

Part 3

Ecosystems

and

Habitats

# San Diego's Biodiversity

Different animals and plants thrive in various regions of the world, ranging from tropical rain forests to coral reefs to sandy deserts.

San Diego has remarkable biological diversity. By some estimates, this region has more plant and bird species than any other county in the United States. The reason for this diversity is that San Diego has such a variety of landscapes, topography and climate.

Crossing San Diego, you may pass from mountains to coastal beaches, from forests to grasslands, from deserts to wetlands. Each habitat supports a distinct population of plants and animals.

San Diego's overall climate is Mediterranean, with cool, moist winters and hot, dry summers. Yet, there are wide variations within the area. For example, the Cuyamaca mountains receive three times as much rainfall as the the coastal regions.

However, the remarkable biodiversity of Southern California is under threat. As cities grow, natural regions are cut off from each other. Native habitat remains as isolated islands that may not be large enough to sustain healthy populations. Animals are limited in travelling to seek food, mates or shelter without confronting man-made roads or obstacles. As a result, many species are threatened or endangered.

In some cases, connecting zones of wildlife corridors have been established to allow animals to travel between natural regions. This is not a perfect solution, but a step in the right direction.

# The Ecosystem of the Lagoon

The lagoon is an **ecosystem**, a community of living things and their physical environment. Within an ecosystem are many habitats, which provide all that living things need to survive and reproduce.

Living (or once living things) in the environment are called **biotic**, or organic. Biotic factors include: insects, fish, birds, mammals, plants, bacteria, and plants, as well as decaying leaves and rotting logs.

Nonliving factors in the environment are called **abiotic** or inorganic. These abiotic factors may include:

*light and heat from the sun*

*oxygen gas in the atmosphere*

*precipitation and wind*

**List six nonliving things in a wetland ecosystem:**

---

---

---

---

---

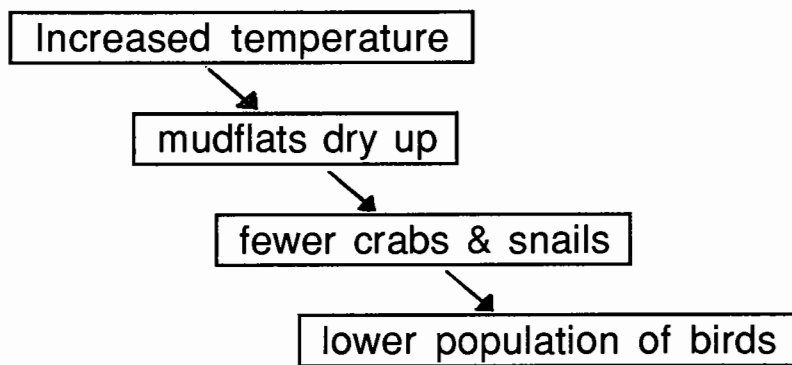
---

The lagoon's ecosystem depends on a web of interactions between living things. Living things also interact with non-living things. As worms eat their way through decomposing matter in soil, they aerate and enrich the soil, making it more fertile for plants to grow.

# Interactions of living and non-living factors

In the lagoon's ecosystem, non-living factors affect whether living organisms thrive or decline. For example: as air temperature increases in summer, the mudflats dry up, becoming less hospitable for crabs and snails, resulting in a decreased food supply for birds.

A flowchart illustrates cause and effect relationships.



Complete the chart below, by entering non-living factors, and their relationship to living organisms:

<i>Nonliving factors</i>		<i>Relationship</i>		<i>Living organisms</i>
Sand	is	a nesting site	for	least tern
Fertilizer	is	a food source	for	algae
Pollution	is	a poison	for	birds
	is		for	
	is		for	
	is		for	

# Niche

Within the ecosystem of the lagoon, animals each have a special role to play. This is called their **niche**. You can think of it as their job.

Within your city, people perform various jobs. Policemen patrol the streets, doctors heal the sick, teachers educate children, firefighters take care of emergencies, while engineers make sure that electricity continues to flow. The city functions efficiently, and people depend upon each other in a complex network. Similar networks operate in nature. Instead of a city, we call it a **community**.

Within the community, each animal has a function, a job. For instance, earthworms occupy the niche of decomposer. Their job is to break down dead matter and return nutrients to the soil, helping plants grow. The earthworm's activity also loosens the soil, helping plant's roots reach deeper. The earthworm is important in the cycle of life, recycling nutrients to the next generation.

Visiting a lagoon, you may notice an abundance of different types of birds. So many different birds can coexist because they occupy different niches. Some are insect-eaters, seed-eaters or meat-eaters, while others are waders, seeking mud creatures.

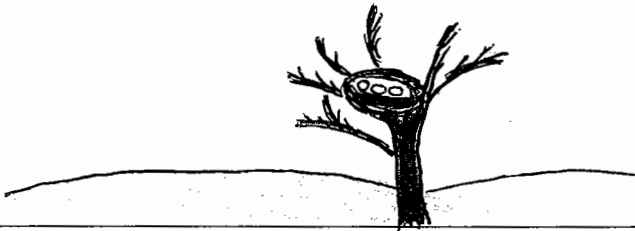
Even the niche of predator is important to the balance of nature. Predators keep the numbers of herbivores in check. Without coyotes, deer populations expand beyond what the ecosystem can support. After eating available vegetation, the result would be starvation, and their numbers would die back. However, such natural cycles have been altered by human development.

# Habitats

The environment in which an animal lives is called its **habitat**. A jellyfish lives in shallow saltwater, while crabs live in mud flats.

An animal's habitat must provide the basic needs of life: food, water, shelter and space to raise their young. Where do animals seek or construct **shelter** around the lagoons?

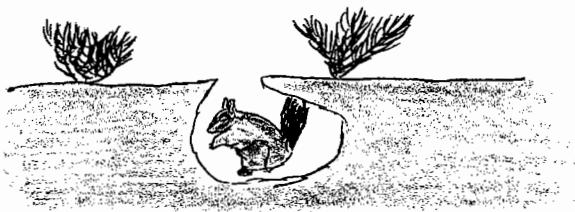
Hérons and egrets build nests in tree branches, out of reach of predators.



A doe hides its fawn under a thick bush.



Ground squirrels burrow underground.



Wood rats construct shelter from branches, bark and grass. The dome-shape may be up to 4 feet across.



Brush rabbits do not dig burrows, but construct nests in dense vegetation.



The Least tern is endangered because it nests on sandy beaches. Its eggs look like tiny stones.

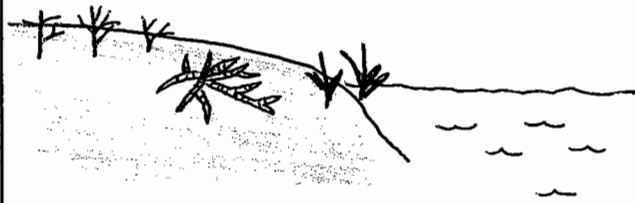


# Habitats for plants and animals

The lagoon area includes several distinct habitats that serve as homes for a wide variety of plants and animals. These range from beach to mudflats to salt marsh to coastal sage scrub to chaparral.

## Salt marsh

Vegetated zones on the edge of an estuary that are affected by salt water as tides ebb and flow.



## Coastal strand

Sandy beaches.



## Mudflats

Muddy level areas, with little or no vegetation, often covered by the tides. A habitat for numerous invertebrates: worms, shrimp, clams and crabs.



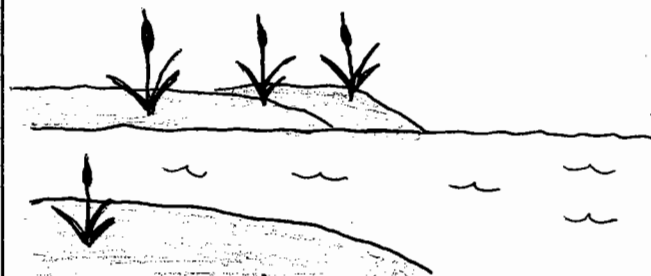
## Coastal sage scrub

Drought-tolerant plants, primarily softer, low-growing shrubs, found close to the coast. Aromatic sage and sagebrush are common.



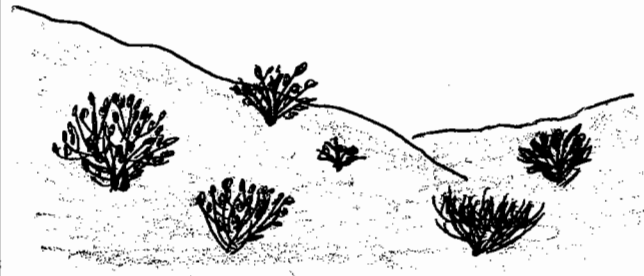
## Freshwater marsh

Wet areas, fed by streams, beyond the reach of ocean tides. Serve as a nursery for fish, a water and food source for birds.



## Mixed Chaparral

Also called Elfin Forest. Mostly low shrubs, with evergreen, waxy leaves. Plants are stiffer than sage scrub plants.

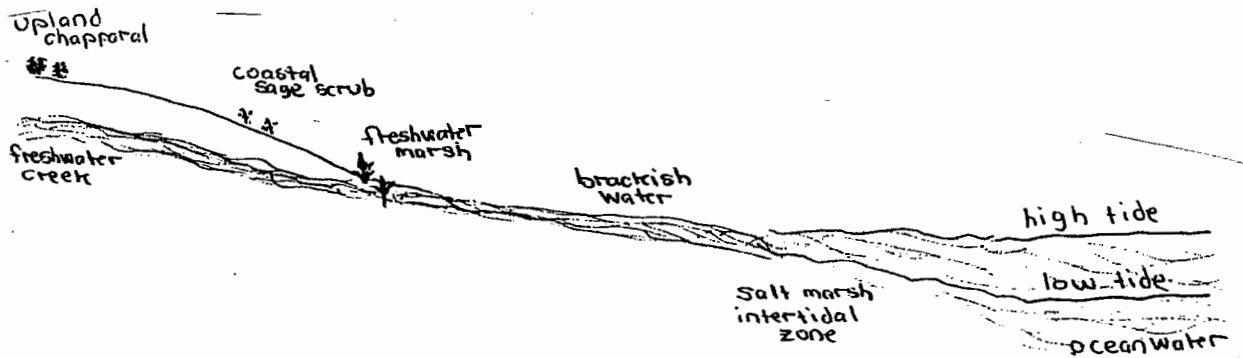


## A Stroll through the lagoon

Starting upland, imagine a stroll down to the lagoon. At first, you pass through woody chaparral, with native willow and rubbery-leaved shrubs. Non-native eucalyptus trees abound.

You notice one of the freshwater streams that feed the lagoon, gently descending from its mountain source miles to the east.

Further downstream, coastal sage scrub plants are less dense, with softer leaves. Smell the aromatic sage and fennel. You may be fortunate enough to glimpse the elusive and endangered gnatcatcher.



The creek flows into a freshwater marsh, surrounded by cattails and reeds. You may catch sight of blackbirds nesting among the reeds, perhaps a raccoon. Watch for tracks and other signs.

Further on, salty ocean water begins to intrude. The marsh becomes increasingly brackish. Pickleweed and salt grass grow along the salty shores. This is **salt marsh**, often covered by the rise and fall of ocean tides.




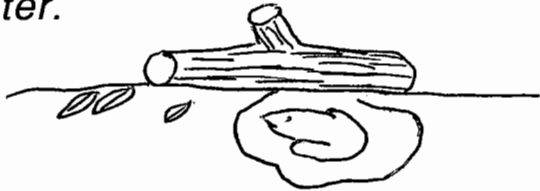




You've come at low tide; notice crabs scampering across the mudflats. Graceful egrets and herons and small, busy shorebirds wade in shallow water, searching for a meal.

Skirting the edge of the lagoon, you pass under man-made bridges, cars rushing overhead, occasionally a train speeding past. Beyond, you reach sandy beaches, and can hear the rush of the ocean waves, pushing inward. Soon the tide will rise. Gulls soar overhead.

The lagoon is a delicate chain linking these ecosystems, interconnecting stream, land, marsh animals, plants and sea.

# Adaptations

Animals have special body features or behaviors that allow them to survive in their environment. These are called **adaptations**.

Body features	Behaviors
<p><i>A hawk's sharp talons and bill enable it to grab prey.</i></p> 	<p><i>Birds migrate to warmer climates in winter.</i></p> 
<p><i>Mollusks can seal their shells closed for protection, and to avoid drying out.</i></p> 	<p><i>Toads hibernate, or sleep during winter.</i></p> 
<p><i>Lizards are dull-colored to blend with the environment (camouflage).</i></p> 	<p><i>Mice are nocturnal, feeding at night to avoid predators.</i></p> 
<p><i>A coyote has sharp canines and claws for killing prey.</i></p> 	<p><i>Crabs burrow into the mud during low tide.</i></p> 

# How do Species Interact?

Living organisms around the lagoon form a community. Within this community, animals interact in complex ways. They may prey upon each other, they may compete for food and space, or they may co-exist in a **symbiotic** relationship. These relationships may be beneficial to one or both animals, or they may be harmful to one species.

One example of symbiosis is the interaction between bees and flowers, critical to the survival of both. Bees gather the flower's nectar in order to make honey. In so doing, they pollinate the flowers, enabling them to make seeds to reproduce. It's good for the flowers and it's good for the bees. This symbiotic relationship is mutualistic.

<p><b>Predator-Prey</b> One species is the predator, and depends on the other species as a food source. Example: Coyote - Rabbit, Owl - Field mouse</p>	<p><b>Competition</b> Species compete for the same space or the same food sources. Example: Coyote - Fox, Hawk - Owl</p>
<p><b>Parasitism</b> One species has a harmful effect on another. Example: Coyote - Tick, Dog - Flea</p>	<p><b>Mutualism</b> Both organisms benefit from the relationship. Example: Bees - Flowers</p>
<p><b>Commensalism</b></p> <div data-bbox="272 1646 602 1835" data-label="Image"> </div> <p>One species benefits, while the other is not affected by the relationship. Example: Fat Innkeeper Worm - goby fish</p> <p>The Fat Innkeeper Worm digs a U-shaped burrow. It eats by secreting a sticky slime net which traps small food particles. Other species (a gobyfish, a pea crab, a clam and a scale worm) share this burrow, and feed upon particles that the Innkeeper Worm leaves behind. They benefit without harming or helping the Innkeeper Worm.</p>	