



MARINE and WILDLIFE CAMP



STUDENT'S MANUAL & WORKBOOK



MARINE AND WILDLIFE CAMP STUDENT'S MANUAL

Copyright © 2012

Philippine Reef and Rainforest Conservation Foundation, Inc.
In partnership with
The Department of Education



A project funded by the
Foundation for the Philippine Environment



Nature's Classroom

Welcome to Danjungan Island



Danjungan is a 43-hectare island that lies in the Sulu Sea, 3 km west of Negros Occidental. This island has 5 lagoons and is covered with limestone forests - home to a nesting pair of sea eagles, rare pigeons and doves, threatened tabon scrubfowls and coconut crabs, fruit and insect bats and many other wildlife species that struggle to exist in the mainland.

Danjungan is nature's perfect classroom. It has seven different types of ecosystems that students can see and experience first hand. Each of these ecosystems are interdependent to one another. The students will be able to trace this connectivity and live within the basic principles of ecology. The Danjungan Island experience instills appreciation of all that is wonderful about nature, creates awareness of its great value and ignites action towards its conservation.

ISLAND REMINDERS



The whole island is a recognized site for wildlife and nature conservation. A true conservationist and lover of nature must know the **principles of ecology** by heart. These are the principles to be practiced not only on Danjungan Island, but in each and every place you go.

- **Everything is connected to everything else.**

Interconnectivity and interdependence are rules within the ecosystem. It is the central theme of ecology. Each living thing depends on the rest either directly or indirectly. **Therefore, we must be aware of our actions. What we do here and now, may affect another sooner or later. Remember the golden rule, Do unto others as you would have them do unto you.**

- **Everything must go somewhere**

A piece of plastic we carelessly throw on the beach may find its way in the ocean and endanger the lives of marine mammals and turtles, as plastic resembles their food. Animals that mistakenly eat plastic, ultimately suffer and die. **Do observe the waste disposal management system on the island. Put all waste in the trash bins and help clean the island by picking up garbage on the beach and your surroundings.**

- **Ours is a finite Earth**

This law tells us that there's a limit to whatever we do and extract as nature can only take or give so much. **Therefore, do not waste fresh water. There is no fresh water on the island, it is a limited resource as it is transported from the mainland. We must also conserve energy. Please switch off lights when not in use.**

- **All lifeforms are important**

All species have an inherent right to exist. Diversity is the characteristic of nature and the basis of ecological stability. **All lifeforms must be respected and therefore we must not provoke or harm any wildlife. We are only guests in their habitat and should also respect them by controlling our noise and minimize our disturbances.**

- **Take only photographs, leave only footprints...**

We must leave with Danjungan what is Danjungan's. **Do not collect plants, shells, corals or any wildlife as souvenirs.**

- **Nature knows best**

We have been careless with Mother Nature and now we are facing the consequences of climate change, calamities, water shortages and more.

Other Reminders: Bonfires are prohibited on the island. They are a fire hazard, a major green house gas and a threat to the fragile ecosystems. For safety purposes, do not wander alone around the island. Always inform the camp staff if you want to visit the beach and trails, and return on the agreed time.

DANGEROUS MARINE ANIMALS

AWARENESS is the first step to safety. Remember that we are only guests in Danjungan Island and are entering into the habitat of many other living things. We strictly adhere to the rule **Do not provoke or harm any wildlife**, not only to protect the wildlife but to also protect each guest that visits the island. Many animals have defense mechanisms that are powerful enough to inflict severe pain and even fatalities in humans. It is best to not handle any wildlife and observe them only from a distance. To be safe, we need to learn about the animals that can potentially hurt us.



Banded sea snake – The most common sea snake found in coastal areas. It is one of the most venomous snakes in the world, with a venom eight times more potent than that of the cobras. Luckily, they are not aggressive. They also have a reduced mouth and their fangs are located almost at the back of their jaw. However, this snake must not be handled by inexperienced individuals.



Stingrays - These fish have a poisonous barb on its tail. Take extra caution while walking in sandy areas.

Sea urchins - These spiny invertebrates have venomous spines for protection. If accidentally touched or stepped on by humans, long spines are capable inflicting great pain that can last for hours. Watch your step when walking along the tidal flats.



Lionfishes, Stonefishes, Scorpionfishes - These fishes have spines that can inflict a painful sting. Stone fishes and scorpion fishes however, are wellcamouflaged and are difficult to see on rocky ocean bottom. When accidentally stepped on bare foot, their spines can penetrate the skin, causing a painful swelling. Proper footwear must be worn when wading in shallow waters to avoid misfortunes.



Blue-ringed octopus - This small octopus has a set of horn-like teeth that can inflict painful bites. It has a highly venomous bite that can be fatal.



Jellyfishes - belong to the Phylum Cnidaria, same group as corals, anemones and hydroids. Their main characteristic is the presence of nematocysts or stinging cells. These are located mostly in their tentacles and can inflict a painful sting and burning sensation. Some jellies can cause skin irritations comparable to a 3rd degree burn. Dangerous jellyfishes – box jellyfish and Portuguese Man-of-war.

Crown-of-thorns starfish – This starfish is covered in venomous spines and can inflict severe pain greater than that of sea urchins.



Cone shells - Cone shells are among those that produce these toxins called conotoxins. The toxins are injected to the prey through their extendible harpoon like “teeth”. The Geographic and the Textile cone shells have reported to have caused fatalities to humans. Better not to handle these kinds of seashells.



Triggerfishes – These fish are known to nip intruders, especially when they're protecting their nests. Most especially the larger species, like the Titan triggerfish.

Sharks - They are the top predators in the ocean and their presence indicate a healthy environment. Most sharks don't attack humans unless provoked.



Barracudas - Not all barracuda species are considered dangerous. Mostly they can attack when they mistake something for their food. Some divers refrain from wearing shiny objects (watches, jewelry) as this may look like food to some animals when it reflects light.



ECOSYSTEMS

Danjungan Island's seven main ecosystems:

1. Mangrove Forest Ecosystem
2. Seagrass Ecosystem
3. Coral Reef Ecosystem
4. Beach Ecosystem
5. Open Ocean Ecosystem
6. Cave Ecosystem
7. Limestone Forest Ecosystem

Can you match the ecosystem to its corresponding photo?

What is an ecosystem?

An ecosystem is a natural unit that consists of living things that function together in an area with non-living things or physical factors of the environment. It is a unit of interdependent organisms which share the same habitat. Ecosystems can be permanent or temporary.















_____ is the study of relationships between living organisms and their interaction with their environment. No organism can live in isolation. All living things, plant and animal alike, take their nourishment from their environment for survival.

The next pages of this workbook illustrates the importance of the environment to the organism and vice versa, specifically for the seven ecosystems found in Danjungan Island.

PHILIPPINE BIODIVERSITY

The Philippines is home to over 7,100 islands and is considered one of the world's most biologically diverse areas with very high endemism. The geological history of the Philippines explains why it possesses incredibly high biodiversity and endemism. Most of the Philippine Islands rose independently from mainland Asia and therefore had the time and space to shelter rare animal and plant pioneers. The main landmass of the Philippines emerged from the Pacific Ocean as a series of "island arcs" about 50 million years ago. Only the islands of Palawan and Mindoro had originated as pieces of mainland Asia, with Mindoro dropping entirely below sea level at one time.

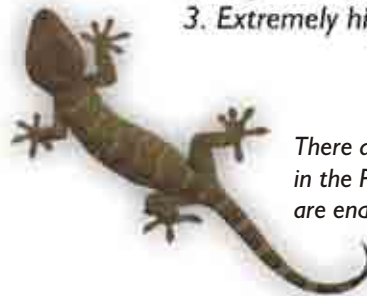
To illustrate further, the Philippines is compared to high ranking biodiverse countries. Brazil, considered the most biologically diverse country, has 725 unique species while the Philippines has 512 unique species, despite it being 28 times smaller than Brazil. Madagascar, another example, has fewer unique mammals than the Philippines (90 vs 111), despite it being two times larger. Therefore, if you consider the number of species versus land mass, the Philippines becomes the most biologically diverse country in the world.

Today, the Philippines is a country with nearly 90 million people, many of which greatly depend on their natural resources. The country's natural wealth has been exploited over the years, which leaves many species and habitats close to disappearing forever.



The Philippines is considered to be the 'hottest of the world's hotspots' due to its:

1. Extremely high biodiversity
2. High levels of endemism
3. Extremely high levels of threat



There are 244 species of reptiles in the Philippines, 68% of these are endemic.



There are 174 species of mammals in the Philippines, 64% of these are endemic.



There are 576 species of birds in the Philippines, 35% of these are endemic.



There are 89 species of amphibians in the Philippines, 86% of these are endemic.

FORESTS

Tropical rain forests are not one ecosystem, but millions of unique ecosystems. There is more life, more biodiversity here than you can possibly imagine. Danjungan has a limestone forest, which is a distinctive forest type, found within tropical rain-forest regions that grow over limestone hills (karst). The forest of Danjungan harbors at least 72 species of birds, 22 species of butterflies, 10 species of bats (insect & fruit bats), pythons, geckos, monitor lizards, coconut crabs and many more.



The diminishing forest of Negros Island:

Due to logging and mining, the forest cover of Negros declined from 95% to 4% in just a little over a century.



DISAPPEARING BEFORE OUR EYES

Rainforests once covered 14% of the earth's land (4 billion acres), now they cover 6% (2.5 billion acres). Our world is now facing the greatest extinction crisis since the fall of the dinosaurs 65 million years ago. 137 species of plants, animals, and insects are lost every day due to rainforest destruction. That's 50,000 species a year!

Why should we care?

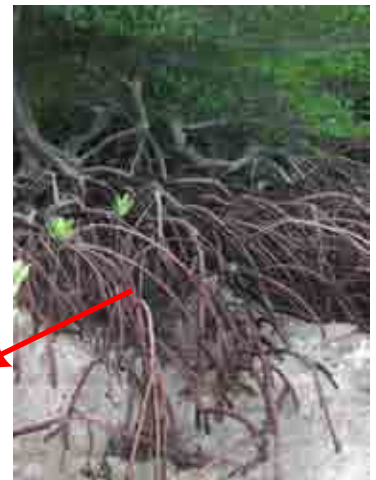
Rain forests are home to thousands of animal and plant species. They protect us against flood, drought and erosion. They are an important source of food and medicine. They are home to our indigenous people. They play a significant role in the stability of the earth's climate. They are the source of water and oxygen. In short, they keep the planet alive.

MANGROVES

Mangroves are trees or flowering plants growing along shallow coastal areas where freshwater and salt water meet. Mangroves are flowering land plants that are xerophytes and halophytes, which means salt-loving and water-loving respectively. They grow in firm but soft muddy substrates rich in organic matter.



Unique roots help mangroves survive the harsh marine environment. Some, called “breathing roots” stick up out of the soil like straws! They have special air channels called lenticels that carry oxygen down to the submerged roots.



Breathing roots

Unlike other trees, mangrove seeds germinate while still on parent plant, once mature, breaks off from parent tree and floats in the ocean until it finds its new home.

Propagules can survive desiccation (removal of moisture) and remain dormant for weeks, months, or even over a year until they finally arrive in an environment suitable for their growth. Once a propagule is ready to root, it will change its density so that the elongated shape now floats vertically rather than horizontally. If a propagule does not root, it can alter its density so that it floats off again in search of more favorable conditions.



Propagule



Sapling



Juvenile fish find shelter in the roots of the mangroves

Diversity:

There are 70 exclusive mangrove species in the world and about 40 species are found in the Philippines. In Danjungan, 17 species have been identified.

Importance of Mangroves:

1. Mangrove roots make a good home for many juvenile fishes, mudskippers, snails, crabs and other invertebrates, and protect them from predators.
2. The mangrove forest is an important breeding and feeding ground for reptiles and birds.
3. Mangroves protect the coastline from harsh storms by acting as a barrier.
4. Mangroves prevent mainland soil erosion from reaching the sea and smothering the coral reefs.
5. Mangroves are excellent recreational areas.



Mangroves in Danger!

In 1918, there were 450,000 hectares of mangrove forests in the Philippines. Only about 110,000 hectares are left today.

MANGROVES



SKETCH-A-MANGROVE

Leaf

Roots

Flower

Propagule

Can you identify the mangrove species based on your observations?

Genus: _____ Species: _____

SEAGRASSES



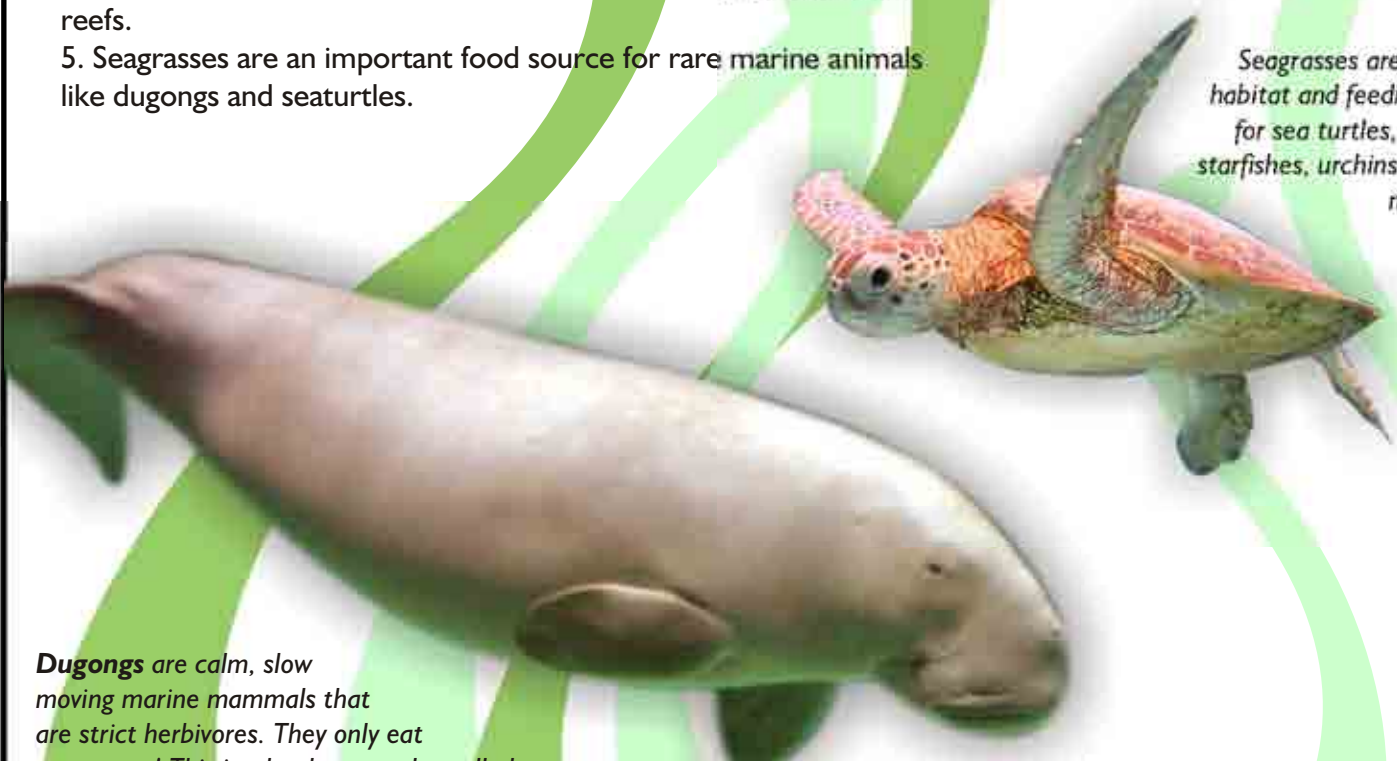
Seagrasses are flowering plants that live submerged in the marine environment. They are called seagrasses only because they look like the grasses that grow on land. Because these plants need sunlight for photosynthesis to produce their food, they are limited to growing mostly in shallow waters. There are about 60 different species of seagrasses in the world, 16 species are found in the Philippines. In Danjungan Island, 8 species have been recorded.

Why are seagrasses important?

1. Seagrass beds are productive ecosystems, and can harbor an incredible diversity of life as juvenile and adult fishes, algae, shellfish, echinoderms, marine worms and more.
2. The seagrass root matrix keeps the sediment together thus keeping the water clear.
3. Seagrasses reduce wave energy and prevent erosion of beaches.
4. Seagrasses are an important link between mangroves and coral reefs.
5. Seagrasses are an important food source for rare marine animals like dugongs and sea turtles.



Seagrasses are important habitat and feeding grounds for sea turtles, seahorses, starfishes, urchins, crabs and many more!

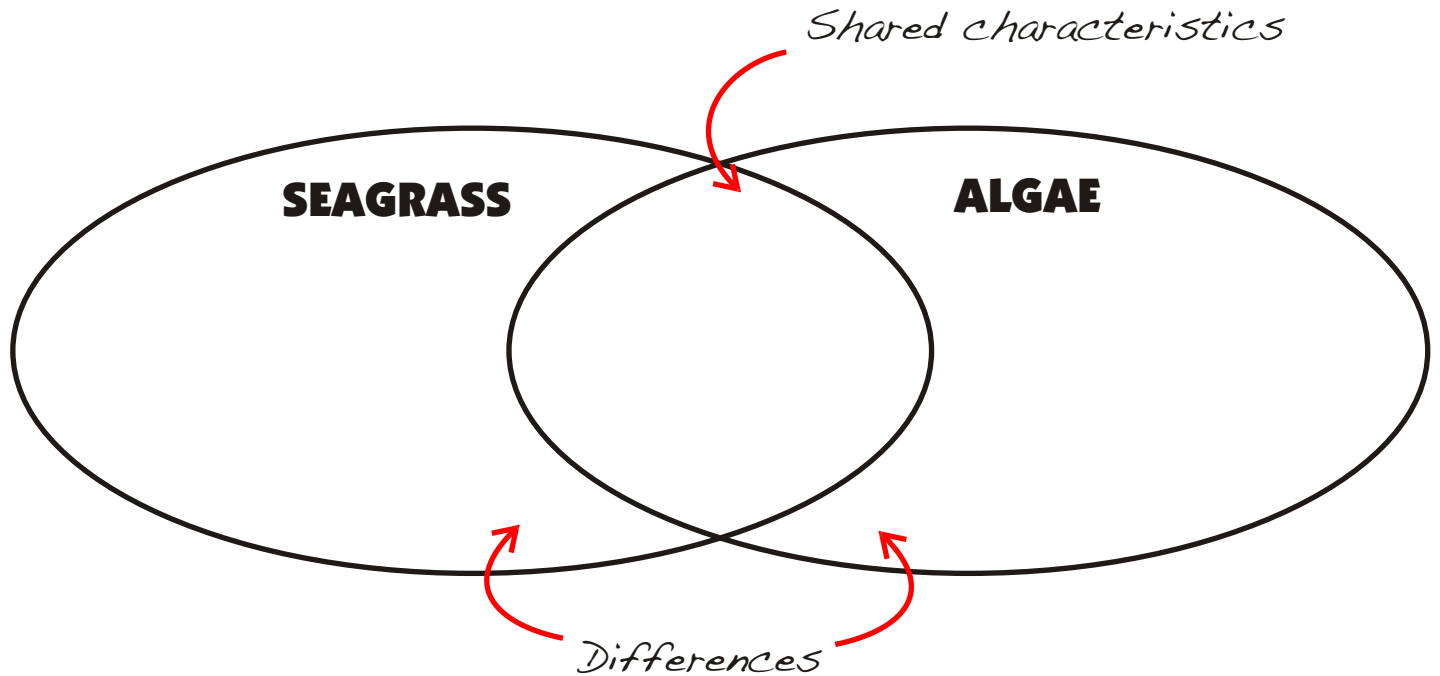


Dugongs are calm, slow moving marine mammals that are strict herbivores. They only eat seagrasses! This is why they are also called sea cows. They are close relatives of the manatee.

Dugongs are endangered! Seagrass habitats are being destroyed all over the Philippines, taking away their only food source. In some areas, they are still being hunted for their meat and some die from being trapped in fishing nets and pens. They need our support and protection!

SEAGRASSES

Compare and contrast seagrass vs algae



DRAW YOUR SEAGRASS AND ALGAE SPECIMEN

Seagrass

Algae

CORAL REEFS

Coral Reefs are amongst the most biodiverse and productive communities on Earth. They are found in tropical oceans worldwide.

Architects and Builders

Coral reefs are formed by millions of colonies of tiny animals called coral polyps. Coral polyps secrete calcium carbonate which forms their hard skeleton (limestone). Coral polyps join together to make a coral colony. Coralline algae cements the coral colonies together to make a coral reef. Corals need sunlight, this is why you don't see much of them in deeper waters. They also need the right water temperature. If the water gets too hot, this may mean trouble for corals!



Label the parts of the coral:

Corals get 80% of their nutrition from this symbiotic algae -

The arms of the coral polyp, used to catch plankton -

Where the coral polyp is encased in -

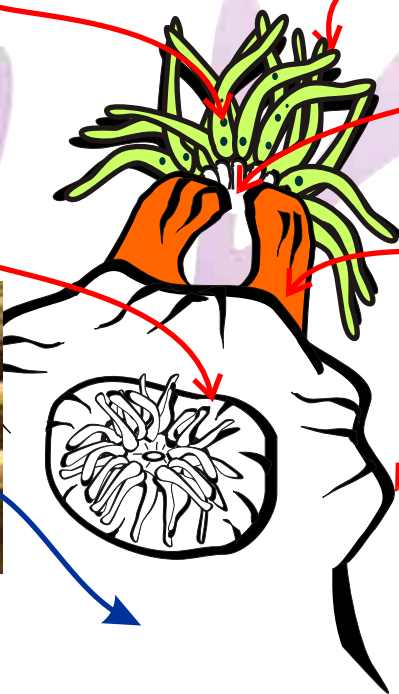
The central portion of the polyp -

The jelly-like layer of the polyp -

The structure made of calcium carbonate -



Colony of polyps of a branching *Acropora* coral



Close up and cross section of a Coral Polyp

Why are coral reefs important?

1. It provides food and shelter to thousands of fish and other marine animals.
2. It provides income and livelihood to many people.
3. It controls the carbon dioxide in the water. Just like trees do on land!
4. It acts as a natural barrier and protects the coastline from the crashing waves and strong ocean currents.
5. It promotes tourism, thus increasing livelihood options for people.
5. It provides a very important food source to people all over the world - FISH!

CORAL REEFS



Soft coral

Hard coral

**Compare and contrast
soft corals vs hard corals**

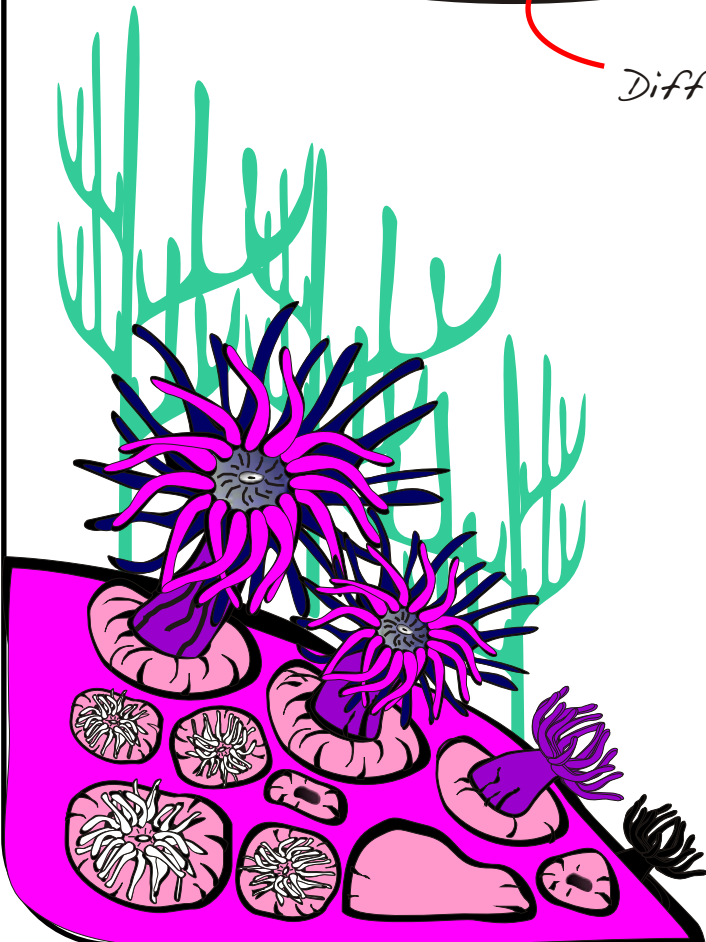
Shared characteristics

SOFT CORAL

HARD CORAL

Differences

**List down 5 conditions corals
need to survive.**



CORAL REEFS

Match the hard coral to their corresponding lifeform.

____ TABULATE

____ MASSIVE

____ BRANCHING

____ DIGITATE

____ MUSHROOM

____ FOLIOSE

____ SUBMASSIVE

____ ENCRUSTING

A.



B.



C.



D.



E.



F.



G.



H.



CORAL REEFS

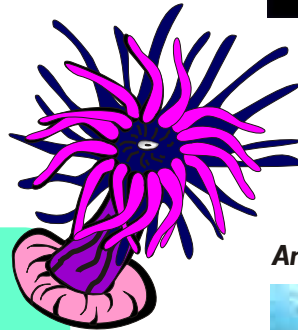
Coral Cousins!

Did you know that corals are related to jellyfishes, anemones, hydroids, sea wasps and sea fans? They are all from the Phylum Cnidaria or Coelenterata.



True or False.
Which characteristics are shared between jellyfishes and coral polyps?

- ☐ 1. Tentacles
- ☐ 2. Central Nervous System
- ☐ 3. Single opening for mouth and anus
- ☐ 4. Polyp lifeform stage
- ☐ 5. Can move freely
- ☐ 6. Have stinging cells
- ☐ 7. Jelly-like
- ☐ 8. Has a skeleton
- ☐ 9. Bilateral symmetry
- ☐ 10. Medusa lifeform stage



Four classes:

Scyphozoa: jellyfishes



Cubozoa: sea wasps



Hydrozoa:
fire corals & hydroids



Anthozoa:



hard & soft corals



Sea fans



Anemones

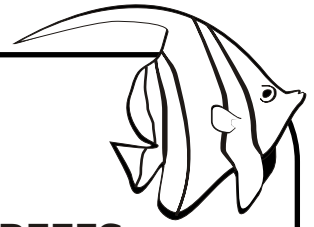


What do you call the region that holds the most diverse marine life in the world? The region encompasses the waters of Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste. It is home to over 600 reef-building coral species, 3,000 species of fish, including the largest fish - the whale shark, and the living fossil - the coelacanth. It also provides habitat to five out of seven marine turtle species.



www.worldwildlife.org

CORAL REEFS



LIST DOWN THE EFFECTS OF EACH THREAT TO CORAL REEFS:

THREAT

EFFECT

Dynamite Fishing →

Cyanide Fishing →

Deforestation →

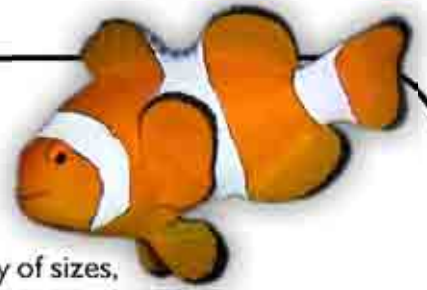
Irresponsible Tourism →

Bleaching Event →

Crown-of-thorns Infestation →

WHAT IS THE LONG TERM EFFECT OF THESE THREATS? WHAT WILL HAPPEN TO CORAL REEFS AND TO THOSE THAT DEPEND ON THEM?

REEF FISHES



Reef Fishes come in an amazing variety of sizes, shapes, structures and colors. About 5,000 species of reef fish have been identified in the world, and more species continue to be discovered. The Philippines has over 2,500 species making it one of the most diverse fish areas in the world. An estimate of 60% of the reef fishes in the world are found in the Philippines. So far, about 572 species of fish have been identified in Danjungan.

Marine fish diversity is highest in coral reef ecosystems. This diversity faces great threat due to pollution, reclamation, mining activities and siltation due to deforestation.

Over fishing poses a greater direct threat to fish diversity. The demand for fish continues to increase and therefore, in the hope of catching fish quicker and easier, fishing activities have become more damaging to the coral reef, like dynamite and cyanide fishing. Over fishing occurs when marine life is taken from the seas faster than it can replenish itself.

Three classes of fish:

Chondrichthyes - cartilaginous fishes like sharks, rays and skates, also called Elasmobranchs.



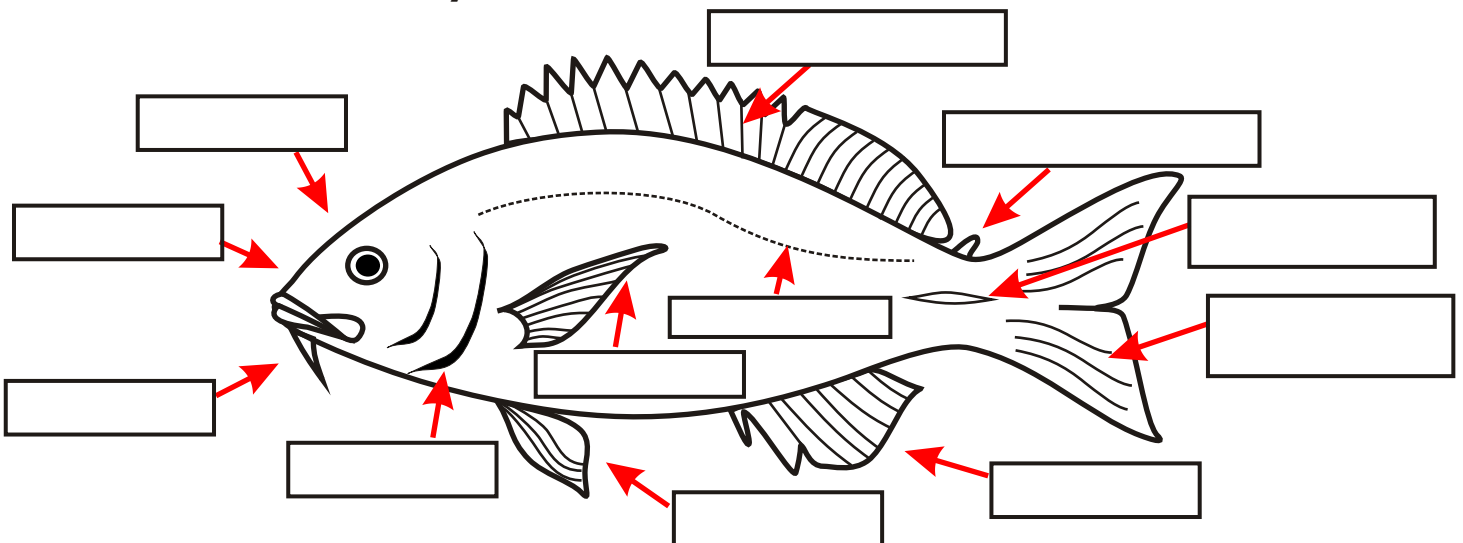
Agnatha - jawless fishes like lampreys and hagfishes.



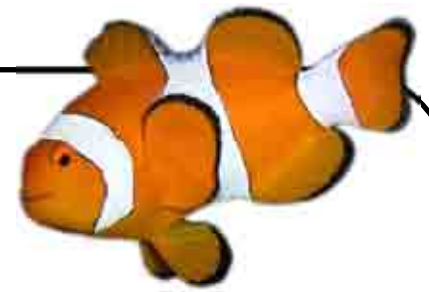
Osteichthyes - bony fishes, the largest fish group. There are about 20,000 species of bony fish, found both in marine and freshwater.



Fish External Anatomy



REEF FISHES



Fishy adaptations

In order to survive in their environment, fishes have acquired different kinds of adaptations such as camouflage, protective coloration and poisonous spines. Adaptations are mostly used as a defense mechanism to ward off and mislead predators and catch prey.



_____ is the adaptation that allows this filefish and scorpionfish to blend with its environment.



Pufferfishes can _____ their bodies and some have spines to ward off predators.



Angler fish have a "lure" which they dangle in front of smaller fish like bait

The butterfly fish has a _____ near its tail so that a predator thinks that it is the front of the fish.



Lionfishes have _____ on its dorsal fin used purely for defense.



Fishy socials

Some fish love to be social and live in a group of hundreds of other fish (called a school), some like to stay with their mate for life (monogamous pairs) and some are just plain loners!



Jacks are known to stay in schools as large as hundreds.



Groupers are solitary fishes.

Some butterflyfishes are known to stay with the same mate throughout their life.



REEF FISHES

Many creatures in a coral reef live in partnership with a completely different species. This is called a _____ relationship or in simpler terms, a “you scratch my back and I’ll scratch yours” relationship. This is essential for the survival of many species.



Clownfish and anemone

The clownfish avoids its enemies by staying nestled among the anemone’s stinging tentacles. Clownfishes have a special mucous coating that prevents them from getting stung by the anemone. In exchange, the clownfish protects the anemone by chasing away animals such as the butterflyfish, which often eat anemones.



Goby

Goby and shrimp

The shrimp spends most of its time digging and cleaning out its burrow while the goby stays near the burrow. When a predator approaches, the goby flicks its tail and dives for cover inside the burrow. This signals danger and sends the shrimp down into the burrow as well.

Shrimp

Mimicry

Many fish species mimic other animals to gain an advantage in the coral reef. The Fang blenny (*Plagiotremus rhinorhynchus*) is a little predator that feeds on the skin of marine fish. This carnivore has a similar coloration, size and body shape to the Cleaner wrasse (*Labroides dimidiatus*), which therefore allows it to come close to its unknowing victim and take a chunk of its flesh.



<http://zukan.itadc.com>

Mimic Fang
Blenny looks
almost like the
cleaner wrasse



Cleaner wrasse



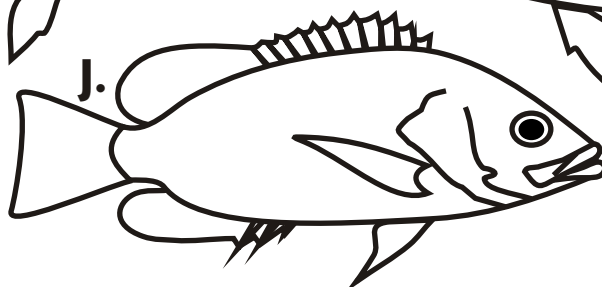
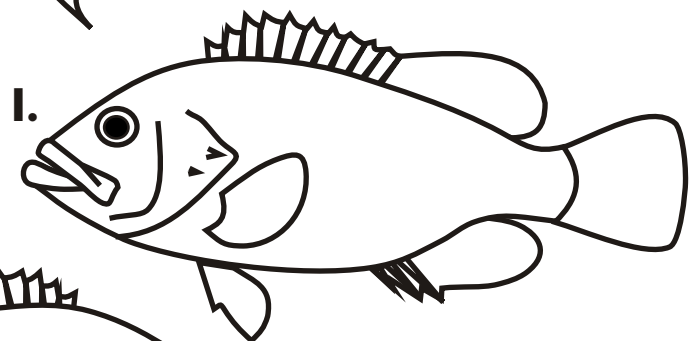
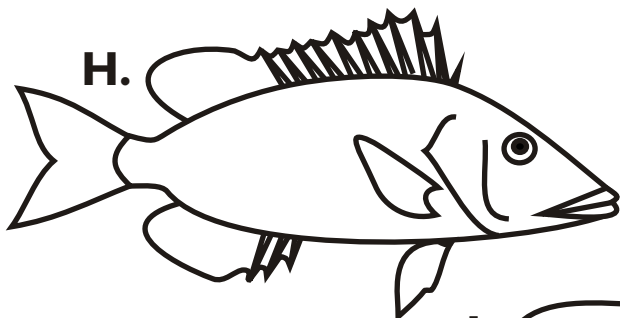
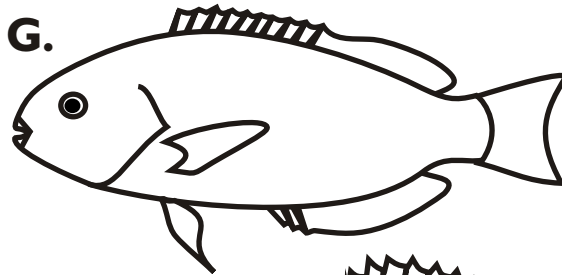
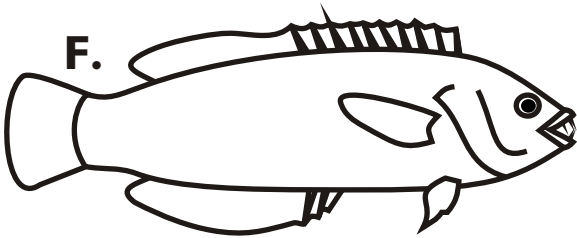
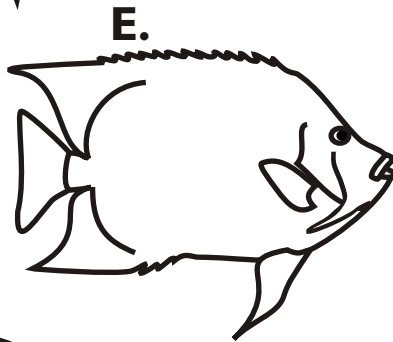
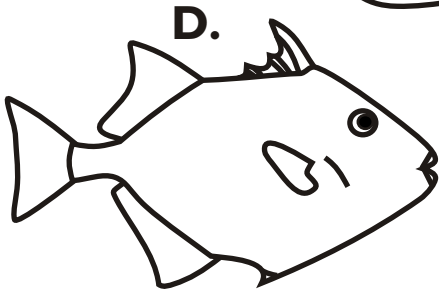
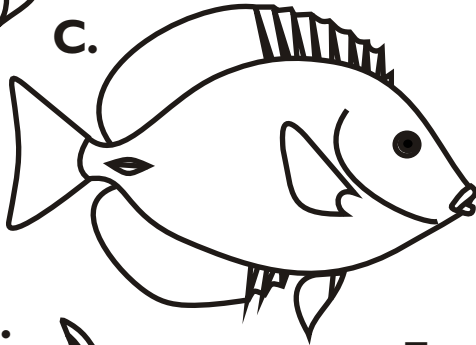
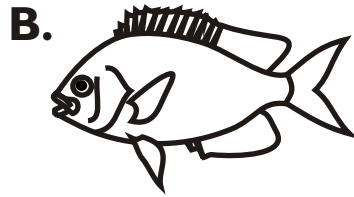
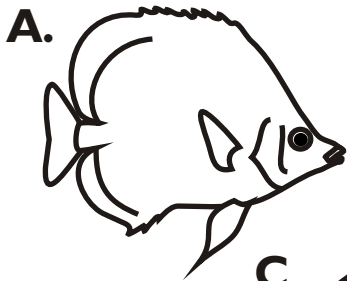
Cleaner shrimp

Cleaner shrimp and wrasse & any fish that needs cleaning!

The cleaner shrimp and wrasse go along the reef picking on fish that need cleaning. These cleaners control parasites that feed off their host. The fishes allow these cleaners to venture inside their mouths. They know best not to eat these little helpers!

REEF FISHES

MATCH THE ILLUSTRATION TO THE CORRECT FISH FAMILY



- ___ 1. Damselfish (Pomacentridae)
- ___ 2. Emperor (Lethrinidae)
- ___ 3. Angelfish (Pomacanthidae)
- ___ 4. Triggerfish (Balistidae)
- ___ 5. Butterflyfish (Chaetodontidae)
- ___ 6. Surgeonfish (Acanthuridae)
- ___ 7. Grouper (Serranidae)
- ___ 8. Wrasse (Labridae)
- ___ 9. Parrotfish (Scaridae)
- ___ 10. Snapper (Lutjanidae)

INVERTEBRATES

Cephalopod is a class from the Mollusc Phylum, that includes the octopus, squid, cuttlefish and nautilus. Cephalopods are considered to be the most intelligent of all invertebrates and have well developed senses and large brains, the most popular - the octopus!



Blue ringed octopus

This tiny little octopus (size of a golf ball) is not to mess with. It is considered to be one of the world's most venomous animals! It lives in the shallows and may be observed in tide pools.



Cuttlefish



Squid



Giant Clams (*Tridacna gigas*)

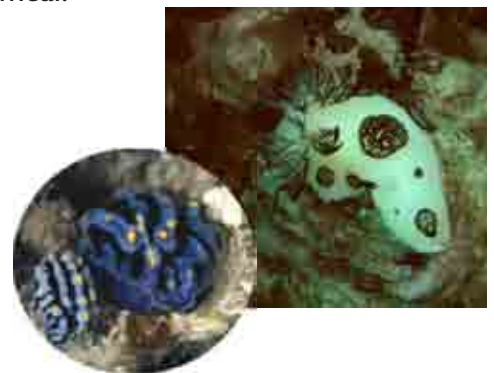
Giant clams are the largest living bivalve molluscs. They can live to over 100 years, weigh more than 200 kilograms (440 pounds) and grow as much as 1.2 metres (4 feet) wide. They are endangered due to over harvesting and habitat destruction.

Danjungan Island, in partnership with University of the Philippines, works to save giant clams. A number of individuals were placed in Danjungan's sanctuary where they are protected.

Nudibranchs

Nudibranchs are also molluscs. They are often called "sea slugs".

Nudibranchs are very attractive animals, displaying a wide array of colors and patterns. The colorful patterns serves as a reminder to predators that they are distasteful meal!



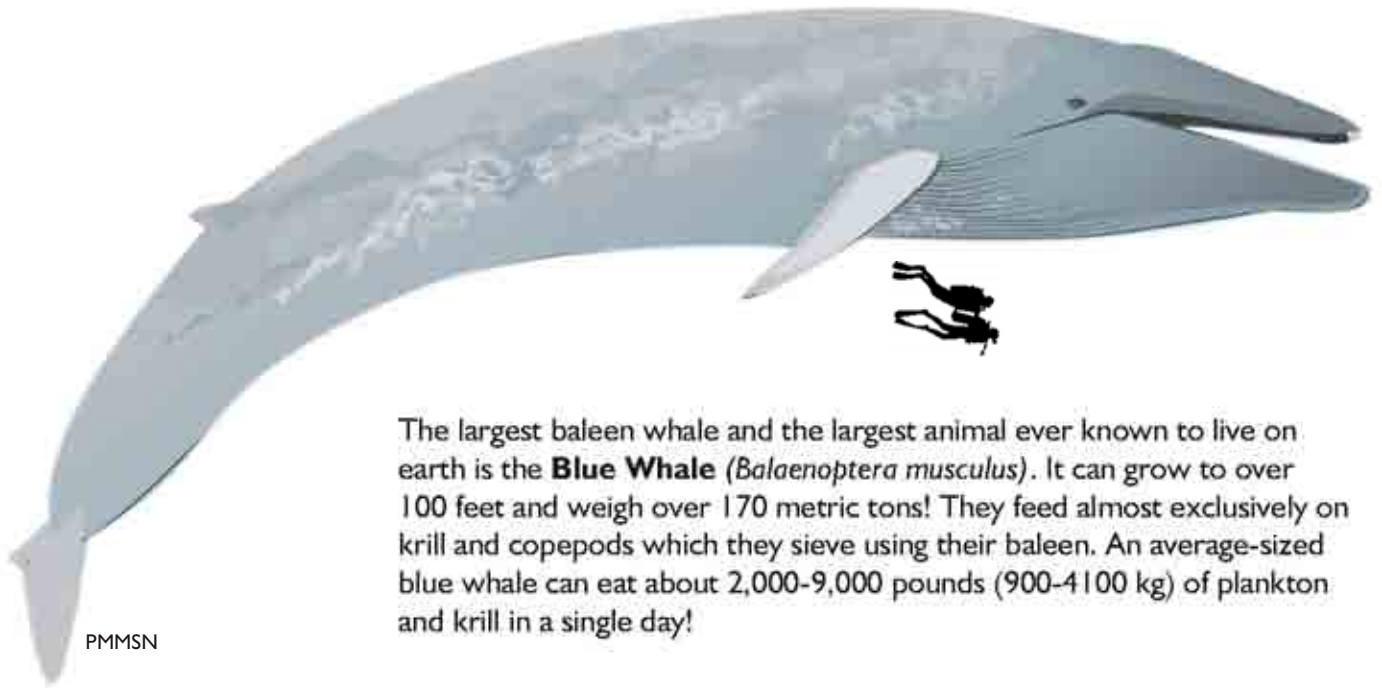
Crown-of-thorns starfish (COTs)

The COTs (*Acanthaster planci*) are echinoderms that feed on coral polyps. They are covered with venomous thorn-like spines, which is why they have very few predators. An individual COT can consume up to 6 square meters of living coral reef per year. When their population blooms (thousands in just a small area), the reef has virtually no chance, unless we help collect them.



The triton trumpet shell is very rare and one of the only few predators of the COTs.

OPEN OCEAN



The largest baleen whale and the largest animal ever known to live on earth is the **Blue Whale** (*Balaenoptera musculus*). It can grow to over 100 feet and weigh over 170 metric tons! They feed almost exclusively on krill and copepods which they sieve using their baleen. An average-sized blue whale can eat about 2,000-9,000 pounds (900-4100 kg) of plankton and krill in a single day!



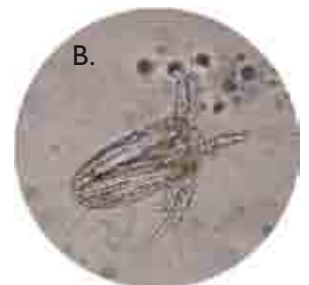
The open ocean is home to cetaceans (whales, dolphins and porpoises) where they find their food, tuna, mackerels and other pelagic fish.

The open ocean consists of the pelagic zone that has the greatest volume and vertical range than any life zone on earth. The different levels of light, temperature, water chemistry, nutrient content, and pressure result in different habitat conditions that then result in a unique array of diverse life. Life is found from top to bottom of the ocean. However, organisms are most abundant in the photic zone, the region where sunlight makes photosynthesis possible.

Life in the open ocean is dominated by plankton, microscopic organisms that move with water currents. Phytoplankton, which is a plant plankton, is the primary food source (directly or indirectly) for most marine life. Zooplankton, which is the animal plankton, feed on the phytoplankton and in turn zooplankton get eaten by larger marine life, such as the baleen whales.



A. Phytoplankton (dinoflagellate) magnified 100x



B. Zooplankton (copepod) magnified 100x (Digital Camera Magnification 4-∞)

BIRDS

Birds are warm blooded vertebrates with feathers, modified for flight. Birds are of a monophyletic lineage which means they evolved from a common ancestor. Therefore, all birds have a common origin.

The forelimbs of birds typically serve as wings, although some are flightless. They walk using their hind legs. Their jaws are developed into a horny beak and are usually toothless. They have a four chambered heart and exhibit a high metabolism. They possess a strong skeleton, however hollow and light weight adapted for flight. They also possess a large muscular stomach and most of their body is covered in feathers. The females lay the eggs, which are large yolked and hard-shelled. Birds show a great example of wildlife parenting. The parent bird provides extensive care of the young until they are old enough to fly.

Diet:

From carnivores to herbivores. Birds as a whole have a wide food preference, depending on the species.

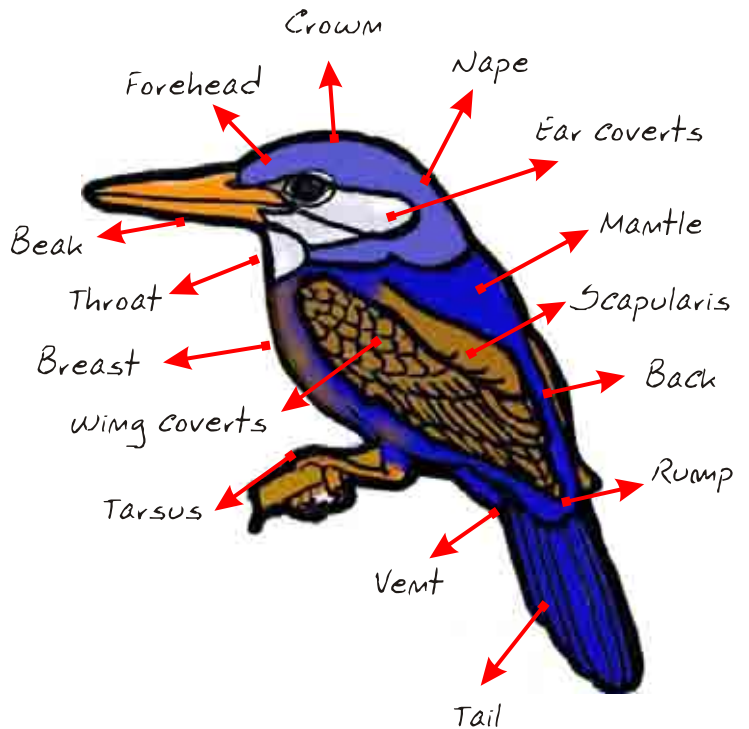
Diversity:

There are about 30 orders of birds, 180 families, 2,000 genera with about 10,000 species all over the world. There are 576 species found in the Philippines, 192 of these are endemic and 86 are threatened.

Biological Importance:

Birds play important roles in the population control of insects and rodents. They are also pollinators and seed dispersers which help in the regeneration of the forest.

External anatomy of a Bird:



Tabon scrub fowl



white breasted sea eagle

Danjugan's forest is home to over 70 species of birds, which include a nesting pair of white breasted sea eagles (*Haliaeetus leucogaster*) and the rare tabon scrub fowl (*Megapodius cumingi*) is common on the island.

Birdwatching in the Philippines!

Tourists from all over the world come to the Philippines just to see the country's birdlife. The Philippines is gaining recognition as a megadiverse country with high levels of endemism and now has become a birdwatching hotspot! Danjugan Island was just included in the Department of Tourism's birdwatching areas.

BIRDS

HOW MANY BIRDS DID YOU SEE DURING YOUR BIRDWATCHING TREK?
CAN YOU DRAW SOME OF THEM?

CAVES & BATS

Limestone forests also harbor caves, which are incredibly important to bats. These insect-eating bats consume tonnes of mosquitoes and moths, controlling their population, which eventually benefits us and our crops.

The world's only flying mammal

The forelimbs of bats are webbed and developed as wings, and therefore making them capable of sustained flight. Other mammals, such as flying squirrels and colugos, do not actually fly, rather they glide.

There are a lot of misconceptions about bats, which cause people to fear them. Here are some myths about bats:

*Bats are blind - false! Bats can see and some use their vision to locate food.

*Bats attack people and drink their blood - false! Bats are timid creatures, only the vampire bat feeds on the blood of cattle and other animals.

*Bats are dirty animals -false! Bats spend a lot of time grooming themselves.

*Bats carry rabies - false! Bats can get rabies just like any other animal. However, there is a slim chance that a person could get rabies from a bat.

Did you know?

The largest bat in the world, the giant golden crowned fruit bat (*Acerodon jubatus*) is found only in the Philippines! But they don't roost in caves, they roost in trees.



Hundreds of insect-eating bats in Danjungan's bat cave.

Caves are also important to swiftlets. What distinguishes swiftlets from other birds is their ability to use a simple form of echolocation (just like bats!) to navigate in total darkness in caves. Swiftlets are also insectivores. They live in caves at night and leave during the day to forage for food. The caves are important as these birds nest on the limestone crevices. Their nests are highly sought after for bird's nest soup, which is very expensive.

Swiftlet nests on a cave wall.



www.katjack.net

<http://orientalbirdimages.org>,
www.birding2asia.com



www.katjack.net

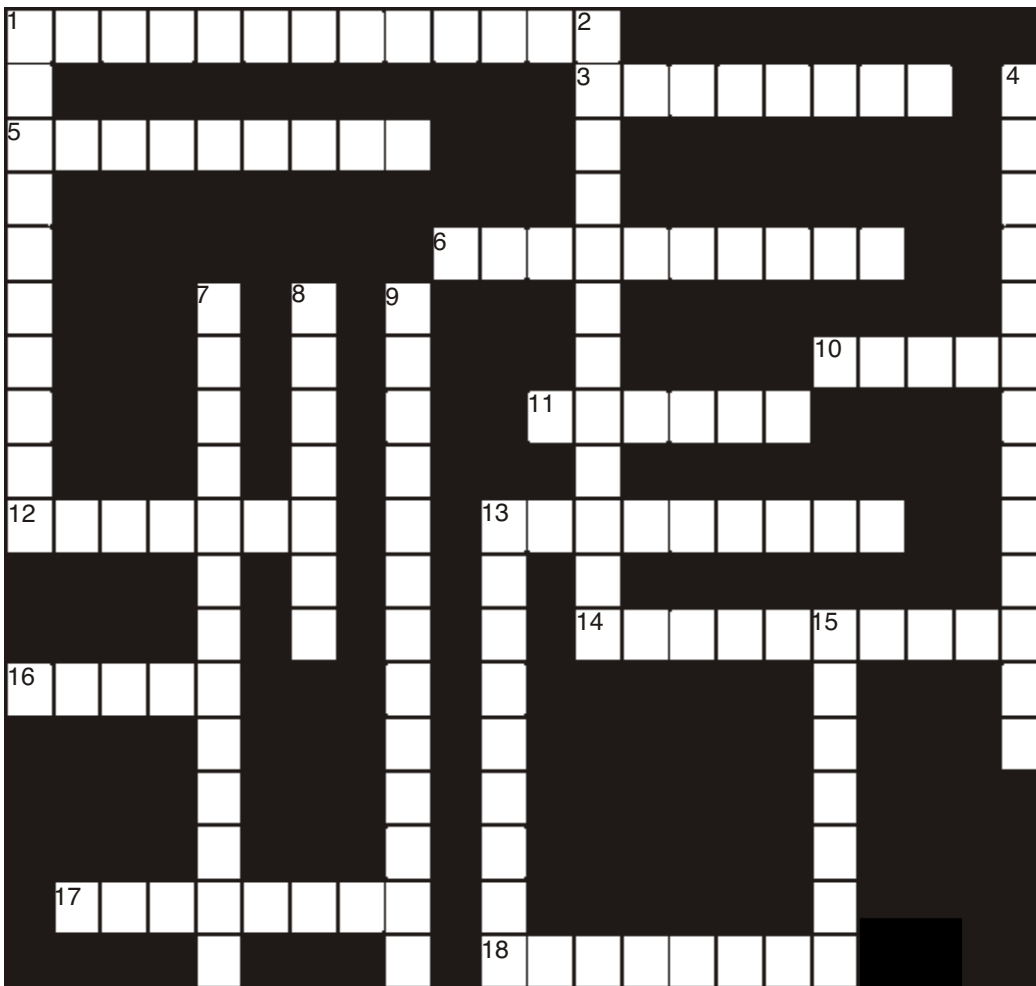
The nest of the swiftlet used in the bird's nest soup, popular in China. In Hong Kong a bowl of Bird Nest Soup costs between \$30 USD to \$100 USD and a kilogram of white nest can cost up to \$2,000 USD.

Unique nest builders

Unlike other birds that build their nests out of twigs, straw, feathers and other materials, swiftlets build their nests intricately using their saliva!

WORD WORM

Now how well
have you learned?
Let's see if you
can complete this
crossword puzzle.



DOWN

- 1 - What do you call the adaptation animals have to blend with their environment?
- 2 - What do bats have that allows them to easily find their prey in total darkness?
- 4 - What is responsible for primary productivity in the open ocean?
- 7 - Another term for the group of sharks, rays and skates.
- 8 - What adaptation allows an organism to gain an advantage by following another?
- 9 - The organism that lives in partnership with corals.
- 13 - What do you call this partnership?
- 15 - One of the smartest invertebrates in the ocean.

ACROSS

- 1 - The region with the highest marine biodiversity in the world.
- 3 - Corals, jellyfishes, hydroids, sea fans and anemones fall under this Phylum.
- 5 - Trees that are halophytes and xerophytes.
- 6 - The largest fish in the world.
- 10 - The coral animal.
- 11 - These birds make their nest using this main ingredient.
- 12 - A term used for something found in one place and no where else in the world.
- 13 - These birds make their nests inside caves.
- 14 - The stinging cells found in corals and jellyfishes.
- 16 - The most important gift the forest gives us.
- 17 - The class where hard and soft corals, sea fans and anemones belong to.
- 18 - The most important ecosystem to dugongs.

WHERE DO I BELONG?

Match the following organisms to their habitat. Remember that one organism can rely on several habitats.

- _____ 1. Blue whale
- _____ 2. Insect-eating bats
- _____ 3. Fruit-eating bats
- _____ 4. Seahorses
- _____ 5. Starfishes
- _____ 6. Juvenile fishes
- _____ 7. Dugong
- _____ 8. Swiftlet
- _____ 9. Blue-ringed octopus
- _____ 10. White breasted sea eagle
- _____ 11. Sea turtles
- _____ 12. Nudibranchs
- _____ 13. Dolphins
- _____ 14. Coconut crab
- _____ 15. Python
- _____ 16. Sharks
- _____ 17. Plankton
- _____ 18. Cucumbers
- _____ 19. Corals
- _____ 20. Kingfisher
- _____ 21. Geckos
- _____ 22. Clownfish
- _____ 23. Mudskippers
- _____ 24. Moray eels
- _____ 25. Crown-of-thorns starfish
- _____ 26. Pelagic fish
- _____ 27. Cuttlefish
- _____ 28. Tuna
- _____ 29. Soldier crabs
- _____ 30. Stonefish

A.



B.



C.



D.



E.



F.



G.



CONNECTIVITY ACTIVITY

FILL IN THE FOOD WEB. Where do the organisms listed belong in this food web?
The primary producers are filled in for your guidance.

ORGANISMS:

Parrotfish

Seagrass

Algae

Dugong

Phytoplankton

Shark

Zooplankton

Barracuda

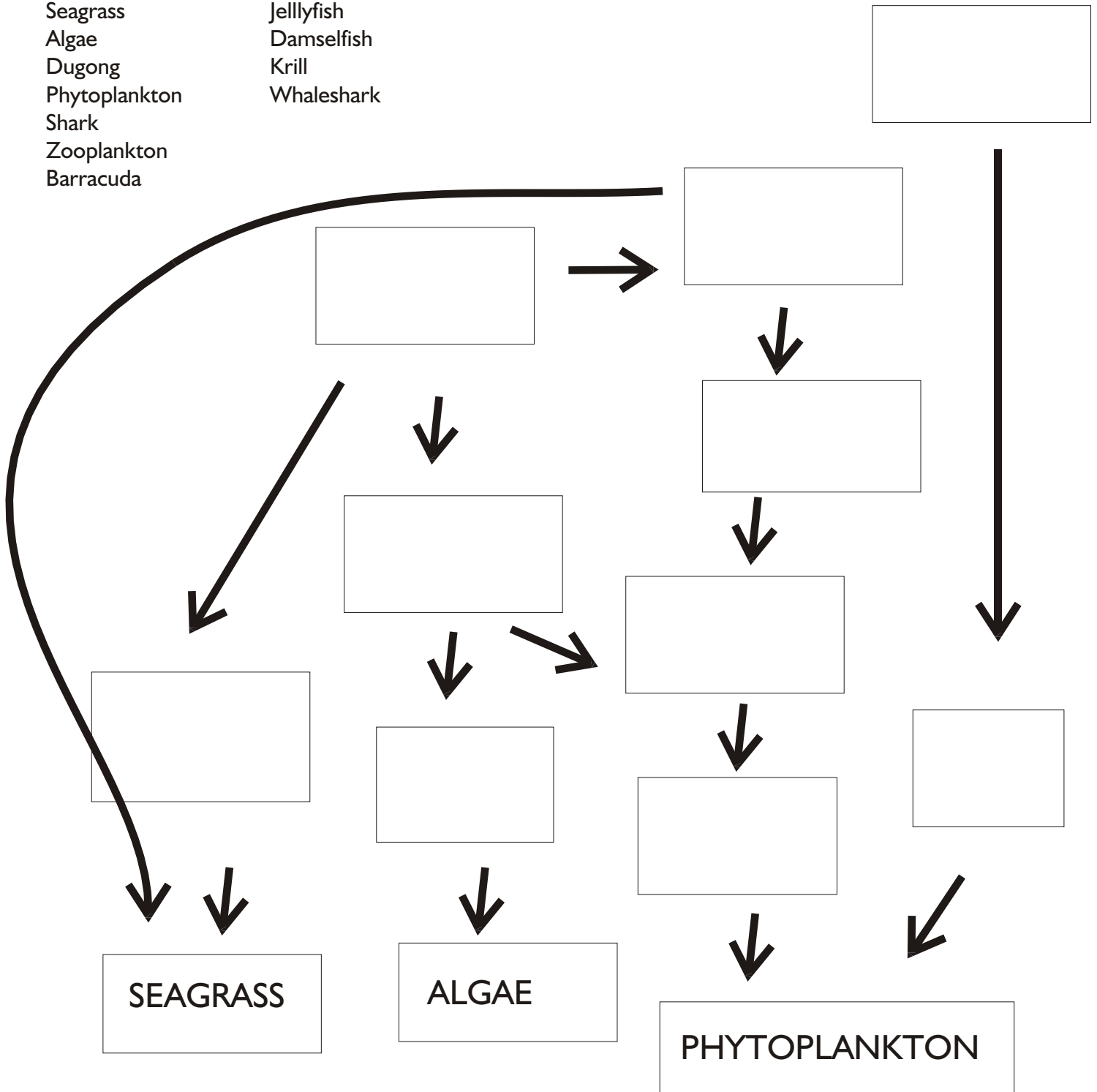
Sea Turtle

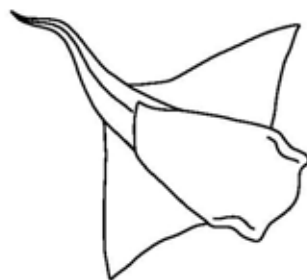
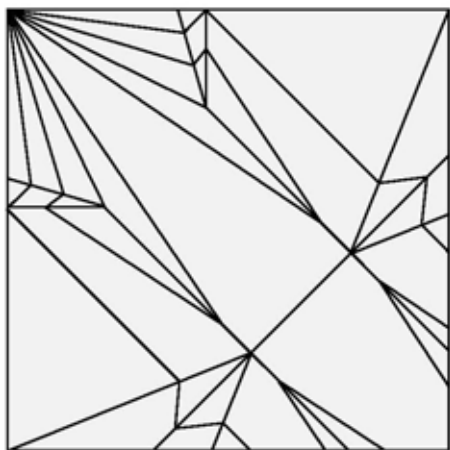
Jellyfish

Damselfish

Krill

Whaleshark

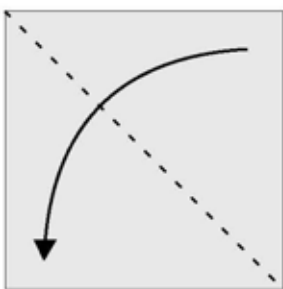




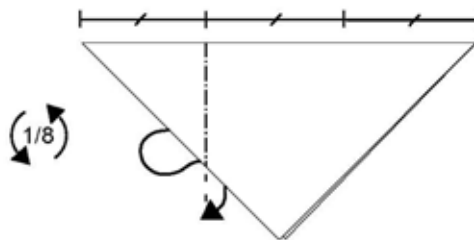
Eagle ray

Designed by Paulius Mielinis

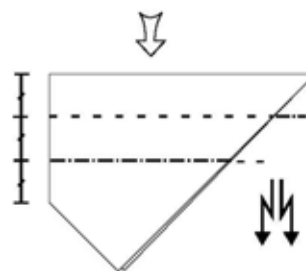
Copyright © 2009. All Rights Reserved



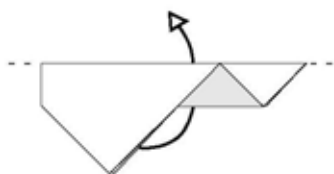
1. Fold in half diagonally, then rotate by 1/8 turn.



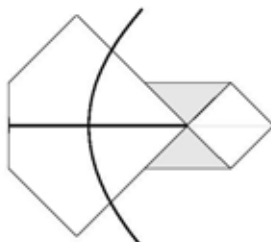
2. Reverse fold at one third of the top edge.



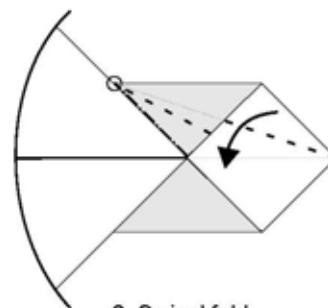
3. Divide into thirds, then sink in and out..



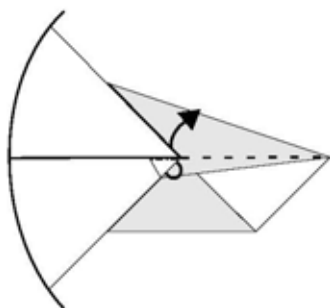
4. Fold 2 flaps up from behind.



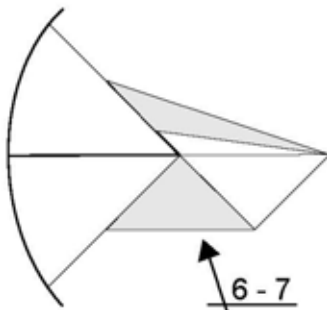
5. The next steps will focus on the right part.



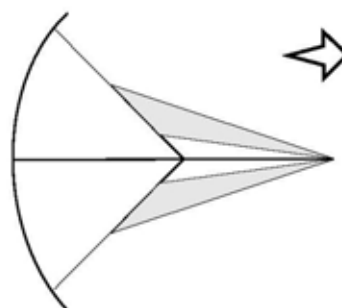
6. Swivel fold.



7. Reverse fold.



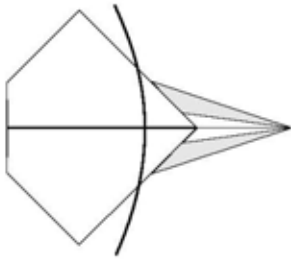
8. Repeat steps 6-7.



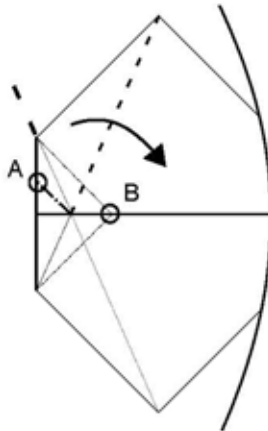
9. Like this. Back to normal view.



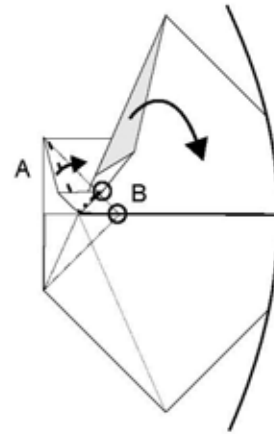
ORIGAMI



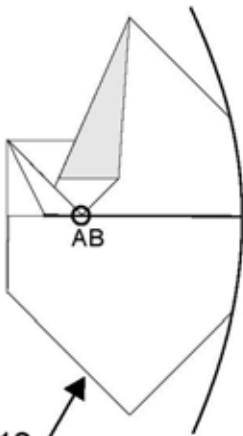
10. Now focus on the left side.



11. Squash fold (bring point A to point B). See step 12.

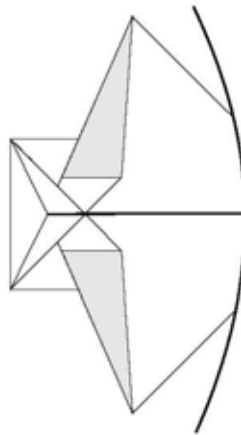


12. Squash fold in progress.

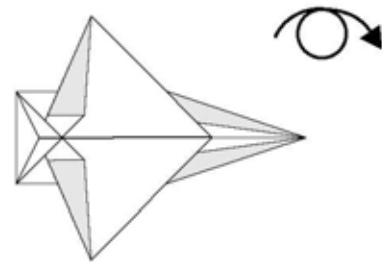


11-12

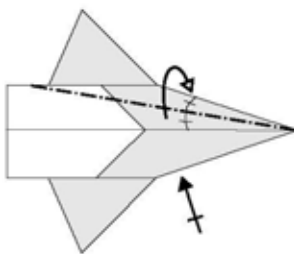
13. Like this. Repeat steps 11-12 on the other flap.



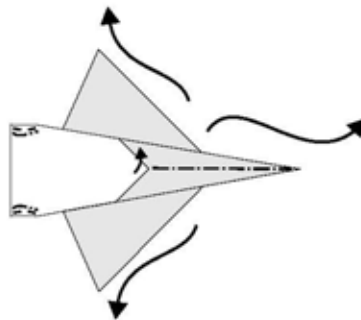
14. Back to normal view.



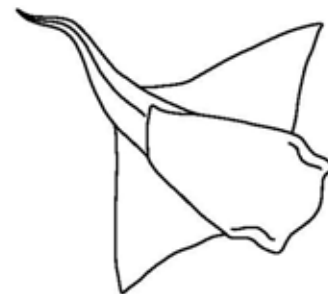
15. Turn over the model.



16. Mountain fold. Repeat on the other side.



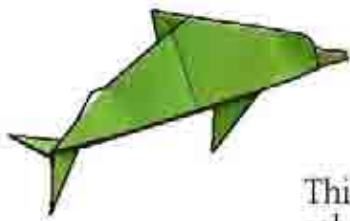
17. (a) Form the eyes
(b) Slightly fold up the "horn"
(a) Thin the tail and curl it to an S-shape, and slightly curl the "wings" at the same time.



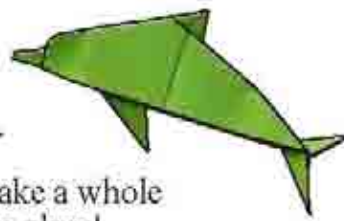
18. Finished Eagle Ray!



ORIGAMI

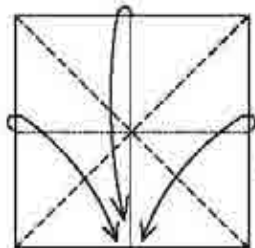


Dolphin



This model is simple enough to make a whole school of dolphins... even while in class!

1

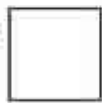


Fold a colored Waterbomb Base. For help, consult the cloud.



Waterbomb Base

1a



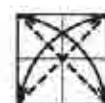
To fold a colored Waterbomb Base, first turn the paper over.

1b



Valley fold and unfold in half both ways. Turn over.

1c



Valley fold and unfold diagonally in half both ways.

1d



Collapse along existing creases.

1e



In progress.

1f



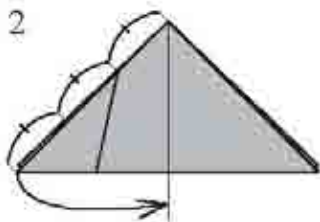
Further in progress.

1g



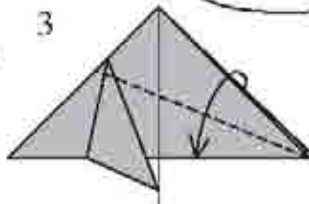
The Waterbomb Base has been built.

2



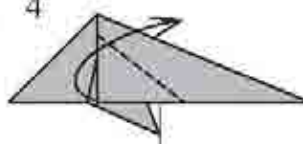
Valley-fold the front flap. Exact placement is not important.

3



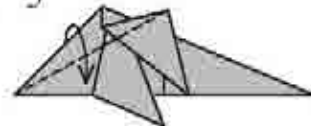
Valley-fold

4



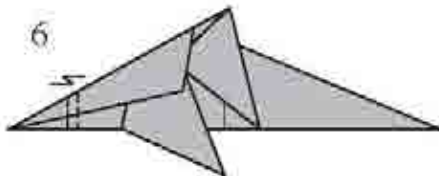
Valley-fold to make the dorsal fin. There is no guideline here; fold to taste.

5



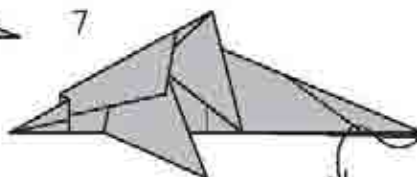
Valley-fold.

6



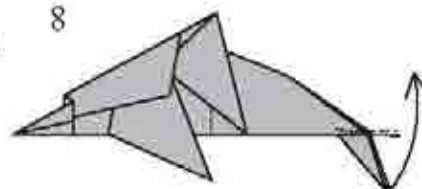
Pleat.

7



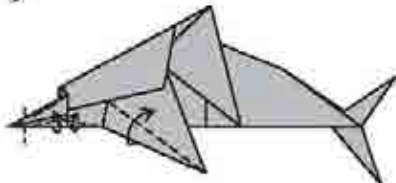
Reverse-fold.

8



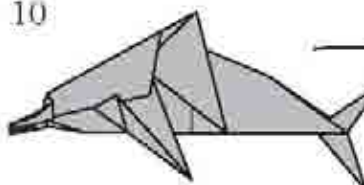
Reverse-fold the inner flap only.

9



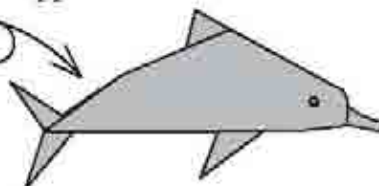
Shape the dolphin to taste with valley folds.

10



Turn over.

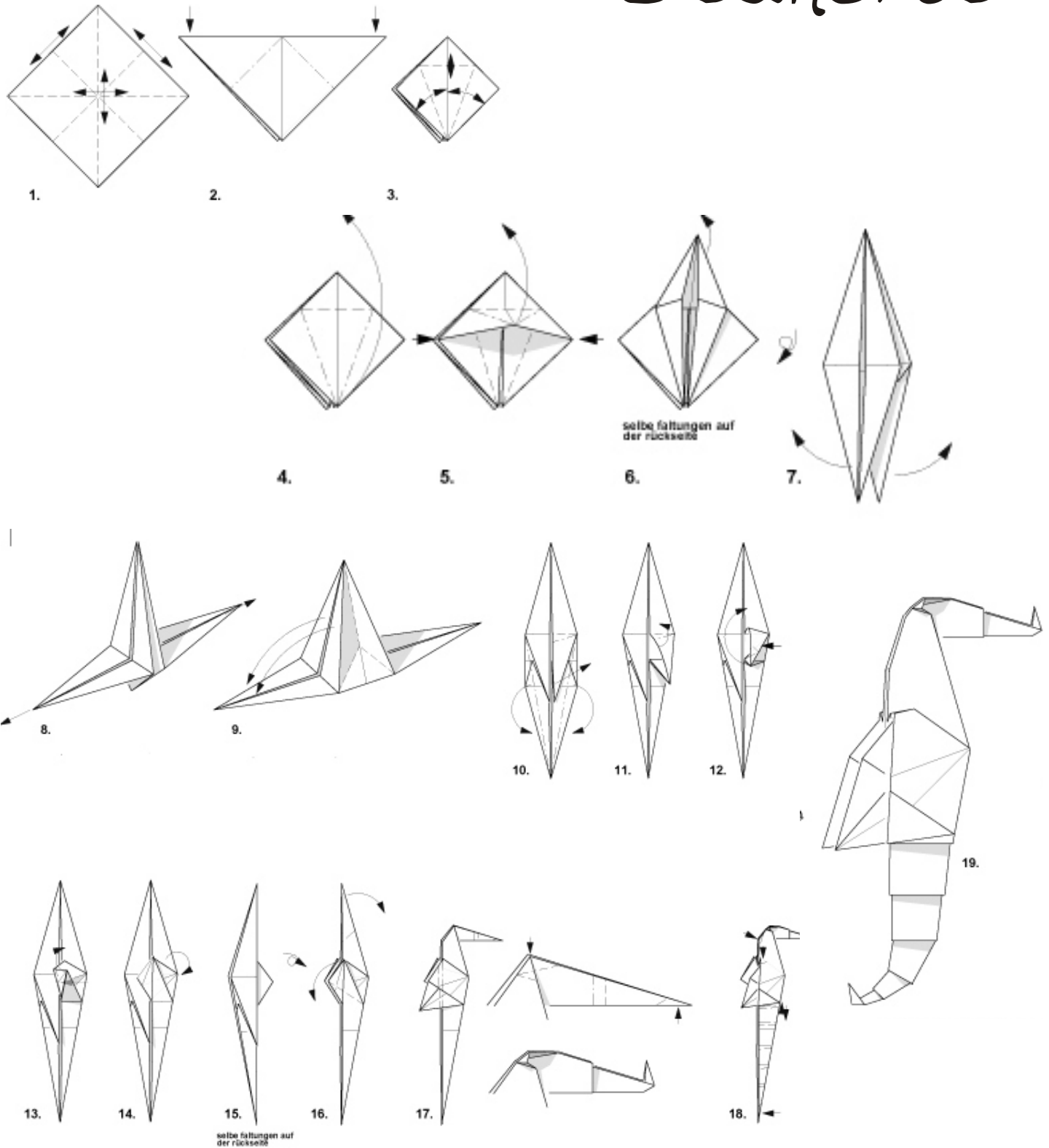
11



The Dolphin ready to swim away.

ORIGAMI

Seahorse



CAMP JOURNAL

The coolest thing I saw

What I liked most about the camp

What I liked most about the camp

What I disliked most about the camp

What I disliked most about the camp

My favorite Camp Activity

My favorite Camp Activity

My wish for Danjungan

My wish for
Danjungan

My favorite fish



My
favorite
bird



Pledge to Mother Earth

Pledge to Mother Earth

CAMP SUMMARY

DAY 1: TOPICS DISCUSSED

LESSONS LEARNED

DAY 2: TOPICS DISCUSSED

LESSONS LEARNED

DAY 3: TOPICS DISCUSSED

LESSONS LEARNED

Camp Notes

Camp Notes



Marine and Wildlife Camp
Danjungan Island, Negros Occidental
www.prrcf.org

Text, Graphics and Layout:
Kaila Ledesma Trebol

Photo Contributors:
Gerardo L. Ledesma
Kaila Ledesma Trebol

Special thanks to the friends of Danjungan who shared their photos:
Cris Hinlo - *Napoleon wrasse (cover), cleaner wrasse, blue-ringed octopus, squid, cuttlefish*
Yvette Lee - *Frogfish, porcupine pufferfish*
Katherine Jack - *Swiftlet nests in cave, collected swiftlet nest*
Nadia Abesamis - *Mangrove deforestation*
Momo Kochen - *Seagrass*