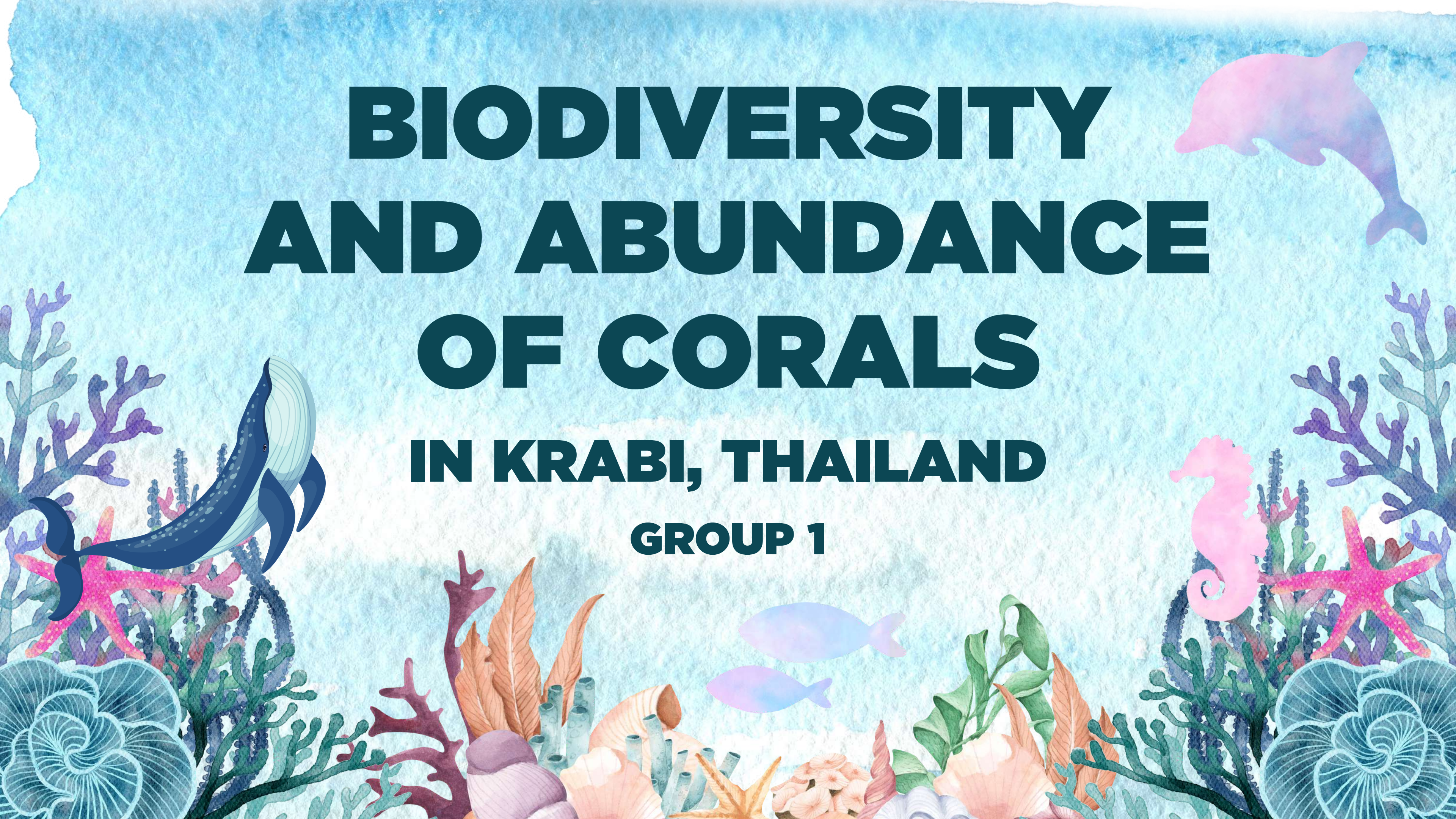



BIODIVERSITY AND ABUNDANCE OF CORALS IN KRABI, THAILAND

GROUP 1



PARTICIPANTS



Students: Jarubha Suanklieng, Anawach Anantachoke, Dilokpat Chaiwirat, Pimpawee Piamjomsiri, Kantinan Lumsun, Kuldhira Iemarrrom, Panthipha Srisutraporn, Sukrita Rasameephen, Gunyarut Chatkaewmorakot, Vasupint krikieatisaku, Manatsakan Ariyapithak, Pornnutcha Khongton, Poonnama Surachutikarn

School: Samsenwittayalai



Teacher: Nuttanit Karnwitee

Scientist: Khemmanut Nontasorn, Suthima Heampan ,Pornthip Kedthawon, Uthai Kuhapong, Krisnadej Jaroensutasinee, Mullica Jaroensutasinee



INTRODUCTION

ABOUT CORALS

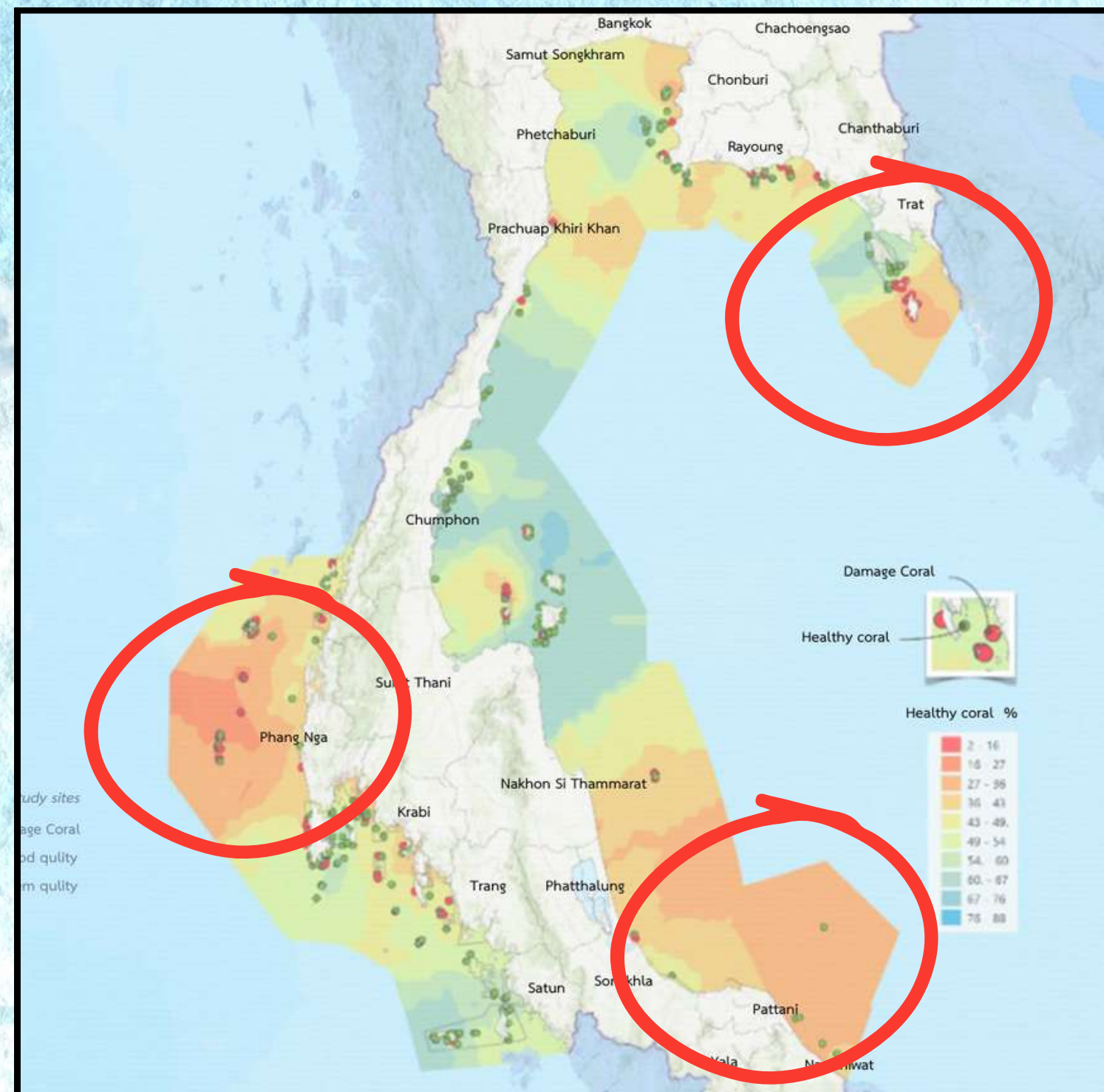
- Coral reefs represent one of the most productive and biodiverse ecosystems in the world, second only to the high diversity found in tropical rainforests.
- Research has shown that increases in water temperature, nutrient (sewage) input, storm water runoff and turbidity or sedimentation are contributing factors to coral disease. Additionally, coral bleaching severely weakens corals and makes them more susceptible to disease.
- Coral reefs are some of the most important ecosystems in the oceans. Many around the world are dying at an alarming rate due to ocean acidification and rising water temperatures from climate change.

BIODIVERSITY AND ABUNDANCE OF CORALS

INTRODUCTION

CORAL STATUS BY PROVINCE FROM 2018 - 2021 IN THAILAND

Corals are maintained and have guidelines for proper care, factors like temperature and water quality, beyond human control, also contribute to coral loss.



INTRODUCTION

Some example cause of the problem



Environment
problems



marine pollution



unsustainable tourism

INTRODUCTION

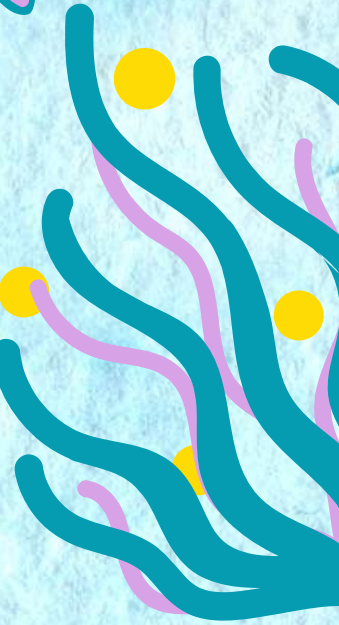
THE BENEFITS OF CONDUCTING RESEARCH

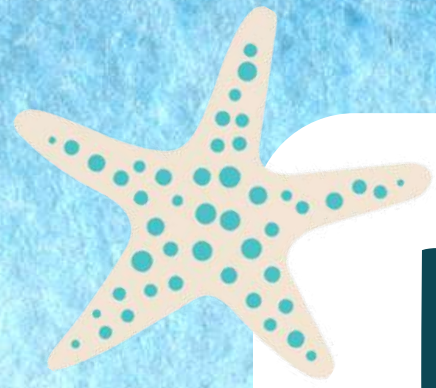
- **IT IS POSSIBLE TO MONITOR THE CHANGES IN CORAL REEFS AND CHECK THE STATUS OF THE CORALS ON KOH PODA.**
- **IN CASES WHERE MATHEMATICA CAN BE USED AND THE RESULTS ARE SIMILAR TO THOSE OBTAINED WITH CPCE, IT WOULD MAKE IT MUCH EASIER TO CALCULATE THE NUMBER AND IDENTIFY THE IMPACT OF CORALS AND THEIR SURROUNDING ENVIRONMENT.**

OBJECTIVES

- MONITOR BIODIVERSITY AND ABUNDANCE OF CORALS IN KRABI, THAILAND
- COMPARE EFFICIENCY BETWEEN BOTH OF SOFTWARE THAT WE USE FOR CORAL ANALYSIS

MATERIALS AND METHODS OF CORAL STUDY





MATERIALS AND METHODS

OF CORAL STUDY

STUDY SITES

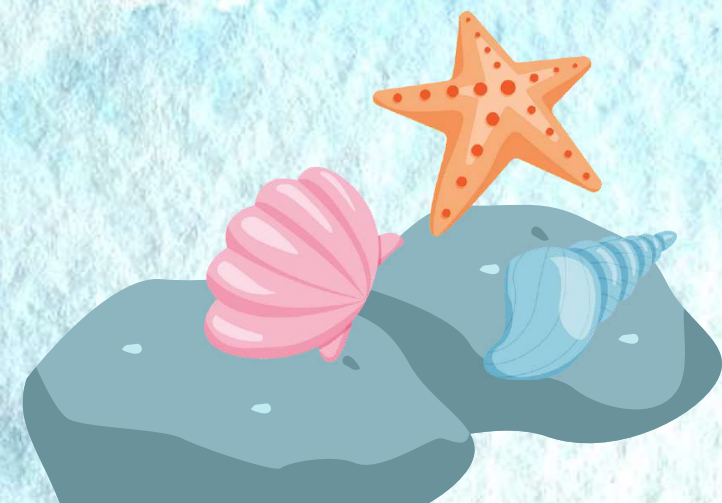
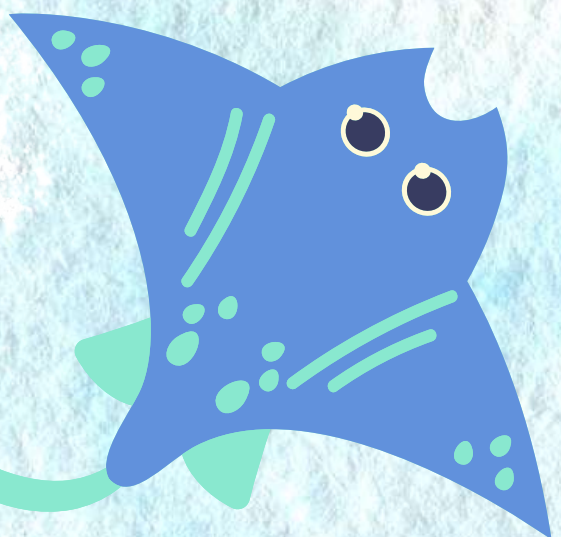
The study area was Koh Poda (N 7.974617, E 98.809475)
Mueng Krabi District, Krabi Province, Southern Thailand

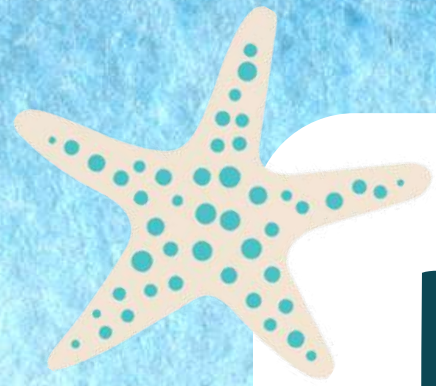


Koh Poda



coordinate





MATERIALS AND METHODS

OF CORAL STUDY

DATA COLLECTION

- **Picture and Video of Corals from**



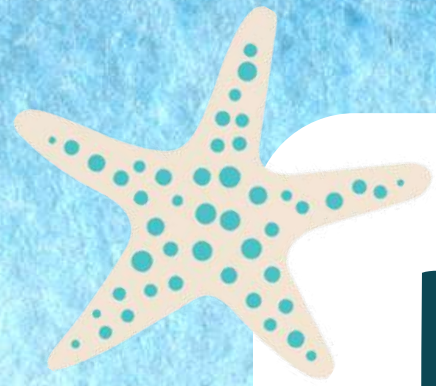
OLYMPUS TG TOUGH



OLYMPUS OMD EM5



**CANONPOWER SHORT
G1X MARK2**



MATERIALS AND METHODS

OF CORAL STUDY

DATA COLLECTION

- Picture and Video of Corals from

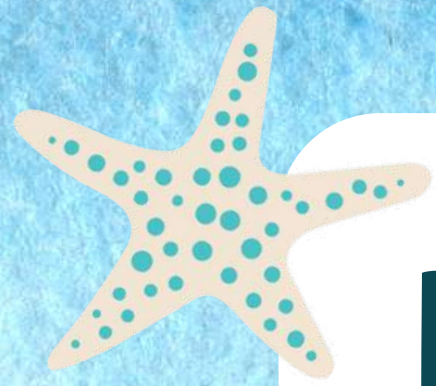


SONY RX1004



OSMO ACTION

DATE : 01/03/24



MATERIALS AND METHODS

OF CORAL STUDY

DATA PREPARATION



Select and crop useable picture and video of corals using "Clip Champ"

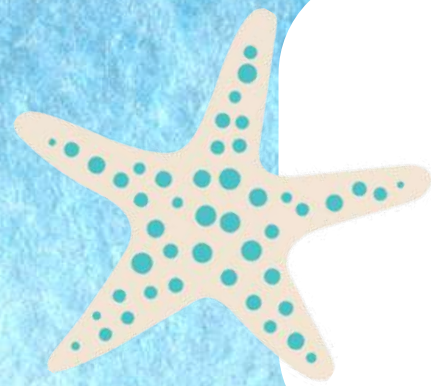


Convert corals video to panorama using "Image Composite Editor"



Color correcting and sharpening using "Photos in Mac"





MATERIALS AND METHODS

OF CORAL STUDY

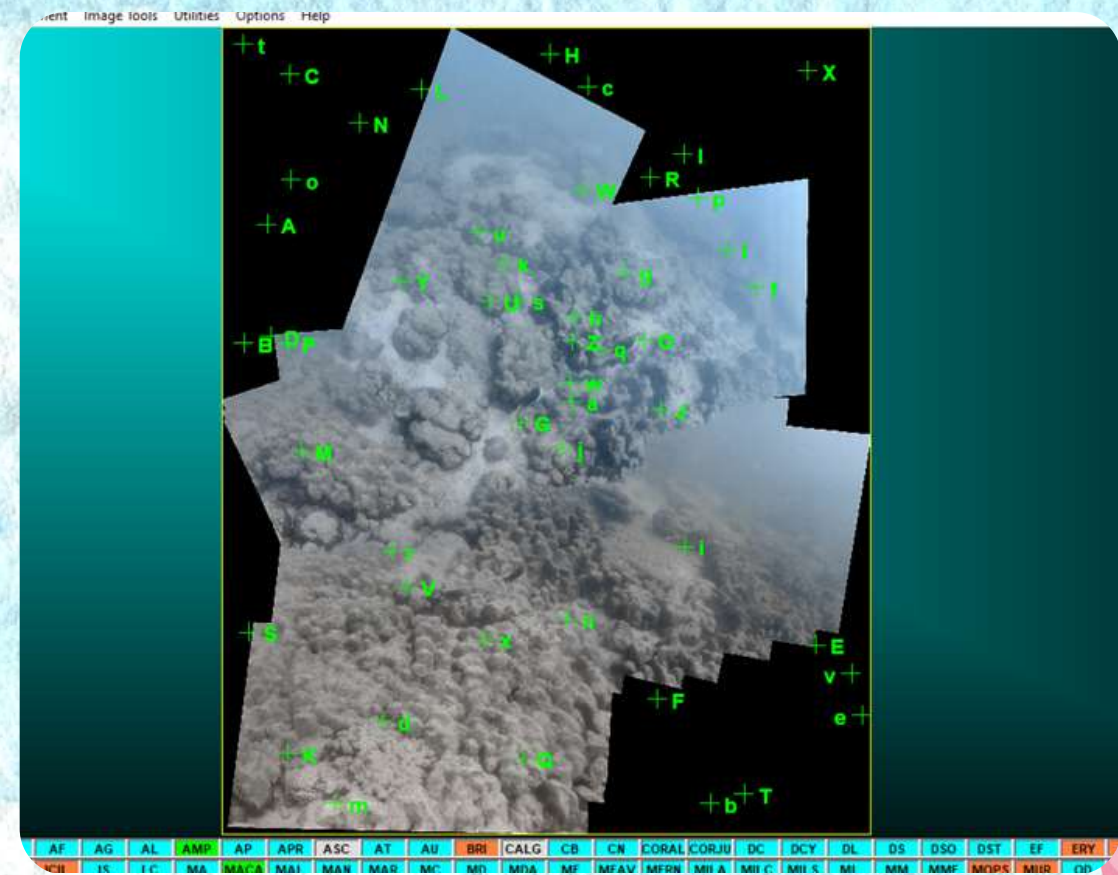
DATA ANALYSIS

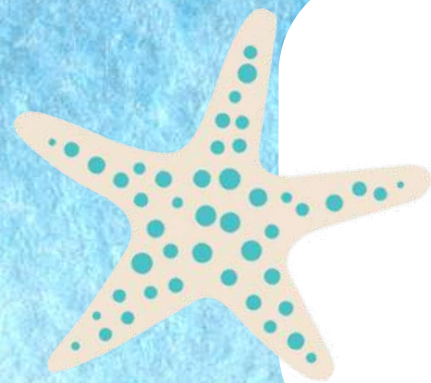
CPCe Application

1. Import all picture from preparation step



2. Auto generate 50 randoms point overlay each picture





MATERIALS AND METHODS OF CORAL STUDY

DATA ANALYSIS

CPCe Application

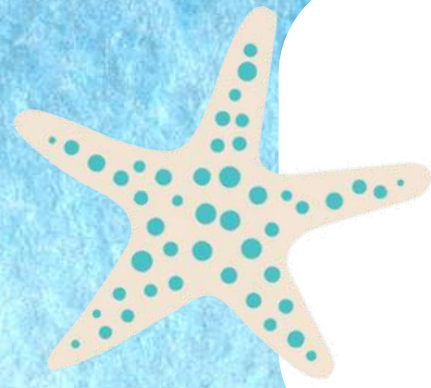
3. Identify object type each point in every picture



4. Export Excel file from the program

	Sheet 1	Sheet 2	Sheet 3	AVERAGE		
Shannon-Wiener Index	1.01	1.13	1.27	1.1366451	CORAL (C)	51.77474803
CORAL (C)	0.30	0.34	0.29	0.3034222081	GORGONIANS (G)	53.13807531
GORGONIANS (G)	0.00	0.00	0.00	0	SPONGES (S)	0
SPONGES (S)	0.00	0.00	0.00	0	ZOANTHIDS (Z)	0
ZOANTHIDS (Z)	0.00	0.00	0.00	0	MACROALGAE (MA)	0
MACROALGAE (MA)	0.00	0.00	0.00	0	OTHER LIVE (OL)	1.355187713
OTHER LIVE (OL)	0.06	0.02	0.05	0.05108326177	DEAD CORAL WITH ALGAE (DCA)	0.4164100418
DEAD CORAL WITH ALGAE (DCA)	0.34	0.14	0.34	0.2042513907	CORALLINE ALGAE (CA)	22.8446942
CORALLINE ALGAE (CA)	0.00	0.00	0.00	0	DISEASED CORALS (DC)	4.60251046
DISEASED CORALS (DC)	0.00	0.00	0.00	0	SAND/PAVEMENT	1
SAND/PAVEMENT (S/P)	0.26	0.26	0.32	0.3114955649	UNKNOWN (U)	28.45183265
UNKNOWN (U)	0.05	0.27	0.26	0.2000925989	TAPE (T) AND SHADOW (TS)	12.96280785
TAPE (T) AND SHADOW (TS)					UNKNOWN (U)	13.38912134

	Sheet 1	Sheet 2	Sheet 3	AVERAGE
Simpson Index of Diversity (1-D)	0.05	0.42	0.66	0.37631172
CORAL (C)	0.36	0.28	0.02	0.1836518567
GORGONIANS (G)	0.00	0.00	0.00	0
SPONGES (S)	0.00	0.00	0.00	0
ZOANTHIDS (Z)	0.00	0.00	0.00	0
MACROALGAE (MA)	0.00	0.00	0.00	0
OTHER LIVE (OL)	0.00	0.00	0.00	0
DEAD CORAL WITH ALGAE (DCA)	0.00	0.00	0.00	0.000153033408
CORALLINE ALGAE (CA)	0.00	0.00	0.26	0.1473198136



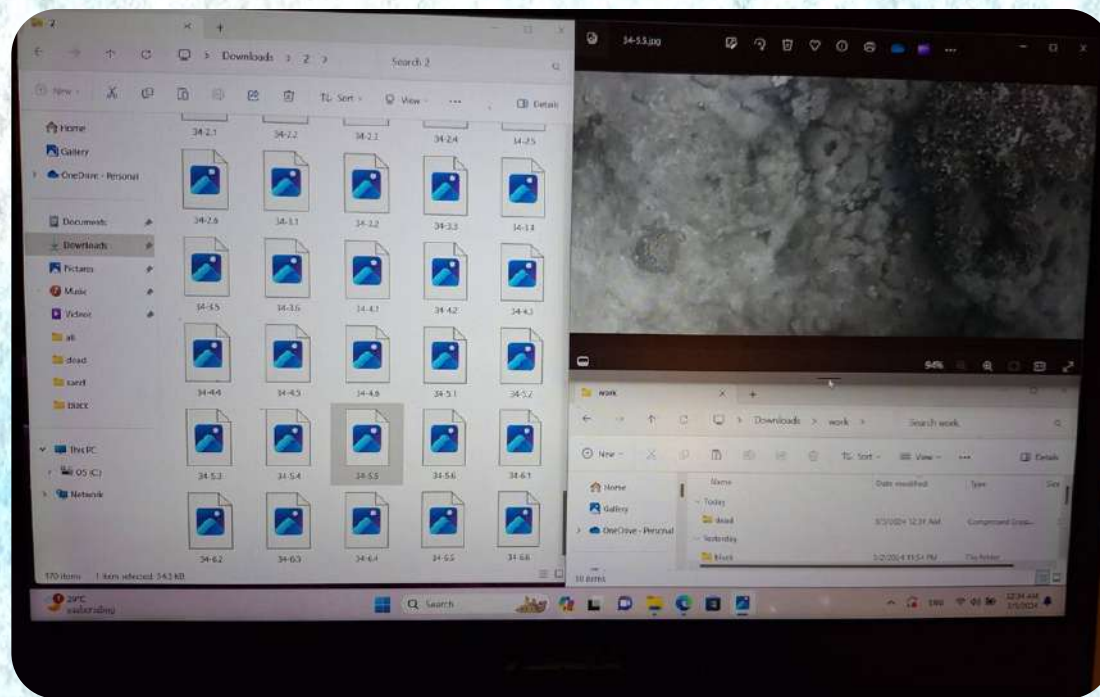
MATERIALS AND METHODS

OF CORAL STUDY

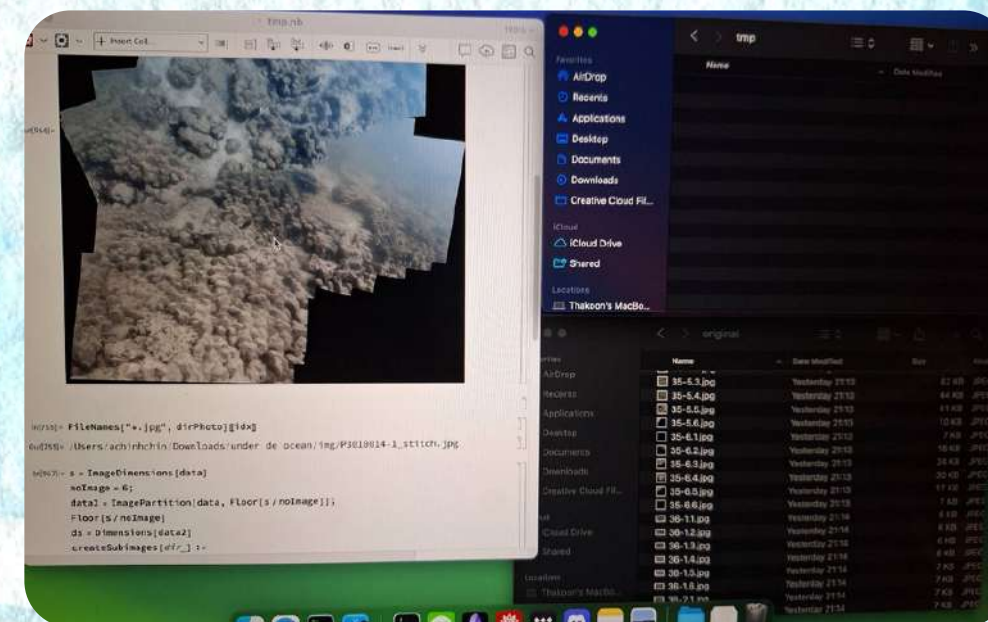
DATA ANALYSIS

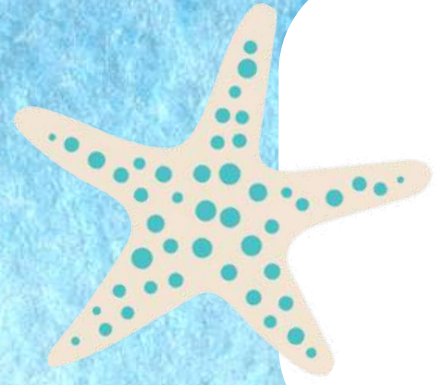
Wolfram Mathematica Application

1. Select some picture from total



2. Divide a picture to many small pictures, then identify types of object by hand





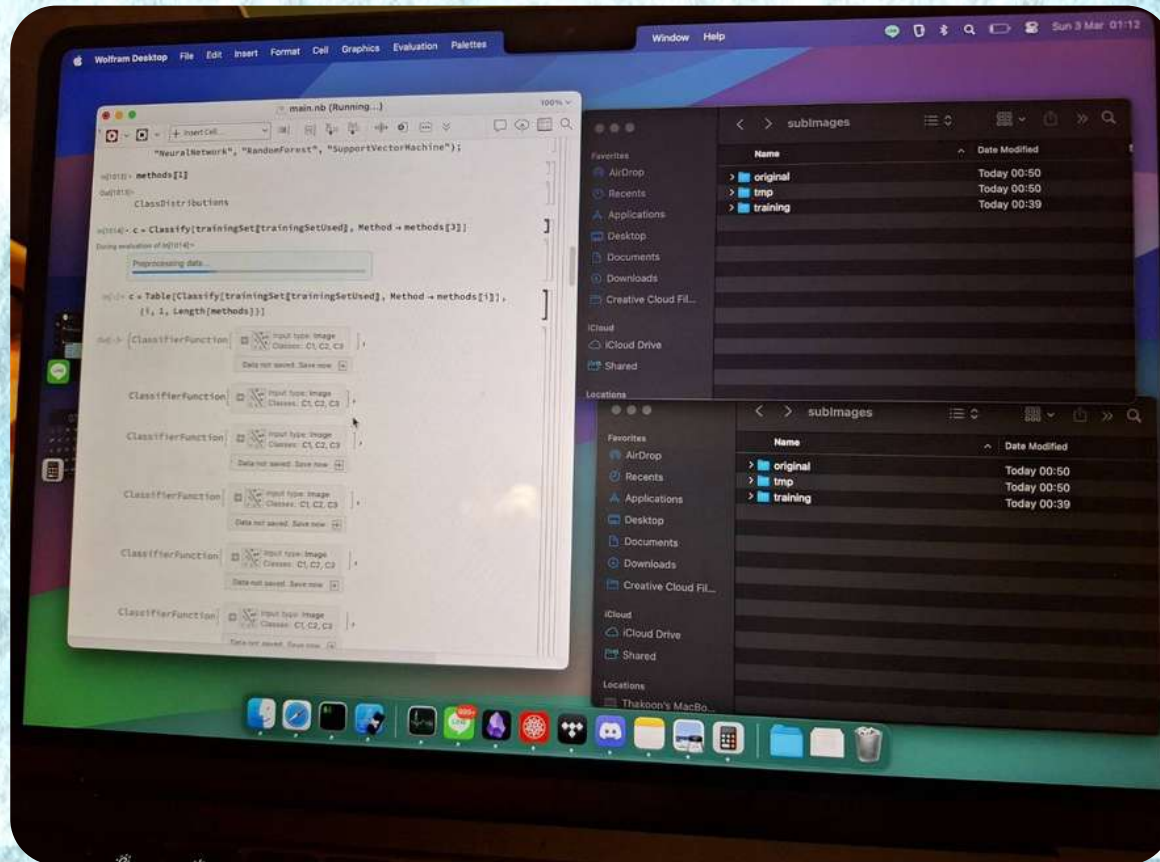
MATERIALS AND METHODS

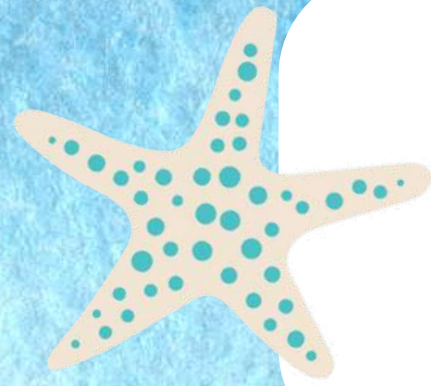
OF CORAL STUDY

DATA ANALYSIS

Wolfram Mathematica AI

3. Take them to train AI to classify and compare the accuracy between many models





MATERIALS AND METHODS

OF CORAL STUDY

DATA ANALYSIS

Wolfram Mathematica AI

4. Use machine learning model to classify and count objects

```

| & /@oData;
on[oClass]

dead, khod, sand, water}

e[Count[oClass, classes[[i]], {i, 1, Length[classes]}]
16, 222, 344, 10}

h[oData]

ngth[classes]

= -Total[1.0 # / total * Log[# / total] & /@ cCount]

= Total[1.0 (# / total) ^ 2 & @ cCount]
45908671697 Total, 0.3692360715323544 Total,
7597976116 Total, 0.013523655283442742 Total,
178992785 Total, 0.000027440255018754044 Total]

al & @ cCount]

.160 Total 146 Total 222 Total 344 Total 10 Total
1909 1909 1909 1909 1909

```

```

CoralML.20240227.nb

Center of Excellence for Ecoinformatics, Walailak University
Assoc.Prof.Dr. Krisanadej Jaroensutasinee

Setting up

In[3]:= dir = NotebookDirectory[]
Out[3]:= /Users/achinhchin/Downloads/MCN2024/

Define Working Directory Training

dirPhoto =
FileNameJoin[
{dir, "TransectPhotoExamples\subImages\original
Out[100]:=
/Users/achinhchin/Downloads/under de
ocean/TransectPhotoExamples\subImages\original

In[4]:= dirTraining =
FileNameJoin[
{dir, "TransectPhotoExamples\subImages15\traini
Out[4]:= /Users/achinhchin/Downloads/MCN2024/TransectPhoto
subImages15\training

In[5]:= catDir = Select[FileNames["*", dirTraining], Direct
Out[5]:= {}

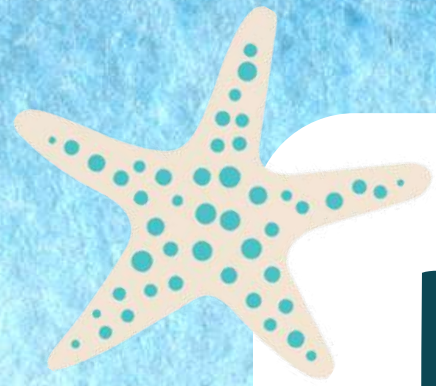
In[49]:= catName = Last[FileNameSplit[#]] & /@ catDir
Out[49]:= {}

In[50]:= fnCat =

```


The background is a light blue, textured surface with a large white, irregularly shaped central area. The scene is decorated with various colorful illustrations of marine life: a pink starfish at the top center, a pink starfish at the top right, a pink starfish on the left side, a pink starfish at the bottom right, and a yellow starfish at the bottom center. On the left, there is a green coral-like structure with a pink flower. On the right, there is a blue and purple coral-like structure with yellow dots. At the bottom left, there is a purple jellyfish with a yellow and pink striped bell. At the bottom right, there is a pink and purple scallop-like shell with yellow dots. The overall style is whimsical and colorful.

MATERIALS AND METHODS OF WATER STUDY



MATERIALS AND METHODS

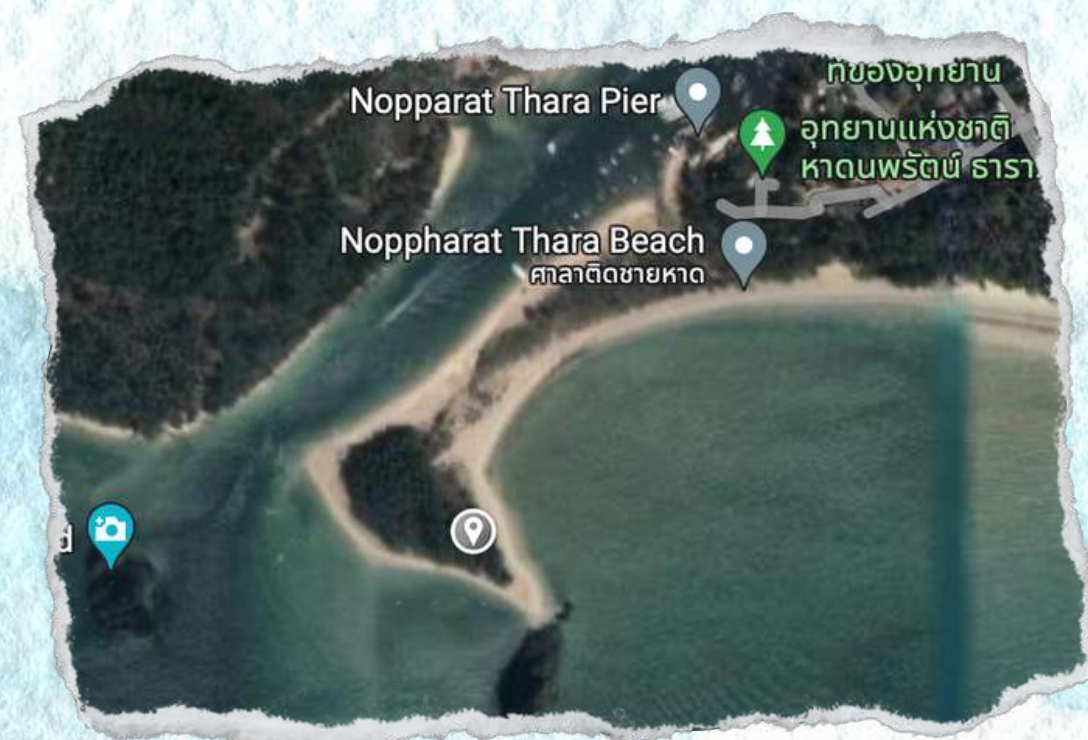
OF WATER STUDY

DATA COLLECTION

Sample of water data obtained from the Nopharat Thara Beach (N 8.044059, E 98.796690) Mueng Krabi District, Krabi Province, Southern Thailand



1500 ML

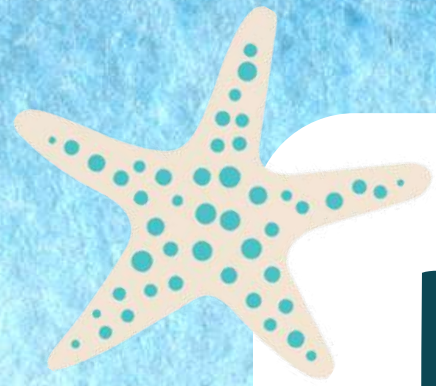


Nopharat Thara Beach



coordinate





MATERIALS AND METHODS

OF CORAL STUDY

DATA COLLECTION

Sample of water data obtained from the Koh Poda
(N 7.974617, E 98.809475) Mueng Krabi District, Krabi Province,
Southern Thailand



500 ml

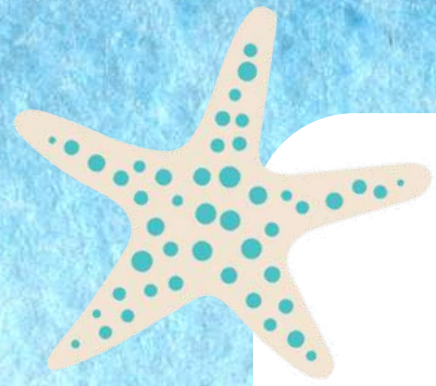


Koh Poda



coordinate





MEASUREMENT OF CORAL STUDY

DATA PROCESS

***MAKE SURE THE DIFFERENCE BETWEEN ALL VALUE IS NOT MORE THAN 0.05 OR ELSE YOU NEED TO REPEAT ALL PROCESS AGAIN**

- 1. COLLECT WATER SAMPLES FROM KO PODA AND NOPHARAT THARA BEACH**
*** FOLLOWING GLOBE DATA COLLECTION METHOD**
- 2. MEASURE EACH VALUE 3 TIMES**
*** CLEAN THE EQUIPMENT AFTER DIPPING IN THE WATER 2 TIMES**
FIRST TIME : WASH BY FILTERED WATER AND WIPE WITH TISSUE
SECOND TIME : WASH BY FILTERED WATER AGAIN AND STABILIZE THE VALUE OF THE EQUIPMENT

AVERAGE
FORMULA

$$\bar{x} = \frac{\sum x}{n}$$

\bar{x}

AN AVERAGE

$\sum x$

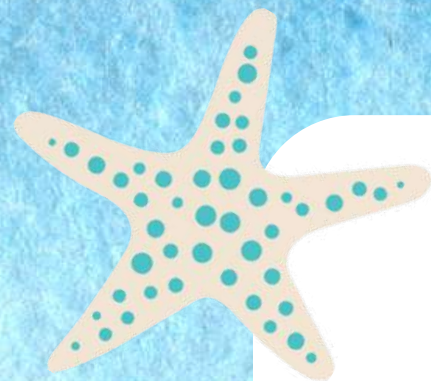
SUM OF ALL DATA

n

TOTAL NUMBER OF DATA

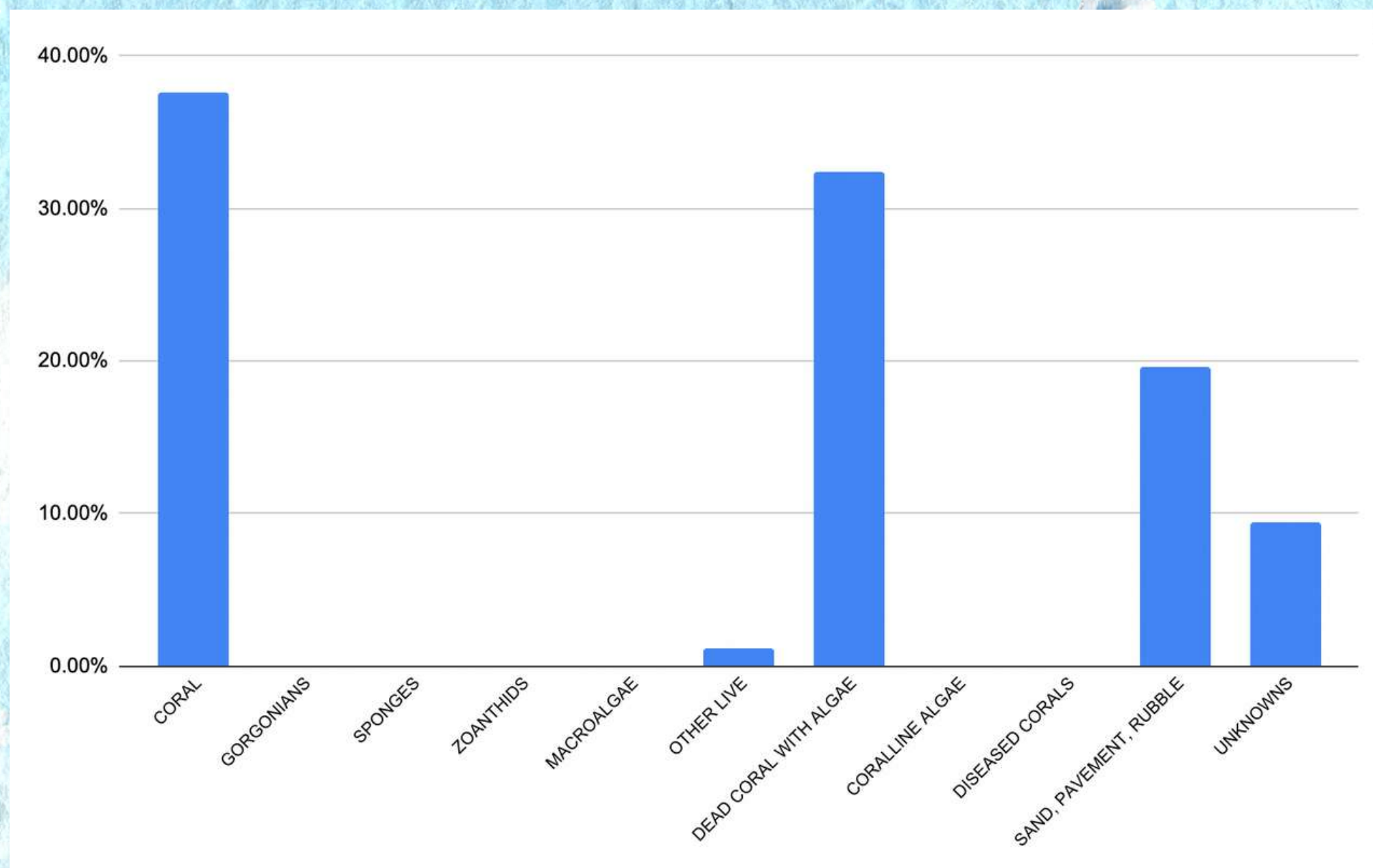


RESULTS AND DISCUSSION



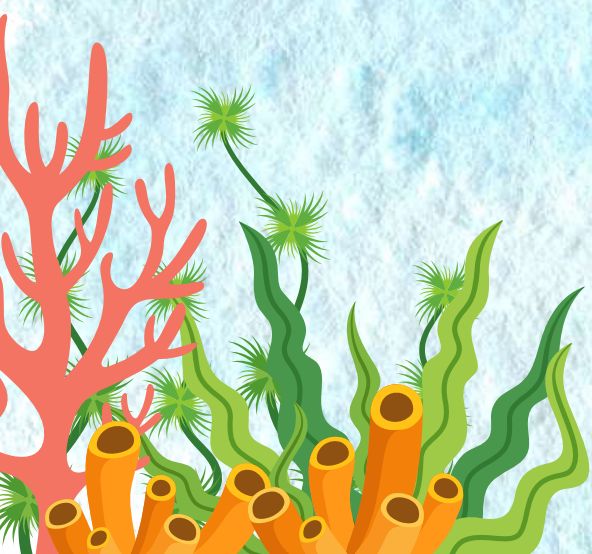
CORAL RESULTS

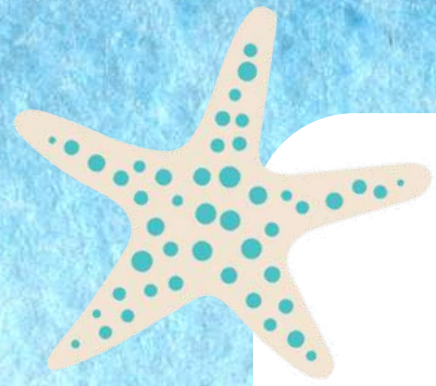
CPCe



Shannon-Weaver Index
1.161

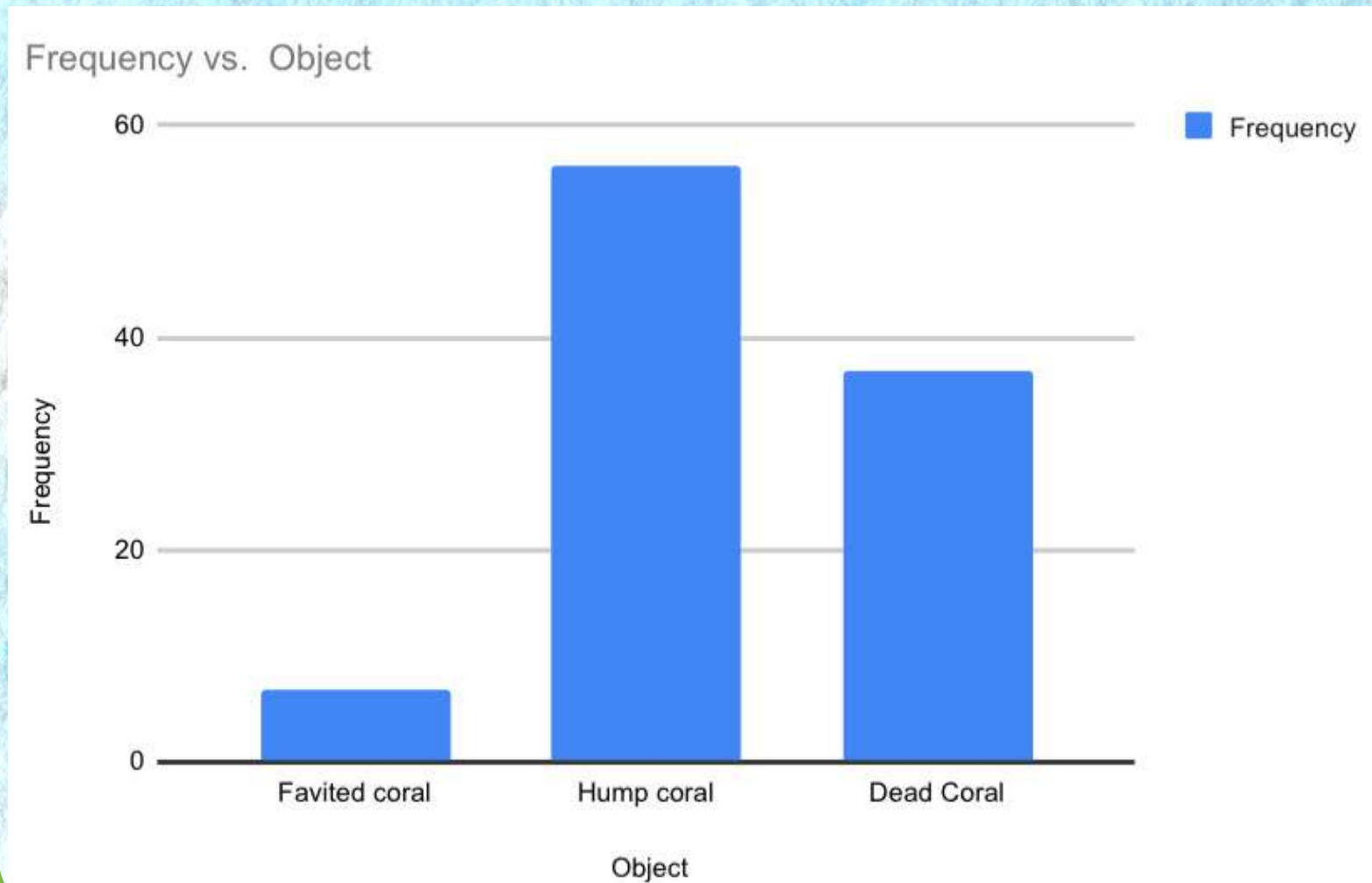
SIMPSON INDEX OF DIVERSITY(1-D)
0.618





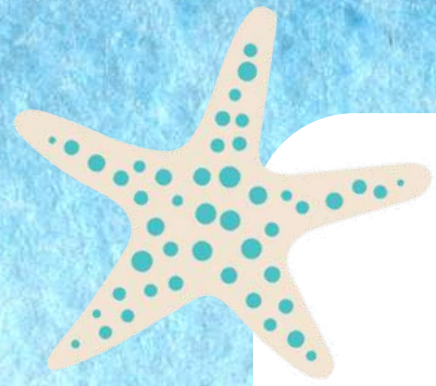
CORAL RESULTS

Wolfram Mathematica



Shannon-Weaver Index
1.146

SIMPSON INDEX OF DIVERSITY(1-D)
0.618



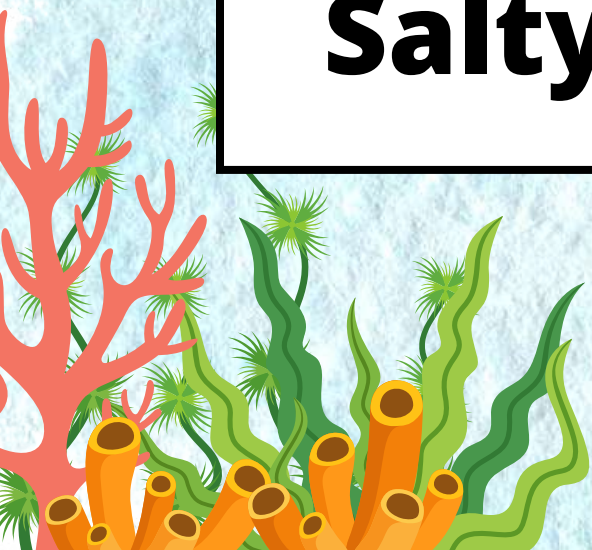
WATER RESULTS

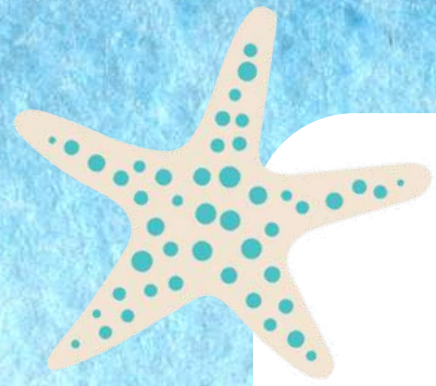
KO PODA

	1	2	3	average
pH	8.54	8.56	8.56	8.55
Salty	17.7	17.7	17.8	17.73%

%_o = PPT (PART PER THOUSAND)

- **APPROPRIATE PH FOR CORAL TO BE ALIVE IS BETWEEN 8.2 AND 8.4**
- **APPROPRIATE SALTY SOLUTION FOR CORAL TO BE ALIVE IS BETWEEN 30%_o AND 35%_o**
- **THE PH AND SALINITY OF THE WATER IN KO PODA ARE NOT SUITABLE FOR CORAL LIVING.**





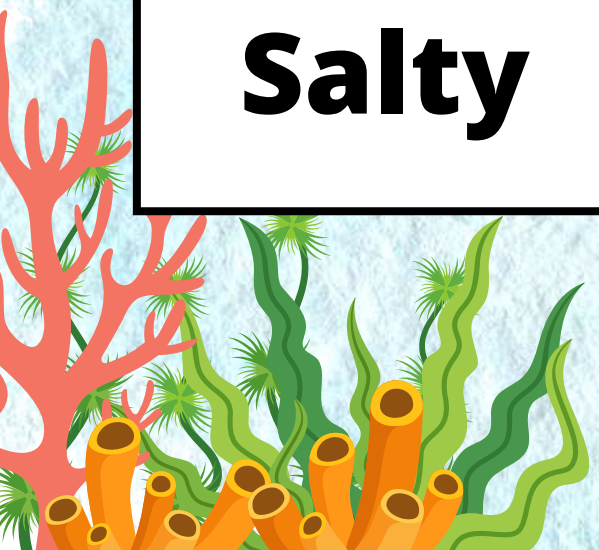
WATER RESULTS

NOPPARAT BEACH

	1	2	3	average
PH	8.44	8.44	8.44	8.44
Salty	17.8‰	17.7‰	17.6‰	17.7‰

‰ = PPT (PART PER THOUSAND)

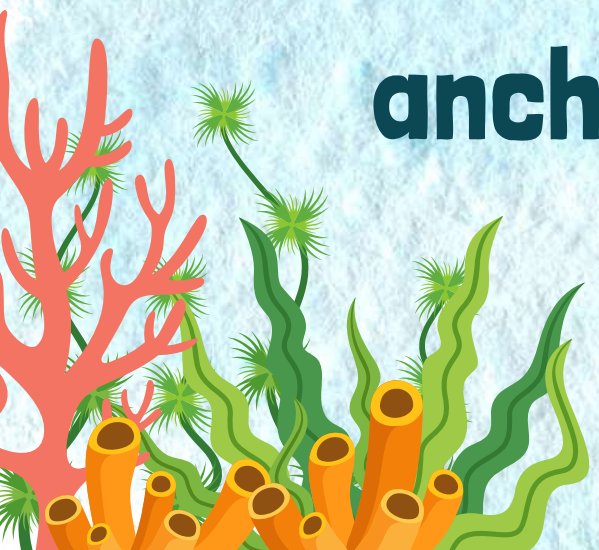
- APPROPRIATE PH FOR CORAL TO BE ALIVE IS BETWEEN 8.2 AND 8.4
- APPROPRIATE SALTY SOLUTION FOR CORAL TO BE ALIVE IS BETWEEN 30‰ AND 35‰
- THE PH AND SALINITY OF THE WATER IN NOPPARAT BEACH ARE NOT SUITABLE FOR CORAL LIVING.





TROUBLESHOOTING GUIDELINES

- 1. Increase the punishment for destroying coral reefs.**
- 2. Limit tourists traveling areas.**
- 3. Place artificial coral reefs to restore natural reefs.**
- 4. Installation of mooring buoys To prevent boats from being anchored on coral reefs.**



CONCLUSION

The water quality analysis around Koh Podah indicates that the pH levels are adequate for coral survival. However, the salinity is lower than what corals require, explaining why most corals found in this area are dead. Corals cannot thrive in water with salinity levels below a certain threshold.

Additionally, most of the corals encountered are in tourist areas, suggesting other factors contributing to their degradation or death. These include inadequate management by park authorities, sedimentation from coastal erosion and transport ships, and the introduction of pollutants harmful to corals, such as trash disposal in the sea and the use of non-reef safe sunscreen.

REFERENCES



Thamasak Y., Vipotit M., Sakanan P., Paulwatt N., Wanlaya K., and Makamas s. (2012). *Impacts of coral bleaching, recovery and management in Thailand*. Australia: Cairns

Ines S., Pepo B., Eike S., and Christian W. (2024) Effects of simulated eutrophication and overfishing on algae and invertebrate settlement in a coral reef of Koh Phangan, Gulf of Thailand. *Marine Pollution Bulletin*. 2015 (0025-326X). 35-44.

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Department of Marine and Coastal Resources. (2013). retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0025326X15000235>

Hagen M. Gegner & Christian R. Voolstra. (2016). retrieved from <https://kids.frontiersin.org/articles/10.3389/frym.2019.00038>





THANK YOU

For Watching and Listening

