

Lab: Sea Connections

(modified from Smithsonian Education)

Background:

Coral Reefs, Kelp Forests, Polar Ecosystems and Hydrothermal Vents are four of the most important ocean biomes. Your goal in this game is to collect five organisms from one of these ecosystems to create a food web.

Coral Reefs are masses of calcium carbonate assembled by colonies of cnidarians. Each individual coral animal is called a polyp, and is closely related to sea anemones and jellyfish. Coral reefs are classified into three types: atolls, barrier reefs and fringing reefs. An atoll is a ring-shaped island of coral that form around subsiding volcanic islands. Barrier reefs generally form parallel to continental shores and are separated from land by a lagoon or deep water channel. Lastly, fringing reefs connect to the shoreline of adjacent landforms. All coral reefs support diverse fish and invertebrate populations.

Kelp Forests consist of fast-growing brown algae. Long stipes (like a stem) with attached blades (like leaves) grow towards the surface while a holdfast anchors the bottom to rock. Gas bladders at the base of each blade help create a dense canopy at the surface. This cold water “forest” is home to a diverse set of animals including sea otters, sea urchins, abalone and fish.

Polar Ocean Ecosystems in the Arctic and Antarctic have some similarities but also stark differences. Both ecosystems are characterized by extreme cold and long periods of darkness. The Arctic Ocean is covered with ice during the majority of the year, and organisms that live there are wholly dependent on ice flows and the phytoplankton and algae that grows during the summer months. Top predators include polar bears and seals. The Antarctic is also ice, but this ice is on land. This continent creates very productive upwelling currents that support huge populations of krill. Penguins and whales are among the diverse organisms that utilize this important resource.

Hydrothermal Vents are unique among these four communities due to their dependence on chemosynthesis rather than photosynthesis. This ecosystem exists in the deep sea well beyond effective light penetration. Organisms that live around hydrothermal vents are dependent on the hydrogen sulfide that is being emitted from the sea floor. Bacteria convert the hydrogen sulfide into biomass through chemosynthesis and serve as the base of the food chain.

Activity:

- Select one player to be the dealer, who should shuffle the deck and deal each player five cards. The deck should then be placed face-down in the middle of the table. The dealer turns the first card of the draw pile face-up to create a discard pile.
- The goal of each player is to collect five cards of one suit (cr, kf, po or hv). During each players turn, first draw one card from the top of either the draw pile or discard pile.
 - If you draw a “disconnect” card, you must play it immediately. If you have multiple “disconnect” cards, you must play one each round until you have none left.
 - If you have a “reconnect” card, you may play it at any time.
- At the end of your turn, discard down to five cards if you have more than five. If you have less than five cards, draw from the draw pile only until you have five cards.
- If the draw pile is emptied, reshuffle the deck and continue playing.
- The first player to collect five cards of the same suit wins. Everyone else is a loser. Play again!

Analysis:

1. Where, specifically, would you find each of the four ecosystems in the game?
2. Which suit did you collect? What is the basis of life in this ecosystem?
3. How does this compare to the other three ecosystems played in this game?
4. Draw a food web that shows how the organisms in your ecosystem are linked.
5. Choose an ecosystem with a different energy source (*photosynthesis/chemosynthesis*) and draw a food web that shows how the organisms in that ecosystem are linked.
6. Compare and contrast the two food webs you have created.