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Protecting Our World, Conquering New Frontiers

RECLAMATION/REHABILITATION OF THE FORMER SEA TIN MINE PT TIMAH TBK

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THE IMPACT OF SEA TIN MINING

The Coral Reefs Covered with Mining Waste Sediment	In The Middle of A Strecth Of Dead Coral Reefs
	

SEA TIN MINING LOCATION

- Example **Sea tin mining activity** by a number of large and small **production suction vessels** around Matras waters (Bangka)
- **The tailings** from tin mining activities that are **discharged directly into the sea**, can cause a change in the color of the **water** from **clear to brown.**
- The structure of the **aquatic substrate**, from **sand mixed with mud** [muddy sand], to the destruction of coral reef ecosystems.
- The *impact of dumping tailings* directly into the sea, **will be devastating**. In particular, coral reef ecosystems are very sensitive to change.

THE LOCATION OF TIN MINING SITES IN BANGKA ISLANDS

Distribution of Tin Mining Business Permits

WIUP = Mining Business Permit Area

Reclamation/Rehabilitation of Former Sea Tin Mine of PT Timah Tbk

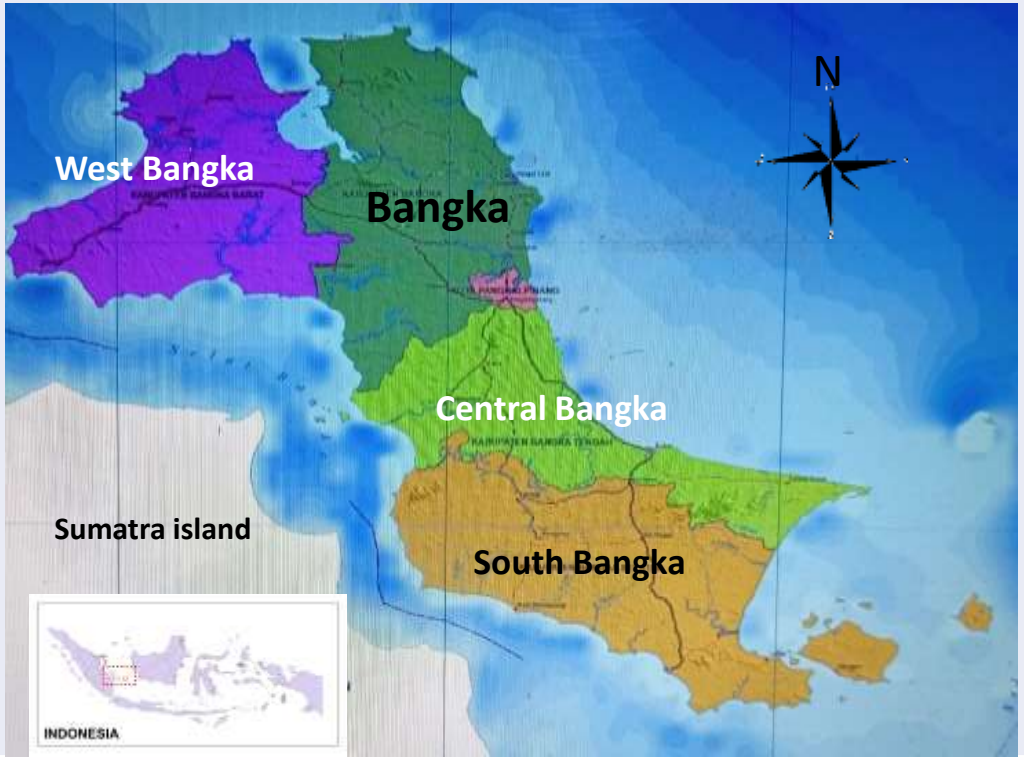
- **Tin mining activities** both on **land and at sea**, in addition to generating financial benefits from the economic **value of tin ore**, also have a negative impact on the environment around the post-mining area.
- Post-mining reclamation/rehabilitation on land is relatively easier to see in terms of conditions compared to reclamation/rehabilitation on the seabed.
- The impact of opening a tin mine at the bottom of the sea apart from leaving land in the form of expanses of land, sand dunes and holes, is also very likely to have some effect on the condition of the surrounding ecosystem.
- The results of tin mining cause some damage to coastal landscapes and ecosystems such as mangroves, coral reefs, seaweed and sedentary species.
- Changes in the landscape, reduced richness of biodiversity on land and in the sea and reduced potential for water resources are environmental issues that are of concern to various parties.

Reclamation/Rehabilitation of Former Sea Tin Mine of PT Timah Tbk

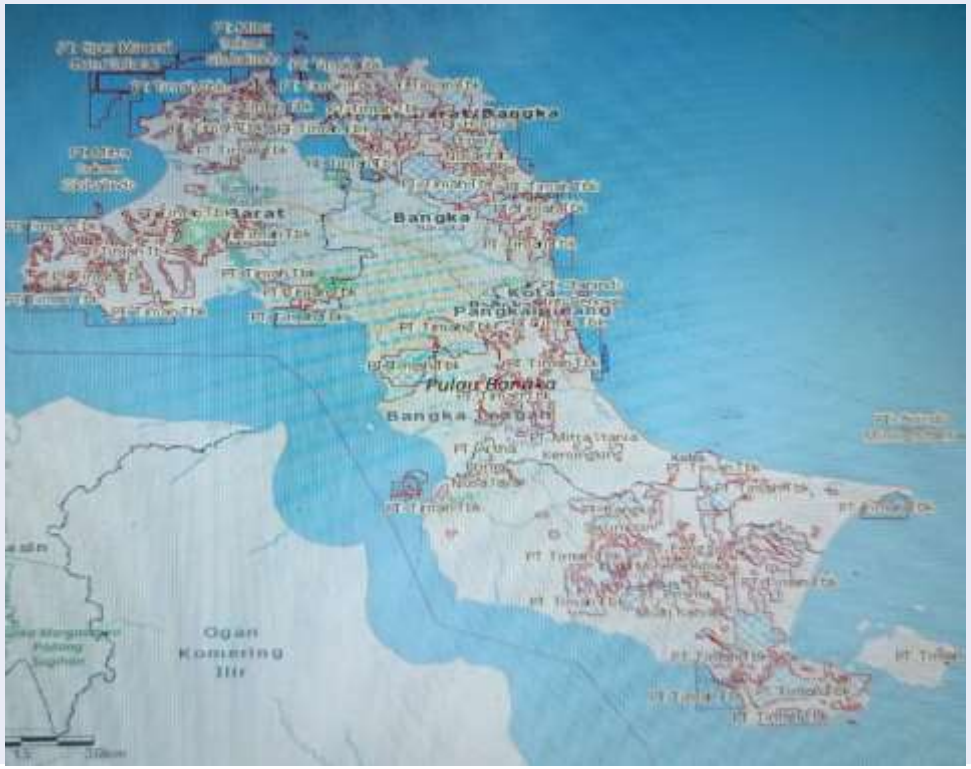
- Based on the Decree of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 1827 K/30/MEM/2018 concerning Guidelines for Good Mining Practices, every mining company is required to carry out reclamation/rehabilitation activities at Production Sites.
- Stages of operations at sea, including management of seawater quality, prevention and control of coastal abrasion and/or silting, and protection of biodiversity.
- Therefore, efforts are needed to restore, repair, and prepare ex-mining land so that it can be reused according to its designation.
- Rehabilitation efforts basically aim to minimize damage caused by mining activities and are expected to rehabilitate ecosystems and various underwater biota.
- PT TIMAH Tbk as a tin mining company that has been carrying out offshore mining activities for a long time, of course feels responsible for the life of underwater biota, especially after its production equipment operates in coastal areas.

Bangka Island is located in Malacca strait, South Eastern part of Sumatra Island, Indonesia, South East Asia

There are 4 (four) district in Bangka island



Distribution of Tin Mining Business Permits



AIM

This study aims to **provide direction/guidance** to parties (local government & private sector) regarding concrete steps for Marine Reclamation/Rehabilitation at Underwater Tin post-mining sites

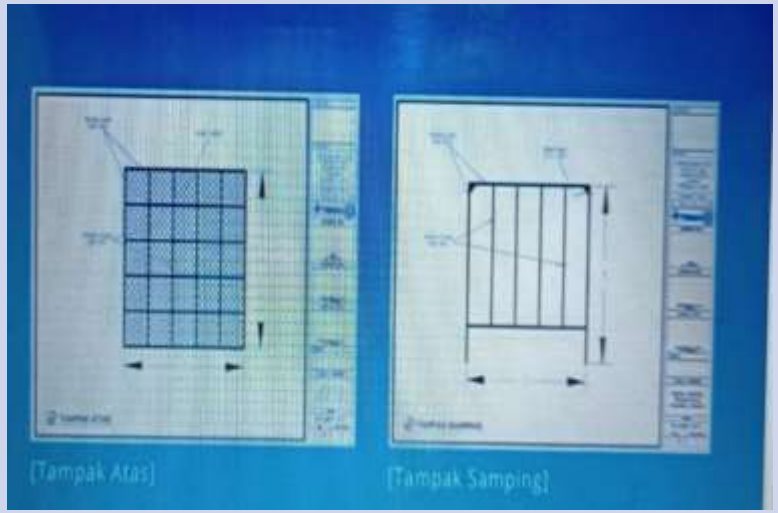
METHODS

- **The application of survey and mapping technology** to identify former tin mining locations at sea or offshore,
- **The implementing coral transplantation** and **fish protection methods within the identified area** as well as a **mangrove planting scheme**.

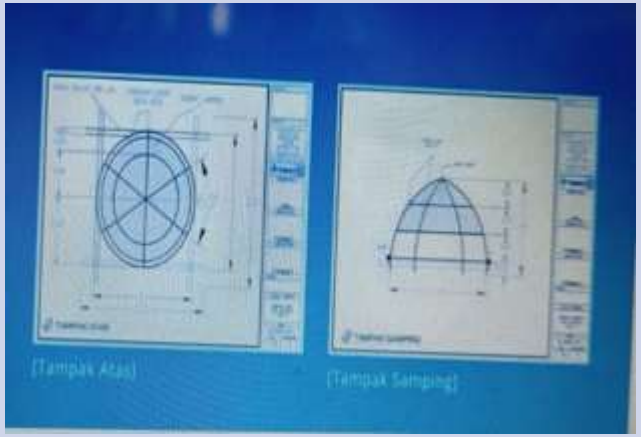
The application of survey and mapping technology

A. Integrated Geospatial Instruments	B. Integrated Bathimetric Survey

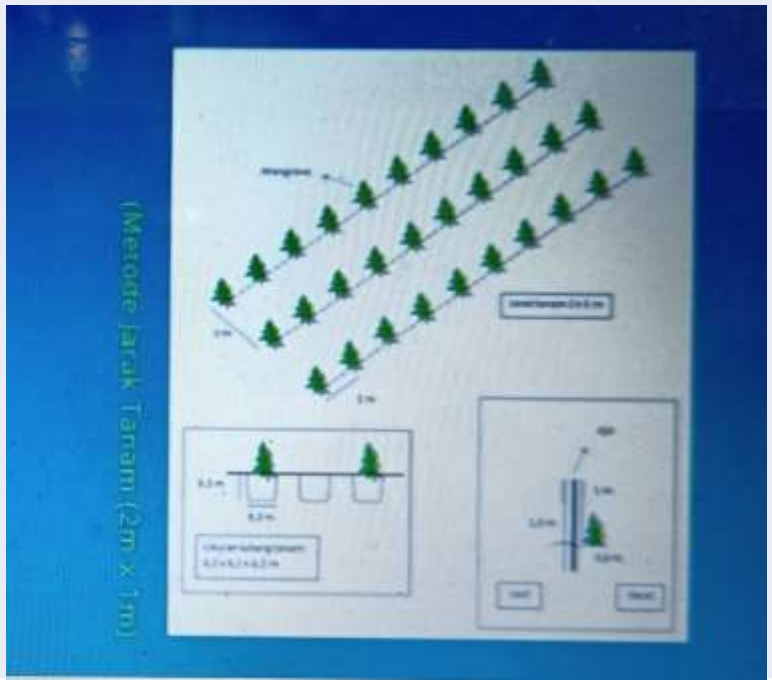
The implementing coral transplantation

Coral Reef Transplant Design in Bangka island waters	Physical Realization of Coral Reef Transplant Media
The transplant media is a place for the transplanted coral seedlings to attach and become a new habitat for corals to grow and develop.	the selection of coral transplant designs is based on the characteristics of coral reefs waters and the proper coral transplant design for use in Bangka waters
	

The implementing fish shelter for fish protection

The fish shelter building design	*This design uses a design like a serving hood which is a symbol/characteristic of the Bangka Belitung Islands.*
Is to attract fish around the placement site	This fish shelter is also intended as a substitute for coral reefs as artificial shelters for fish.
	

The implementation of Mangrove Planting Scheme

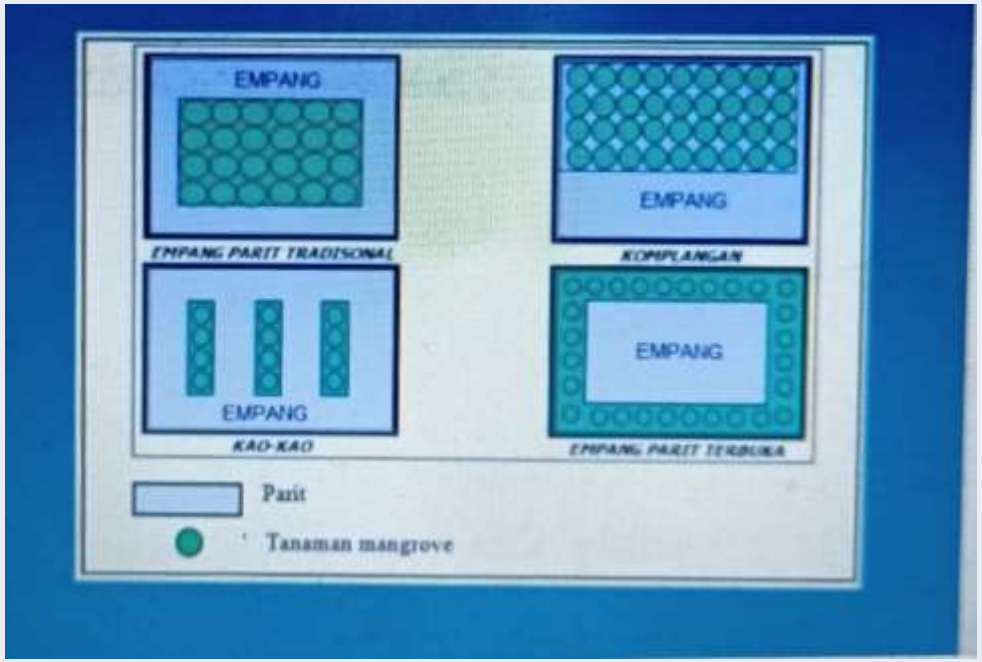
Planting Distance Method (2 m x 1 m)	Mangrove Planting Design TYPE 1
	• At the planting stage, mangrove species are grouped by type. • Mangrove seedlings are planted at the planting site using a mangrove planting technique using stakes. • The use of stakes is useful for keeping the mangrove seedlings from falling when hit by waves. Spacing 2 m x 1 m.

The implementation of Mangrove Planting Scheme

Cluster/Group Method	Cluster Spacing (Group) design TYPE 2

- At the planting stage, mangrove species are grouped by type of species.
- Mangrove seedlings are planted at the planting site using the mangrove planting technique in groups (clusters) where the mangroves planted are within the scope of the marker.
- The use of stakes is useful for keeping mangrove seedlings from falling when hit by waves

The implementation of Mangrove Planting Scheme

The Intercropping pattern of ponds	Intercropping pattern of ponds design TYPE 3
	• Planting mangroves can be done using an intercropping pond system to optimize and support capacity building and community empowerment and help protect biodiversity. • In several locations in the **Kundur area** there is potential for mangrove planting activities with this system which can be used as pilot locations. • In addition to maintaining the existence and improving the mangrove ecosystem, this activity will later be integrated with fish/crab/shrimp farming activities.

RESULTS

The Districts of Bangka Island

Results of survey and mapping of the state of the seabed in a former marine tin mine in the areas of Bangka Island; ***West Bangka***, ***South Bangka***, ***Central Bangka*** so far this has only been done to identify the best location area to penetrate and analyze :

- the *Basic Substrate Cover Conditions,*
- *Condition of Reef Fish and*
- *Condition of Benthic Biota.*

As a condition to prepare the implementation of **coral transplantation** activities and **fish shelters** as well as **planting mangroves** that are environmentally friendly

RESULTS	

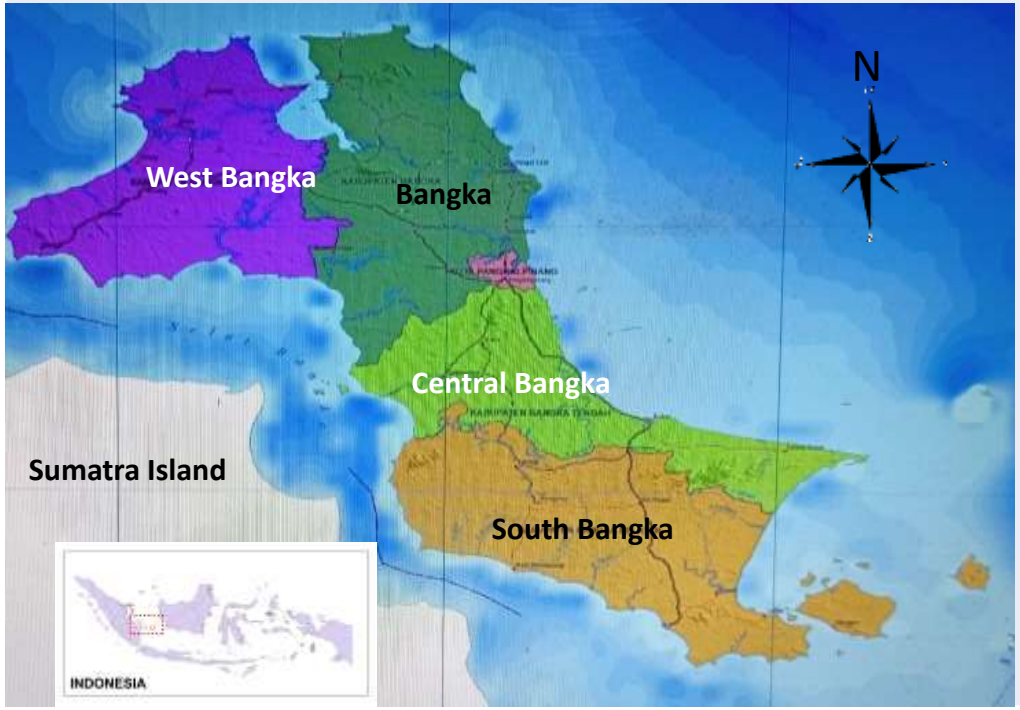
In the **West Bangka, South Bangka, Central Bangka areas** are appropriate to carry out includes **transplanting coral reefs**, *sinking and placing **the*** **fish shelters**. The indicator of success, seen from the mainstay fish species diversity index (**H'**) **1.412 - 3.232** from the standard expected value **H'> 1.5**.

Fish shelters have been quite successful in being implemented throughout the waters of **Bangka Belitung** except in the waters of **Pulau Permis**, **South Bangka Regency**, where there are still many tin mining activities at sea by the local communities (Floating TI) and where the water conditions are more turbid.

The highest **H'** value was found in the **Rebo Melantut & Rebo Sungailiat** with the number of fish species found as many as **54 species**,"

RESULTS

West Bangka ; **Bangka**; Central Bangka; South Bangka



In areas commensurate with the coast of the former sea tin mine on Bangka Island, **West Bangka, South Bangka**, **Central Bangka** which experienced of abrasion, the types of plants chosen as a form of reclamation activity were **mangrove plants** of :

- the types *Rhizophora sp (mangrove plant),*
- *Sonneratia sp (plant quad). ,*
- *Avicennia sp and beach plants such as Casuaria equisetifolia (Sea cypress) and*
- *Terminalia catappa (Ketapang).*

CONCLUSIONS

- The Success Implementation of a coral transplantation system and fish shelter in former tin mining areas at sea or offshore in the **Bangka Belitung Islands**.
- Becoming an effort of sustainable reclamation so that the ecosystem can grow and bring sustainable economic benefits

- The Coral transplantation and fish shelter methods will be implemented in Bangka, West Bangka, Central Bangka and South Bangka Regencies.

- Especially in **South Bangka Regency**, only the fish shelter program, while in other districts it is **completed** for fish shelter and coral transplants.
- Several areas where **fish shelters** have been placed, will become ***fishing and catching locations*** **for fishermen**.

- The Empowerment of fishing communities were distributed in **ten points** of the reclamation /rehabilitation area namely :
- *Player Island, Gunung Namak Beach, Mattress Waters, Karang Kering Rebo, Karang Melantut, Pulau Putri, Pulau Panjang, Karang Aji, Karang Tanjung Ular, and Tanjung Melala.*

CONCLUSIONS

The coral transplants, not all of them have been successful because the corals have a high sensitive to decreasing water quality.	The condition of the waters which are still affected by the impact of mining in the sea is not optimal for coral growth, especially the changing currents and waves.
Some of the transplanted corals grew well, but many of them died covered in fine mud sediments and were lost/dislodged due to currents.	Many of the coral transplant modules in the waters of Tanjung Melala, Parit Tiga District, West Bangka Regency, were damaged by strong waves during the west monsoon.

CONCLUSIONS

• The Coral transplants in several areas have been quite good, including on ***Pulau Panjang, Regency of Central Bangka***, ***Tanjung Melala, Regency of West Bangka***, **Karang Batu Putih, Pulau Putri, and Karang Melantut, Bangka Regency.**	• PT Timah as the initiator of sea reclamation /rehabilitation and become the role model for local governments and private companies that carry out mining activities in the sea.
• The method of reclamation/rehabilitation past-marine mining will become a reference and input for local governments in preparing technical guidelines regarding reclamation/rehabilitation activities at the ***Production Operations stage at sea.***	• PT TIMAH, Tbk will always be committed to continuing to be friendly with marine or sea by maintaining its biodiversity which includes covering the condition of coral reefs, fish,benthic and mangrove biota as well as the local communites, by sharing knowledge and experience in carrying out marine reclamation/rehabilitation activities.

GLOSSARY

- This paper will be presented on FIG Working Week 2023, Orlando, Florida, USA
- The largest and most prestigious conference of surveying and geospatial professionals in 2023; held in Orlando, Florida USA. We expect around 2,000 surveying and geospatial experts from all over the world.
- The International Federation of Surveyors (FIG) is a United Nations and World Bank recognized non-governmental international professional organization. FIG was founded in 1878 and represents national associations of surveying, cadastre, valuation, national mapping professionals, geospatial experts and quantity surveyors working in both the public and private sectors, in the scientific, research and academic community, as well as from technology innovators and industry from more than 120 countries around the world.
- Each year, FIG convenes a conference in cooperation with a national member association. This Working Week will be held in cooperation with our US member - the National Society of Professional Surveyors, NSPS.
- The overall theme is **Protecting our World, Conquering New Frontiers** which refers to the importance of looking ahead and discovering what will be needed in the future for our profession and at the same time make sure to preserve what works well today.

Glossary

The Advantages of this International dissemination for PT TIMAH TBK

EXTERNAL ADVANTAGE	INTERNAL ADVANTAGE
• International recognition for Tin sales standard • Ease of Tin marketing to the world • Good tin mining practice • Guarantee for price certainty • Convincing the potential tin buyers	• Guidance on the reclamation/rehabilitation model for all sea tin miners • Development site for the Economic development and National Strategy project • Regional marine investment development • Regional marine conservation area

THANK YOU

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