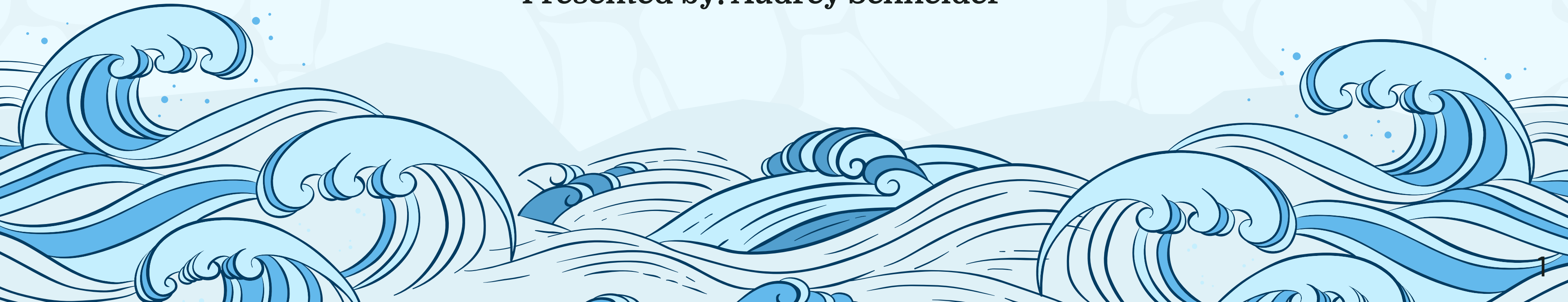
UC San Diego
SCRIPPS INSTITUTION OF OCEANOGRAPHY
Tyler Center for Global Studies
株式会社 生物技研 Bioengineering Lab
Applied Microbiology International

Assessing microbial community compositions of *Zoanthus sansibaricus* across urbanization gradients in Okinawa, Japan

Presented by: Audrey Schneider



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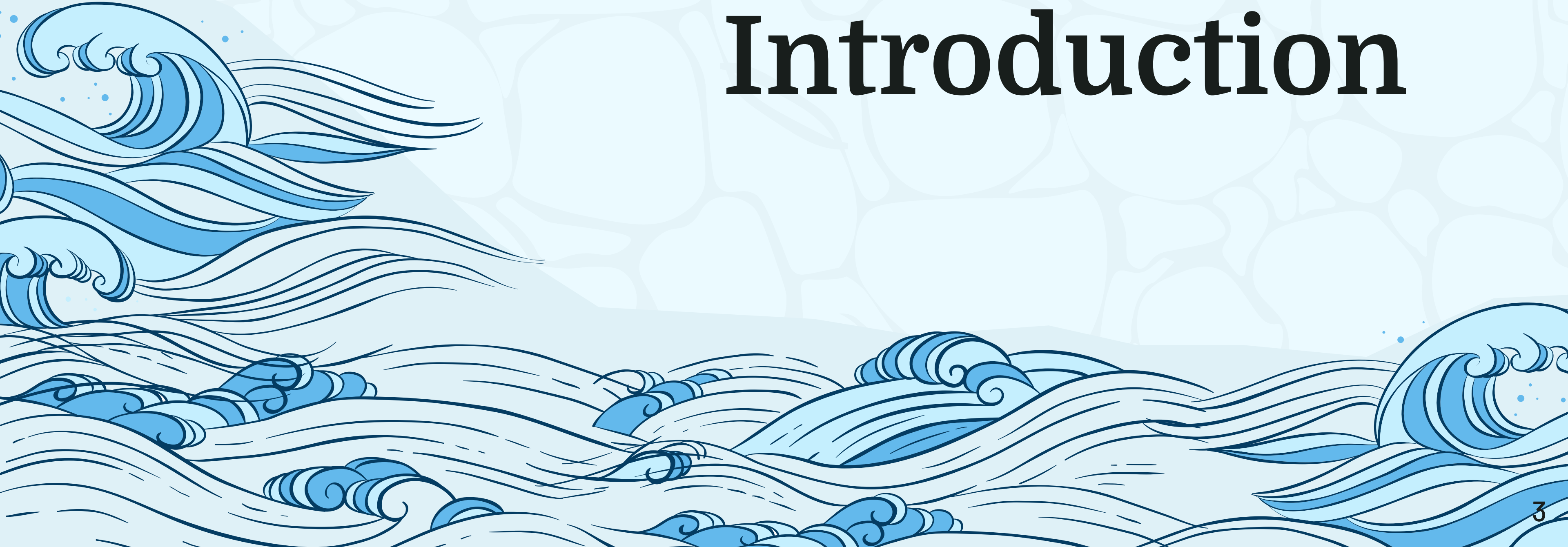
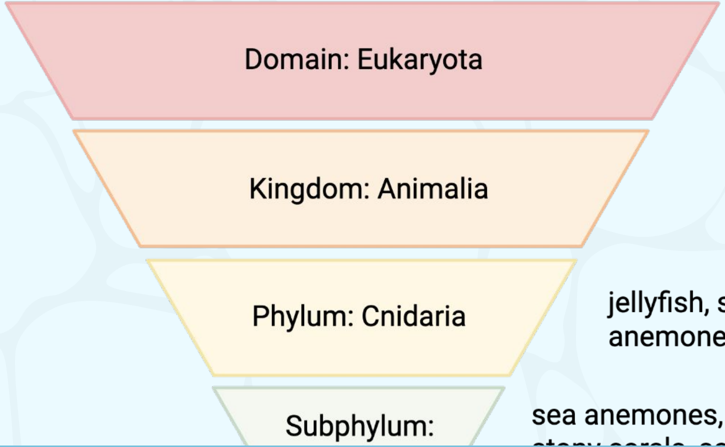
01

Introduction



Introduction & Background



Domain: Eukaryota

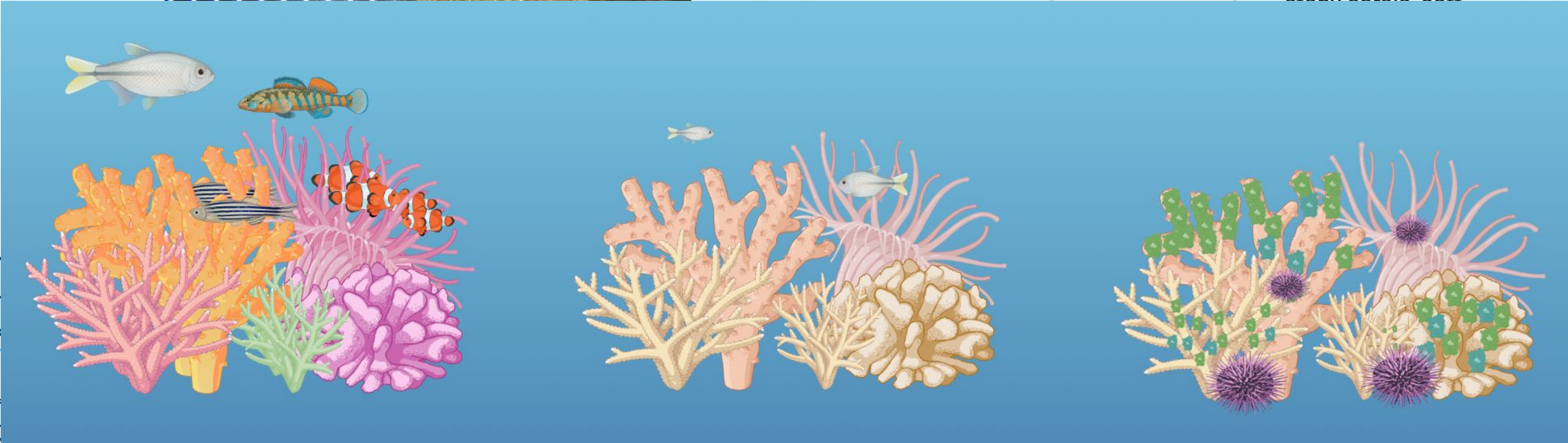
Kingdom: Animalia

Phylum: Cnidaria

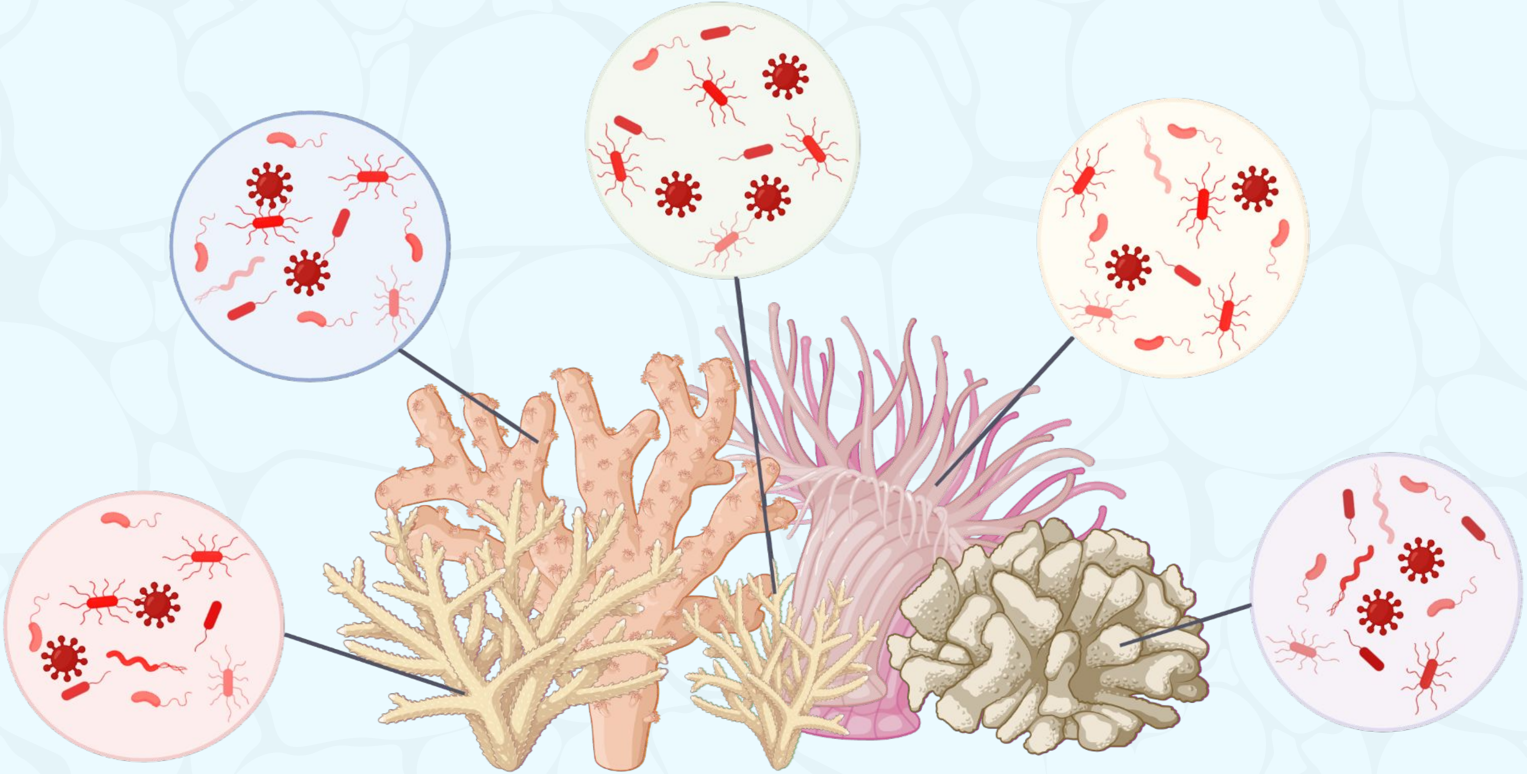
jellyfish, sea anemones, corals

Subphylum:

sea anemones,



Introduction & Background

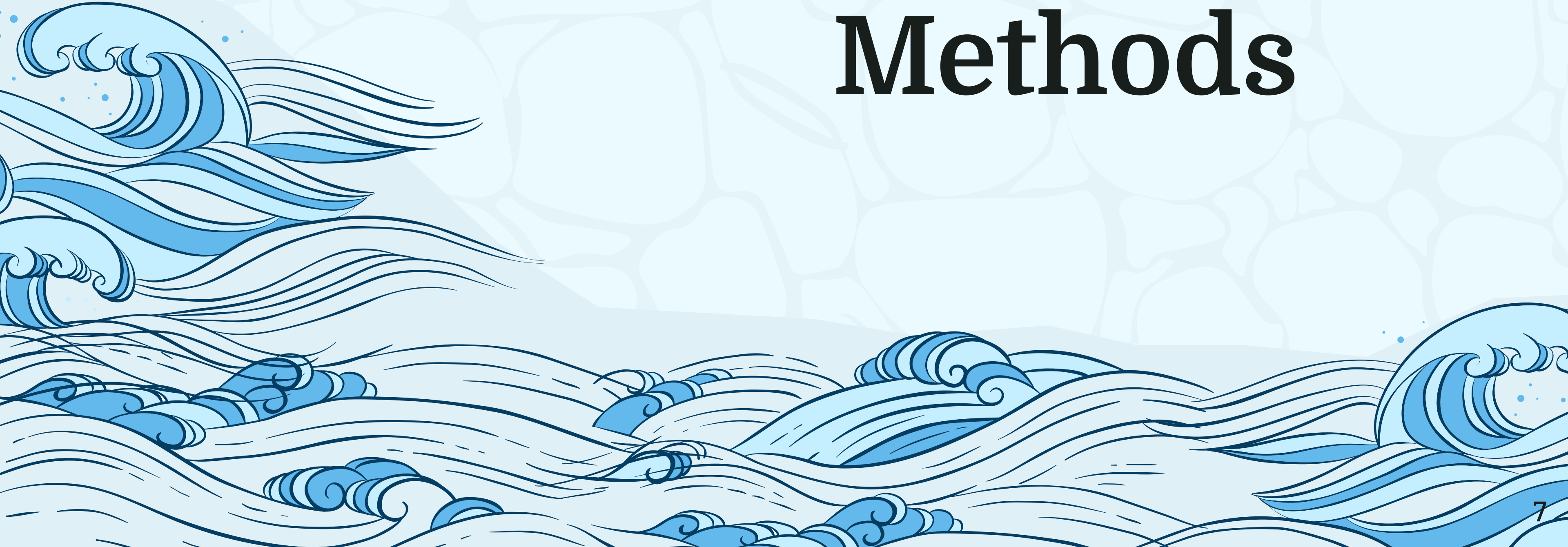


My Research Question

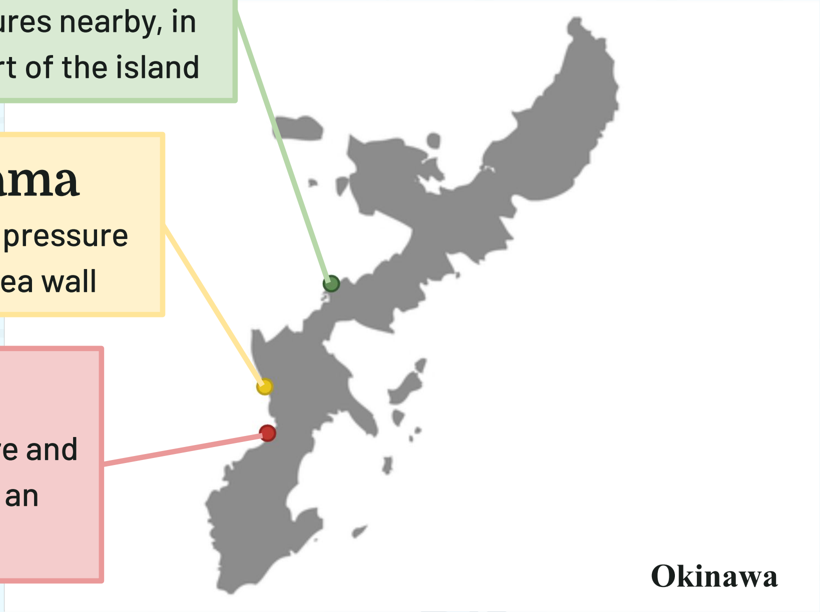
Does the microbial community composition of *Zoanthus sansibaricus* significantly change as a function of urbanization gradients?

02

Methods



3 Sites: High, Medium, and Low Impact



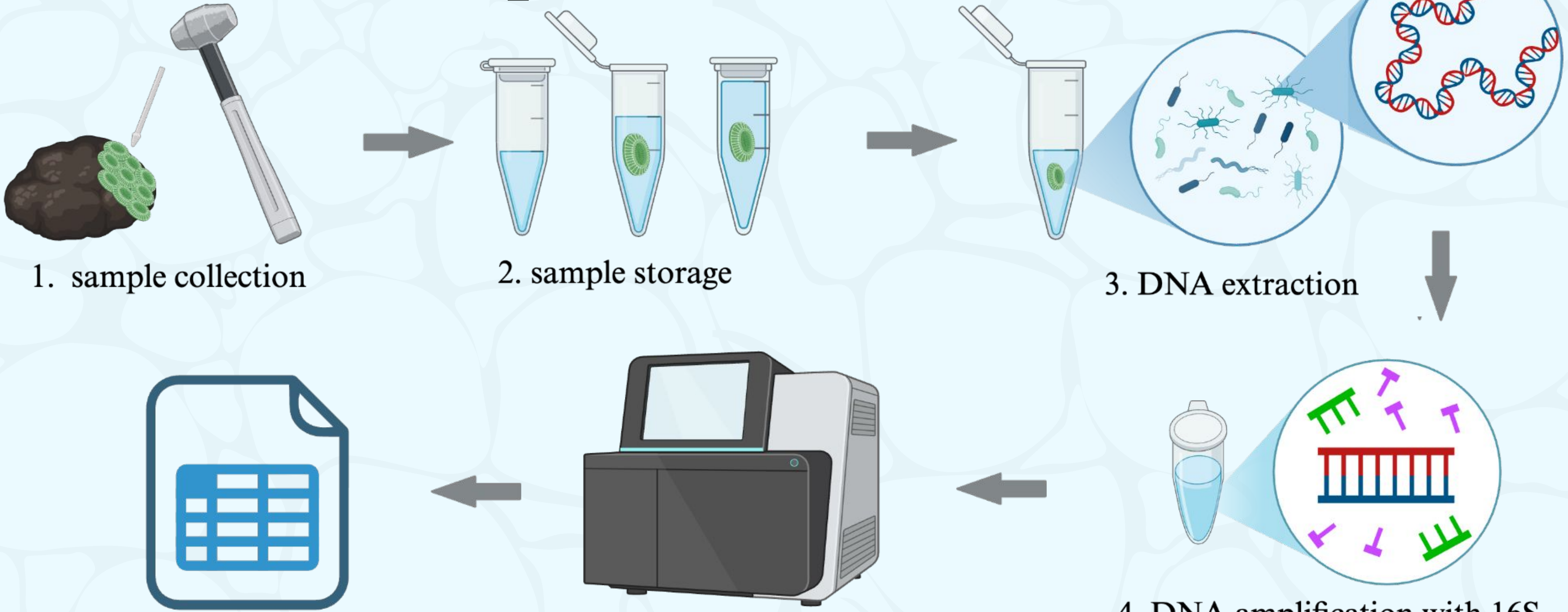
3. Manza
No man-made structures nearby, in the more northern part of the island

2. Mizugama
High anthropogenic pressure with an artificial sea wall

1. Ginowan
Higher anthropogenic pressure and ship-based activities, with an artificial sea wall

- Sampled at low tide
- 13 samples at each site = total of 39 samples

Experimental Protocol



1. sample collection

2. sample storage

3. DNA extraction

4. DNA amplification with 16S primer

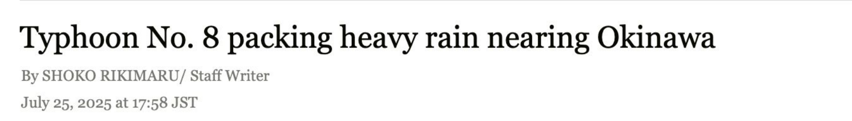
5. Illumina Sequencing

6. data for bioinformatic analysis

03

Trials and Tribulations

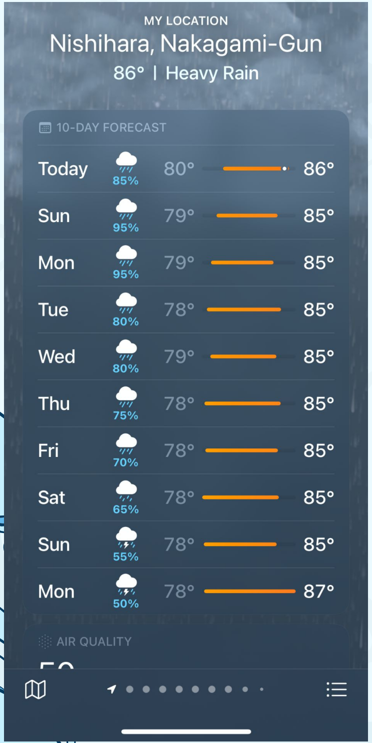
Typhoons and Tsunamis



Typhoon No. 8 packing heavy rain nearing Okinawa

By SHOKO RIKIMARU/ Staff Writer

July 25, 2025 at 17:58 JST



MY LOCATION

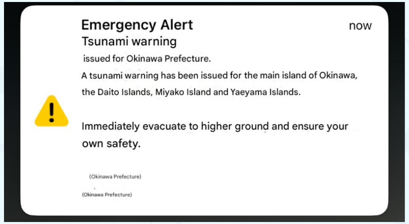
Nishihara, Nakagami-Gun

86° | Heavy Rain

10-DAY FORECAST

Today	85%	80°	86°
Sun	95%	79°	85°
Mon	95%	79°	85°
Tue	80%	78°	85°
Wed	80%	79°	85°
Thu	75%	78°	85°
Fri	70%	78°	85°
Sat	65%	78°	85°
Sun	55%	78°	85°
Mon	50%	78°	87°

AIR QUALITY



Emergency Alert now

Tsunami warning

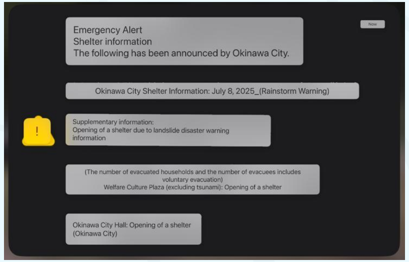
issued for Okinawa Prefecture.

A tsunami warning has been issued for the main island of Okinawa, the Daito Islands, Miyako Island and Yaeyama Islands.

Immediately evacuate to higher ground and ensure your own safety.

(Okinawa Prefecture)

(Okinawa Prefecture)



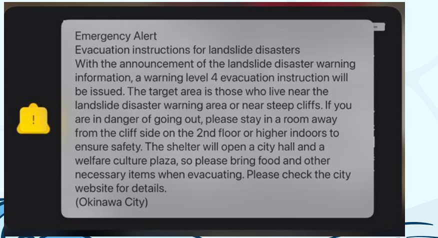
Emergency Alert
Shelter information
The following has been announced by Okinawa City.

Okinawa City Shelter Information: July 8, 2025_(Rainstorm Warning)

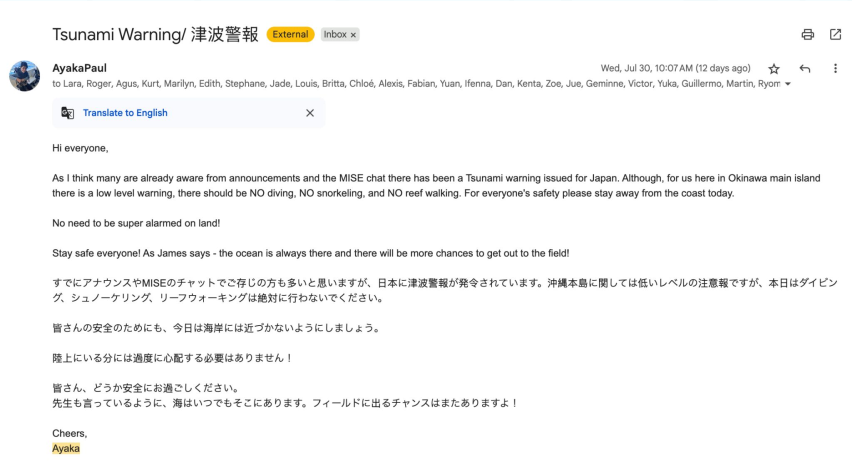
Supplementary information:
Opening of a shelter due to landslide disaster warning information

(The number of evacuated households and the number of evacuees includes voluntary evacuation)
Welfare Culture Plaza (excluding tsunami): Opening of a shelter

Okinawa City Hall: Opening of a shelter
(Okinawa City)



Emergency Alert
Evacuation instructions for landslide disasters
With the announcement of the landslide disaster warning information, a warning level 4 evacuation instruction will be issued. The target area is those who live near the landslide disaster warning area or near steep cliffs. If you are in danger of going out, please stay in a room away from the cliff side on the 2nd floor or higher indoors to ensure safety. The shelter will open a city hall and a welfare culture plaza, so please bring food and other necessary items when evacuating. Please check the city website for details.
(Okinawa City)



Tsunami Warning/ 津波警報

AyakaPaul Wed, Jul 30, 10:07 AM (12 days ago)

to Lara, Roger, Agus, Kurt, Marilyn, Edith, Stephane, Jade, Louis, Britta, Chloé, Alexis, Fabian, Yuan, Ifenna, Dan, Kenta, Zoe, Jue, Geminne, Victor, Yuka, Guillermo, Martin, Ryom

Hi everyone,

As I think many are already aware from announcements and the MISE chat there has been a Tsunami warning issued for Japan. Although, for us here in Okinawa main island there is a low level warning, there should be NO diving, NO snorkeling, and NO reef walking. For everyone's safety please stay away from the coast today.

No need to be super alarmed on land!

Stay safe everyone! As James says - the ocean is always there and there will be more chances to get out to the field!

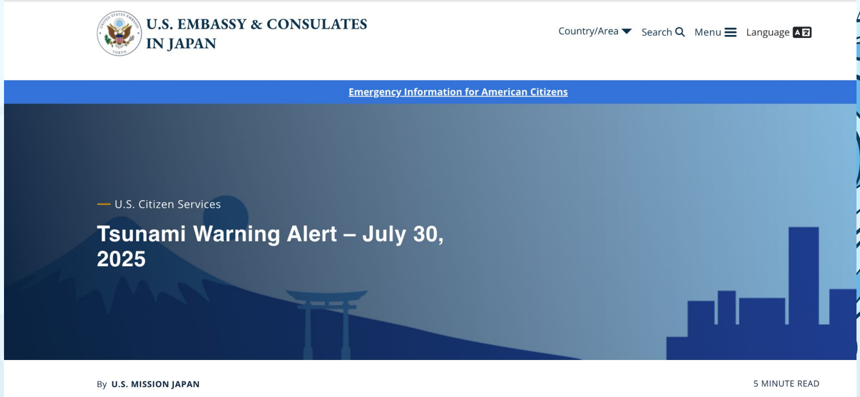
すでにアナウンスやMISEのチャットでご存じの方も多いと思いますが、日本に津波警報が発令されています。沖縄本島に関しては低いレベルの注意報ですが、本日はダイビング、シュノーケリング、リーフウォーキングは絶対に行わないでください。

皆さんの安全のためにも、今日は海岸には近づかないようにしましょう。

陸上にいる分には過度に心配する必要はありません！

皆さん、どうか安全にお過ごしください。
先生も言っているように、海はいつでもそこにあります。フィールドに出るチャンスはまたありますよ！

Cheers,
Ayaka



U.S. EMBASSY & CONSULATES IN JAPAN

Emergency Information for American Citizens

— U.S. Citizen Services

Tsunami Warning Alert – July 30, 2025

By U.S. MISSION JAPAN

5 MINUTE READ

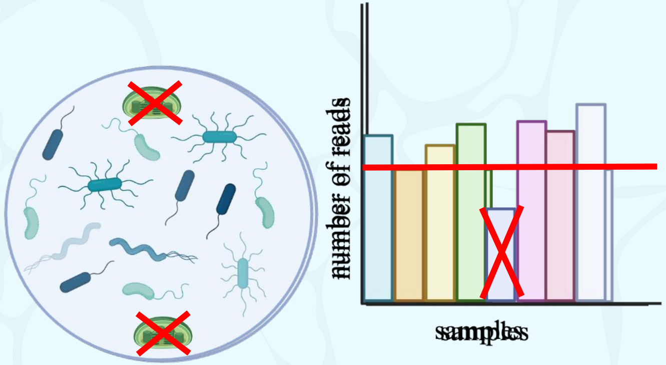
low tide = not low enough

04

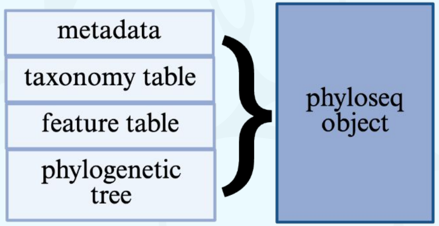
Expected Results

Statistical testing: Pipeline

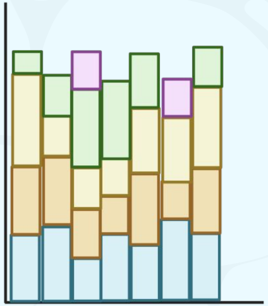
1. Prepare the raw data for data analysis

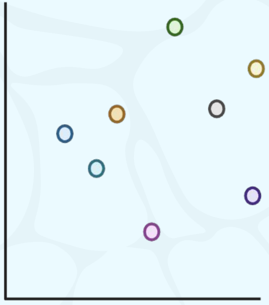


2. Create phyloseq object

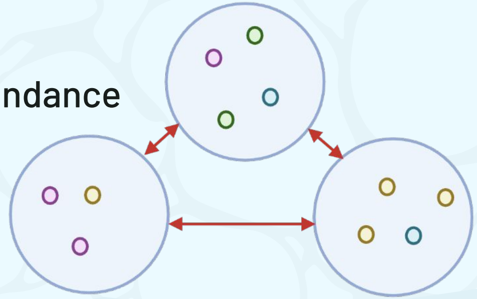

metadata
taxonomy table
feature table
phylogenetic tree
phyloseq object

3. Visualize data

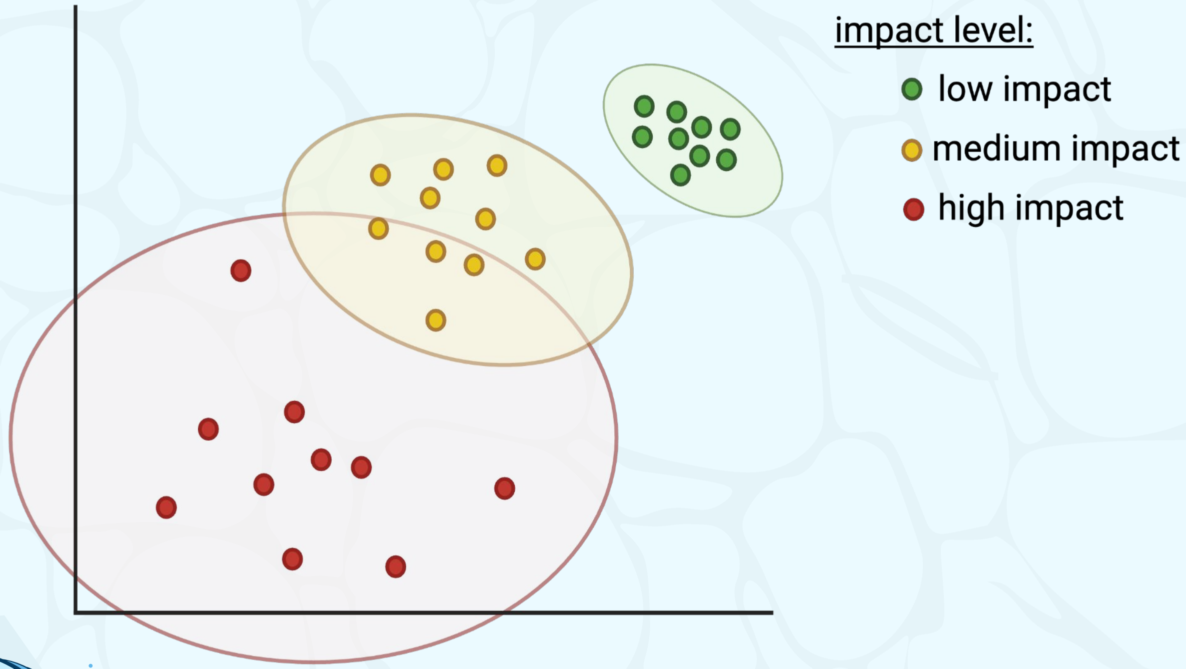

relative abundance


PCoA plot

4. Run statistical analyses
   a. Alpha diversity
   b. Beta diversity
   c. Differential abundance



My hypotheses...



PCoA plot

1. Microbial community composition will be significantly different as a function of urbanization level
2. Microbial variability will be greater in the high impact site than in the low or medium impact sites

Results

Do we see significant differences in composition and variability across sites?

Yes

- *Zoanthus sansibaricus* are susceptible to human impacts and urbanization of coastlines.
- Microbes are important to host health and resilience, and changes in the microbiome makes the organism more susceptible to disease and stress

No

Either:

1. *Z. sansibaricus* is resilient against urbanization and the microbiome is not significantly affected by human impact
2. Regardless of impact level, urbanization affects the microbiome the same across sites

Next Steps

1. **Time series analysis**
    a. This data is super cool because it is one of the first studies to look at the microbiome of a Zoantharia, and sets a baseline to monitor shifts in the microbiome
2. **More sites**
    a. There are many sites that could be categorized as high, medium, or low impact across Okinawa. The northern part of Okinawa is even more remote and rural than the "low impact" site, so it would be interesting to find Z. sansibaricus there and sample.
3. **Other organisms**
    a. Z. sansibaricus is a good beginning model organism for coral reef ecosystems but does not cover the whole extent of the diversity. Other studies can look at different organisms at the same sites.

Acknowledgements

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Scripps Institution of Oceanography
GikenBio

Tyler Center for Global Studies

MISE
University of the Ryukyus Okinawa

Applied Microbiology International

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Thank you for listening!