community and Biodiversity (CCB) study
3. Conducting regular monitoring the growth of 5,000 ha planted mangroves
4. Conducting carbon accounting research for the above- and below ground carbon stocks on the 2, 4, 6, 8, 10 years of restored mangroves using the non-destructive and destructive methods, in 2 different sub-ecosystem
5. Conducting research on physical & chemical parameter and local climate (rain-fall, air temperatur, humudity, sun radiation and wind speed) linked to the carbon stocks of mangrove ecosystem
6. Developing field monitoring for local community through android system.
7. Conducting Economic Valuation of the mangrove ecosystem
8. Providing the research grants for post-graduates on various mangrove issues
9. Monitoring the impacts of mangrove restoration and protection on commercial biodiversity, such as fish, crab, oyster and shrimp
10. Conducting a specific research on mangrove usages for foods, “batik” inks and other products



The program also created a leverage funding mechanism through a cooperative agreement with USAID-Indonesia program. This leverage project is to build the models of Village Land-use Plan (VLP), Mangrove Protected Area (MPA) and Village Regulation; conduct the several research activities; operate Community Patrolling Unit; and improve local economic through various village business incentives and cooperatives. Those program are integrated into the mangrove REDD+ development.



Mangrove restoration based on land-used carbon offset in Aceh and North Sumatra through the combination of voluntary carbon scheme, livelihoods development and REDD+ programs play a unique role of the Coastal Carbon Corridor model in mitigating and adapting the harmful effects of climate change.

FUNDING SCHEME



The funding scheme is not as a grant but as an investment. The project developer received an advance fund for running the project. All economic impacts of the project will go to the local community and they don't need to return their received funds to the project developer or investor. However, the local community should taking care the planted mangroves as they signed the contract. If there is any risk regarding the failure of the project, it will be shared between the project developer and the investor.

The project has received the LOA from the Executive Chair of the National Committee on CDM of the Republic of Indonesia. However, the project is registered through the VCS verification scheme. In order to improve the CER, the project will also be registered to the **Gold Standard** for the positive impacts on community and biodiversity.

PROJECT IMPACTS

The project has prioritized to improve community resilience to the potential coastal natural disaster with special attention given to women groups. This project involves around 4,800 local people divided into 165 community groups that are located in 118 villages of 13 districts/towns. As an incentive of mangrove protection, economic alternative for local community is introduced as an innovative approach for sustainable financing. The local economic program has been developed that include organic silvo-fishery, fishing recreation, mangrove eco-tourism, crab fattening and soft-crab production, organic “batik” mangrove inks, mangrove foods and beverages and other various coastal business. The revolving funds and village cooperatives have been set up for local community business and product marketing.

The next step is to combine the climate change mitigation program with the adaptation program. This project also create a leverage of new projects such as business to business with the companies who invest their funds.



Planting mangroves in Percut, started on November 2002



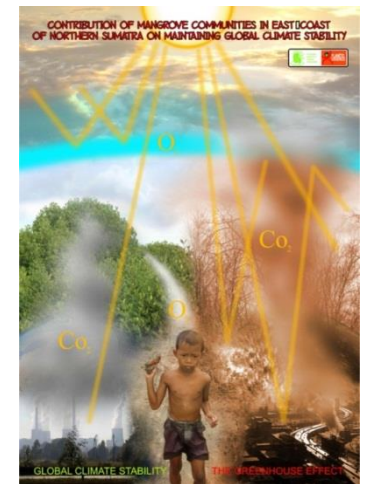
MANGROVES FOR CLIMATE CHANGE MITIGATION

Yagasu has used CCB method to identify coastal based projects that can simultaneously deliver compelling climate, biodiversity and community benefits. We conducted field survey in two pilot project sites (Percut and Secanang) in 2008.

We created our own Carbon and Biodiversity Research Center in Percut for permanent plots of carbon and biodiversity study.

Local climate change

We analyzed secondary data climate measurement for the period 1987 – 2011 (rainfall, temperature, relative humidity, sunlight intensity period, and wind velocity) from the Sampali and Belawan climate stations. The *t*-Test shows the air temperature, length of radiation, air humidity and wind velocity have significantly changed during the last 25 years.



Net positive climate impact prediction: calculation measuring carbon emissions with- and without- the mangrove planting project

	Current stock 2008 (ton)	Predicted stock 2038 (ton)	Carbon sequestered (ton)	Project emission reduction (ton)	CO ₂ equivalent (ton)
Baseline	38,731	527,118	488,387		
Project	38,731	1,034,104	995,373	506,986	1,860,639

The average CO₂ emission reduction after the project implementation of above ground mangroves will reach 46.67 tons CO₂ per ha per year, however, the total above- and below ground is around 90 tons CO₂ per ha per year

Looking at the long-term mangrove ecosystem resilience, the project scenario, backed up with our CCB study, the 5,000 ha restoration for the ecosystem resilience in the face of climate change for 20 years program will potentially offset approximately 9 million ton CO₂ from above- and below ground mangrove carbon stocks.



MANGROVES FOR LOCAL ECONOMIC DEVELOPMENT

Ecosystems	sources of fish & shrimp larvae, mollusks meat, natural honey, aquaculture, eco-tourism and fishing business
Stems and branches	Timber for pond construction/fences/fishing poles, yield-honey, tanbark for for tanning leather, fibers for ropes, dyeing fish-nets and natural batik coloring inks.
Roots	Handicrafts, medicines and natural batik coloring inks
Fruits	alternative food products and nypa wine/alcohol/vinegar
Leaves and flowers	herbal tea and nypa roof shingles, young leaves as forage to cows, and natural batik coloring inks.

As an Incentive of coastal restorations, economic alternative for community will be introduced as an innovative approach for sustainable financing. An extra source of income is generated by the rapid productivity increases on fish, shrimp and crab fattening. The development of eco-tourism is another serious expected source of income for the local communities.



NET POSITIVE COMMUNITY IMPACTS

To estimate the net benefits to communities resulting from planned activities, the project will develop a design standard to validate an accurate achievement from the beginning of the program. This will be achieved through stimulation by investment in the project development for the local community to earn income through rehabilitation, protection and sustainable of the mangrove ecosystem.

The initiative can be developed through a model at local level with some indicators on community net-income using the formula below.

$$TPB = \sum_{i=1}^n Y_i P_i - C_i$$

TPB : Total net-income (Rp)

Y_i : Production of community land i (kg)

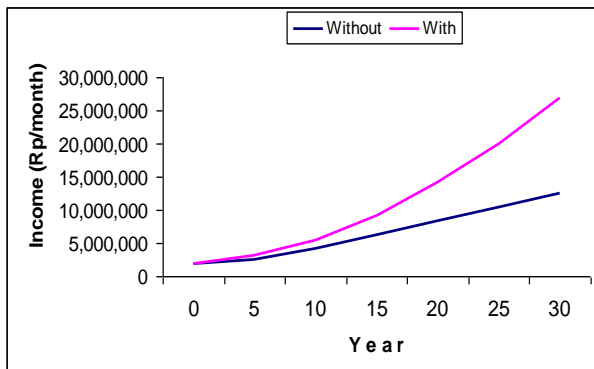
P_i : commodity price i (Rp)

C_i : Expenses of product commodity i (Rp)

The project will target economic institution revitalization, such as facilitating access to local market under fair conditions through cooperative system. Therefore, beside its role as an ecological protection from natural disaster, mangrove rehabilitation may leverage income and improve the sustainability and a better quality of fishery activities.

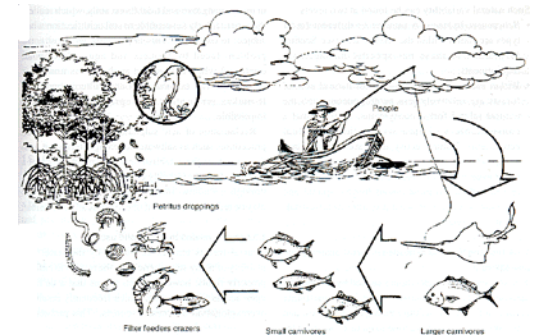
The income analysis clearly indicates that fishing activities represent the main income for communities in the project sites, and that, therefore, mangroves play a crucial role in fisheries yield and interact closely with community income.

Prediction of community income with and without project:



In terms of economic benefits for local people, our study shows that the average income is Rp 1.850.000 or 205 USD per family per month if there is no mangrove restoration project. Whereas a restoration project's positive impacts will increase community income 57% to Rp 3.071.000 or 323 USD per family per month.

Analysis of results shows a positive correlation between mangrove ecosystem existence and catchments fishery production in Aceh province, especially for shrimp and small pelagic. This interaction is illustrated in the Fozal equation, where: $h_t = 0.6883E_t + 5.23623 E_t^2$. Thus, the mangrove ecosystems contribute 27.21% to fishery resource production.



MANGROVES FOR FOOD SECURITY



Acanthus illicifolius



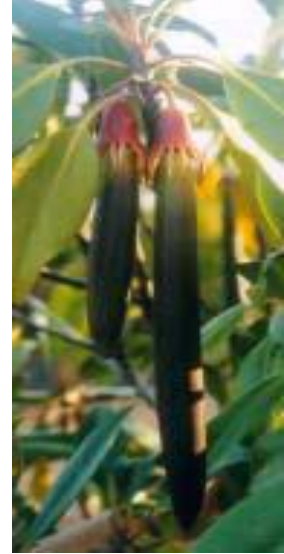
Nypa fruticans



Avicenia oficinalis
Avicenia marina
Avicenia alba



Sonneratia caseolaris
Sonneratia alba



Bruguiera gymnorhiza

Proximate analysis of *Avicenia marina*: protein (4.83%), fat (0.24%), carbohydrate (25.25%), amylase (17%), water (37.15%) and vitamin C (70.6 mg).

Mangroves consist of bioactive compounds: alkaloid, flavonoid, fenol, terpenoid, steroid, saponin and tanin (Eryanti *et al.*, 1999).

	Energy (kcal/100 gram)	Carbohydrate (gram/100 gram)
<i>Bruguiera gymnorhiza</i>	371	85.1
Rice	360	78.9
Corn	307	63.6

MANGROVE FOOD PRODUCTS





MANGROVES FOR FASHION

CREATIVE KANAWIDA



SCHOOL CHILDREN PARTICIPATION IN MANGROVE RESTORATION

We will also mobilize school children in the nearest project sites to participate in planting mangroves. The purpose of the program is to increase awareness and to involve school children directly in climate change issues self learning and understanding process, through tree-planting action, from their earlier age.



*Long-term funding mechanism for mangrove protection
will improve our future environment and people*



THANK YOU