

Title

Developing equipment to help anchor seagrass seedlings  
to increase seagrass survival rates

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## Abstract

The purpose of this project is create equipment for help anchor seagrass seedlings to increase seagrass survival rates. This equipment made from bamboo that strong and biodegradable without having a negative effect on the marine ecosystem, it has pin for fasten seagrasses with soil. Inventors design ,create and plant seagrasses by 3 types of equipment to compare with normal planting. Type 1 have prongs for resist water current, type 2 does not have prong and type 3 looks like an anchor. Inventors collected data on the survival rate after planting for 1 month. It was found that seagrasses was grown normally, planted with biocups and equipment type 2 has a survival rate of 11.11 percent. Seagrasses grown using equipment type 1 has a survival rate of 22.22 percent and seagrasses grown using equipment type 3 has a survival rate of 33.33 percent. The soil quality of Bunkong Bay , is an area that plant seagrasses in this experiment .The nitrogen content is very low. Low phosphorus content and high potassium content .This may affect the growth of seagrasses. Therefore, this equipment can increase seagrass survival rates and we should plant it in an area that is appropriate. This will be beneficial in long terms of storing carbon. Including increasing food sources Habitat for aquatic animals and dugongs as well.

*keywords: Seagrasses, Survival rate, Growth*

## Research Question

1. Is there a difference in water quality before and after planting seagrass?
2. Is there a difference in soil quality before and after planting seagrass?
3. Innovation for fasten seagrasses can increase the survival rate of seagrasses or not?

## Hypothesis

1. Water quality before and after planting seagrass is difference.
2. Soil quality before and after planting seagrass is difference.
3. Innovation for fasten seagrasses can increase the survival rate of seagrasses.

## Introduction and Review of Literature

Nowadays, coastal resources tend to deteriorate. The seagrass ecosystem is one of the first ecosystems to be affected by various activities. Deterioration of seagrass is caused by natural factors and human actions. It affects the abundance of habitats, feeding grounds, and refuge for many marine life. (Marine Resources Research and Development Institute Coastal and mangrove forests Thailand, 2019)

Seagrass area in Trang Province, such as around Makham Bay, Sukorn Island, Kangkoaw Island, Bunkong Bay, Thung Chin Bay and Libong Island has deteriorated. Over the past 10 years, seagrass ecosystems have been conserved and restored. By replanting and transplanting. But it was found that seagrass had a low survival rate. Due to environmental limitations in nature in each area (Department of Marine and Coastal Resources, 2016)

The organizers studied the factors affecting the growth of seagrass. Both water quality and soil quality in the area of Bunkong Bay, Trang Province, which is an area where seagrass cultivation has been trialled. Both before planting and after planting seagrass. To compare the differences in soil and water quality. And also to see the suitability for the growth of seagrass.

The organizers want to increase the seagrass chances of survival. Therefore, we invented an equipment for fasten seagrasses to increase the survival rate of seagrasses. This equipment made from bamboo that strong and biodegradable without having a negative effect on the marine ecosystem, it has pin for fasten seagrasses with soil and there is prong of bamboo to resist the violence of the water current.

The organizers are aware of the importance of the seagrass ecosystem therefore we developed an equipment for fasten seagrasses to increase the survival rate of seagrasses. This can help restore natural seagrass resources.

## Research Methods and Materials

### Materials

1. Thermometer
2. Turbidity tube
3. DO meter
4. pH meter
5. NPK test kit
6. Equipment for fasten seagrass
7. Biocups
8. Oven for baking soil
9. Kiln
10. Digital scale
11. Bamboo
12. Epoxy glue
13. Seagrass 45 trees
14. Plastic rope
15. PVC shovel

### Research Methods

#### 1. Surveying the area

1. Study water quality before planting seagrass. Collects data on water temperature, turbidity, water surface temperature, pH and DO of the water.

2. Study soil quality before planting seagrass. Collects data on nitrogen potassium phosphorus and organic matter in the soil.

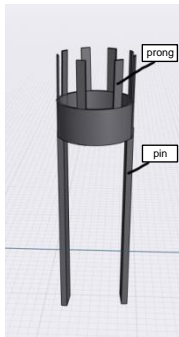
3. Sent data of water quality and soil quality to GLOBE data.

## 2. Study factors

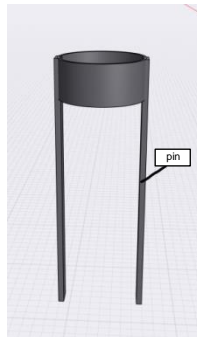
1. Factors affecting seagrass survival
2. How long can seagrass plants survive on their own
3. Materials with properties suitable for equipment creation.
4. How to plant seagrass

## 3. Design innovation for fasten seagrasses

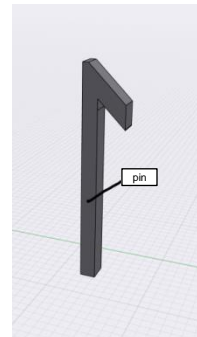
We use shapr3D application for design all type of equipment



type 1



type 2



type 3

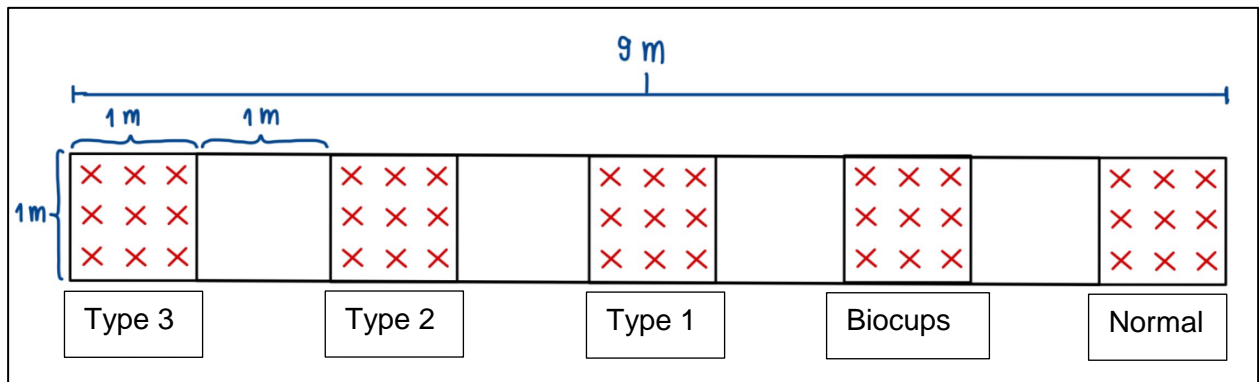
## 4. Create innovation for fasten seagrasses

1. Create equipment that including by prongs and pins.
2. Cut bamboo into 1-inch cylinders.
3. Create pins, Length 5 inch and width 0.6 inch
4. Create prongs
5. Create innovation 9 piece/type

## 5. Test the innovation

1. Planting seagrass in the area of Bunkhong Bay at 47 N (x = 532580 , y = 83088)

2. Specify the planting area to be 1x1 meter per plot, totaling 5 plots and in each plot plant 9 seagrass as shown in the picture.



3. Use PVC shovel dig soil
4. lay seagrass in the hole
5. cover with soil
6. cover with the innovation

## 6. Data collection

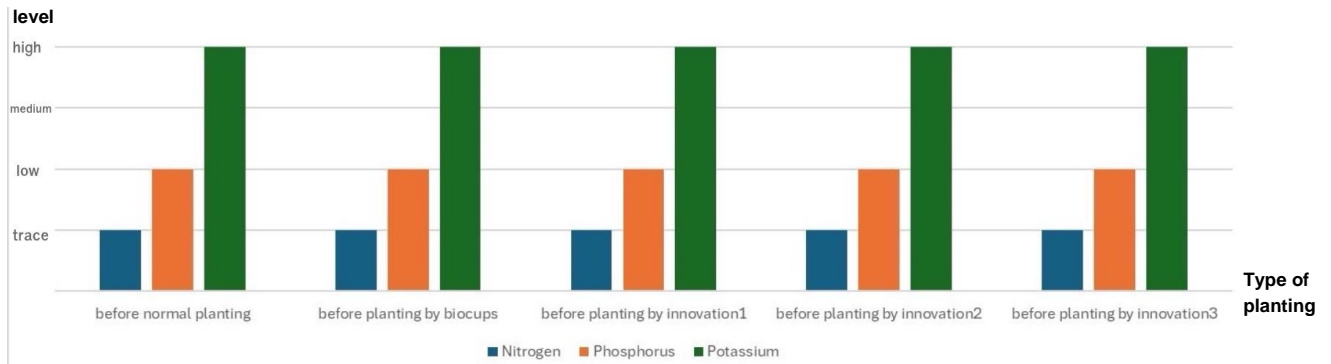
1. Study water quality after planting seagrass. Collects data on water temperature, turbidity, water surface temperature, pH and DO of the water.
2. Study soil quality after planting seagrass. Collects data on nitrogen potassium phosphorus and organic matter in the soil.
3. Sent data of water quality and soil quality to GLOBE data.
4. Collect data of survival rate of seagrass after plant for 1 month

## Results

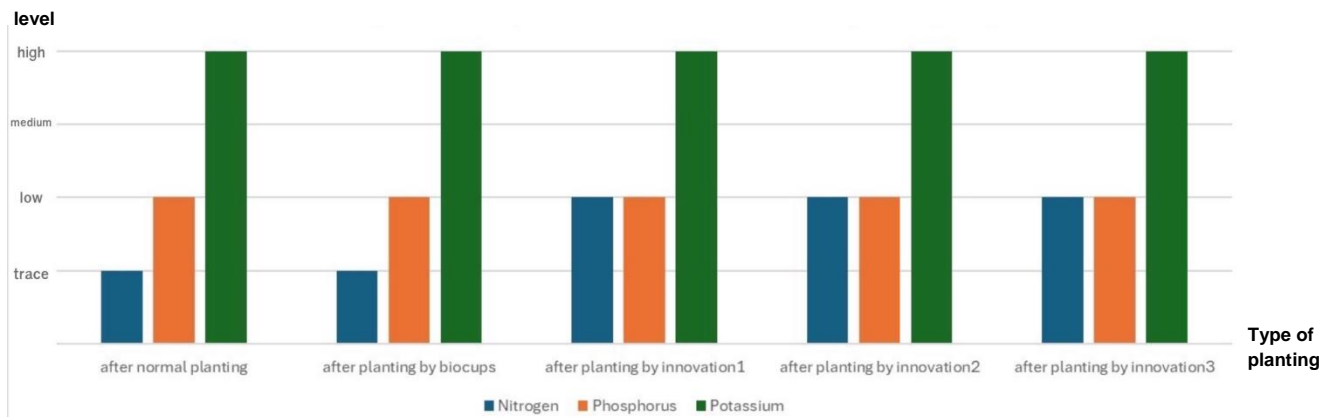
Table 1: results of water quality before and after planting seagrass in Boon Kong Bay.

factors time	Water temperature	Surface water temperature	DO	pH	Turbidity
Before planting	29±0	28.5±0	5.3±0.2	7.8±0.1	9.33±1.52
After planting	27±0	27.5±0	5.6±0	7.6±0	10±2

Graph 1: result of nitrogen phosphorus and potassium values before planting seagrass.

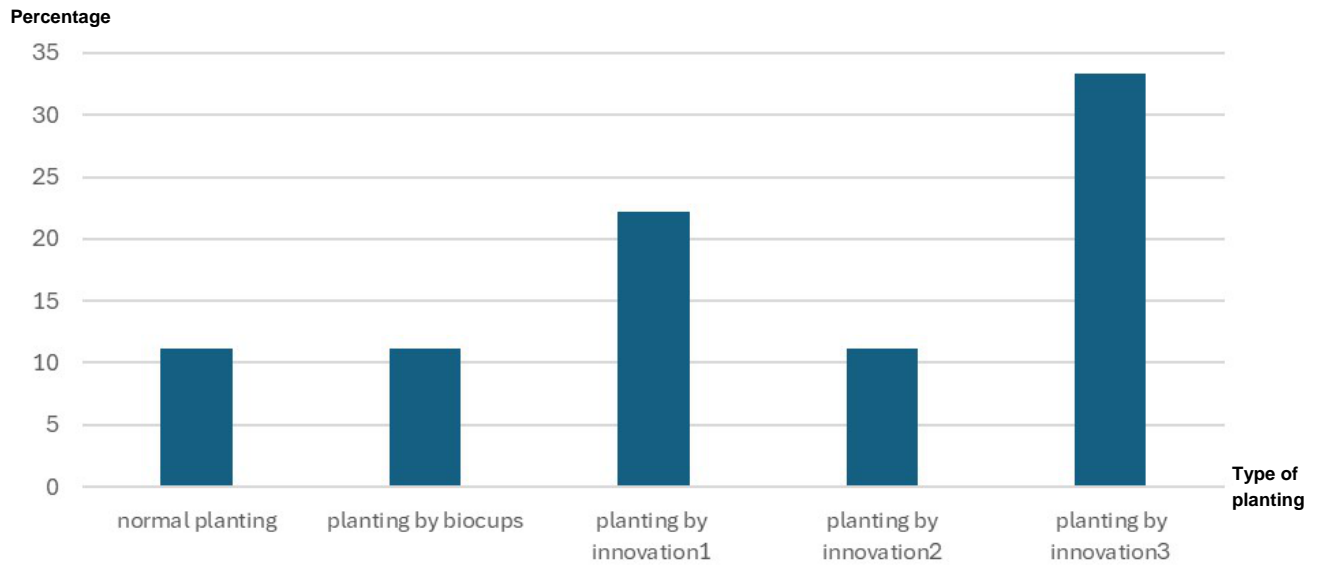


Graph 2: result of nitrogen phosphorus and potassium values after planting seagrass.



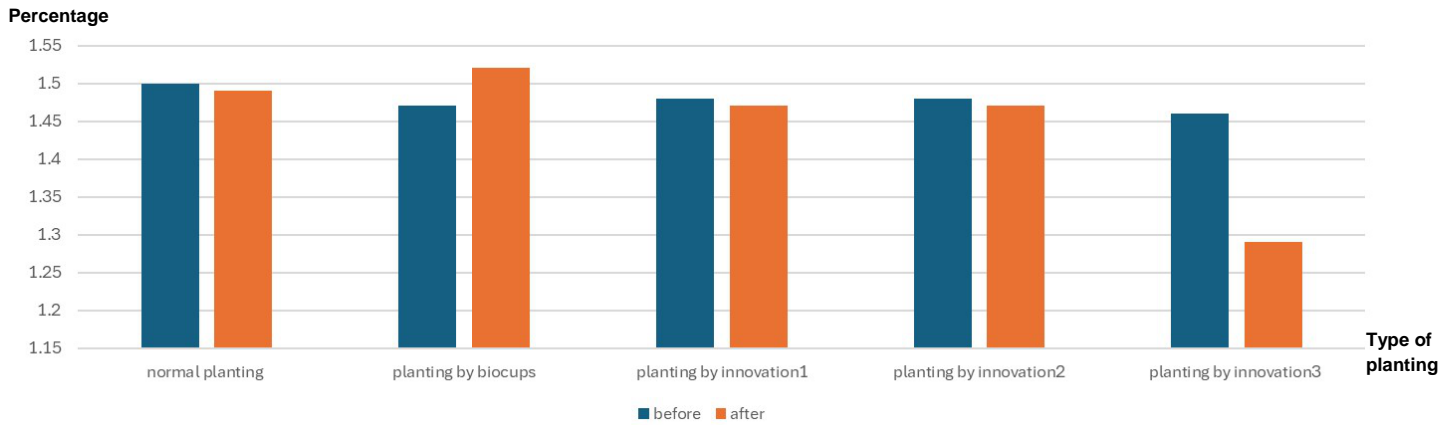
note: The soil in the area planted using innovation type 2 has become darker.

Graph 3 : Comparison survival rates of seagrass grown using different types of equipment and normal planting.



Note : Seagrass have yellow leaf, survival rate is average of each planting plot

Graph 4 : results of organic matter in the soil before and after planting seagrass.





## **Discussion**

After planting for 1 month. It was found that seagrasses was grown normally, planted with biocups and equipment type 2 has a survival rate of 11.11 percent. Seagrasses grown using equipment type 1 has a survival rate of 22.22 percent and seagrasses grown using equipment type 3 has a survival rate of 33.33 percent. The soil quality of Bunkong Bay , is an area that plant seagrasses in this experiment .The nitrogen content is very low. Low phosphorus content and high potassium content. Very low nitrogen can cause seagrass have yellow leaves. And it was found that the amount of nitrogen grown using all three type of equipment increased. In addition, the water quality and organic matter in the soil before and after planting were not different that much.

## **Conclusion**

seagrasses grown using equipment type 3 has the most survival rate of 33.33 percent ,seagrasses grown using equipment type 1 has a survival rate of 22.22 percent and seagrasses that was grown normally, planted with biocups and equipment type 2 has a survival rate of 11.11 percent. Therefore this equipment can increase the survival rate of seagrasses. By the way,should select the area that have environment, water quality and soil quality that suitable for planting seagrass for the most survival rate.

## **Acknowledgement**

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## Bibliography/Citations

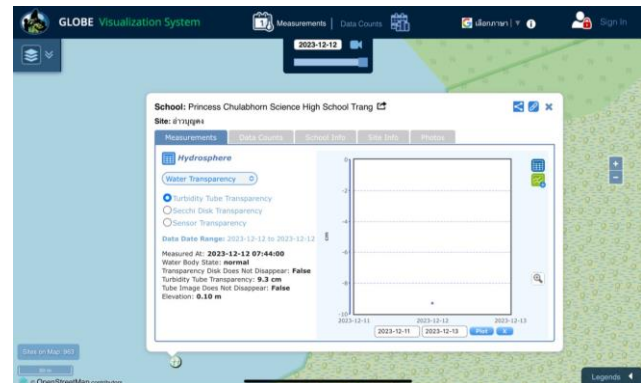
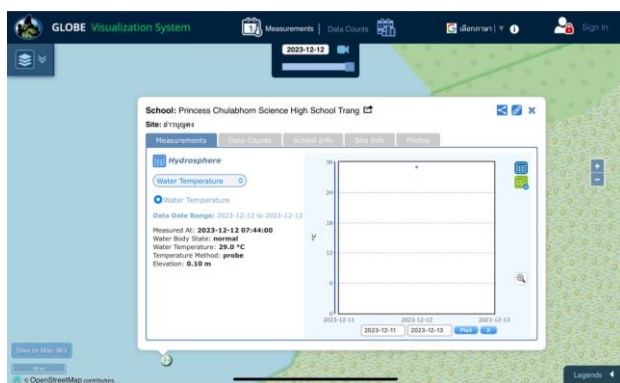
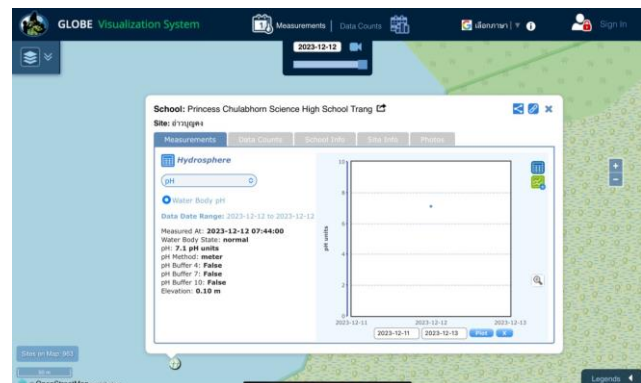
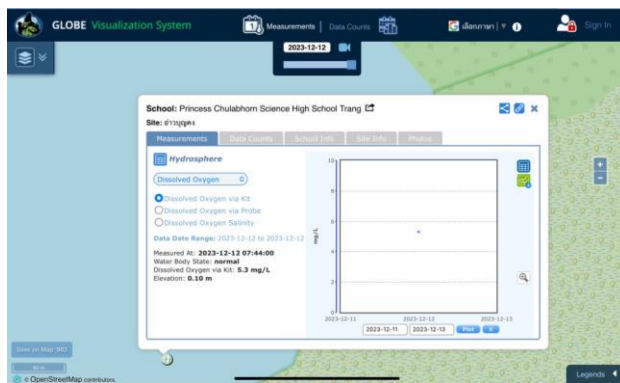
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## GLOBE's databases

### Hydrosphere data on GLOBE DATA ENTRY



## **(Optional) Badge Descriptions/Justifications**

**I am an engineer** : This project has used engineering processes in its design and create three types of equipment s. Starting from identifying the problem , find a solution , equipment design , create equipment and test equipment .To solve the problem of degradation of seagrass resources and increase the survival rate of seagrass .The increased amount of seagrass can help increase carbon storage and help reduce global warming.

**I am a collaborator** : Doing this project received cooperation from the community in the planting for restore seagrass .In addition, we received cooperation from schools, teachers, and friends as well.

**I make an impact** : This project helps to increase the amount of seagrass. Therefore, it is beneficial to help reduce global warming because seagrass can store carbon well. seagrass is also a source of food and habitats for marine animals.