



A Cleaner Port. A Brighter Future. The Greening of the Port of Los Angeles by Robyn C. Friend and Judith Love Cohen tells the story of the Port of Los Angeles: how the Port was founded, its importance in bringing you goods made overseas, shipping products made in your town to people in other parts of the world, and what the Port of Los Angeles has done to make its operations as clean and green as possible.

This book is one in a series focused on the environment and the value of preserving it by depicting people and organizations working to improve the health of our planet.

Some other books in the series include:
A Clean Earth: The Geothermal Story
A Clean Planet: The Solar Power Story
A Clean City: The Green Construction Story
A Clean Sky: The Global Warming Story
A Clean Sea: The Rachel Carson Story



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THE GREENING OF THE PORT OF LOS ANGELES



Robyn C. Friend and Judith Love Cohen

Illustrations: David A. Katz

FRIEND & COHEN, KATZ

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CASCADE PASS

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**Robyn C. Friend
and
Judith Love Cohen**

**ILLUSTRATIONS:
David A. Katz**

*Editing:
Lee Rathbone*





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This book is one of a series that emphasizes the environment and the value of preserving it by depicting what real people are doing to meet the challenges.

Other books in the series include:
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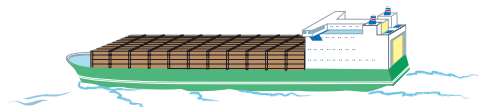
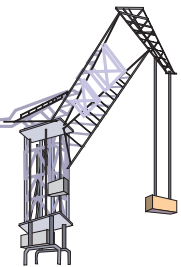


Introduction

Whether you live by the ocean or far from the sea, ports are part of your world. Your shoes probably came from another country. Your family car may have crossed an ocean on a cargo ship to get to you. If your town grows food or makes machines or other products, customers for these goods are likely to include people just like you overseas. All these items travel through ports to reach their destinations.

This book tells the story of ports, what they do and why they matter. This book also explains how today's ports are moving cargo in cleaner ways, with the Port of Los Angeles as an international leader.

This is the sixth book in Cascade Pass' environmental series dedicated to planet Earth's natural resources and those working to protect them. *A Cleaner Port. A Brighter Future.* *The Greening of the Port of Los Angeles* explains how cleaning the air and water at a single port helps make the world a healthier place.

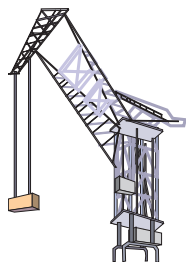




You know that your tennis shoes, your cell phone and your family car probably came from another country. Did you know that the fruit you ate for lunch or the meat cooked for your dinner also may have come from far away? Did you know that products grown or made in the United States – such as raw cotton, scrap paper, grains and heavy machinery – are shipped to people in other countries?

Big ships carry all this *cargo* between *ports*, where it is loaded and unloaded by people and machines working around the clock.

If you grew up in New York, you learned about the Dutch traders whose voyages led them to New York *Harbor*. If you grew up in California, you studied the Spanish and Portuguese explorers who came to Los Angeles and San Francisco when these places were very small new towns along the California coast. Sheltered inlets and bays such as those in New York, Los Angeles and San Francisco welcomed ships for hundreds of years, and trade in these areas sparked the growth of the major cities you see today.





Avocado



Phone



Everyday things come
from far away!

Sweater



Skirt



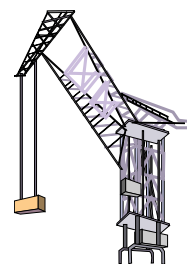



The History of the San Pedro Bay and the Port of Los Angeles

You've heard of Christopher Columbus, the Italian explorer who came to America in 1492. Fifty years later, Spanish and Portuguese voyagers were exploring the west coast of our continent. On October 8, 1542, a Portuguese explorer named Juan Cabrillo came upon a crescent-shaped *mud flat* tucked behind a *peninsula*. His log entry for that day described "an excellent harbor, with many plains and groves of trees." The place was San Pedro Bay, in Southern California. Today, it is home to the Port of Los Angeles.

Who could predict this peaceful and pristine setting would become one of the world's largest and most successful harbors?

In the centuries that followed Cabrillo's arrival, many explorers and pioneers came to San Pedro Bay. They included Spanish missionaries, like Father Junipero Serra, who founded the California missions. In fact, the monks at San Juan Capistrano were the first traders to use the San Pedro harbor to send *hides* and *tallow* to Spain in exchange for supplies for the mission.





sailing ships
came here!

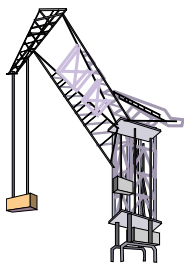
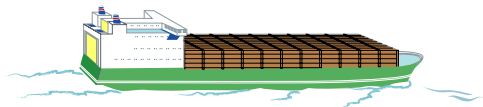




In 1851, Phineas Banning, a young man born in Wilmington, Delaware, sailed into San Pedro Bay on a *clipper ship* from the East Coast. He was so inspired by what he found that he rented a small boat and started a business selling drinking water to ships anchored in the bay. He also worked as a *stagecoach* driver and, when he had saved enough money, he bought the company.

These services made it easier to move goods on and off ships, which led to more *freight* and passenger traffic. In time, Banning's company grew to 15 stagecoaches and 50 wagons and had government contracts to deliver goods to army bases throughout California, New Mexico, Utah and Texas.

But Banning's greatest innovation was relocating his *wharf* five miles up the Port's main *channel*. To do this, the main waterway had to be deepened – a project that would establish the modern Port of Los Angeles.





Phineas founded the Port of Los Angeles!

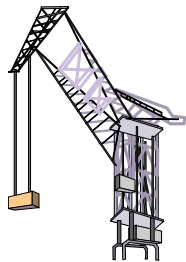
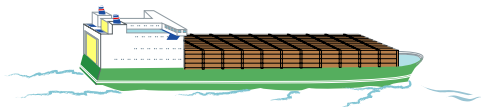




In the early years of modern ports, dock workers unloaded cargo from ships and loaded it onto stagecoaches and wagons. Later, they loaded cargo onto trains and trucks, but the work was still done by hand and the goods were still packaged in individual boxes, bales and sacks. It was hard work that required many people to get the job done. It could take 10 days to unload and reload a single cargo ship.

Then, in the 1960s, a simple invention came along that revolutionized the shipping industry – *cargo containers*! Instead of people loading and unloading all different kinds of boxes, sacks and packages by hand, cargo could be carried in large steel containers and moved by machines.

The use of containers transformed ports and the business of moving cargo. Giant *gantry cranes* on tracks loaded and unloaded containers. Trucks and trains were modified to haul containers which carry everything from clothing to toys, televisions to food. From start to finish, goods traveling across borders and oceans moved faster and more efficiently.





Today cargo
comes
in containers.



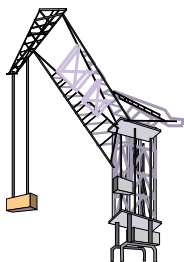
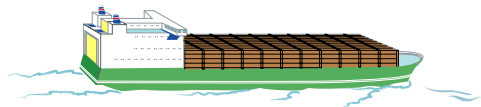


Today's Port of Los Angeles: Cleaning the Air

Today's busiest ports are hubs of trains, trucks, cargo ships, cruise ships, *tugboats*, cranes, *forklifts* ... an army of machines powered by mighty engines that keep cargo moving. Most of the engines run on *diesel*, a fuel whose exhaust releases unhealthy particles into the air.

The business of the Port of Los Angeles is trade, but the Port also has *marinas*, beaches, shops and parks. Many people live, work and play in the harbor community surrounding the Port. So the quality of the air in the Port matters.

In the late 1990s, scientific studies showed that the ships, trains, small boats, trucks and other machines at the Port were a significant source of air pollution. To clean up the air in the San Pedro Bay and keep it clean, the Port of Los Angeles created a Clean Air Action Plan – known as the CAAP – with its neighbor, the Port of Long Beach.





Ships use electric power
at docks.

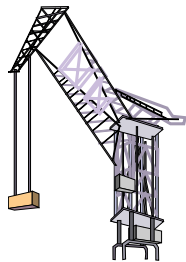
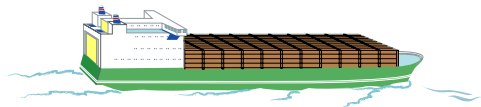




The CAAP identified the five most polluting sources at ports. The first was ships that, while docked, spewed diesel fumes the entire time. If the ships could run on electricity instead of burning diesel while at the Port, those harmful fumes could be eliminated. Today, ships at *berth* can plug into large electrical outlets – a program the Port of Los Angeles pioneered called *Alternative Maritime Power*[™] (AMP[™]).

The CAAP also required ships coming into the harbor to slow to 12 *knots* when they got close enough to be within 20 *nautical miles* of the Port. By running their engines at their most efficient speed, ships cut down on air pollution along the coast and in San Pedro Bay.

Another group of polluters was tugboats, the smaller vessels that guide cargo ships in and out of the Port and “park” them at the *dock*. Tugboats used to run on diesel fuel, too, but today, ports and their partners are starting to use a new generation of tugboats built with cleaner *hybrid electrical engines*. The Port of Los Angeles played a key role in advancing this technology by helping to fund the world’s first Eco-tug!





Tugboat engines help
run the Port!

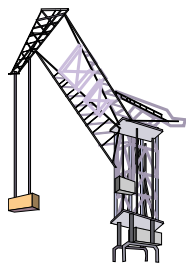
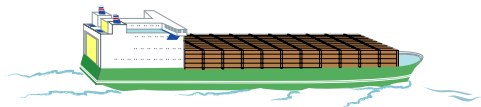




Once ships are docked, how does the cargo reach people in other cities and towns? Much of the cargo is moved by heavy-duty trucks, which used to be another major source of pollution. Many trucks were old, wasted fuel and made a lot of smoke that scientists call *emissions*. The Port of Los Angeles was one of the first ports to create a Clean Truck Program. This program required that only newer, less polluting trucks could enter Port *terminals*.

By the end of its second year, the Clean Truck Program cut the amount of harmful, tiny particles contained in truck exhaust by more than 80 percent. Today, thousands of clean trucks operating at the Port of Los Angeles and the Port of Long Beach – including several hundred that run on *liquefied natural gas* (LNG) – are reducing particulate matter emissions by more than 30 tons per year. That's the equivalent of taking 250,000 cars off Southern California's freeways!

Some cargo travels to and from the docks by rail. Trains also run on diesel fuel, and the Port is working with its rail partners to power locomotives with less polluting technology such as cleaner fuels and hybrid engines.





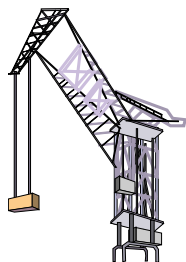
Trains haul cargo!





Before the CAAP, machines that loaded and unloaded cargo on the docks inside the terminals were another major source of pollution. This equipment used to run on diesel fuel and it often ran all day. Today, all these cargo-handling machines are clean, and they include hybrids powered by a combination of electricity and gasoline. In fact, the Port of Los Angeles partnered with a company to produce the world's first electric truck for use on container terminals!

Also, terminal equipment now must be turned off when it is not in use. This simple change reduces pollution and conserves fuel, too!





Cranes
lift cargo
containers.

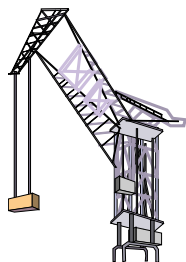
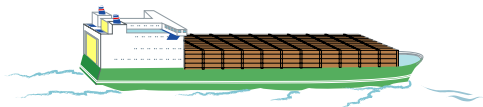




Today's Port of Los Angeles: Cleaning the Water

When the Port looked at pollution in the harbor, it turned its attention to water, too. Over the years, the water in the harbor had grown darker and dirtier. By the 1970s, there was so little oxygen in the water that fish and plants could not survive in it.

How did the water get so polluted? Until the 1960s, factories miles away routinely dumped chemicals into the waterways flowing into the bay. Also, rainwater – which travels to the ocean through storm drains – carries anything that washes away with it into the harbor. This includes paper, trash, oil, lawn chemicals and other residue and materials. About 1,000 storm drains empty directly into Port waters.





Today the water
is beautiful!

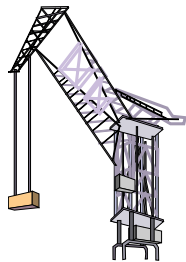
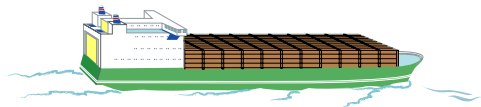




In 2010, the Port of Los Angeles and the Port of Long Beach teamed up to adopt the Water Resources Action Plan or WRAP. The first task was to make sure that trash and chemicals from the storm drains did not flow directly into the ocean. Today, *catch basins* in these storm drains trap trash, oil and grease before they drain into the harbor. Every year, 2.5 tons of trash are captured and removed from the storm drains before it can contaminate the ocean.

Some trash and toxic *sediments* still seep into the water, but the Port remains committed to cleaning the water and keeping it clean. Projects include *dredging* the ocean floor to remove layers of dirty sediments that have built up over the past 100 years. The Port also banned boat owners from dumping harmful chemicals or oil into the water.

Trash skimmer boats now regularly vacuum debris that floats on the water's surface, acting like a street sweeper for the ocean. Likewise, street sweepers circulate through the Port to collect trash on the ground. The street sweepers pick up 5 cubic feet of debris every day – a pile the size of a small car!





Giant Kelp
in the Harbor!





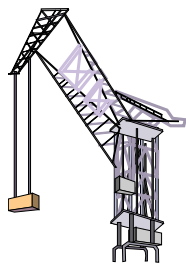
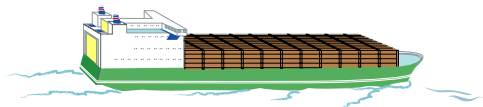
The Port of Los Angeles: Making a Difference

The Port of Los Angeles has many programs to maintain a good home for millions of animals and plants living in and around the Los Angeles Harbor.

The Port's more famous environmental projects include transplanting a bed of giant *kelp* in the L.A. Harbor, creating a new *habitat* for *marine* animals.

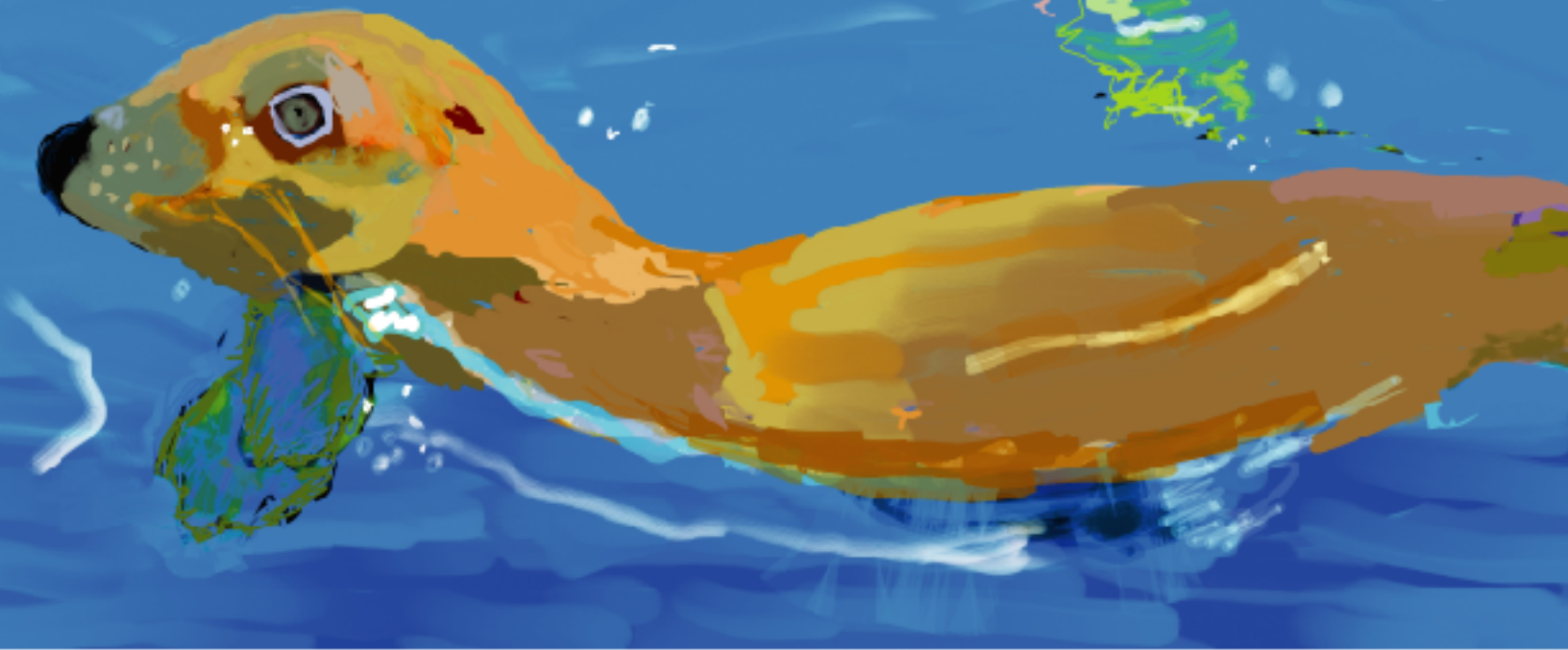
The Port also created shallow water habitats so underwater environments can grow and marine life can flourish.

Additionally, the Port also maintains and protects 15 acres of land for a sea bird *sanctuary*. Nearly 1,000 pairs of endangered birds now build nests there during the nesting season. Biological studies in the harbor show that 100 species of birds, 70 species of fish and 400 species of underwater animals of all shapes and sizes have been observed in the Port. Among the most spectacular are the sea lions, porpoises and whales that swim in and around San Pedro Bay.





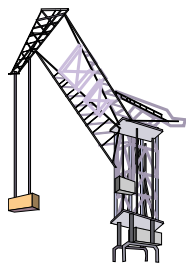
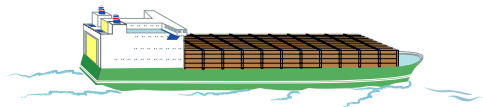
Sea lions
greet visitors!

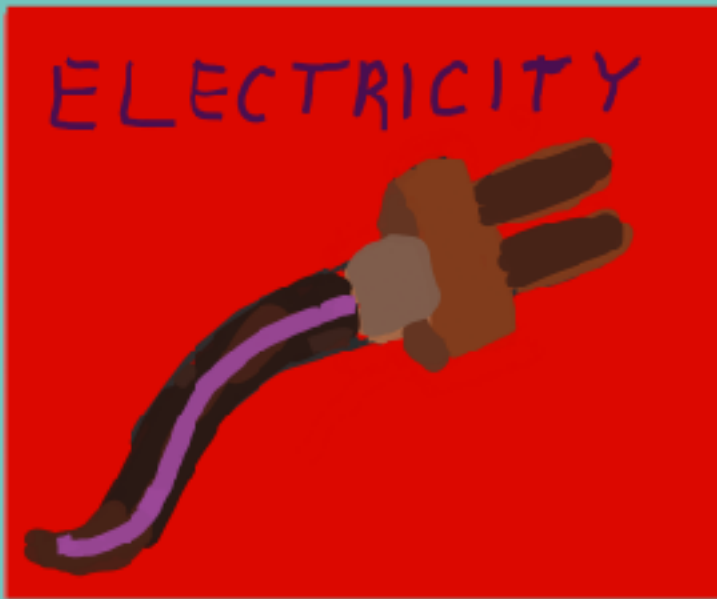




Since the Port of Los Angeles has made all these changes, how clean is the air and water? Between 2005 and 2010, Port-related air pollution dropped as much as 76 percent. At the same time, the business of trade continues to grow and the Port is moving more and more cargo. Cleaner air at a busier port shows the Port of Los Angeles' clean air programs are succeeding.

Fifty years ago, there was virtually no oxygen in the water so nothing could live in the harbor. Today, the Port of Los Angeles has the cleanest water of any industrial port in the world. Sea life has returned and is thriving at the Port.





or



REPLACING



or



Equals A Cleaner Port!



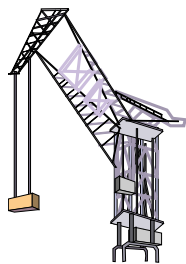
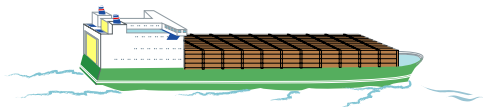


How has greening the Port of Los Angeles made a difference around the world?

Ships deliver goods to ports all over the world, so they can plug into dockside electrical power at all ports that offer it. The Port of Los Angeles was a leader in developing the international standard for dockside electrical power plugs and outlets, and the number of ports that offer this alternative is growing!

Also, trucks, forklifts and other equipment powered by electricity, natural gas, and hydrogen are tested at the Port of Los Angeles to be introduced at other ports around the world.

The Port of Los Angeles also promotes a healthier global environment by sharing its knowledge and expertise with ports and trade partners around the world.





Ships go
all over the world.

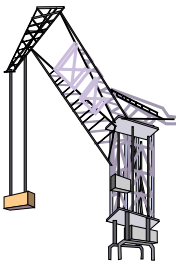
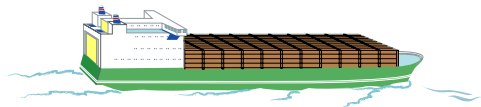




You Can Make a Difference, too!

You can do your part to help keep the Port and your environment clean. First, remember that everything that goes into your storm drain can end up in the ocean. Be sure to carefully place trash and recyclables in proper containers with strong lids. Always dispose of oil, car fluids or other harmful chemicals at designated public disposal facilities. Most cities have places where you can take old cans of paint, cleaning chemicals, dead batteries and other things that should never be thrown out with the household trash.

Learn more about the history of the Port of Los Angeles and the ecology of the San Pedro Bay by visiting the Cabrillo Marine Aquarium and the Los Angeles Maritime Museum. Both have interesting exhibits about the Los Angeles Harbor area. At the aquarium, you can see whale and shark bones, learn about *bioluminescence* and visit a nursery where sea creatures hatch. Learn more online at cabrillomarineaquarium.org. At the Maritime Museum, you'll see ship models, fishing gear and diving equipment. Visit the museum online at lamaritimemuseum.org.





Children Visiting the Port!





30

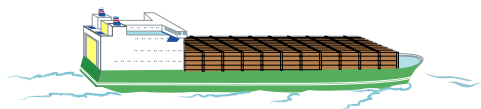
Careers that You Can Choose to Help

There are many jobs that allow people to help the environment. Here are some examples:

Marine Biologist: A marine biologist studies living things in the sea. Marine biologists learn to scuba dive and study creatures and plants that live in the ocean and their interaction with the world above.

Civil Engineer: Civil engineering is a branch of engineering that deals with the design, construction, and maintenance of roads, bridges, buildings, and water supply and sewage systems. Civil engineers use math and science in their work and are often at construction sites. Some civil engineers focus on design and technology that improves the environment and reduces pollution.

Environmental Scientist: Environmental scientists combine physical and biological sciences to study pollution and other environmental problems and come up with solutions to those problems. They examine what is in the air, water, and soil, and give advice on how to clean the environment. Environmental scientists work in offices and laboratories, but also spend time in the field gathering data and monitoring environmental conditions.





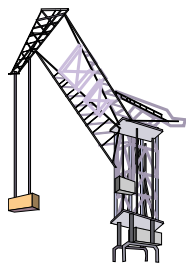
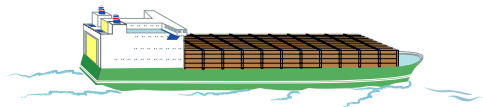
A Marine
Biologist
Working!





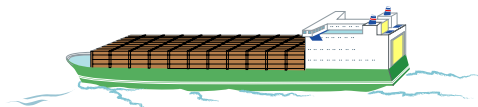
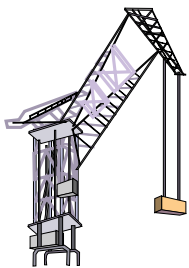
FUN FACTS

- Plugging a ship into electricity at dock, or “AMPing” prevents the spread of as much as one ton of emissions (from the ship’s smoke stacks) within a 24-hour period.
- 99% of the goods entering the U.S. from other countries come by water. More than 40% of those goods come through the Port of Los Angeles and the Port of Long Beach. That’s nearly half of all the imported goods entering the country.
- The Port of Los Angeles has 43 miles of waterfront – nearly twice the length of Santa Catalina Island.
- The Port of Los Angeles covers 7,500 acres – 56% (4,200 acres) are land and 44% (3,300 acres) are water. The total amount of land at the Port is nearly 10 times the size of Disneyland.
- Every year more than 2,100 cargo and cruise ships call at the Port of Los Angeles.





- The Port of Los Angeles helped design and create the first heavy-duty electric truck for hauling cargo containers. Ports around the world can reduce air pollution by using electric trucks to move cargo.
- Gantry cranes that load and unload ships are so big – up to 300 feet high at rest or as tall as a 30-story building.
- Kelp grows up to 2 feet per day - and up to 250 feet long – at the Port of Los Angeles.
- A pelican diving into the ocean for a fish averages one catch for every 16 attempts





GLOSSARY

Alternative Maritime Power (AMP): Electricity provided at the dock so a ship can plug into and run on electrical power instead of burning fuel.

Bay: A body of water surrounded on three sides by land and a calm place for ships.

Berth: A place where a ship is docked.

Bioluminescence: Natural light from a living organism. Some fish, especially those living in the deepest waters of the ocean where there is no sunlight, use bioluminescence to see their surroundings.

Cargo: Goods and raw materials carried by a ship or another form of transportation.

Catch Basin: Part of a storm drain system designed to trap trash and other objects so they can't enter drainage pipes and contaminate the ocean.

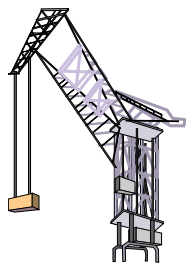
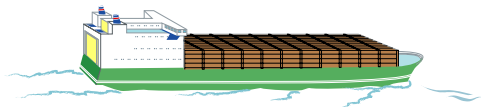
Channel: A narrow body of water between two landmasses, or a deeper natural or manmade waterway within a shallower body of water.

Clipper Ship: A fast, 19th-century sailing ship with three or more masts and a square rig. The vessel was small and narrow compared with other ships, but had a larger total area of sail. It carried small amounts of cargo, but sailed all over the world.

Container: A large, steel box used to transport goods by ships, trains and trucks locally and all over the world.

Diesel: Fuel refined from oil and commonly used in the engines of trucks, trains, buses, small boats and large ships.

Dock: A fixed structure that a ship ties to when it stops at a port. A term also used as a verb, as in *ships dock at a port*.





Dredging: Digging up and removing sand and rocks from the bottom of a harbor or bay. Dredging often is done to deepen a waterway so large ships can move more easily and safely through a harbor. Dredging also is done to remove unwanted material such as trash or toxic mud.

Emissions: Gasses released into the air, especially from engines used to power ships, trucks, trains, cars and equipment that run on fuel.

Forklift: A small, powered vehicle with a large fork-like arm that slides under, lifts and moves cargo.

Freight: Any type of cargo that is being transported either traveling locally or across oceans and countries.

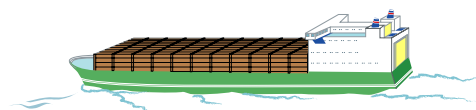
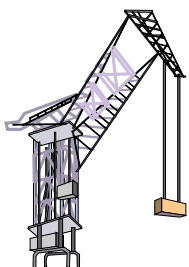
Gantry Cranes: A very large crane that lifts cargo, such as shipping containers. A gantry crane is usually fixed to a platform, such as a dock, and moves back and forth on tracks.

Habitat: A specific place or natural surrounding where a plant or animal lives. The habitat for fish is water; the habitat for sea lions is both water and the seashore. Pollution can destroy habitats and harm creatures dependent on them. In some cases, habitats can be restored and support life once again.

Harbor: A sheltered area of water, next to land, where ships can dock.

Hides: Animal skins, sometimes with the fur still attached. In the past, hides were commonly used for clothing and fabric. Today, with modern machines and manufacturing techniques, man-made and plant-based materials are more commonly used than leather hides.

Hybrid Electrical Engines: An engine that uses two kinds of power. The most common hybrid engines are a combination of gasoline and electric power, but now natural gas and hydrogen fuel cell power technology is paired with electric power. Electrical power can come from an outside source – through a plug connected to an outlet – or can be generated by the engine itself while the vehicle is running.





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Inlet: A small body of water along the seashore that goes inland from the sea. An inlet can be a good place to anchor a ship.

Kelp: A type of brown seaweed found in shallow places in oceans and harbors. This fast-growing plant is vital to a healthy aquatic environment for sea life to grow and flourish.

Knots: A unit that measures speed based on one nautical mile per hour. Knots are used to describe the speed of cargo ships and other ocean-going vessels.

Liquefied Natural Gas (LNG): A natural gas (mostly methane or CH₄) converted to liquid form for easier storage or transport because LNG takes up less space than natural gas in its gaseous state.

Marina: A place on water near land where boats can dock.

Marine: An adjective meaning “of or relating to the sea” such as *marine biology* or *marine life*.

Mud Flat: An area of mud (rather than sand) that stays wet most of the time and sits next to a body of water.

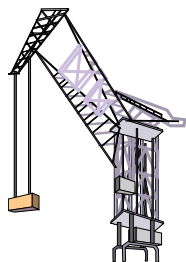
Nautical Mile: A unit that measures distance and corresponds approximately to one minute of arc of latitude along any meridian. By international agreement, it is exactly 1,852 meters (approximately 6,076 feet.) On land, the mile measures 5,280 feet and is shorter than the nautical mile used by air and sea navigators.

Peninsula: A segment of land that branches out into an ocean or bay, but is part of a larger land mass.

Port: A place on the coast or a lake where ships can dock to load and unload cargo and passengers.

Sanctuary: An area set aside for wildlife protection. For example, a bird sanctuary is a place where birds may not be killed, captured or disturbed.

Sediment: A layer of small particles, such as dirt, that flows from a river or other body of water.



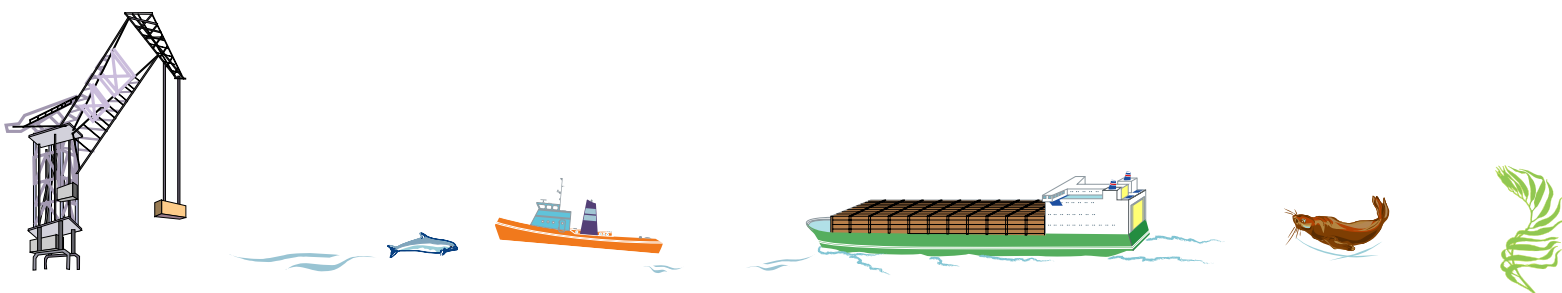
Stagecoach: A type of covered wagon called a coach that was drawn by horses and used to transport people, goods and mail before cars, trucks, trains and airplanes were invented. Because horses and people traveling long distances needed breaks, the journey would happen in “stages” between stations.

Tallow: A waxy substance made from animal fat and used to make candles, soaps and other products.

Terminal: A designated area within a port where containers and other forms of ship cargo are loaded, unloaded or temporarily stored.

Tugboat: A small vessel used for pushing, turning, towing or docking a large ship, or helping to guide a ship in and out of a port.

Wharf: A structure in a harbor where ships can dock to load and unload cargo or passengers.



A CLEANER PORT, A BRIGHTER FUTURE

LESSON PLAN 1: OIL SPILL

PURPOSE: To understand how oil spills can harm the environment.

MATERIALS: Salad oil, red pepper, popcorn, tissue paper bits, seeds, cotton balls, detergent, popsicle sticks.

PROCEDURES: Mix red pepper with three tablespoons of oil. Pour this oil into a small bowl of clean water. Drop the popcorn, tissue paper, seeds into the small bowl, then take them out. Try cleaning up oil with cotton balls, sticks, detergent.

CONCLUSION: Is it easy to clean up spills? What works best? Does detergent also harm sea life?

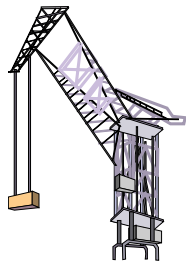
LESSON PLAN 2: RECYCLING

PURPOSE: To learn about recycling and what and how you can recycle.

MATERIALS: Pictures of four recycling bins, glue, markers, scissors, pictures of trash items.

PROCEDURES: Color bins and trash with markers. Cut out trash and glue in appropriate bins.

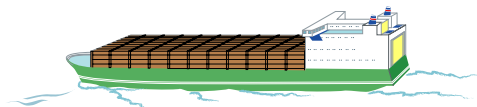
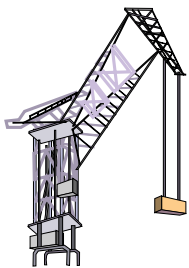
CONCLUSION: Many common household items are recyclable. Some items are not. Which items are not recyclable?





LESSON PLAN 3: HABITATS

- PURPOSE:** To understand how species in an ocean habitat have specific roles and special adaptations for survival.
- MATERIALS:** Mural-sized paper, art supplies (crayons, paint, colored pencils, glitter, etc.), scissors, glue.
- PROCEDURES:** Plan and construct a mural to illustrate plants and animals in a specific marine ecosystem (e.g., reef, kelp forest.)
- CONCLUSION:** Where in the world is your ecosystem? What kind of fish and plants live in this habitat? How do colors and shapes of fish relate to their habitat? Which are predators and what do they eat? Compare the shapes and colors with plants and animals that live in other ecosystems.
- RESOURCES:** Posters, textbooks on marine biology or specific ocean communities, magazine articles. Visit a local aquarium. Take a trip to a habitat (e.g., reef, kelp forest.)





ABOUT THE AUTHORS:

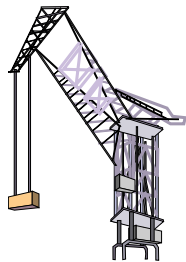
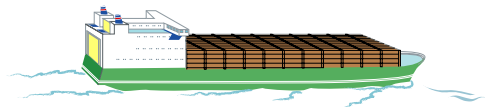
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Graphic materials created by **KANA TATEKAWA**, Momo Communications, Inc.



Good Day.

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Kites in flight at San Pedro's 22nd Street Park

