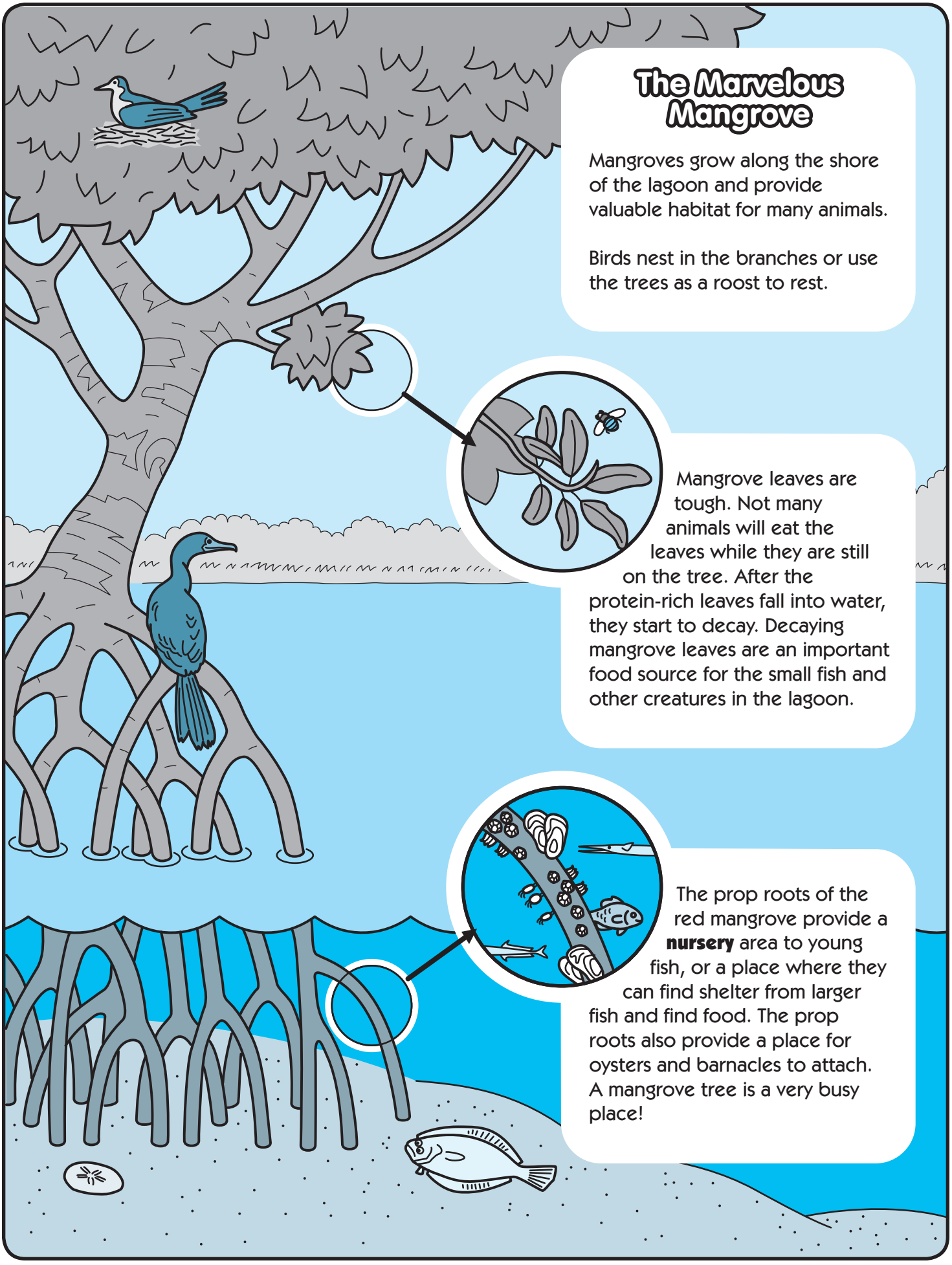


The Marvelous Mangrove

Mangroves grow along the shore of the lagoon and provide valuable habitat for many animals.

Birds nest in the branches or use the trees as a roost to rest.

Mangrove leaves are tough. Not many animals will eat the leaves while they are still on the tree. After the protein-rich leaves fall into water, they start to decay. Decaying mangrove leaves are an important food source for the small fish and other creatures in the lagoon.

The prop roots of the red mangrove provide a **nursery** area to young fish, or a place where they can find shelter from larger fish and find food. The prop roots also provide a place for oysters and barnacles to attach. A mangrove tree is a very busy place!

SEAGRASS SEARCH

Follow these directions until you reach the manatee munching on seagrass.

1. Are seagrasses the same as seaweeds? _____ **Yes** **Go to #12** _____ **No** **Go to #9**

2. **False**. Seagrasses are important for animals and people. **Now go to #11**

3. **True**. The beds of seagrass slow the waves and allow the **sediments** to sink to the lagoon's bottom. Are these thick seagrass beds avoided by juvenile fish and other young animals that grow or live in water? _____ **Yes** **Go to #6** _____ **No** **Go to #8**

4. **False**. In shallow water, boats can be a problem. **Now go to #5**

5. **True**. In shallow water, the propeller from a boat's motor can dig up the seagrasses. The boat may be damaged as well. It is important to avoid shallow seagrass beds. If you cannot avoid them, then drive very slowly and lift the motor. Are seagrass beds important to people? _____ **Yes** **Go to #11** _____ **No** **Go to #2**

6. **False**. Seagrass beds provide a nursery for young animals. **Now go to #8**

7. **False**. Seagrasses can help keep the water clear. **Now go to #3**

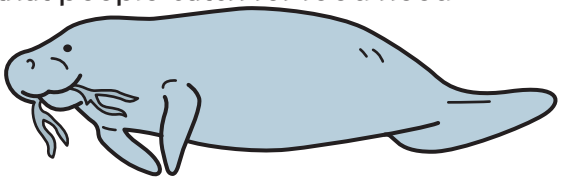
8. **True**. The seagrass beds provide places for the juveniles to hide from larger animals. The seagrasses also provide food. Many people use the lagoon along with the animals. Can boats be a problem for seagrasses? _____**Yes** **Go to #5** _____ **No** **Go to #4**

9. **True**. Seagrasses are flowering plants, unlike seaweeds, which are algae. Segrasses grow in the brackish (salty) waters of the Indian River Lagoon. Rainwater that runs too quickly off farms, roads and towns carries a lot of sediments (soil and other particles) into the Indian River Lagoon. These sediments make the water turbid, or cloudy. When the water is turbid, is this good for the seagrass? _____ **Yes** **Go to #10** _____ **No** **Go to #13**

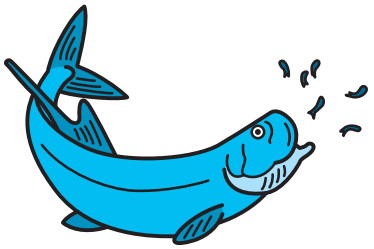
10. **False**. If the water is very turbid, it can kill the seagrass. **Now go to #13**

11. **True**. Most of the fish, clams, oysters and **crustaceans** that people catch for food need seagrasses at some point in their lives. Seagrasses also help keep the Indian River Lagoon clear and healthy.

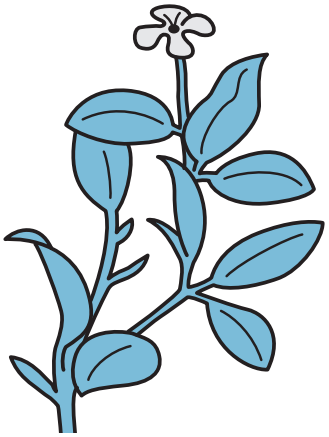
12. **False**. Seaweeds are algae. **Now go to #9**



13. **True**. High turbidity prevents sunlight from shining through the water to the seagrasses. Seagrasses need the sun's energy to produce food. Do seagrasses help keep the water clear? _____ Yes **Go to #3** _____ No **Go to #7**



What's for Supper?



All organisms need food in some form or another, but only plants can use the energy of the sun to make food. They use sunlight and **nutrients** to manufacture food and oxygen. Plants are called **primary producers** because they provide food for all animals.

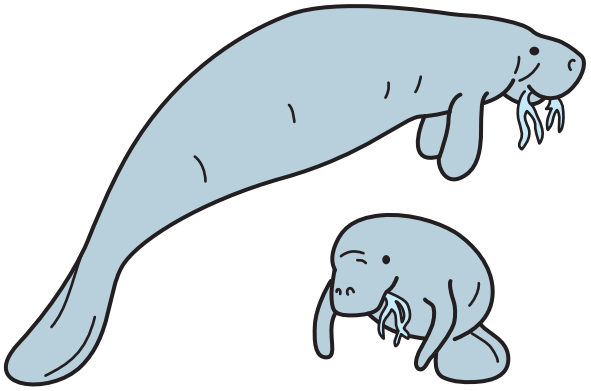
Animals are called **consumers** because they cannot make their own food in the way primary producers do. Consumers must get their energy in the form of food from either plants or other animals.

This flow of energy from the sun to plants → plant eaters → meat eaters is called a **food chain**.

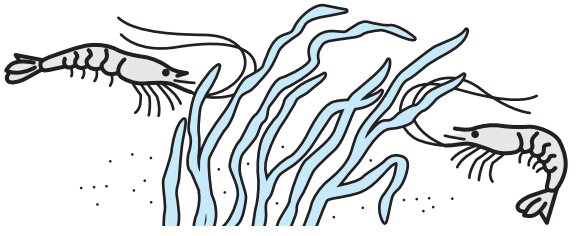
Primary producers in the Indian River Lagoon are mangroves, marsh grasses, seagrasses and algae. There are even primary producers floating in the water that are too small for you to see without a microscope. These microscopic plants, called **phytoplankton**, provide food for microscopic animals, called **zooplankton**, as well as for larger animals like clams and oysters.

Let's take a closer look at an example of a food chain. Plants are the first link in the food chain because they get their energy from the sun. In the previous lesson, we studied seagrass. It is an important primary producer in the Indian River Lagoon.

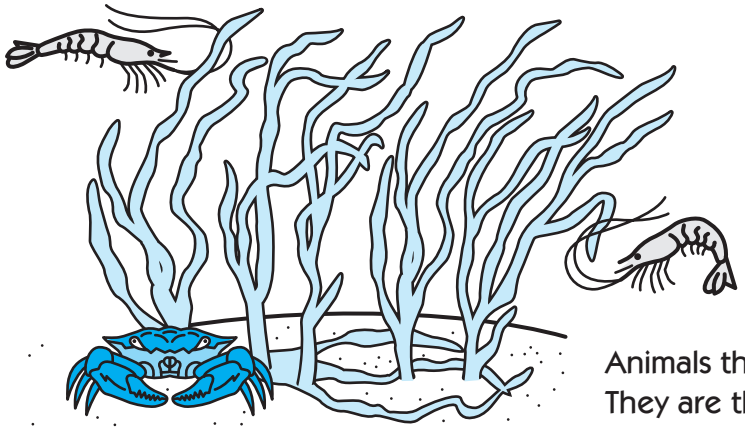
There are three ways in which seagrass provides food for animals in the lagoon. Some animals, such as manatees, eat the seagrass but generally do not harm the root system, thus allowing regrowth.

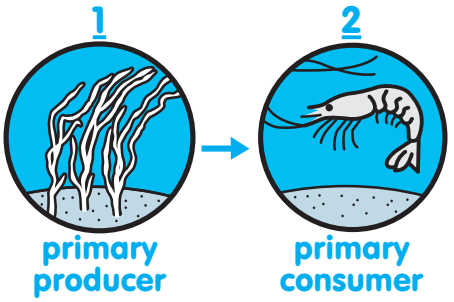


Other animals, such as shrimp and snails, eat algae that grow on the blades of seagrass.



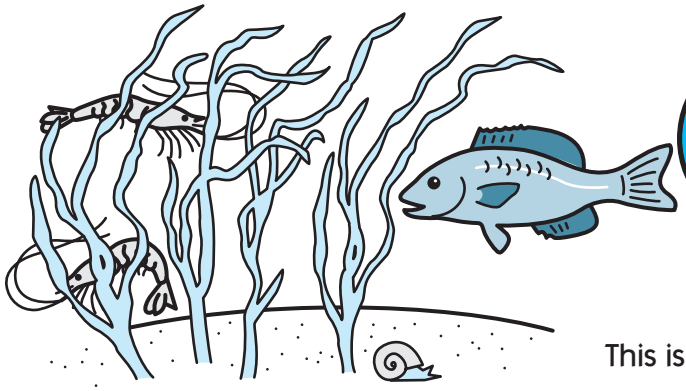
As seagrass grows, old leaves die and settle to the bottom of the lagoon, where they become covered with **microorganisms** — or tiny plants and animals. These microorganisms are called **decomposers** because they cause dead plants and animals to decay. This mixture of decaying dead leaves and animal remains covered with microorganisms is called **detritus**. This is the third way in which seagrass provides food. Crabs, clams and shrimp are a few of the animals that feed on detritus in the Indian River Lagoon.

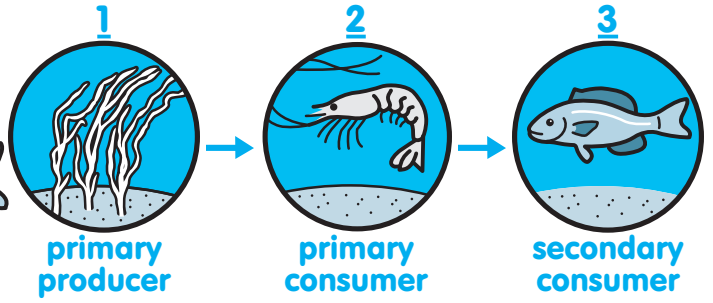




Animals that eat plants are called **primary consumers**. They are the second link in the food chain.

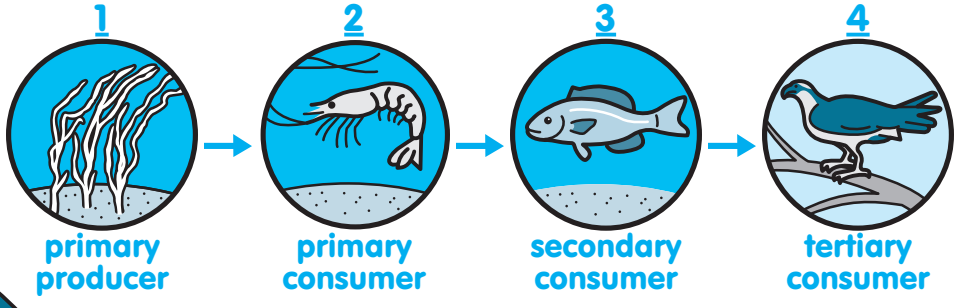
Animals that eat the primary consumers are called **secondary consumers**. In the lagoon, for example, a snapper would feed on shrimp and crabs.





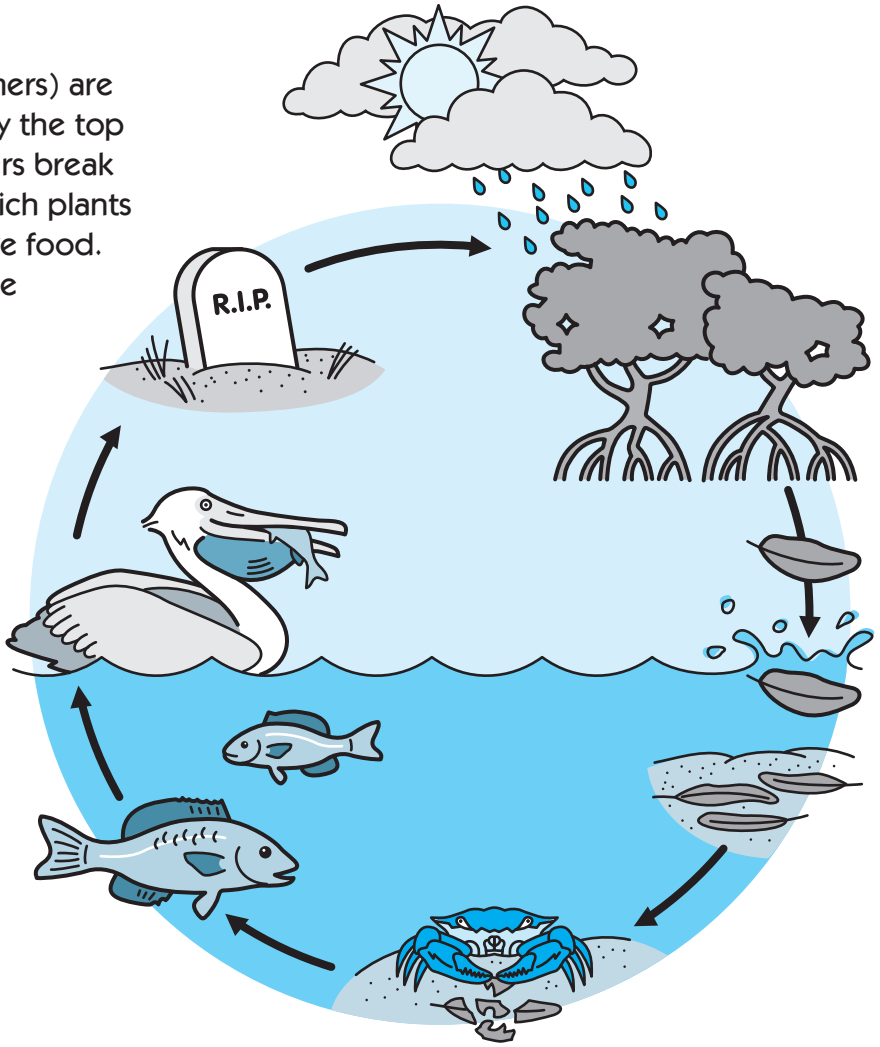
This is the third link in the food chain.

Animals that eat secondary consumers are called **tertiary consumers**.



An osprey becomes the fourth link in the food chain as it snatches the snapper out of the water.

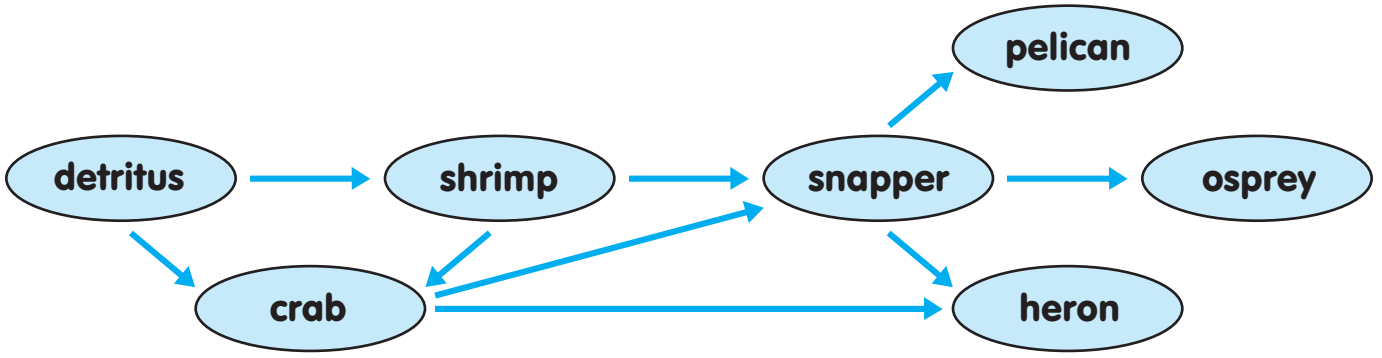
Only **top predators** (tertiary consumers) are safe from being eaten. But eventually the top predators die. Then the decomposers break the dead material into nutrients, which plants use again to grow and produce more food. The flow of energy completes a circle which repeats itself over and over.



Studying a food chain is an easy way of seeing how organisms depend upon each other. However, the process isn't always that simple. If more consumers are added to the food chain, it becomes more complex.

We can start out with a simple food chain like this:

But when we add a crab, pelican and heron, it begins to look more like a web than a chain.

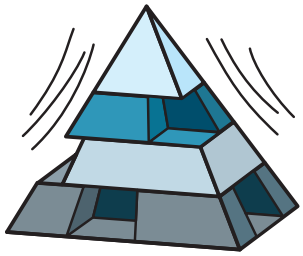


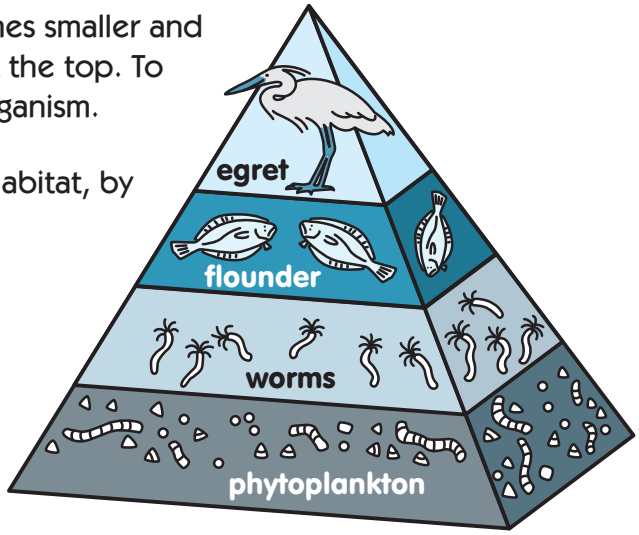
A **food web**, an interrelated group of food chains, is a more realistic way to view the flow of energy among organisms. In addition to understanding how energy flows through food chains and webs, it's important to realize what happens to the energy.

Plants and animals need to use some of the energy they obtain. Animals need energy to grow, move about and reproduce. When one animal eats another, it stores part of the original energy and uses the rest. Only a small part of the original energy gets to the top of the chain. This idea is best illustrated by a **pyramid of energy**.

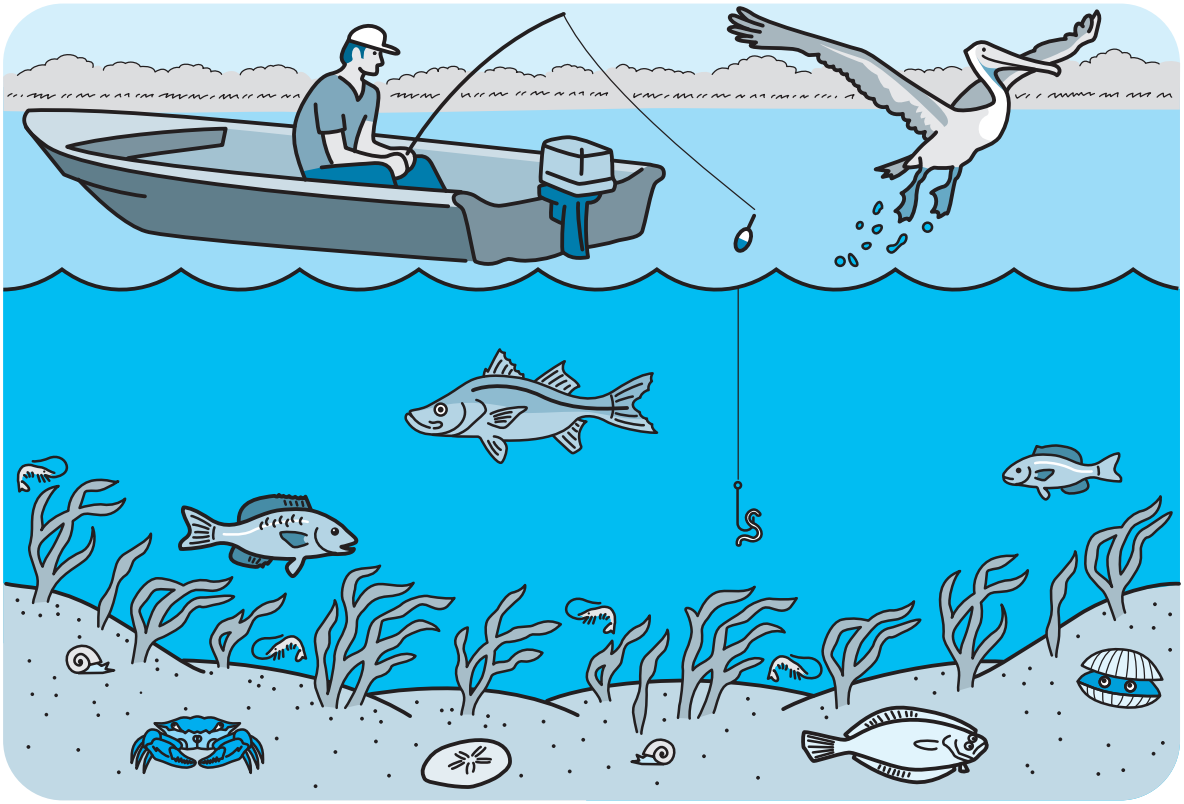
There are many organisms (primary producers) at the bottom of the pyramid. The amount of energy passed upward becomes smaller and smaller until only a few organisms can be supported at the top. To sustain life, every organism depends on every other organism.

If we remove too much of the pyramid by destroying habitat, by pollution or by over-fishing, what will happen?





Humans are also part of the food chain. We depend upon the lagoon for fish, clams, oysters and shrimp. When we disrupt the delicate balance, we affect not only the lagoon, but ourselves as well.



FAST FOOD CHAINS

This does not refer to hamburgers or hot dogs. In this activity you will see how many food chains you can make using a list of plants and animals found in the Indian River Lagoon.

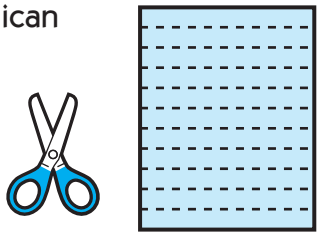
Materials needed: Several sheets of blank paper, scissors, tape or glue, and a pencil.

Directions:

1. Work together in groups of four or five. On a sheet of paper, write down a food chain using the list of plants and animals on the next page.

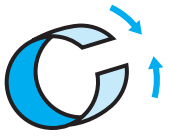
   Example: phytoplankton → barnacle → snapper → pelican

   (Hint: It may be easiest to start with a top predator — such as a pelican or raccoon — and work backwards.)



2. Cut a blank sheet of paper into strips about an inch wide.
3. Taking one strip of paper, write the producer on it.

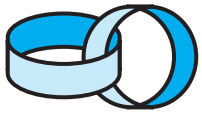
   phytoplankton



Make a link by taping or gluing the ends of the strip together.

4. On another strip, write the primary consumer that will eat the producer.

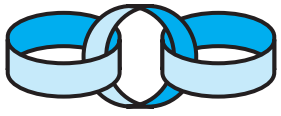
   barnacle



Add this link to your chain.

5. On the next strip, write the secondary consumer that will eat the primary consumer.

   snapper



Add this link to your chain.

6. Keep adding links until you reach a top predator (tertiary consumer).

   pelican

Add this link to your chain.

7. Write down more food chains using the list of plants and animals. Make as many different food chains out of paper as you can in the time limit set by your teacher.