



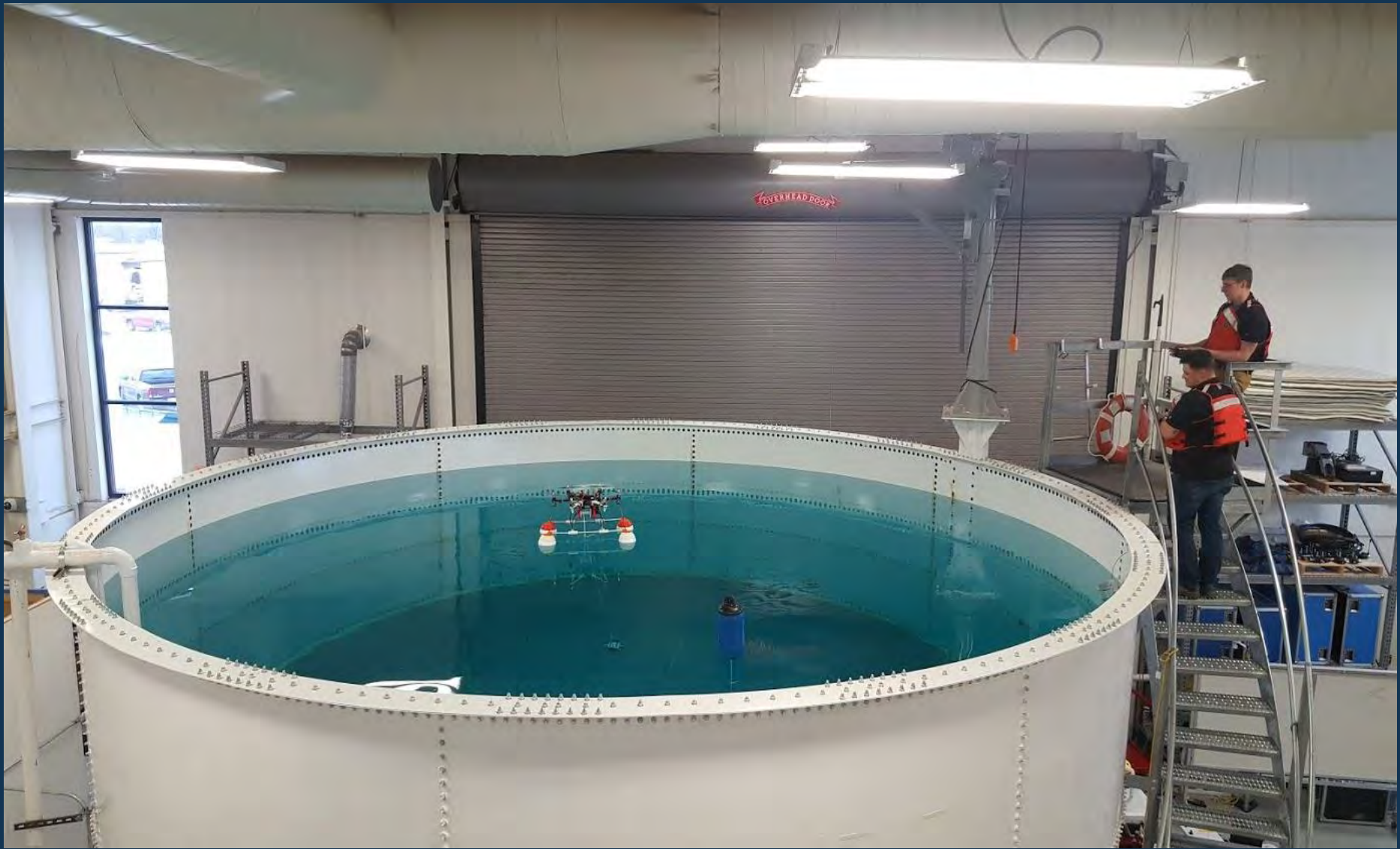


Coral Reef Study – Bunaken National Park

North Sulawesi, Indonesia

A black and white photograph of a drone flying in a factory. The drone is centered in the upper half of the frame, with its four arms and propellers visible. The background is a blurred industrial environment with overhead lights, structural beams, and various pieces of equipment. The text "ENGINEERING TECHNOLOGY" is overlaid in the center of the image in a large, white, sans-serif font with a slight drop shadow.

ENGINEERING TECHNOLOGY

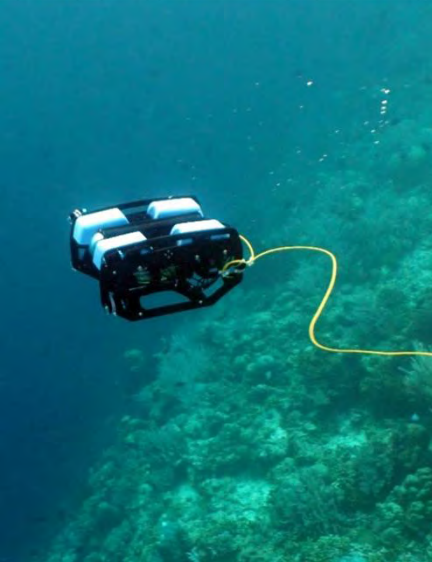




No Swimming or Diving

NORTHWESTERN

REG. NO. 1171-01



Bunaken Coral Reef Study – Our story

Presentation

- Background
- Project overview
- Our story



WSI 400: Marine Technology Capstone

Program requirement: BS Marine Technology degree

Project scope:

Integrated survey (marine, aerial, water quality) of the coral reef system around the Bunaken Island located in North Sulawesi, Indonesia.

Course Objectives:

- Project management skills
- Application of technical assets
- Data integration and application
- Research collaboration
- Training Politeknik students



Project Overview

Aerial Imagery

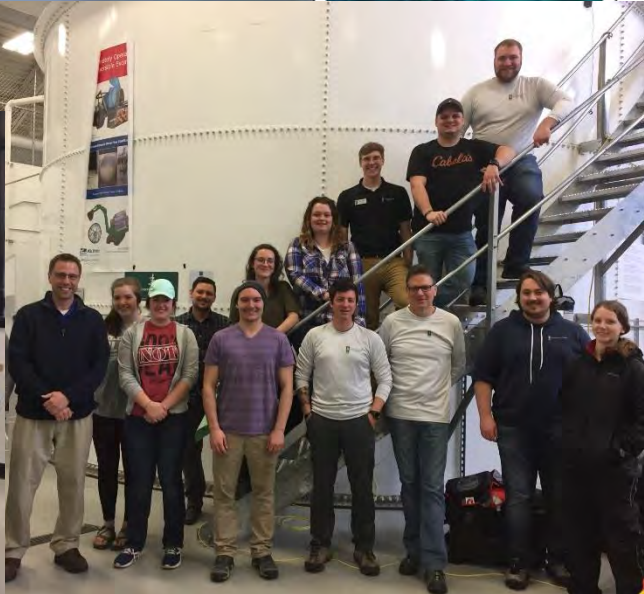
ROV (underwater imagery)

Water Quality Data



Bunaken Coral Reef Study – Project overview

Planning & Preparation



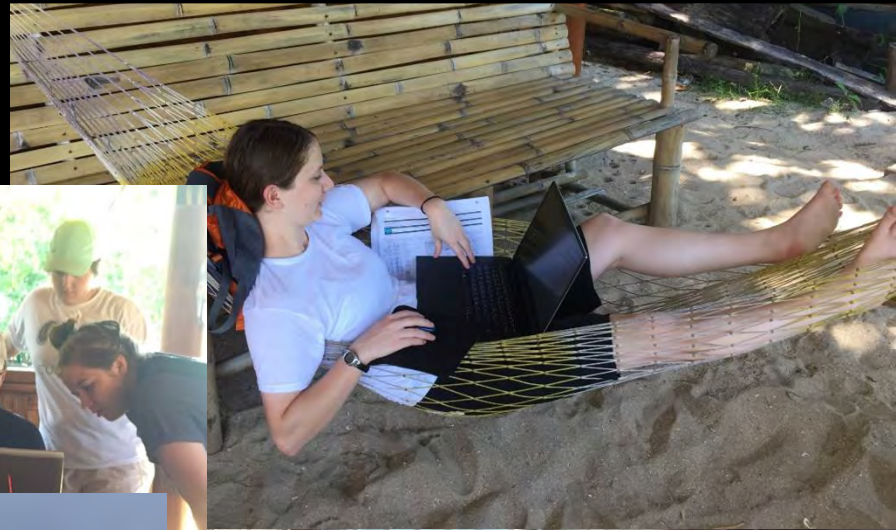
Bunaken Coral Reef Study – Our story

Our environment



Bunaken Coral Reef Study – Our story

Our environment



DATE	QUEST NAME	DIVE SIDE	GUIDE	CAPT	CREW	TIME	TANK
5/5	ROV	Lulu Pasa Pjs SACHIKO ALBAN FUKU		JEMI	ONAL	07.30	
	Water Quality			Sahil	Nyong	08.00	
	ROV	LIKUAN 1-3 Mika KMP		JEMI	ONAL	LUNCH 12.00	
	WQ + DRONE	RONIS WEST		SAHIL	NYONG	06.00	



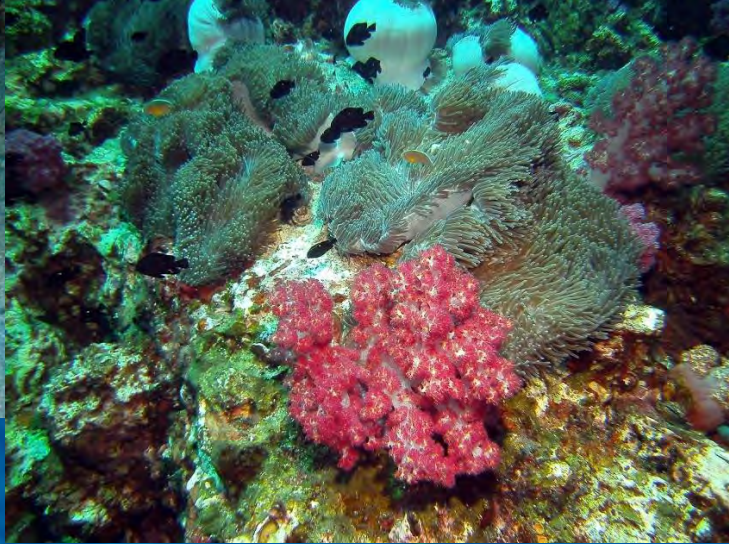
Bunaken Coral Reef Study – Our story

Our environment



Bunaken Coral Reef Study – Our story

Our environment



Bunaken Coral Reef Study – Our story

Our Partner



Bunaken Coral Reef Study – Our story



Water Quality Survey

Data Collected

- Ph
- Conductivity
- Dissolved O₂
- Temperature
- Depth

150 Drops
around the
entire Island



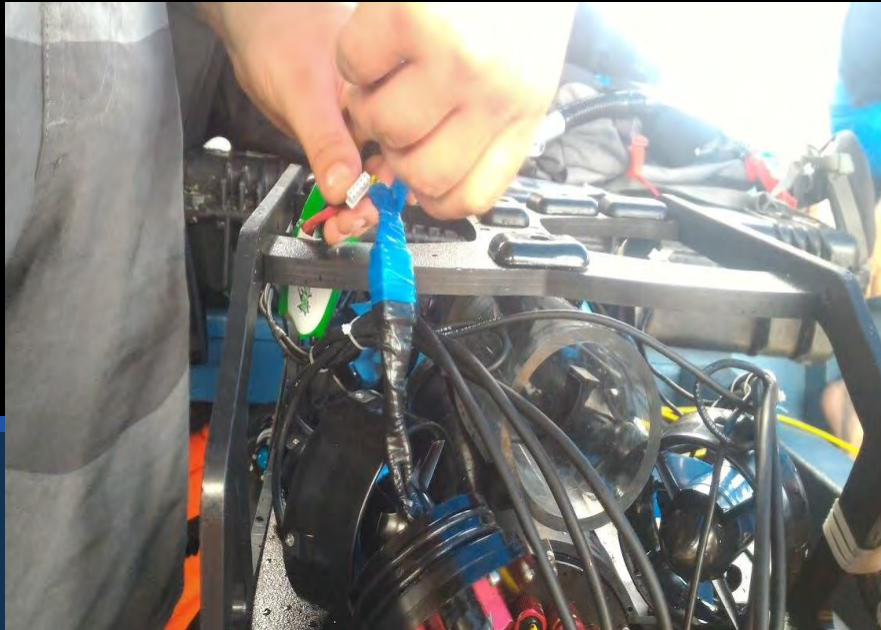
Bunaken Coral Reef Study – Our Results



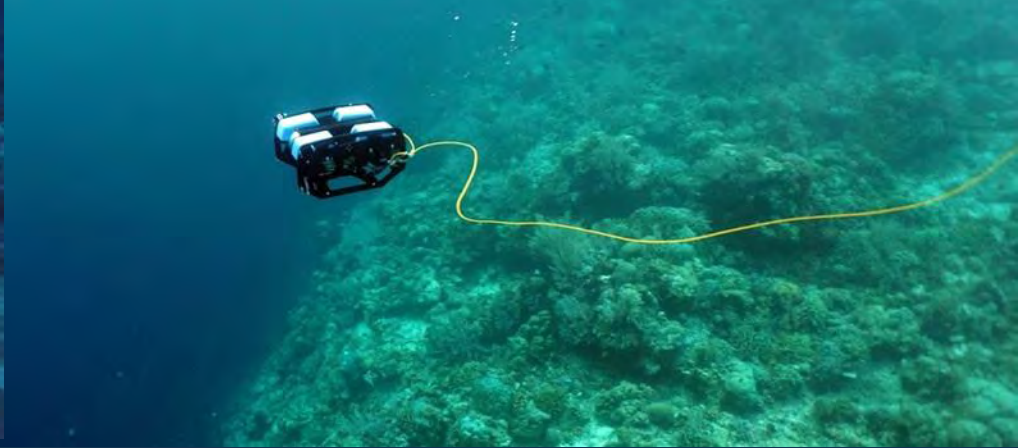


Blue ROV 2

ROV Ops

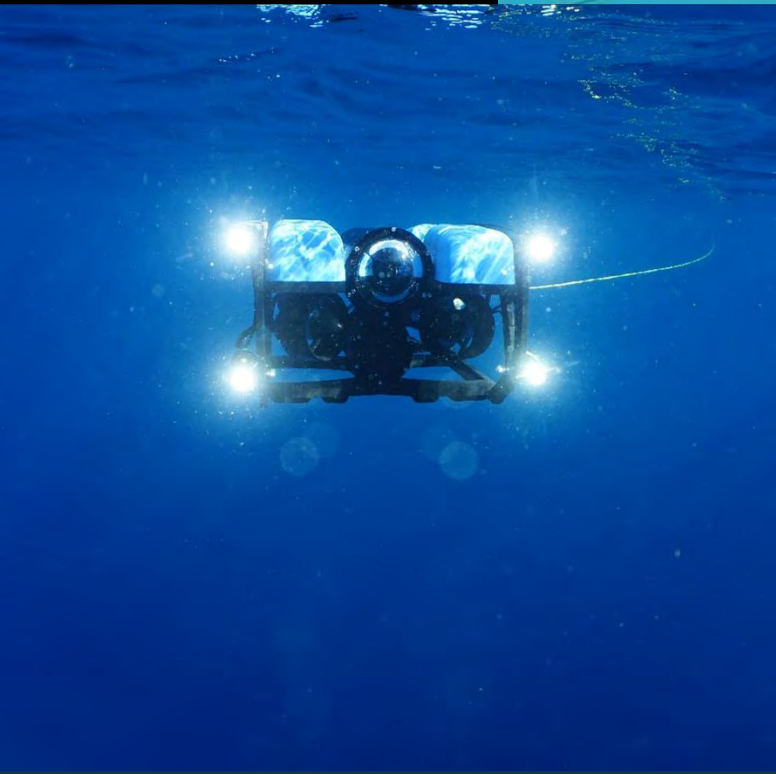


ROV Imagery



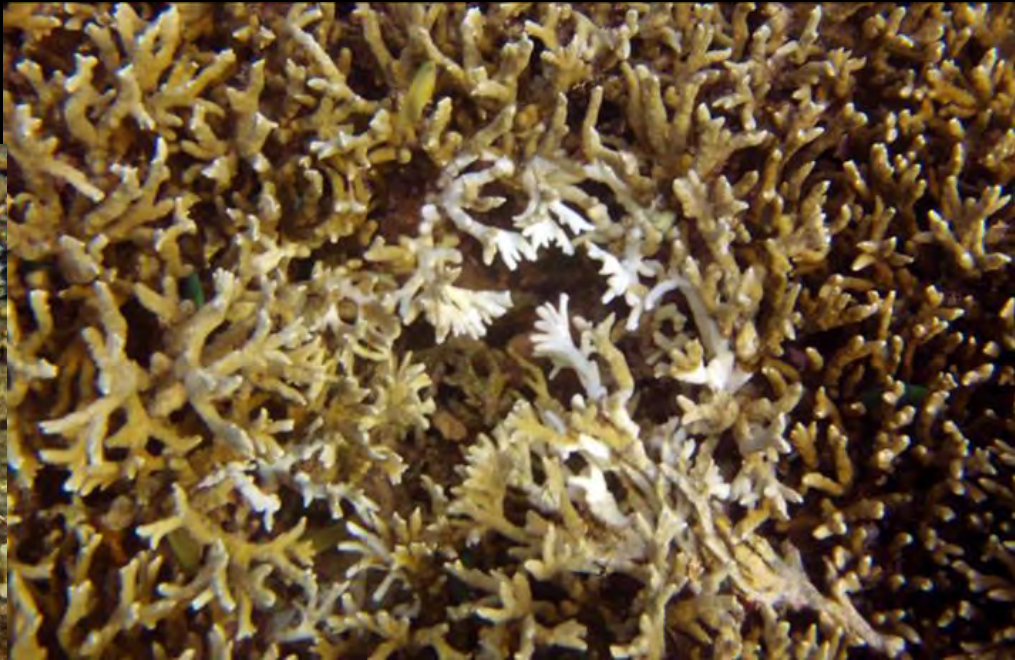
Bunaken Coral Reef Study – Our Results

ROV Imagery



Bunaken Coral Reef Study – Our Results

ROV Imagery – the problem



Bunaken Coral Reef Study – Our Results

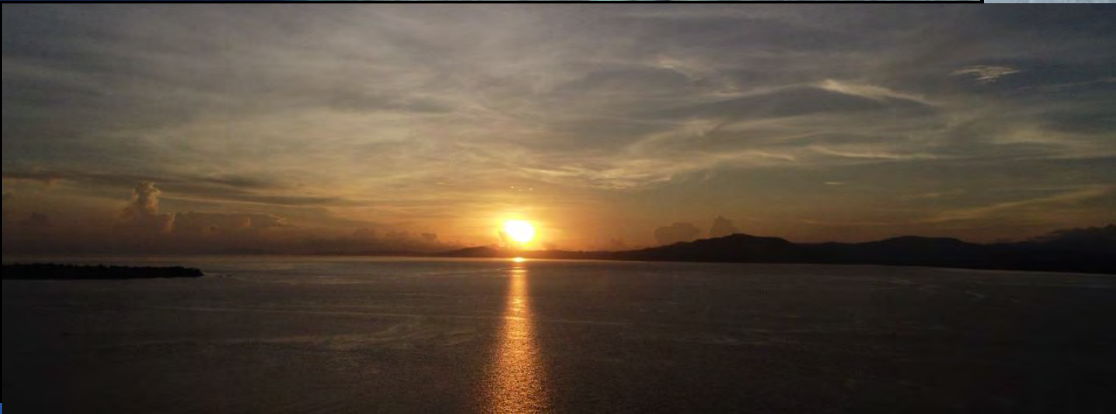
UAV Imagery



Bunaken Coral Reef Study – Our Results



UAV Imagery



Bunaken Coral Reef Study – Our Results



Our success



POLITEKNIK NEGERI MANADO
in collaboration with
NORTHWESTERN MICHIGAN COLLEGE



Present

**International Seminar on Coral Reef,
Marine Technology and Marine Tourism**

Manado, 30 May 2018



Bunaken Coral Reef Study – Our story

Our celebration - Singapore



Bunaken Coral Reef Study – Singapore

Our Results - StoryMap



Bunaken Coral Reef Study

QUESTIONS



2019 - Bunaken Revisited



Snorkeling and SCUBA

