Coral Reefs

Marine Conservation Section
Division of Environment and Conservation
Ministry of Natural Resources and Environment

GOVERNMENT OF SAMOA
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT


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INTRODUCTION

- More than 80% of the earth's surface is covered by water which consists of a vast network of oceans and seas. The Pacific Ocean is the largest ocean in the world. Within the world's ocean, the greatest variety of life is found on amazing living structures called 'coral reefs'.
- Coral reefs are often referred to as the "rainforests of the sea" since it is one of the most diverse, species rich and highly productive biological systems in the world.
- Coral reefs play various important roles for a variety of marine animals and plants that interact with one another and their surrounding environment.
- They also have great value and benefits for humans, especially Samoa and other Pacific islanders that heavily rely on them to provide every day needs such as food.

Role of Marine Conservation Section

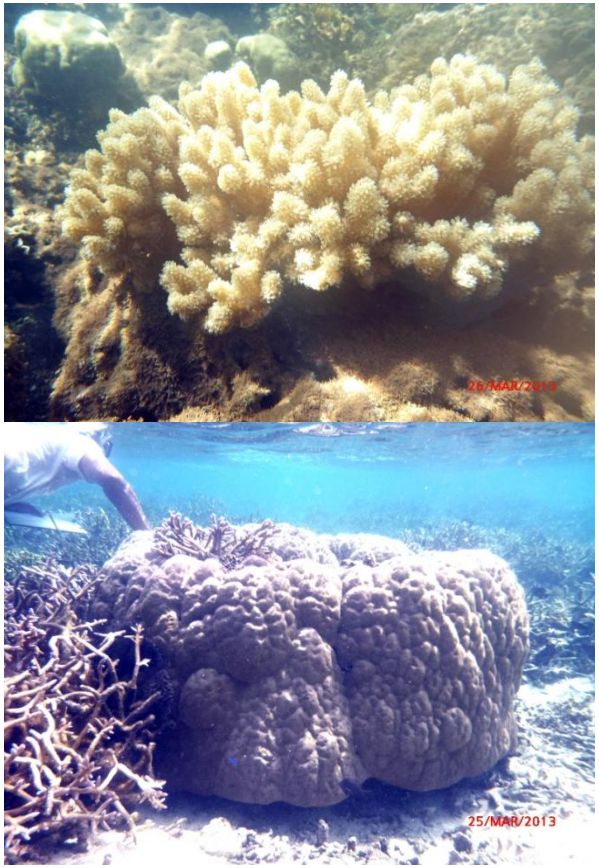
- Vision:
  - Ensure Samoa's biological and genetic resources is protected, conserved and sustainably managed so that it will continue to flourish and regenerate, for present and future generations
- Mission:
  - Promote **"Sustainable development & management of marine biological diversity and environment"**

What are Corals?

- Corals are animals that belong to the phylum '**Cnidaria**' and class '**Anthozoa**' which includes sea anemones and jellyfish
- They are made up of tiny marine animals called '**polyps**' that deposit an external skeleton made up of calcium carbonate or limestone.'
- Most reef building corals live in colonies and are made up of many individual polyps connected by their living tissues called '**coenosarcs**'.

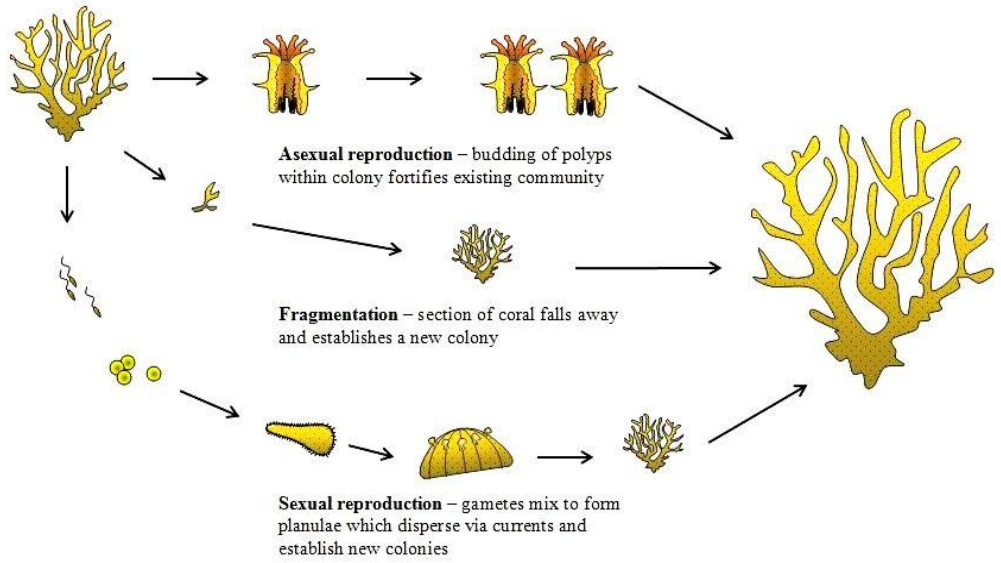
Types of Corals

- There are many different species of corals and they are generally classified into two main types, **soft** or **hard** corals.
- <u>Soft corals</u>
  - These include sea whips and sea fans which are soft and can bend with the water currents. They have flexible skeletons that contain calcium carbonate in small clumps called **spicules**. These corals are abundant on coral reefs but do not help build the coral reefs because they do not have a hard skeleton.
- <u>Hard corals.</u>
  - Hard or stony corals are also called **reef builders** because of their firm calcium carbonate skeletons. These reef building corals have many different types of morphologies such as; table corals, submassive corals, mushroom corals and so forth.



How do Corals Reproduce?

- Corals reproduce in two ways; **sexually or asexually**
- Asexual reproduction
  - Budding
  - Fragmentation
- Sexual reproduction
  - Fertilization of gametes occurs either internally or externally.
    - Hemaphrodictic species
    - Gonochoric species



Feeding Methods.

- Most corals feed by using their stinging tentacles to capture food from the surrounding water and by using symbiotic algae **zooxanthellae** that live inside the polyp to produce food.
- **Zooxanthellae** uses sunlight to produce its food through the process **photosynthesis.** They provide 80-90% of the polyps food. Zooxanthellae also gives corals their colors.

Conditions needed for coral growth

- Sunlight
- Water clarity
- Temperature
- Salinity
- Substrate
- Water circulation

What are coral reefs?

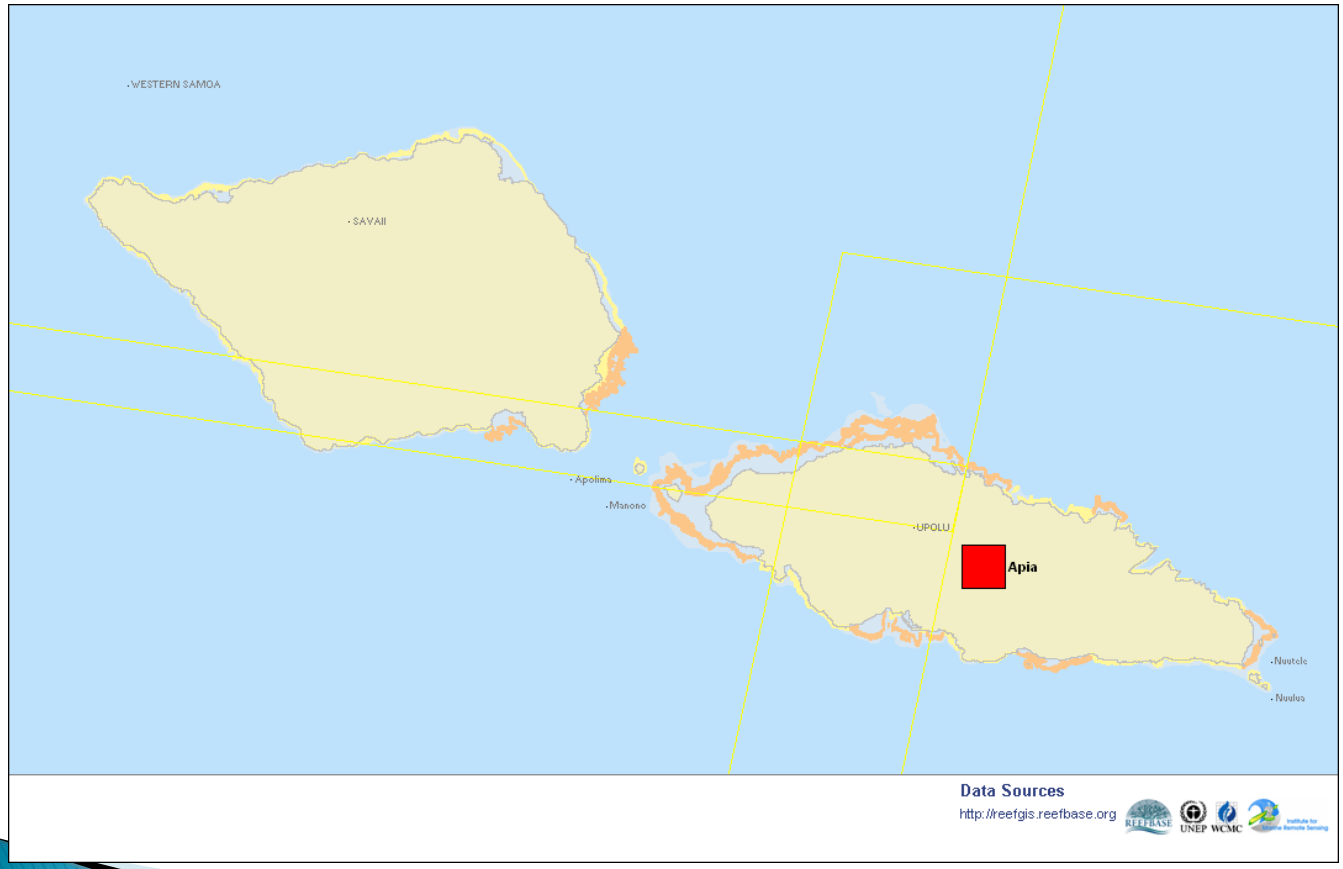
- Coral reefs are unique ecosystems that are made up of limestone that are deposited by living organisms.
- Although corals are major reef builders, the are not the only ones that make up the reef. Many plants and animals that live on the reef such as coralline algae, seagrass, sponges and even giant clams contribute to the formation of the reef.

Types of reefs

- There are three major types of coral reefs that occur throughout the world
  - Fringing reefs
    - Most common reefs that grow in shallow water near shorelines of continents or tropical islands
  - Barrier reefs
    - Occur further offshore and are separated by a channel that can be a deep lagoon in some cases. It has a reef front that faces the open ocean and a reef flat behind it.
  - Atolls
    - Are circular reefs that are made up of sandy cays and islands surrounding a relatively shallow lagoon

Reefs of Samoa

- Samoa has both fringing reefs and barrier reefs.



Fringing

Barrier

Reefs of Samoa cont.

- 123 coral species have been recorded in Samoa.
- There are more than 900 marine species that inhabit and depend on the reefs.
- The north west coast of Savai'i has the highest diversity coral of species and northern Upolu with the least diversity of coral species.
- Northern Upolu has the highest diversity of species inhabiting the reefs.

Status of coral reefs in Samoa

- Despite cyclones Val and Ofa in the early 1990's that caused significant damages, the reefs are still in good conditions and are recovering.
- The tsunami in 2009 caused extensive damages mainly to the south eastern coast and are slowly recovering.
- Cyclone Evan in 2012 had little impact on coral reef communities.

Importance of corals and coral reefs

- Ecological values
  - Provide food and shelter for a diverse group of marine life
  - Shoreline and lagoon protection from strong waves and currents
  - Protect mangroves and seagrass from strong waves which are other habitats important to coral health
  - Water filtration

Importance of corals (cont.)

- Community Values
  - Provide subsistence - Samoa consumes up to 57kg of marine species per year capita.
  - Support the fisheries industry – families rely on coral reefs for income
  - Provide raw materials for medicines
  - Provide healthy ecotourism

- Anthropogenic threats
  - Destructive fishing methods (e.g. dynamiting, ava niukini)
  - Over-fishing of certain species (e.g. Parrotfish/fuga)
  - Pollution, rubbish and siltation
  - Removal of corals
  - Destruction of other marine habitats (e.g. mangroves, seagrass)

Threats (cont.)

- Natural threats
  - Cyclones
  - Tsunami
  - Climate change
  - Diseases
  - Fresh-water runoff
  - Coral bleaching
  - Crown of Thorn Starfish outbreaks

Impacts of damaged reefs

- People derive a lot of benefits from coral reefs and degradation to this ecosystem would result in negative impacts such as;
  - Decrease or loss of food sources
  - Decrease or loss of income
  - Increase vulnerability of coastal land
  - Decrease or loss of potential sources for medicine
  - Loss in tourism industry
  - Blooms in unwanted/toxic animals and plants
  - Reduce resilience of reefs to recover naturally

Minimizing problems affecting coral reefs

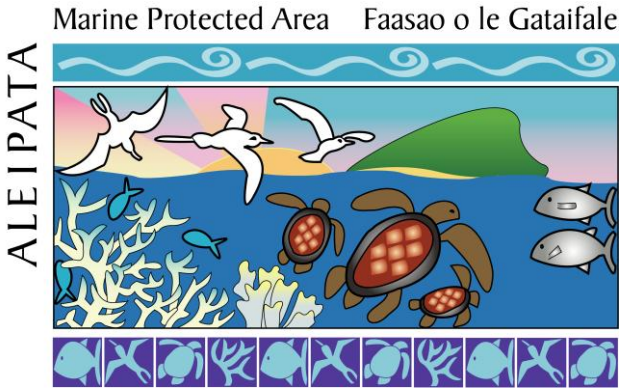
- We can minimize problems affecting coral reefs by respecting our oceans by:
  - Encouraging sustainable fishing practice (e.g. stop using destructive methods, avoid over-fishing and harvesting undersized fish)
  - Reduce pollution and prevent habitat degradation (e.g. mangroves)
  - Establishing marine reserves and protected areas
  - Restoration, enhancement, restocking
  - Raise awareness programs about the effects of damaging the reefs
  - Working with the communities to enforce policies and legislation

Students from Vaiala Beach School learning about mangroves

Current coral reef and marine resources management and conservation in Samoa

- 1. Traditional Management
  - Traditionally Samoa had elaborate customs of ownership and control of fishing rights. With communities having ownership of the marine resources, traditional management and conservation protocols are very important and needed for the effective conservation and management of marine resources including coral reefs

- 2. Marine Protected Areas and Projects
  - Palolo Deep Marine Reserve (est. 1974)
  - Community-based Marine Protected Areas (e.g. Aleipata and Safata MPA)
  - Community-based Fish Reserves
  - Establishing additional Marine Protected Areas



Current coral reef and marine resources management and conservation in Samoa (cont.)

- 3. Coral Reef Monitoring
  - Monitoring programs are conducted to assess the health and status of coral reefs and includes;
    - Division of Environment and Conservation, MPAs, Community-based and Scientific Monitoring Program
    - Fisheries Division Monitoring Programs
    - Global Coral Reef Monitoring Network Node
- 4. Coral replanting
  - Fisheries Division
  - NGOs
- 5. Legislations
  - Lands Surveys and Environment Act 1989
  - The National Parks and Reserves Act 1974
  - The Fisheries Act 1988
  - Fisheries Regulation 1995
  - Fisheries Village by-laws
  - Village fono Act 1990

Questions ?