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Florida's Water Resources

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Florida's Water Resources

by Armalee Fegan, B.A.



Edited by Joan Bray and Teri Rosen
Illustrated by David Wallace



FLORIDA'S WATER RESOURCES

Florida is a watery place. Oceans surround us; aquifers creep beneath us; rivers, lakes and wetlands are everywhere. The Everglades are freshwater wetlands like no others in the world. Florida's waters are some of the natural treasures of our state. They provide drinking water for a growing human population. They enable agriculture and industry to grow. They provide a place for wildlife, including many endangered species.



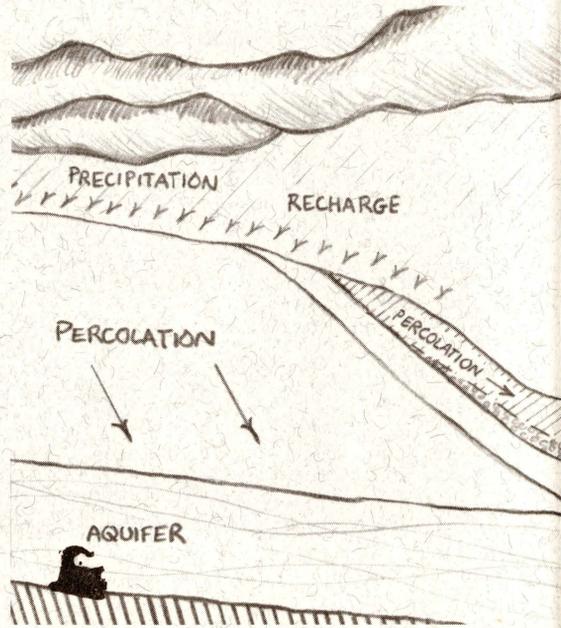
Florida's waters are threatened by the same interests that depend on them. With threats to water quality come threats to humans and other living creatures. In order to ensure that we will have water for the future, we must understand Florida's diverse water resources.

GROUNDWATER

Groundwater is exactly what it sounds like – water in the ground. When water falls on the land, it moves down through the soil until it reaches a layer of rock that it cannot penetrate. The layer of soil on top of the rock is saturated with water. The top of this water-saturated layer is called the water table.

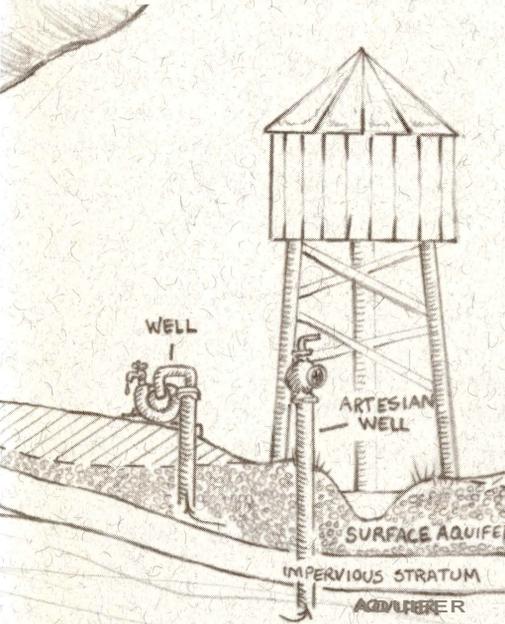
An aquifer is formed by groundwater flowing through porous rock. We dig wells to remove drinking water or water for irrigation from an aquifer. Sometimes when a well is dug, the water pressure in the aquifer forces the water toward the surface without a pump. This type of well is an artesian well.

A spring is a naturally occurring artesian well. Springs have always been popular tourist attractions in Florida. The Spanish explorer Ponce de Leon was one of Florida's first tourists. He was searching for a spring called the "Fountain of Youth." Many other tourists have come to Florida's springs to swim and dive in the cool, clear water.



FLORIDA'S GROUNDWATER SUPPLIES

Florida has a large reserve of groundwater in aquifers. The Floridan aquifer is a deep limestone aquifer that lies under the entire state. Other aquifers lie on top of the Floridan aquifer. The major source of fresh water for south Florida is the Biscayne aquifer. Because this aquifer is close to the surface of the land, it is more likely to be contaminated than the deeper Floridan aquifer.



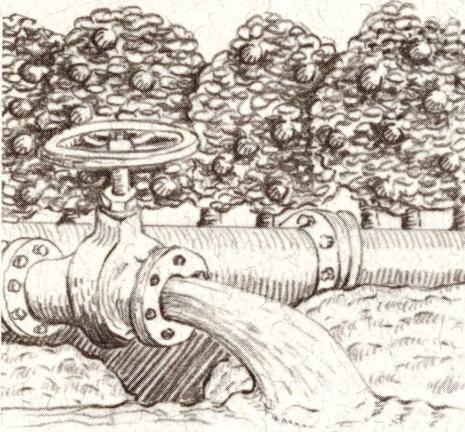
The figure shows the aquifers in northeast Florida. The Floridan aquifer is the deep aquifer. It is protected from contamination by a layer of rock that water cannot penetrate. A surface aquifer lies on top of the Floridan aquifer. The top of the surface aquifer is the water table. In some places, an aquifer lies between these two.

Rain enters the aquifers by moving through the soil. This process is called recharge. The Floridan aquifer is located below a layer of rock, so water can only enter it in special recharge areas through openings in the rock layer. Recharge of the Floridan aquifer is a very slow process. In some places, water is being removed from the aquifer faster than it is being replaced.

PROBLEMS WITH AQUIFERS

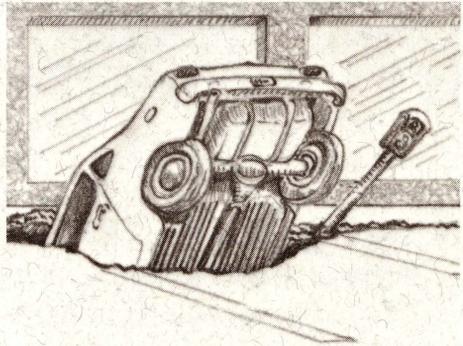
Most of the water used in Florida for farming, industry and human needs is groundwater. Each new person who arrives

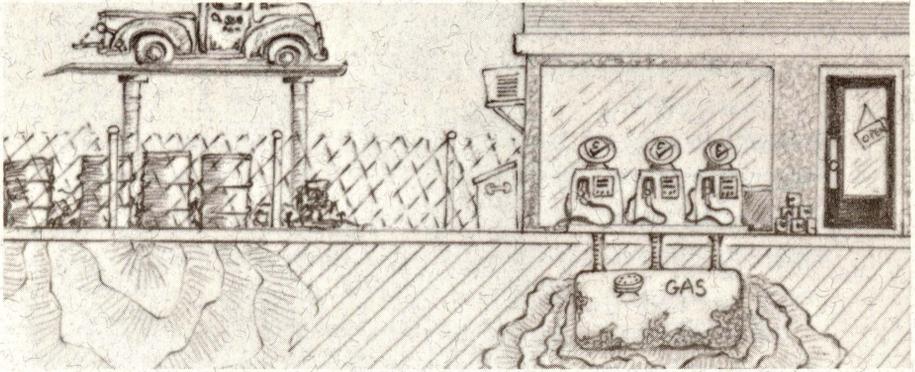
in Florida needs about 200 gallons of fresh water per day. As the state's population grows, more people use more water, and recharge areas are being reduced. Many recharge areas have been turned into roads, sidewalks and parking lots.



Removing too much water can reduce the water pressure within the aquifer. Soil and rock above the aquifer can settle and reduce the size of the aquifer. Water can gradually dissolve large holes in limestone. When pressure in the aquifer drops, sinkholes can form. Saltwater intrusion occurs in coastal areas where fresh water removed from the aquifer is replaced by salt water from the sea. Water containing too much salt is unfit for drinking or irrigation.

Removing too much water can reduce the





Contamination of aquifers is of serious concern to Florida's citizens. Contamination may come from waste water ponds, landfills, hazardous waste dump sites, leaking underground gasoline storage tanks, and runoff of pesticides and fertilizers from agricultural lands.

DEALING WITH GROUNDWATER PROBLEMS

Aquifers are large and do not neatly fit within the boundaries of cities or counties. The state of Florida has been divided into five water management districts in order to preserve, protect and manage surface and groundwater resources. Duval County and much of northeast Florida belong to the St. Johns River Water Management District.

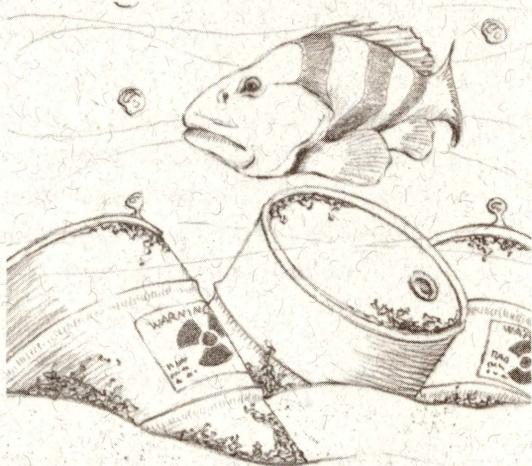
Water management districts take steps to protect groundwater supplies. They monitor landfills, hazardous waste disposal, and cleanup of leaking underground gasoline storage tanks. They issue water-use permits to industries or housing developments. In times of drought, they limit how often people can water lawns or wash their cars.

SURFACE WATER RESOURCES

Most of us are much more familiar with surface waters than with ground water. We have grown up surrounded by the ocean, lakes and rivers. These surface waters provide beauty, recreation, transportation, and water supplies.

Oceans

Oceans are home to a wide variety of living organisms. Microscopic plants in the ocean provide food for many small fish and other animals. Some of the larger fish provide food for people. Microscopic plants in the ocean produce most of the oxygen in the earth's atmosphere.



For many years, oceans have been the dumping grounds for many of our wastes. We used to think the oceans were so large that they could absorb all these wastes. We now know that even the oceans are affected by pollution.

Estuaries

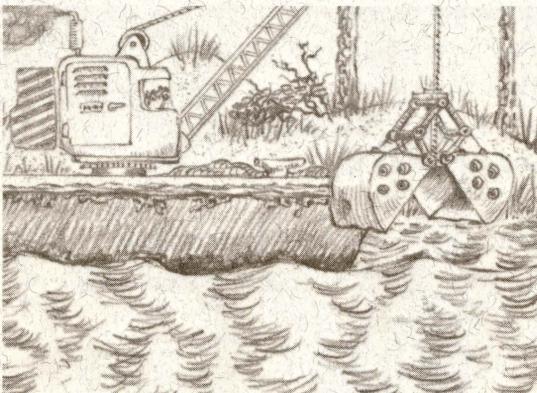
Estuaries are the wide mouths of rivers that run into the ocean. They receive fresh water from the rivers and salt

water from the ocean tides. Organisms living in estuaries are adapted to changes in water levels, temperature and salt content.

Estuaries are important to humans. Estuaries and their salt marshes and mangrove swamps are the most productive natural ecosystems. Many organisms harvested by fishermen – including shrimp, oysters, clams and many fish species – spend a portion of their lives in the estuary. Estuaries protect inland areas from the effects of ocean storms. They absorb pollutants that would otherwise contaminate the ocean. They provide transportation, industrial sites, recreation areas, and homesites.

Developing the wetlands for housing and industry has had a negative effect on Florida's estuaries.

Dredging channels and filling wetlands destroys these wetlands. Pollutants disrupt food chains and harm wildlife. Building near estuaries reduces the flow of fresh water. Such activity makes the water more salty



and can harm commercial fish populations.

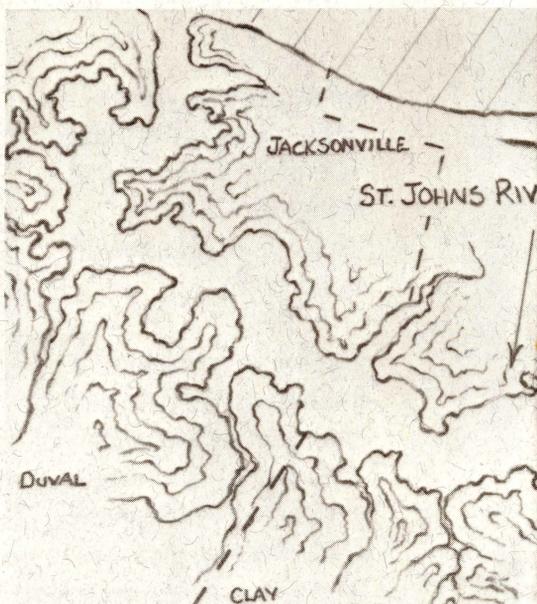
The Florida Department of Natural Resources and the Department of Environmental Regulation as well as the water management districts are responsible for enforcing current laws and developing new plans to protect Florida's estuaries.

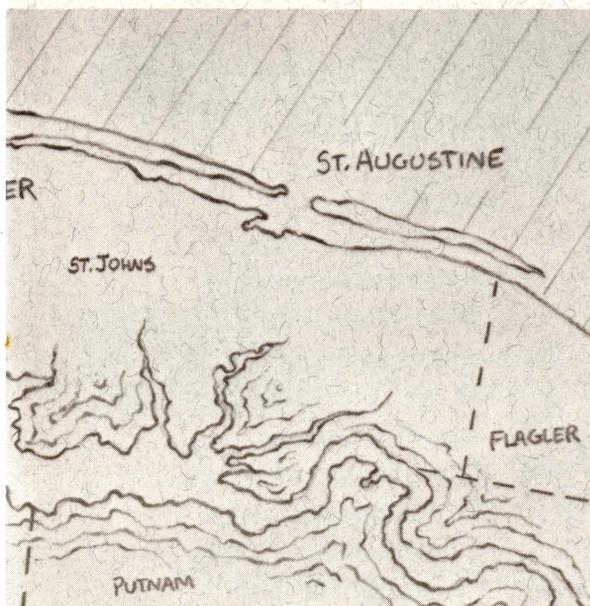
Rivers and Streams

The St. Johns River is Florida's longest river. It begins in the marshes in the Cape Canaveral area and flows north until it enters the Atlantic Ocean just past Jacksonville.

The St. Johns River and its wetlands support a large number of people and provide homes for many animals. Many birds live in the marshy wetlands of the upper St. Johns and in the marshes at the river's mouth. Bald eagles and ospreys catch fish and nest among the trees. White-tailed deer graze along its banks. Blackwater tributaries, colored like tea by tannic acid, flow through cypress stands. Here live a variety of insects, amphibians, reptiles, birds and mammals. Manatees thrive in many parts of the river.

Ocean tides affect the river all the way from its mouth at Mayport to Palatka. Saltwater fish, blue crabs, oysters and shrimp live in the lower St. Johns.





The St. Johns River suffers from many of the same problems that threaten other rivers. Wetlands are often destroyed by developers. Fertilizers from fields run into the river. Manufacturing plants and cities dump wastes into the river.

The St. Johns River Water Management

District, the Florida Department of Natural Resources and the Department of Environmental Regulation are all responsible for the health of the river. In the city of Jacksonville, the BioEnvironmental Services Division monitors the river. These agencies have plans to improve water quality. They plan to purchase wetlands to save them from development, improve sewage treatment, and control agricultural runoff.

In Jacksonville, plans are in effect to control the flow of storm water into the river. After a heavy rain, many pollutants are washed into the river, including fertilizer and pesticides from lawns and oil from parking lots and roads. New housing and commercial developments have storm water retention ponds to hold this polluted water until natural processes destroy the pollutants.



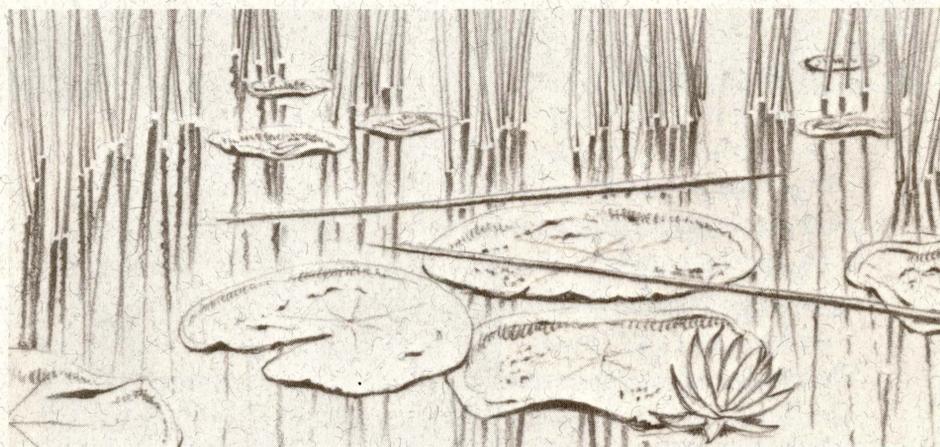
The Suwannee River, made famous by Stephen Foster's song, begins in the Okefenokee Swamp in southern Georgia and flows south and west, emptying into the Gulf of Mexico. Along the way the Suwannee is joined by the Alapaha, Withlacoochee, and Santa Fe Rivers. Parts

of the Suwannee and its tributaries are spring-fed. The upper Suwannee is blackwater. The tea color comes from tannic acid, a product of the decay of pine needles and other leaves. The river wanders through cypress swamps and hardwood swamps. Limestone cliffs look down upon the upper Suwannee. As the river nears the Gulf of Mexico, it widens into the Suwannee River Estuary.

The river provides homes for Florida's wildlife. The endangered bald eagle and many other water birds nest along the Suwannee. Manatees, Suwannee Cooter, and Suwannee Bass are all endangered species that breed in the river. The estuary is important to commercial fisheries in the Gulf of Mexico.

Water quality in the Suwannee River is generally good. Not many people live along its banks. There are no dams on the river except one in the Okefenokee Swamp. For these reasons, the Suwannee and its tributaries are popular

for recreation. The Suwannee has been named an Outstanding Florida Water, which makes it subject to strict regulations protecting it from pollution and other damages. What pollution exists comes from farming and mining, the main industries in the region. The Suwannee River is threatened with increased development as more people are drawn to its relatively untouched beauty.



Wetlands

Wetlands are periodically submerged by water. Depending on the depth of the water, trees, cattails, or pond lilies may grow. Wetlands are important for many reasons. They help control flooding by absorbing flood waters and slowly dispersing them. They act as natural water treatment plants by filtering sediments and by breaking down chemical pollutants. Wetlands provide homes and food for many animals including endangered species.



Human activities have seriously affected wetlands. Wetlands are often destroyed when they are drained and filled for agriculture and development. Wetlands are also damaged by sediments, fertilizers, and chemicals.

Florida has several programs aimed at preserving wetlands. The Conservation and Recreations Lands Act is a program in which the state buys sensitive lands in order to protect them. Other programs restrict development in wetlands. Sometimes developers who destroy wetlands are required to replace them with new areas of wetlands.

The most common forested wetlands in Florida are cypress swamps. In addition to cypress trees, bays, red maples, and gums grow in these swamps. Many kinds of shrubs, ferns and vines grow among the trees. The Big Cypress and Corkscrew Swamps, both in south Florida, are home to large populations of birds, otters, beavers, deer, squirrels, turtles, rodents, and insects.

The Everglades

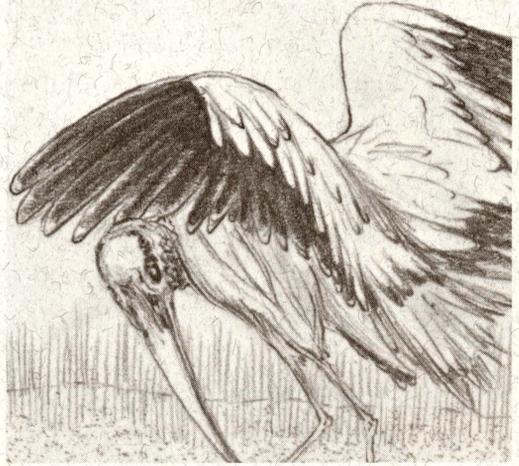
The Everglades are huge wetlands covering most of south Florida. The Everglades are part of a water system that includes the Kissimmee River and Lake Okeechobee. Under natural conditions, Lake Okeechobee received water from its surrounding drainage basin, much of it from the Kissimmee River. Water then spilled out of the lake and flowed south, supplying the Everglades.



Under natural conditions, the Everglades have a yearly cycle of fire and flood. During the dry season, wildfires burn, releasing nutrients and preventing the growth of trees. The rainy season spreads the nutrients throughout the system. During the dry season, alligator holes are often the only source of water for the fish, wading birds, and other animals in the Everglades.

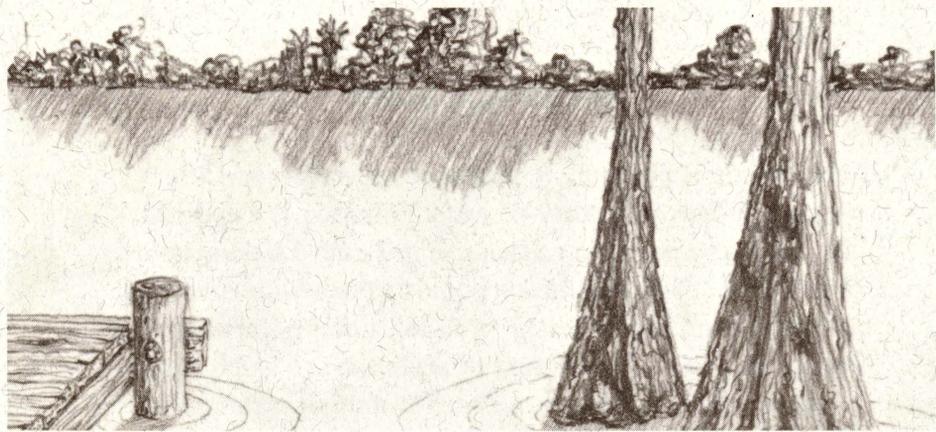
Today, people control where, when, and how much water will enter the Everglades system. Massive changes in drainage for flood control, city water supplies, and agriculture have caused serious damage to the Everglades ecosystem. The life cycles of many Everglades creatures have

been disrupted. Wading bird populations have decreased by 95%. The wood stork, an endangered species, has suffered a great deal. Because of changes in water flow, wood storks now breed later in the spring. By this time of year, rains distribute fish over too wide an area, making it difficult for the adults to find enough food for their young.



Water in the Everglades is now polluted by fertilizers and pesticides from dairy and sugar cane farms. The Everglades must compete with cities and the farms for water. Engineers want to control floods. The result is too much water during the wet periods and not enough during the dry season.

In 1983, Governor Bob Graham established the Save the Everglades Program, a massive restoration project. The goal is to restore the Everglades to the natural conditions that existed before the drainage projects began. The project includes restoration of the natural water flow, creation of new wetlands, control of agricultural runoff, purchase of land to create a buffer zone around the Everglades, and restoration of the Kissimmee River to its original channel.



Lakes

Florida has nearly 8000 lakes. Some are natural; others were made by humans. Some are large; others are very small. Some lakes are used as a source of water for drinking and irrigation. They are also used for recreation and fishing. Lakes provide homes for many kinds of wildlife.

Plant fertilizers pose the biggest threat to lakes in Florida. Too much fertilizer causes overgrowth of algae and larger plants. When the plants have used up all the fertilizer, they die. The bacteria which decay their bodies use oxygen from the water. Fish cannot live without oxygen, so many of the fish die also. The only fish that remain in the lakes are fish that require less oxygen. Often they are less desirable to fishermen.

Lake Okeechobee is Florida's largest lake. Fertilizer is washed into the lake from fields and livestock yards every time it rains. New laws are in effect to control fertilizer runoff from dairy farms, a major part of the problem.

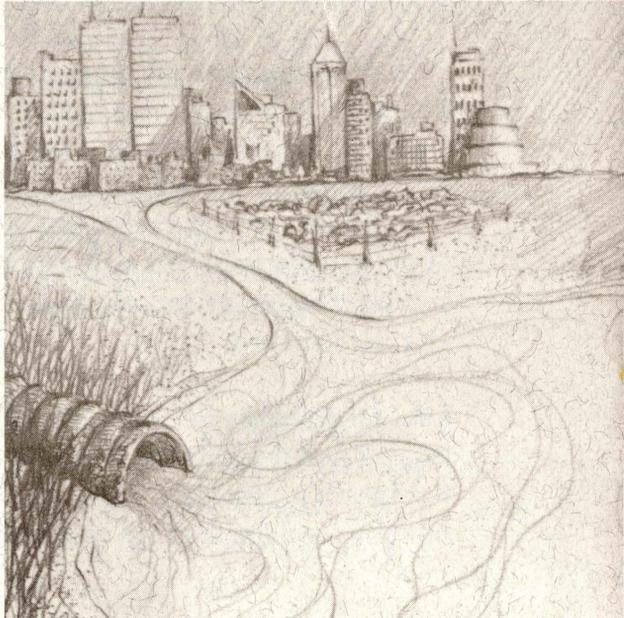
WATER POLLUTION

When water is polluted, it cannot be used for a specific purpose. When the source of water pollution is a specific site, such as a pipe from a factory, it is called a point source of pollution. When pollution comes from a wide area, such as runoff from city streets, it is called a non-point source of pollution. Non-point sources of pollution are much harder to locate, control and treat. About half of all water pollution comes from non-point sources.

One type of water pollution, called turbidity, comes from particles of soil, sand and silt that become suspended in water, making it cloudy. Sunlight cannot penetrate the cloudy water, so photosynthesis cannot take place. Sediments fill in lakes and ponds and smother aquatic life.

Sediment pollution is the result of soil erosion. Poor farming practices, carelessness at construction sites, cutting trees, and mining are all causes of sediment pollution.

Fertilizer pollution is another common type of water pollution. Phosphorous and nitrogen are essential for plant growth.

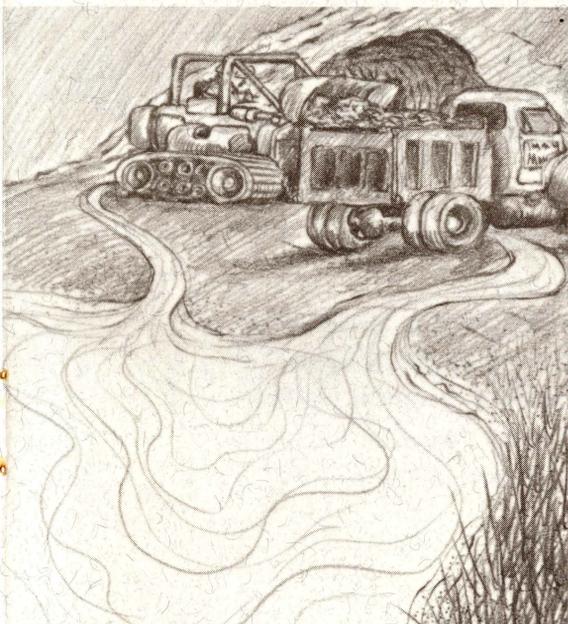


Runoff from agricultural fields and livestock yards, and inadequately treated sewage cause excessive growth of aquatic plants. The plants eventually use up the fertilizer supply and block so much sunlight that they begin to die. Decay by bacteria uses up oxygen in the water. If bacteria use too much oxygen not enough is left for other creatures in the water.

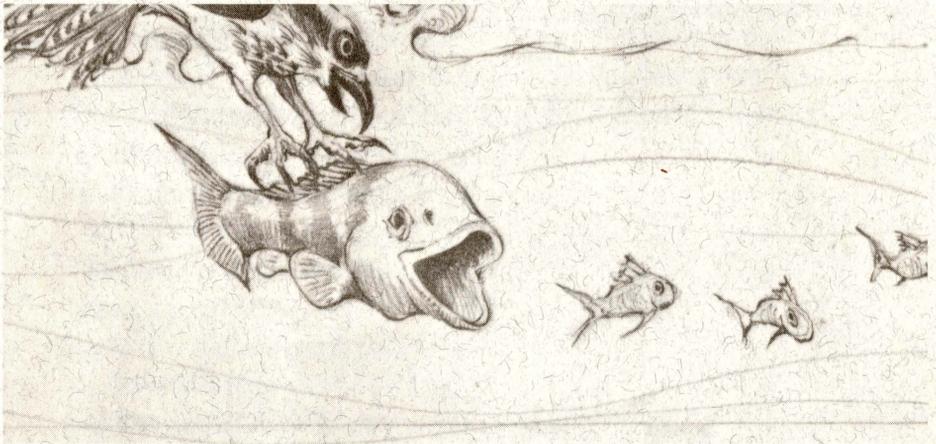
Disease-causing organisms contaminate water supplies in many developing countries and they contaminate shellfish and recreational waters in this country. Water-borne diseases such as hepatitis, cholera, dysentery, and typhoid can be spread through contact with untreated or under-treated human wastes. Proper sewage treatment can prevent this problem. This type of water pollution is checked by a test called a coliform bacteria count. Since coliform

bacteria live in our intestines, their presence in water is a sign the water may be contaminated by human wastes.

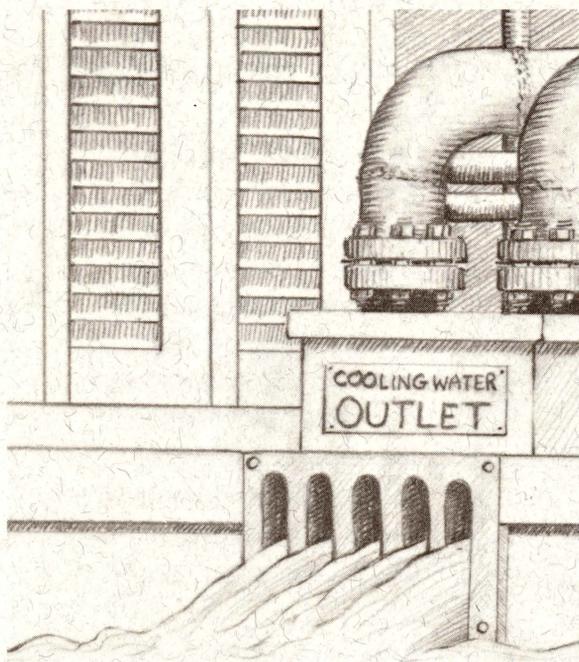
Acids enter water from mining operations, industry and acid rain. Acids can kill aquatic life directly. Acids also kill indirectly by releasing toxic metals from sediments on the bottom of the body of water.



Heavy metals such as mercury and lead come from a variety of sources, including industry, leaded gasoline, and pesticides. Heavy metals are toxic to many kinds of plants and animals. They are especially dangerous because they tend to become more concentrated in the tissues of animals higher in the food chain. Just a little mercury in algae will become more concentrated in the tissues of the small fish that eat the algae. The large fish that eat the small fish have still more of the mercury. And the osprey which catch the large fish may have very high levels of mercury.



Pesticides used in agriculture and forestry can be toxic to many organisms besides the pests they are designed to control. Some pesticides are toxic to humans. Pesticides get into waters through runoff from treated land. Using fewer pesticides on crops, forests and lawns will help to reduce this problem.

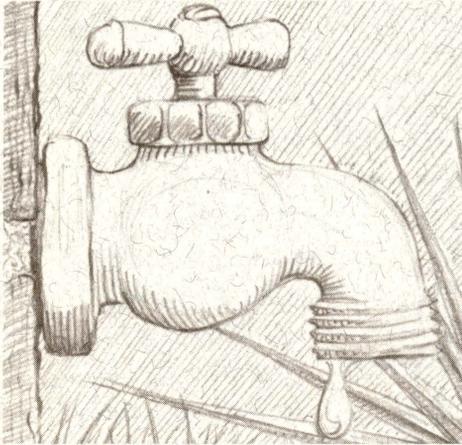


Heat can also pollute water. Many industries take water from rivers and streams to use in cooling processes. Then they return the warm water to the rivers. Warm water cannot hold as much dissolved oxygen as cool water. In extreme cases, fish may die from lack of oxygen. Heated water

can cause stress on fish and other organisms, weakening their ability to resist disease and parasites. Organisms that depend on temperature cues to regulate their reproductive cycles may not reproduce well. To control thermal pollution, industries must hold cooling water in ponds until it cools to nearly the temperature of the river from which it came.

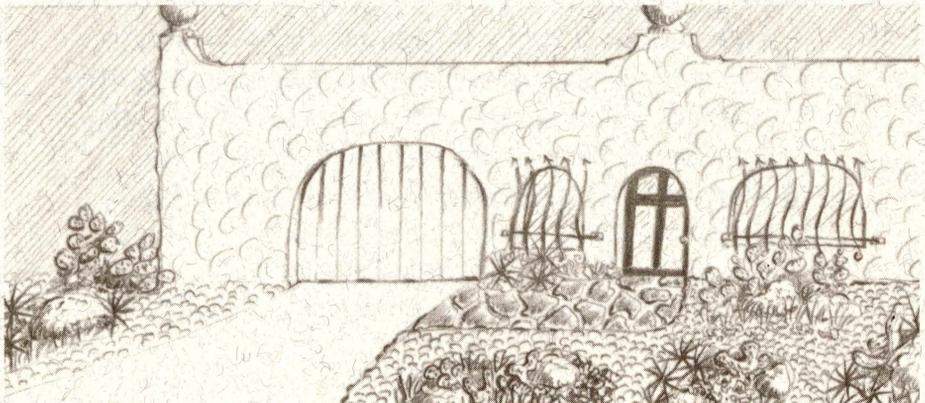
Thermal pollution has had a positive effect. Endangered manatees have been attracted to warm water around many electrical power plants in the state. At these sites, the manatees find safety and a constant warm temperature, enabling scientists to study them more easily.

WATER CONSERVATION - WHAT YOU CAN DO

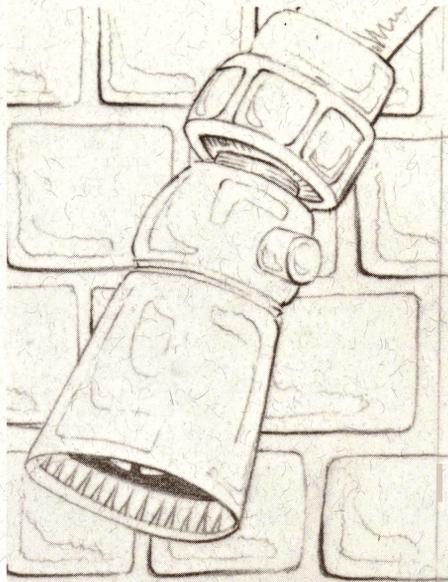


In the future, technologies such as reverse osmosis and re-use of industrial and domestic waste water will help us to clean, protect, and preserve our groundwater resources. But conserving water is something inexpensive and immediate we can all do to protect our water supply.

You can save water by reducing the amount you use on your lawn and flower beds. You can landscape with plants that require little water. Planting native, drought-tolerant plants is called xeriscaping and is very popular in southwestern states where water supplies are very short. “Lawns” in these states often consist of white gravel with beds of cactus.



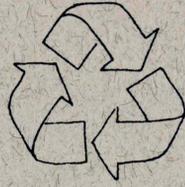
Taking showers instead of baths will save water. If you do take a bath, put only as much water in the tub as you really need. Install a water-saving shower head. When you take a shower, don't run the water constantly. Instead, wet your body, turn the water off, soap, then rinse. When you brush your teeth or wash your hands, don't let the water run constantly.



When you have to buy a new washing machine or dishwasher, buy the water-saving model, and use its water conservation settings. Don't run the dishwasher until it is full. Wash large loads of laundry instead of small loads. New toilets may have water conservation features. You can reduce the volume of water released per flush by an old toilet by filling a milk jug with water and placing it in the tank. You can save water by washing your car less frequently. When you do wash it, use a bucket and brush to wash, and a control nozzle on the hose to rinse.

Conserving Florida's water resources is an important duty for us all.

THE END



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