

# **Invertebrate indicator species, coral diseases, trash & impacts**

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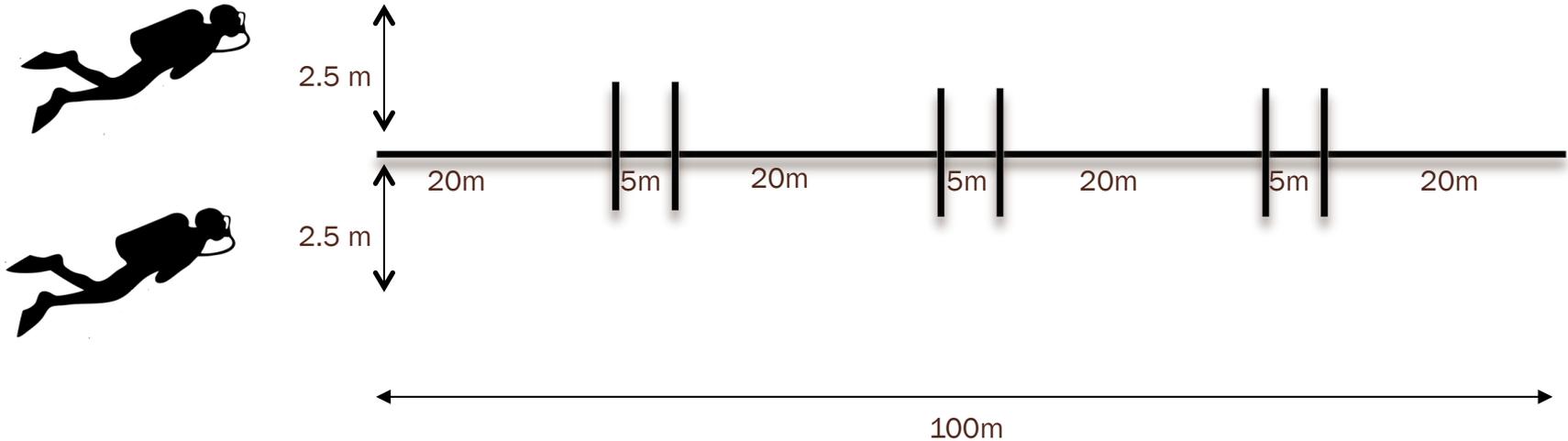


# INTRODUCTION

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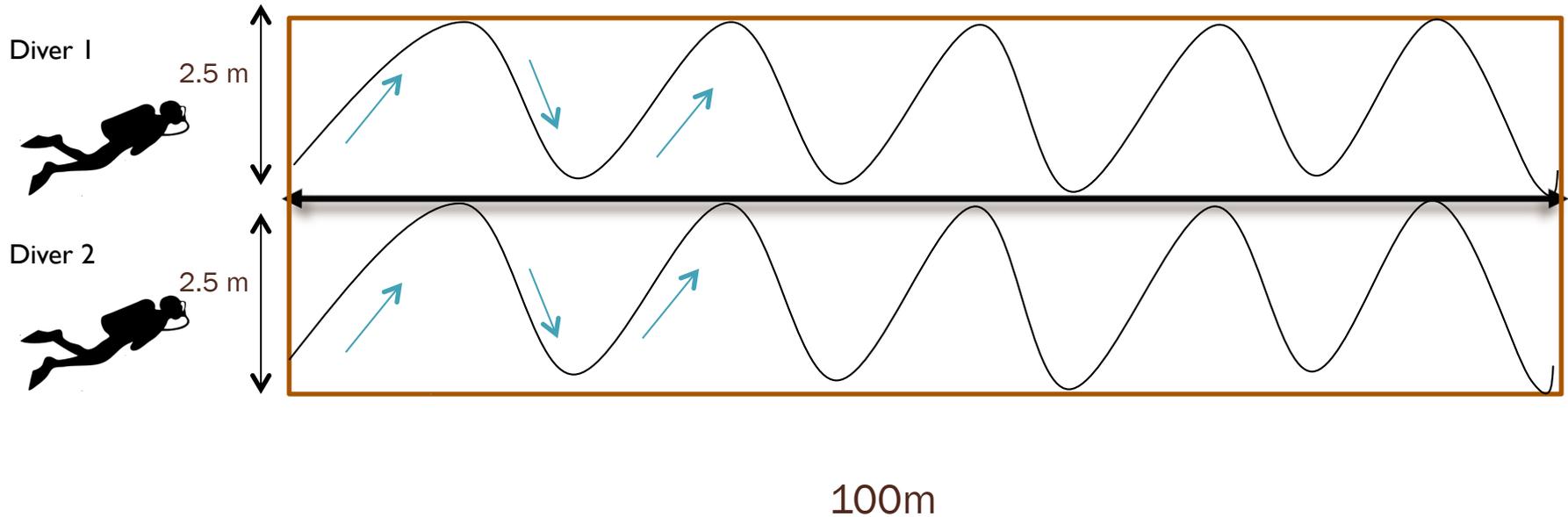
- ✘ Invertebrates are animals with no backbone; besides the fish, almost all organisms on coral reefs are invertebrates.
- ✘ Many invertebrates (sea shells, lobsters, urchins..) are fished out of the water for food, curio or aquarium trade, therefore they have an important economical value for the region. But if these organisms are overfished, their population may not be able to replenish themselves and lead to the failure of fishery activities.
- ✘ 9 animals have been selected as indicators of human impacts because of their ecological and economical value.
- ✘ In addition, we will also measure general impacts affecting the reefs such as bleaching, damage, disease or trash.
- ✘ Those invertebrates are bottom dwellers thus, divers will need to have their face facing down during the survey.

# THE TRANSECT



- ✓ The basic idea of the Reef Check protocol is to swim along a 100 meter measuring tape (called a transect) and count invertebrates, typically targeted by fishermen, aquarium collectors and others, in four 20 m long sections.
- ✓ It is very important to respect the 5 meters gap between each 20 meter segment.

# THE TRANSECT



- ✓ Invertebrates are counted in a 5 m wide (centered on the transect line) and divers should swim in a S-shaped pattern and search for indicator species inside cracks or crevices.

# BANDED CORAL SHRIMP : *Stenopus hispidus*



- × Banded Coral Shrimp have long white antennae.
- × They have a red & white striped body.
- × They live in crevices and cracks.
- × They are often seen in pairs.

- ✓ They keep parasites under control by cleaning up other living organisms.
- ✓ Coral Banded Shrimp are collected for aquarium trade.



# DLADEMA URCHIN : *Echinothrix* & *Diadema*



- ✘ Diadema urchins have very long sharp spines.
- ✘ They are found under corals, in holes or cracks are not commonly seen during daylight hours, thus it can be hard to see them.

- ✓ Sea urchins are grazers that keep macro algae under control, preventing it to smother small corals. By cleaning rocks, new coral recruits are able to settle down. They also participate in the bioerosion of the reefs.
- ✓ Diadema urchins are therefore a keystone species in the tropical ecosystem.
- ✓ Carnivorous fish eat sea urchins thus, if the population of sea urchins is too large it can be an indicator of overfishing; Instead of helping the settlement of juveniles corals, the sea urchins erode the reef and coral larvae's along with the algae.

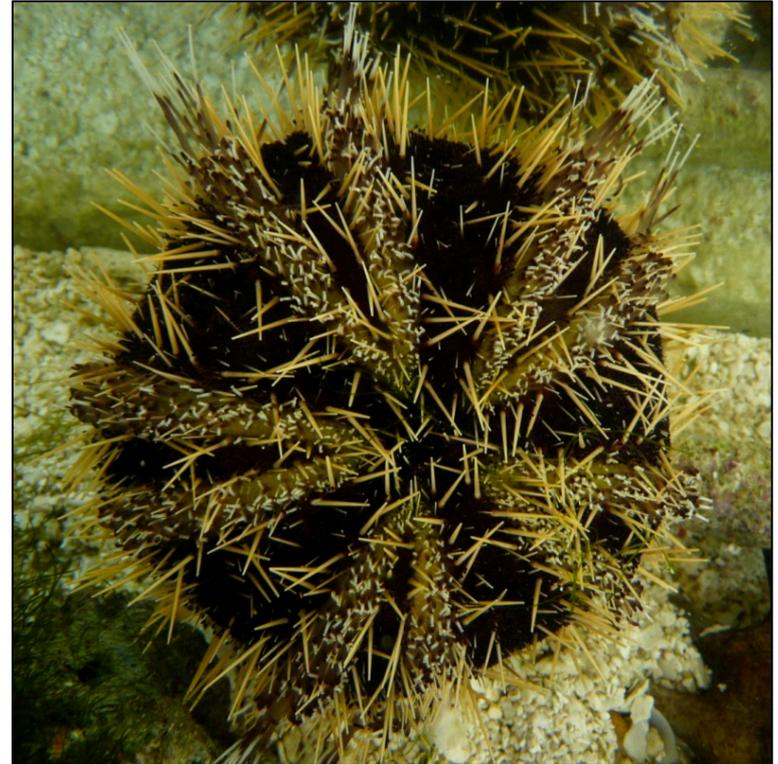
# PENCIL URCHIN : *Heterocentrotus mammilatus*



- ✘ Pencil Urchins have very thick, red or brown, spines looking like pencils.
  - ✘ They can be found under corals, in holes or cracks, but are very secretive.
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- ✓ Pencil Urchins are also algae-grazers but are less common than Diadema Urchins and are not considered as a key stone species.
  - ✓ A small number of them is an indicator of overfishing for curio trade, as they are used for jewelry or decorative wind-chimes.

# COLLECTOR URCHIN : *Tripneustes gratilla*

- ✘ Collector Urchins have thin spines which are often white.
- ✘ They collect debris (coral, algae..) to use them as camouflage.
- ✘ Their body is often purple but may appear darker in the water.



- ✓ They also keep macro algae under control.
- ✓ They are collected for the aquarium trade and harvested for food in many countries throughout the world.

# SEA CUCUMBERS : *Holothuroidea*

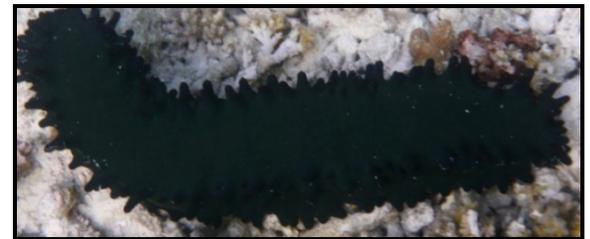
## → Redfish : *Thelonota ananas*

- × Redfish are bright orange to brown.
- × They have firm pointed dorsal papillae.
- × They can grow to 70 cm.



## → Greenfish : *Stichopus chloronotus*

- × Greenfish have a dark-green color.
- × Their underside is flat, almost square in cross section.



## → Pinkfish : *Holothuria edulis*

- × Pinkfish are black on the top and pink underside.
- × The body is smooth with no papillae.
- × They are round in cross sections.



- ✓ Sea Cucumbers feed on the detritus by ingesting sand, thus cleaning it.
- ✓ Sea cucumbers are harvested for food and exported to the Asian market where they can be sold USD \$ 100 / Kg. These 3 species are selected because of their broad distribution and easiness to identify in the water.

# GIANT CLAMS : *Tridacnidae*

- ✗ Giant Clams are very large bivalves (10 to 50 cm).
- ✗ They are sessile animals, usually anchored to the reef.
- ✗ They have a colorful mantle (blue, green, brown...), containing zooxanthellae (a micro algae) which provide nutriments to the Giant Clams by photosynthesizing the sunlight's.
- ✗ Presence of 2 siphons.



- ✓ Bivalves filtrate the water and are a good indicator of the quality water.
- ✓ Giant Clams have been collected for aquarium trade, harvested for food and curio for centuries. Large specimens are now rarely seen.

Count and size Giant Clams to the nearest 10 cm

# LOBSTERS : *Paninuridae*

- ✘ The maximum size is about 45 cm.
- ✘ Lobsters have a cylindrical-shaped carapace and a pair of long spiny antennae.



- ✓ Lobsters feed on organic matter (scavengers).
- ✓ They are highly prized seafood and a small number is an indicator of overfishing.

# CROWN OF THORNS (COT): *Acanthaster planci*

## PREDATION



- ✘ The Crown of Thorns are a large starfish (12-19 arms).
- ✘ They have long black spines covering their body which are very poisonous.
- ✘ In the Maldives they are bright purple and black.
- ✘ They are conspicuous on the reef but during day time they are hiding under corals and rubbles and can be hard to find.



- ✓ They feed on living corals and are responsible for the destruction of large reef areas when their numbers is too large.
- ✓ Look for the fresh COT scars (white corals).

# GIANT TRITON : *Charonia tritonis*

- ✘ Giant Tritons are very large gastropod, reaching the size of 45 cm (18 in).
  - ✘ They have orange and black antennae protruding from the front of the shell.
  - ✘ You have to make sure the animal is still in the shell and that it is not a hermit crab instead.
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- ✓ Giant Tritons are natural predators of the Crown of Thorns , and keep the population of starfish under control.
  - ✓ They are highly demanded for curio trade because of their impressive large shell.



# CORAL BLEACHING: GLOBAL WARMING INDICATOR

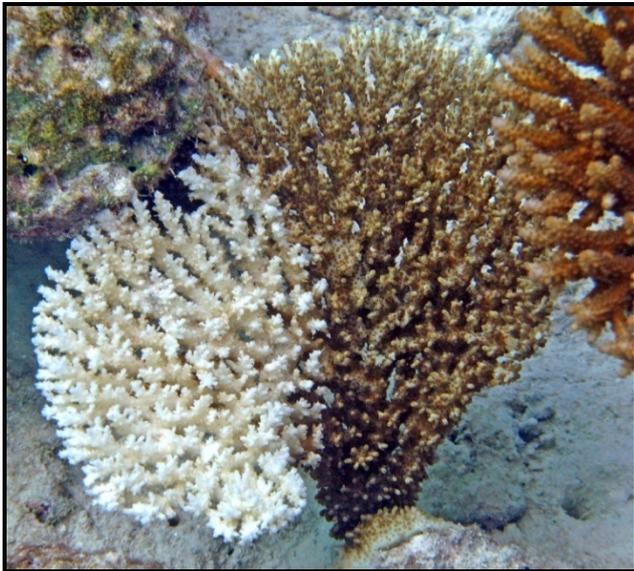
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- × Bleaching occurs when the coral is under stress :
  - × Surface sea temperature (el Niño)
  - × Pollution
  - × Siltation
- × This can lead to the death of the corals if the stressor remains for a long time.



# CORAL BLEACHING : GLOBAL WARMING INDICATOR

- ✘ This coral is partially bleached (45%).
- ✘ This reef is 40 % bleached and the colonies are 50% bleached.

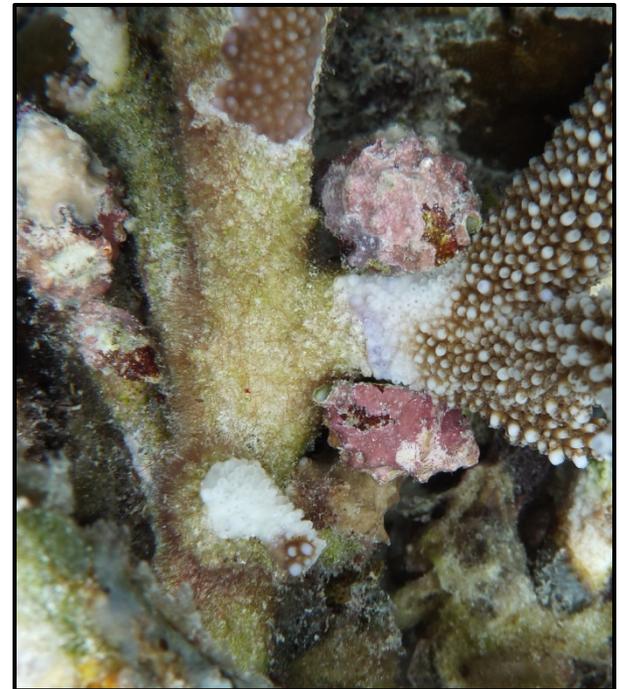


Asset the percentage of the colony that is bleached and the percentage of the coral population that is bleached on the reef.

# DRUPELLA CORNUS

## PREDATION

- ✘ Drupella snails are coral eaters that can be found in large aggregation in the coral colonies.
- ✘ To not be confused with coral bleaching or coral disease, look inside the coral to see if there is any snail.



# BLACK BAND DISEASE : CORAL HEALTH INDICATOR

## DISEASE

- ✘ On the coral colony a black band surrounding a white, dead patch is an indicator of black band disease.

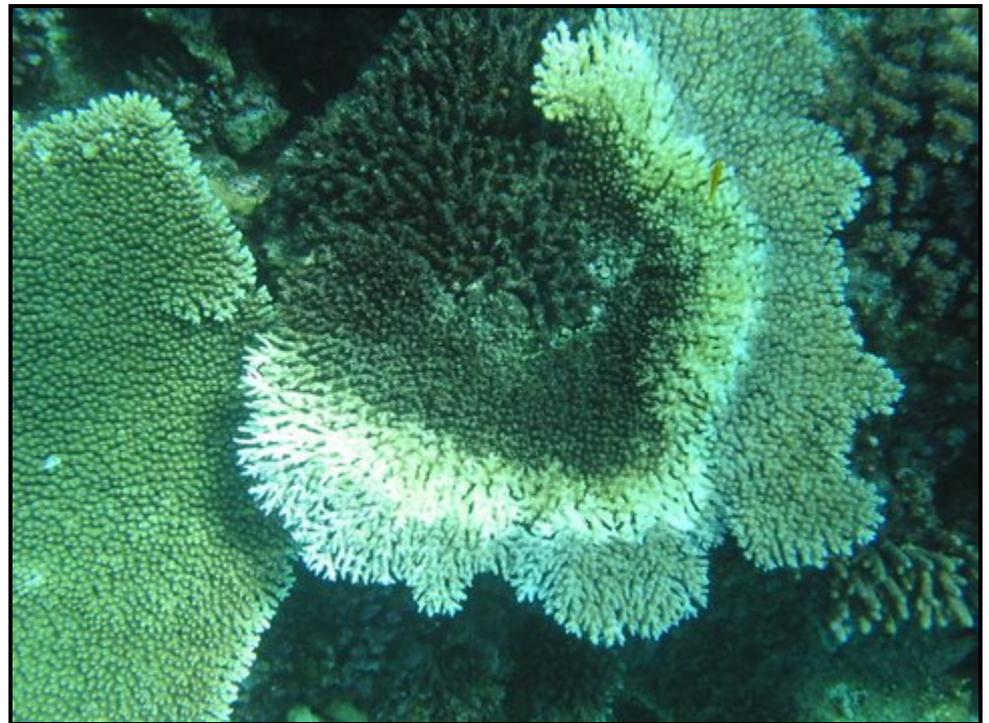
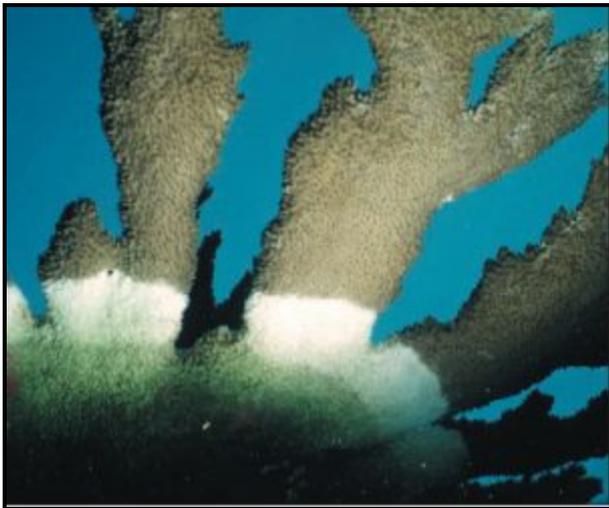


- ✔ This is not black band disease, this is coral competition

# WHITE SYNDROME DISEASE : CORAL HEALTH INDICATOR

## DISEASE

- ✘ Characterized by a white band or line of bleached but intact coral tissue between the exposed coral skeleton and the healthy coral tissue.



# TRASH AND CORAL DAMAGE

- ✘ Discarded fishing gear, rubbish, anchor damage (to not confuse with storms).
    - + None = 0
    - + 1 piece / damage per transect
    - + 2-4 pieces/damage per transect
    - + More than 4 pieces/damage per transect
- low = 1  
medium = 2  
high = 3

