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ABSTRACT

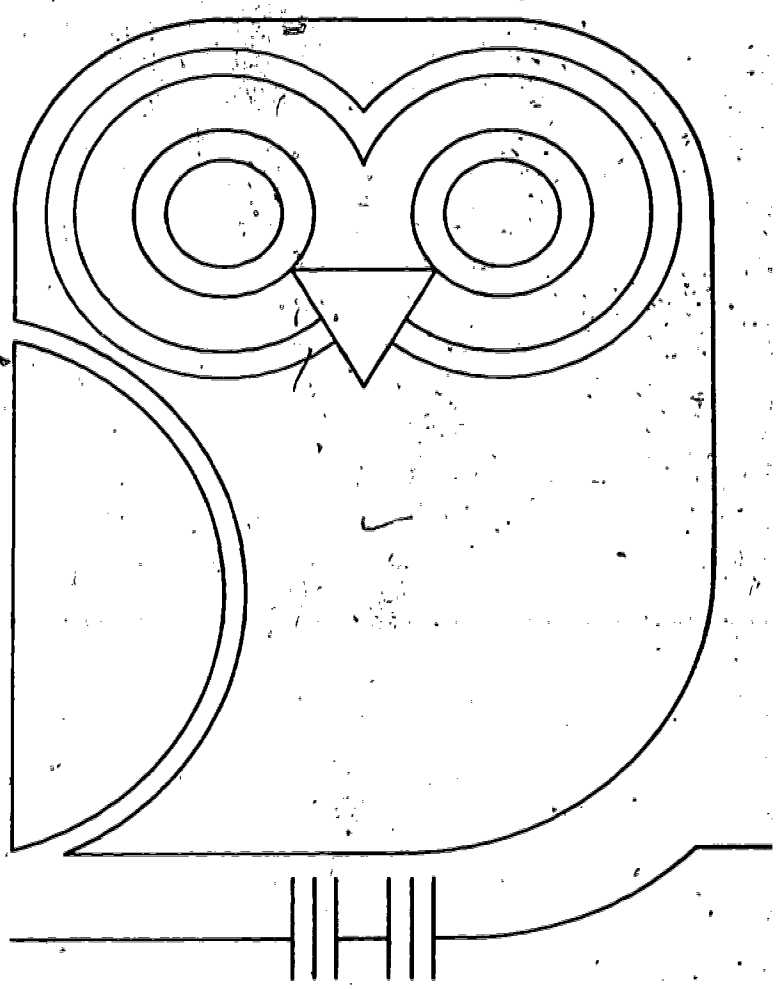
This guide for elementary school students deals with the importance of and the uses of water, especially in the western United States. Topics covered include the importance of water as a resource; the need for conservation; water storage through dams and reservoirs; irrigation; the lack of water in the old West; the uses of water for cities and towns, crops, energy, recreation, fish and wildlife; and flood control. Classroom activities are provided for each of the sections on the uses of water as well as for the section on flood control. A test of vocabulary terms and a crossword puzzle are included. (DC)

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

WATER WISE

A Water Use Handbook



More and more people are becoming concerned about our natural resources. It is a concern that affects all of us. One of the most important of those resources is water. In fact, our lives depend on it. From the beginning of time, people have built their communities around water sources. Western settlers fought over water when it was scarce. Today, the need for water is even greater. Each day the demand grows larger. We are faced with difficult decisions. We must look closely at where our water comes from, how it is used and ways to preserve it for our future needs. This is called conservation. When we conserve, we use things wisely. Each one of us can help conserve.

This handbook provides information about water that will help you practice conservation.

This booklet is intended for elementary school children.

YOUR ENVIRONMENT

What do you know about your environment? Do you know that it is your surroundings? If you are in a classroom, the books, the chairs, your teacher, and your classmates all make up your environment. At home, your furniture, your family, and even your pet are parts of your surroundings.

We can see trees and birds and bicycles and buildings. But, some things in our environment are invisible. The air we breathe is an example.

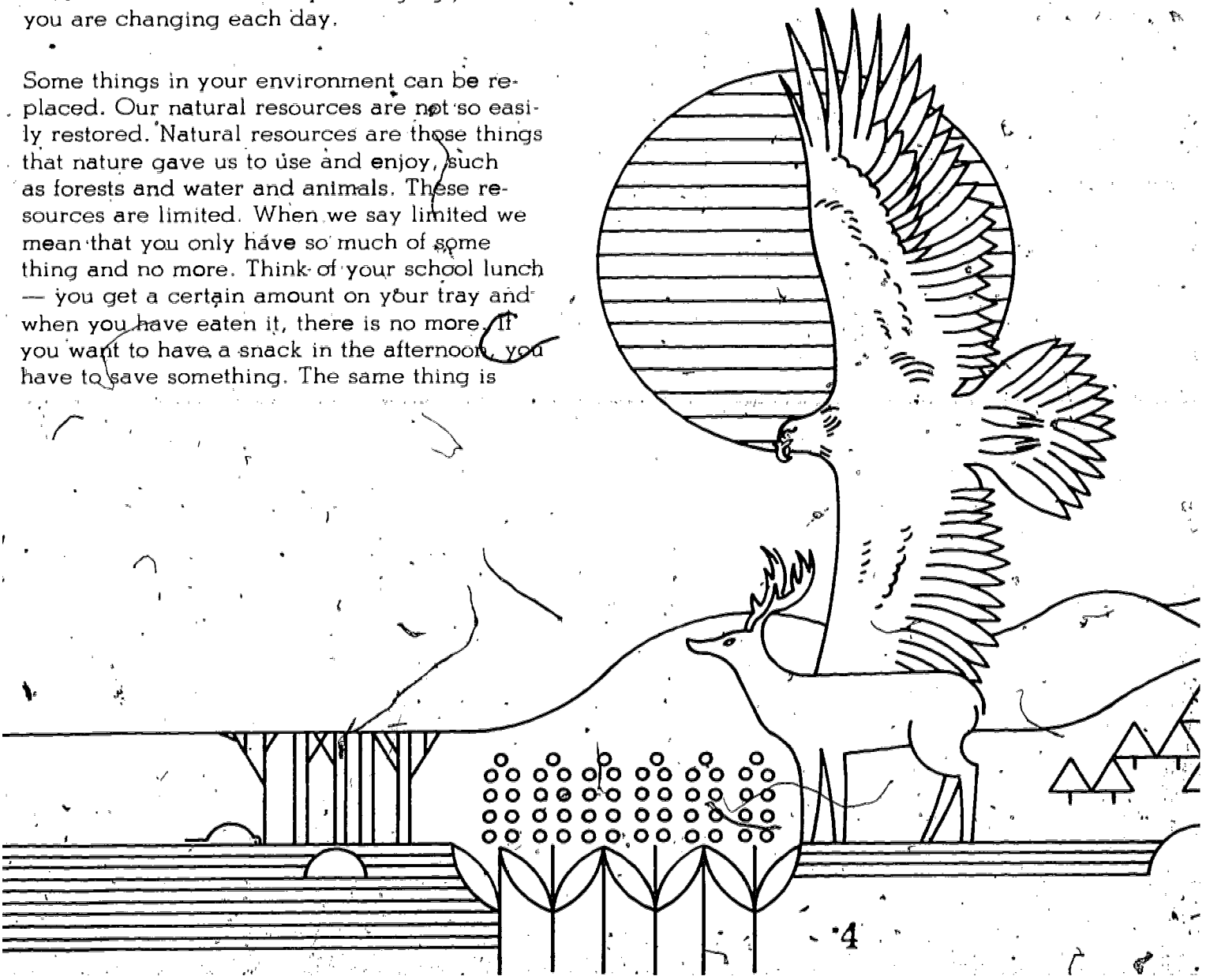
Your environment is always changing just as you are changing each day.

Some things in your environment can be replaced. Our natural resources are not so easily restored. Natural resources are those things that nature gave us to use and enjoy, such as forests and water and animals. These resources are limited. When we say limited we mean that you only have so much of some thing and no more. Think of your school lunch — you get a certain amount on your tray and when you have eaten it, there is no more. If you want to have a snack in the afternoon, you have to save something. The same thing is true of our natural resources. We have to use them carefully and not be wasteful, so we will always have plenty for the future.

Conservation means to use wisely. We must all learn to use our natural resources wisely. We must conserve.

Take a look at your surroundings. What is in limited supply? What can be replaced? What cannot be replaced?

Remember, it is your world. Use it wisely.



OUR WATER RESOURCES

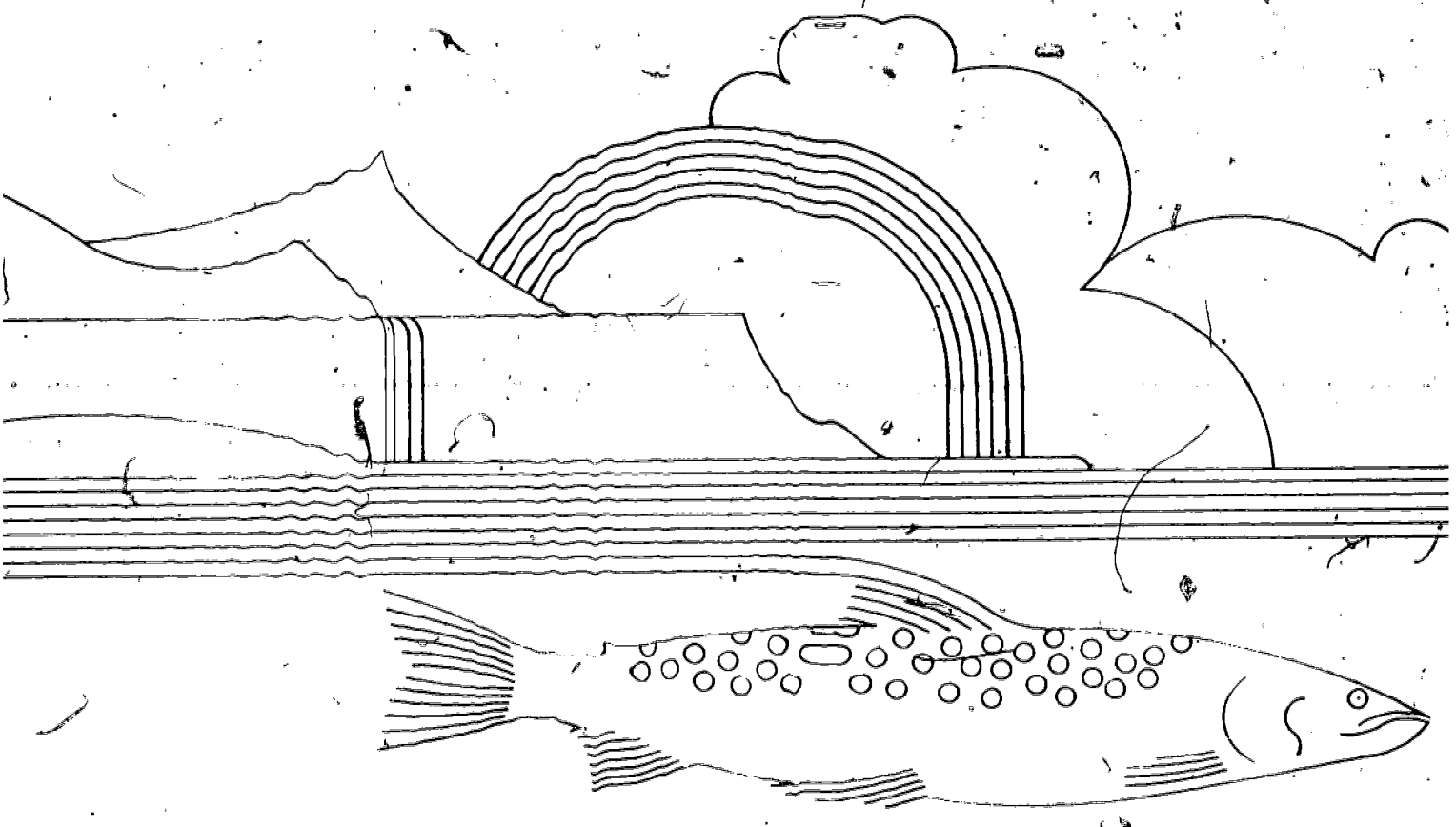
The United States is a land of many natural resources. The most important of these is water. Without it, there would be no life. Every living thing needs water to survive.

In the Western States much of the land is desert and semidesert. This means that very little rain or snow falls. Conservation of water is very important. As we said, conservation means to use wisely. We should all conserve our water resources.

Both rain and snow help to provide a water supply in the West. The people have learned to save rain and melting snow when it is plentiful. They use the water later during dry seasons of the year.

Several major rivers flow through the Western States. Snowfall is often heavy in the mountains. In the spring, this snowpack begins to melt. The melting snow or runoff travels down the mountain slopes and fills the rivers and streams.

In the next few pages, we will look at the ways this water is collected and stored. We will also discuss the many ways water is used and see why it is so important to all of us.



.JA· 'N THE WEST

...ost f us have tried to capture raindrops during a sh..ver. If you put containers in different places, ...er.aps you noticed that some filled faster than ...ners. This same pattern exists in the West. Some areas receive heavy rainfall while others get only scattered showers.

Because the rainfall is so unevenly distributed, people in the Western States know they must be ready to collect and store rainfall at any time.

Dams have been built across many rivers. A dam is a wall or barrier built across a river to control its water. The water is stored in reservoirs. These reservoirs are manmade or artificial lakes that form behind the dams. The water can then be released as it is needed.

Dams also help control floodwaters when heavy rains or snowmelt in the mountains cause the rivers to overflow their banks.

Reservoirs and dams are part of the reclamation of the Western States. The word reclamation means to make something better and more useful. By supplying water to the West, the people have reclaimed the dry lands.

EARLY SETTLERS

Concern for water in the West is not new. Early Indians in this region often lived along the rivers or near springs and waterholes. As they learned to make simple tools, they dug ditches, so the water could flow to their crops. This practice is called irrigation. To irrigate is to supply with water.

Later, Spanish missionaries and other settlers built communities around available water supplies. Irrigation methods were improved to grow more crops.

In 1847, a group of religious people called Mormons settled in the Salt Lake Valley of Utah. The Mormons made their living by farming with irrigation. They showed the rest of the country that the "Great American Desert" could be settled. The key to settlement was water.

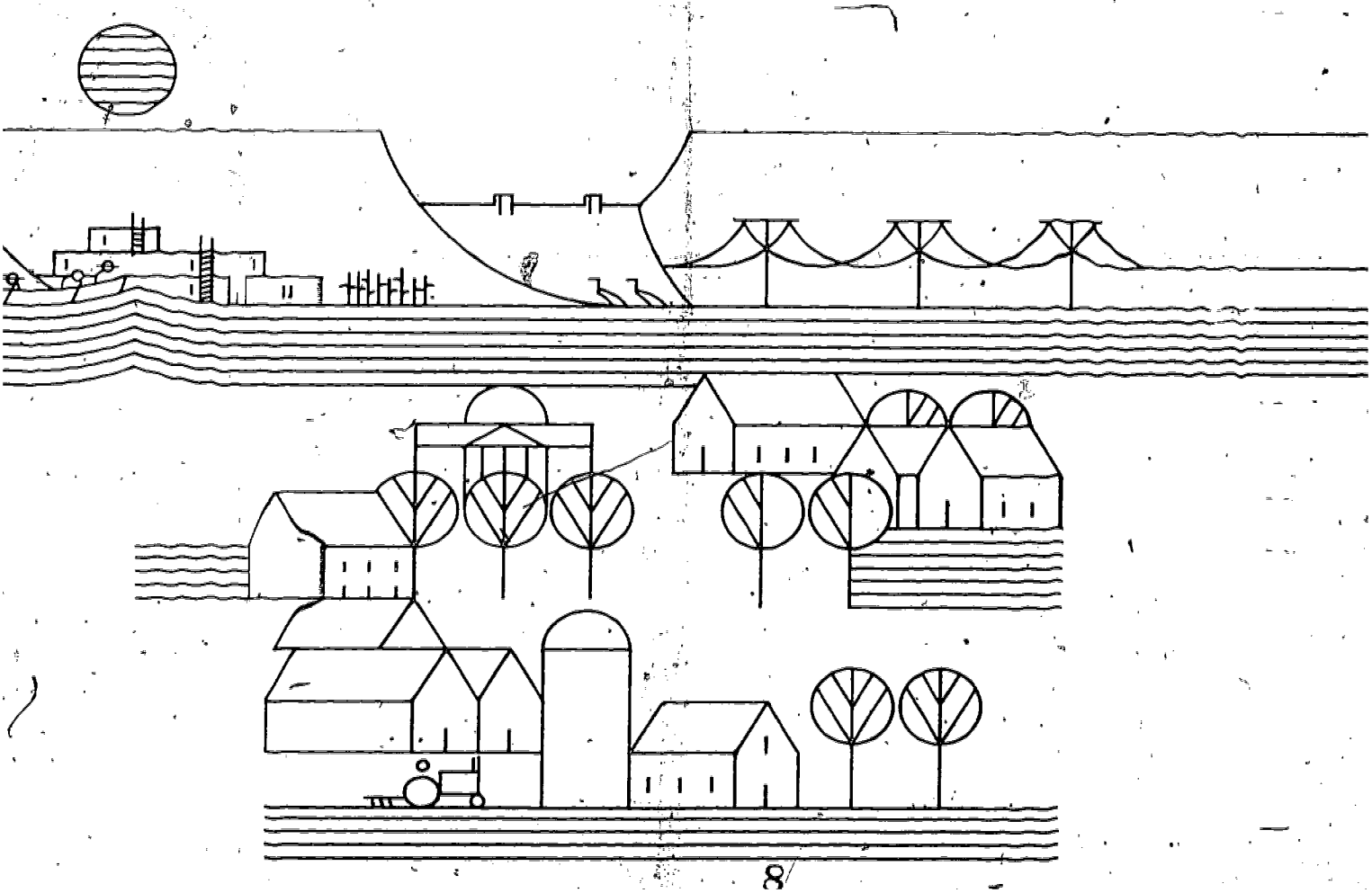
MAJOR POWELL

Many of the early pioneers crossed the desert lands on their way to Oregon and California. Few stopped to settle because of the shortage of water. One famous explorer was Major John Wesley Powell. He boated down the Colorado River in 1869.

Major Powell told the Nation of what he had seen in his western travels. He spoke of the mountain streams swollen by winter storms. In the spring, melting snow caused the rivers to overflow and flood the countryside. But, in the summer, these same rivers dried up to little trickles. Water was hard to find.

Major Powell thought about the problem of water in the West. He knew the answer lay in saving water when it was abundant and using it during dry periods of the year.

Today, Major Powell's dream has come true. Dams, reservoirs and irrigation projects have brought new life to the West.



USES OF WATER

During the early years of the reclamation movement, irrigation water was the main concern. Since then, towns and cities have sprung up all over the West. Your community is an example. Maybe you were born there or perhaps you have moved from another part of the country. In either case, there will continue to be more and more people coming to live in the Western States. This means that more water will be needed.

Reclamation projects are trying to meet these water needs. Water is still provided for irrigation. It is supplied to homes and businesses. It is used to produce electricity.

Dams and reservoirs provide flood control. They offer water for recreation. They increase fish and wildlife.

By now, you can probably begin to see why water is surely one of our most precious resources.

WATER FOR CITIES AND TOWNS

Water is important to many different aspects of our lives. Can you imagine a city or a town without water? First, it is a necessity of life. The human body is about 65 percent water; that means that your body is more than half water. Therefore, we all need water to drink. But, think of the many other ways we use water.

We use it in kitchens and bathrooms. We sprinkle lawns and gardens. We wash everything from clothes to cars to the family dog. Even a glass of lemonade takes that important ingredient - water.

Schools and hospitals use large amounts of water every day. Factories use water to manufacture goods and to provide services.

Some people make their living directly from the water. Others, such as firefighters, need water to do their jobs.

Trees and flowers make our towns more beautiful. These also need water to grow.

Cities and factories are major water users. Water used for people and businesses in cities and towns is called municipal water. Water used by factories to make things is called industrial water. Do you know where your town gets its water supply? This is something to think about.

CLASSROOM ACTIVITIES

1. List the different ways water is used around your school.

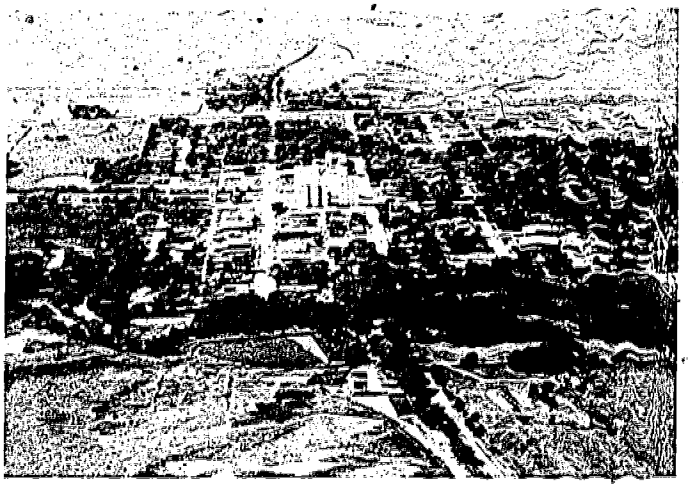
2. List the different ways water is used in your home.

3. Prepare a bulletin board display of the ways water is used by clipping pictures and articles from newspapers and magazines.

4. Using a map of the Western United States, locate the major metropolitan areas. Can you give reasons why cities were built at these locations? Where do you think the people get their water supply?

5. Look at a map of your State. Locate where you live. Can you find a major source of water? Contact a representative of your local water department to determine the source of water for your community.

6. Select a vacant plot of land that has some water supply such as a river or lake. Divide the class into different interest groups, such as farmers, ranchers, businessmen, housewives, medical personnel, firefighters, etc. Have each group develop a plan for using the water, and be able to defend its plan. Discuss which water uses are the most important.



WATER FOR CROPS

Many people make their living by farming and ranching in the West. Water is especially important to them. Some live in areas that get a lot of rainfall. Others live in very dry regions.

When rainfall is scarce, farmers must irrigate. As we said, irrigation means to supply crops with water. Each year billions of gallons of water are delivered to farms and orchards in the Western States.

Canals, pipelines and tunnels are built to carry water from rivers and reservoirs to irrigate the land.

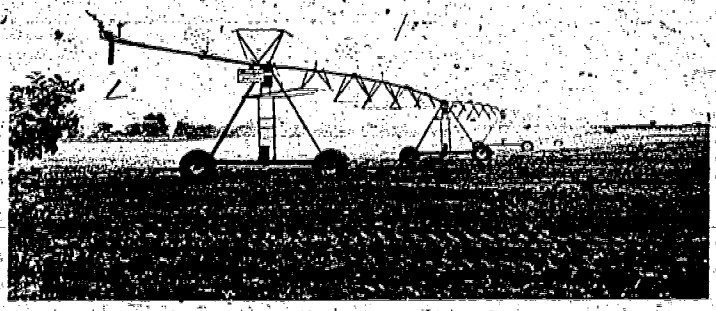
Water makes the dry land prosper. Cattle graze in green pastures in Wyoming. Corn and wheat fields flourish in Nebraska and Kansas. Oranges grow in California. People all over the country benefit from fruits and vegetables grown on irrigated farms.

Every year the population of the United States grows larger. This means that more food must be grown to feed the people. By irrigating the dry lands, more crops can be grown and more food produced.

Do you live in a wet or dry region of the West? How is irrigation important to you?

CLASSROOM ACTIVITIES

1. Plan a model community. Sketch an area that includes a mountain range, a valley and a river. Show the best locations for houses, croplands, community businesses and recreation areas. Give reasons to justify your choices.
2. Visit your school library to find information about early irrigation practices. Report on irrigation developed by Indians, Spanish and other early settlers of the Western States. Perhaps a simple skit would be fun.
3. Look at a map of your State. Find the areas used for farming and ranching. Are they located near bodies of water? Are they near large cities? Where do the farmers and ranchers get their water?
4. Visit a farm and observe an irrigation system in operation.
5. Discuss the main farm crops in your State. Do these crops or livestock need large or small amounts of water? Invite a county extension agent or a farm bureau representative to your class to discuss crop yields and the different kinds of crops in your area.
6. Plant two geraniums. Water both plants at the same time, but give one plant half as much water as the other. Keep a daily log to record any change in color, leaf texture, growth or number of blooms of the two plants. What conclusions can be drawn about water and plants.
7. Bring a bag of lemons and some sugar for lemonade. Weigh the lemons before squeezing; then weigh the lemons after squeezing. What is the difference in weight between the whole lemons and the squeezed lemons. Why is the weight different?



WATER FOR ENERGY

Electricity is something many of us take for granted. Have you ever experienced a "blackout" when the power went off for a time? Did you realize how many things around your home were powered by electricity?

Lamps, television sets, radios, refrigerators and washing machines are only a few of the appliances that use electricity. One of the most important uses of electric power is to produce heat for our homes. What do you think life would be like if we had no heat for houses and schools?

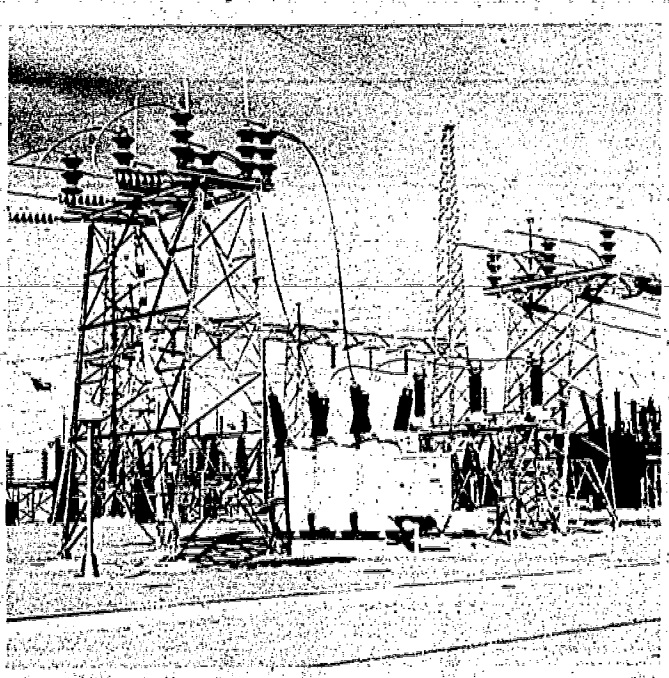
Hydro means water, so hydroelectric power is electricity that is produced by water. Many hydroelectric powerplants have been built in the West. We have already talked about the storage of water in reservoirs behind dams. This water can be released to flow through a powerplant. Inside the plant, the water turns huge machines called generators. These generators turn like waterwheels and produce electricity.

The energy is carried through powerlines to millions of homes and businesses. This makes it possible for you to flip a switch and have heat or light or music instantly.

We should all be concerned about keeping our environment clean. Hydroelectric power is a very clean source of energy. It does not pollute the water or the air. It does not use up the water supply either. We could say that powerplants take energy from the falling water in the plants. After the water passes through the powerplant, it moves on downstream to be used in other ways.

Every year hydroelectric powerplants in the West produce more electricity than is used annually by all the people living in New York City, Washington, D.C., Dallas, Chicago and San Francisco. It would take 70 million barrels of oil to produce that much electricity.

Hydroelectric power is helping to make life better for people all over the West.



CLASSROOM ACTIVITIES

1. Visit or call a representative of your local power company. Find out the major source of energy for your community. Has this source changed in the past? What are the future sources of electrical energy likely to be?

2. Look at a map of the United States. What areas have potential for the development of hydroelectric powerplants?

3. Trace the path of electric power from its origin to the fuse box in your home.

4. Clip articles from newspapers and magazines on different sources of electrical energy. Discuss the advantages and disadvantages of each. Which energy sources do you think would be the cleanest in the environment?

5. Map the locations of any hydroelectric power facilities in your State or in neighboring States. Why do you think these locations were chosen?

6. List the appliances in your home that are powered by electricity. Rank them according to their importance. Which do you feel you could eliminate most easily?

WATER FOR RECREATION

We have talked about the many ways water is used in the West. But, reservoirs and lakes are also places of beauty and fun. Families and friends come from far and near to enjoy the water. Swimming, fishing, boating and water-skiing are common activities.

Recreation areas have been built around many dams and reservoirs. Are there any near your home?

Some of the people who visit these water playgrounds live nearby. Others come from cities and towns far across the country. Many tourists visit water areas in the Western States each year.

Water is very important to us at home and at work. But, it is also important to us at play.

CLASSROOM ACTIVITIES

1. List the different types of water sports. Which do you enjoy?

2. What kind of equipment and skills are needed for each sport?

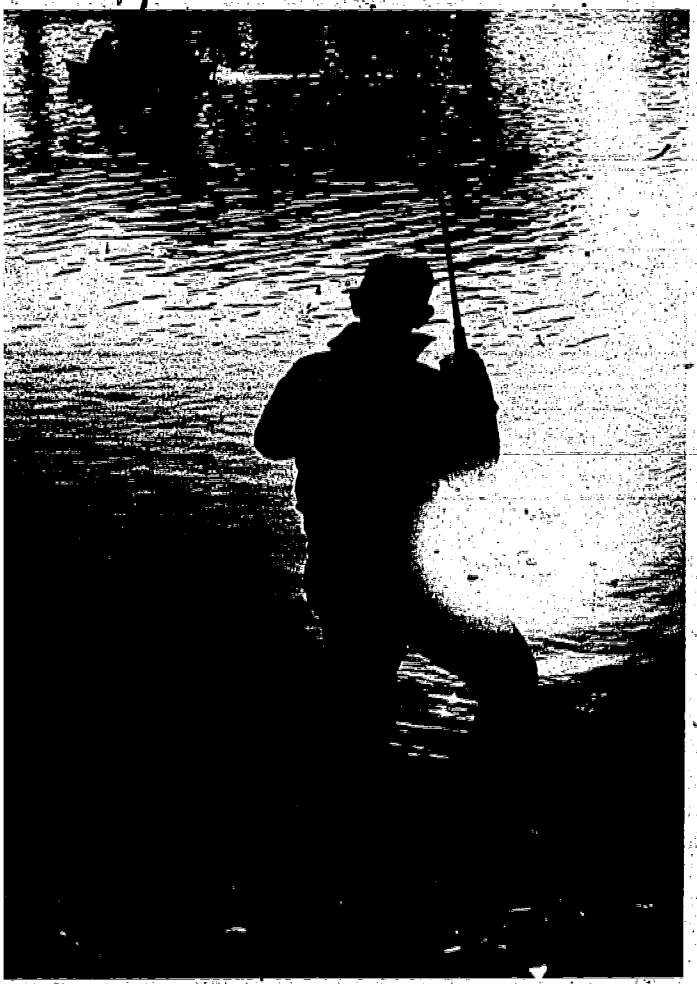
3. Look at a map of your State. Which water areas are natural and which are manmade? What kind of recreational facilities have been developed around these areas?

4. Use your imagination to design a water safety message. Perhaps you could write a poem, draw a picture, make a bulletin board or perform a pantomime. Share your ideas with your classmates. Then make a combined list of the different water safety ideas.

5. As a class effort, design a water supply project. Show the different kinds of recreational facilities that could be built around the project.

6. Plan a "recreation fair" at your school. Make posters and set up booths for different sports including water sports. Perhaps local sporting goods stores would participate by demonstrating equipment and techniques. Include a demonstration on water safety.

7. Invite a speaker on water safety. Discuss special safety rules for reservoirs and canals.



WATER FOR FISH AND WILDLIFE

Water is important to animals, too. This is especially true in the West where much of the land is dry.

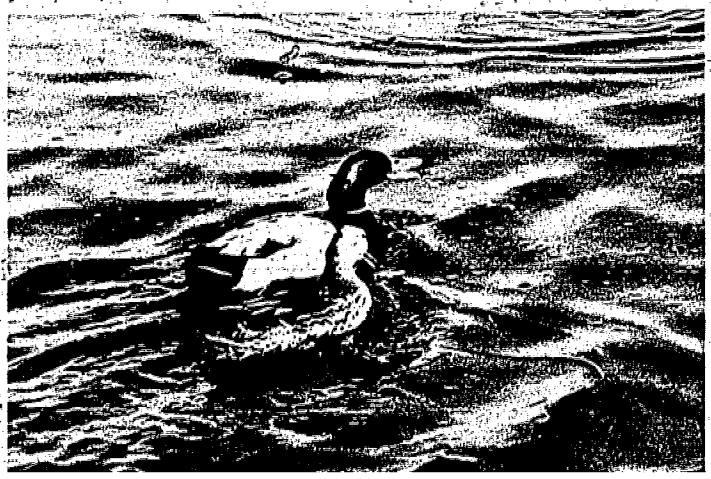
Lakes and reservoirs provide water for our wildlife friends. Many animals live along the shorelines. Birds build nesting areas.

Many of these areas have wildlife refuges. A refuge is a protected area set aside for animals and birds. We have talked about the environment. Well, animals need water in their environment, too. Millions of birds seek food and shelter along these sites. The lakes are often stocked with fish..

Dams help to control flooding that could destroy animals and their homes.

At one water project, land was set aside as a feeding ground for a herd of elk. At another, nesting platforms were built for geese.

Fish and wildlife are important to our environment. If we care about our surroundings, then we must care about them, too.



CLASSROOM ACTIVITIES

1. List and discuss the kinds of animals that live in and around lakes and rivers.

2. Visit a stream or river and collect specimens of aquatic life. Using reference books, identify the specimens collected.

3. Discuss the effect that drainage of a water area would have on fish and wildlife.

4. Discuss the effect that flooding would have on fish and wildlife.

5. Invite a speaker to visit your class and discuss the need for and the contents of an environmental impact study.

6. Visit a lake or reservoir. Discuss the kinds of wildlife sighted and where they were found. Why do you think animals live in this area? How do you think your presence affected the fish and wildlife?

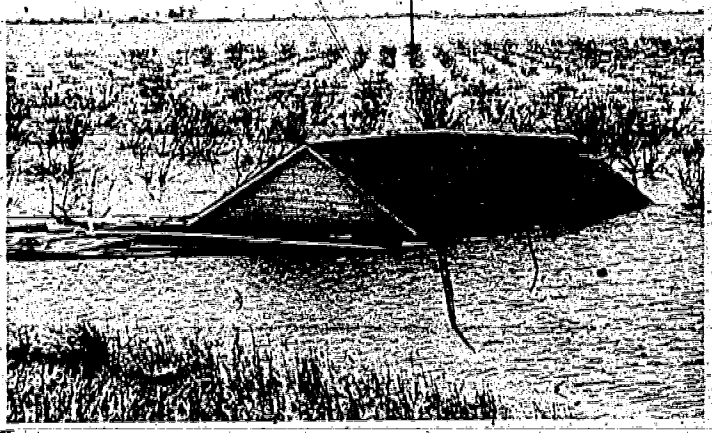
STOPPING FLOODWATER

Our environment is filled with many different elements. One of the most destructive forces of nature is flooding...water raging out of control. Flooding is caused by too much rain or melting snow at one time.

Floods in the Western States have taken the lives of many people. Farms and homes have been destroyed. Animals have been drowned.

Dams and reservoirs help to store and control floodwaters. Today, people are living in areas that were once plagued by seasonal flooding and massive destruction.

Flood control is a very important use of dams and reservoirs in the West.



CLASSROOM ACTIVITIES

1. Discuss the forces that might cause flooding.

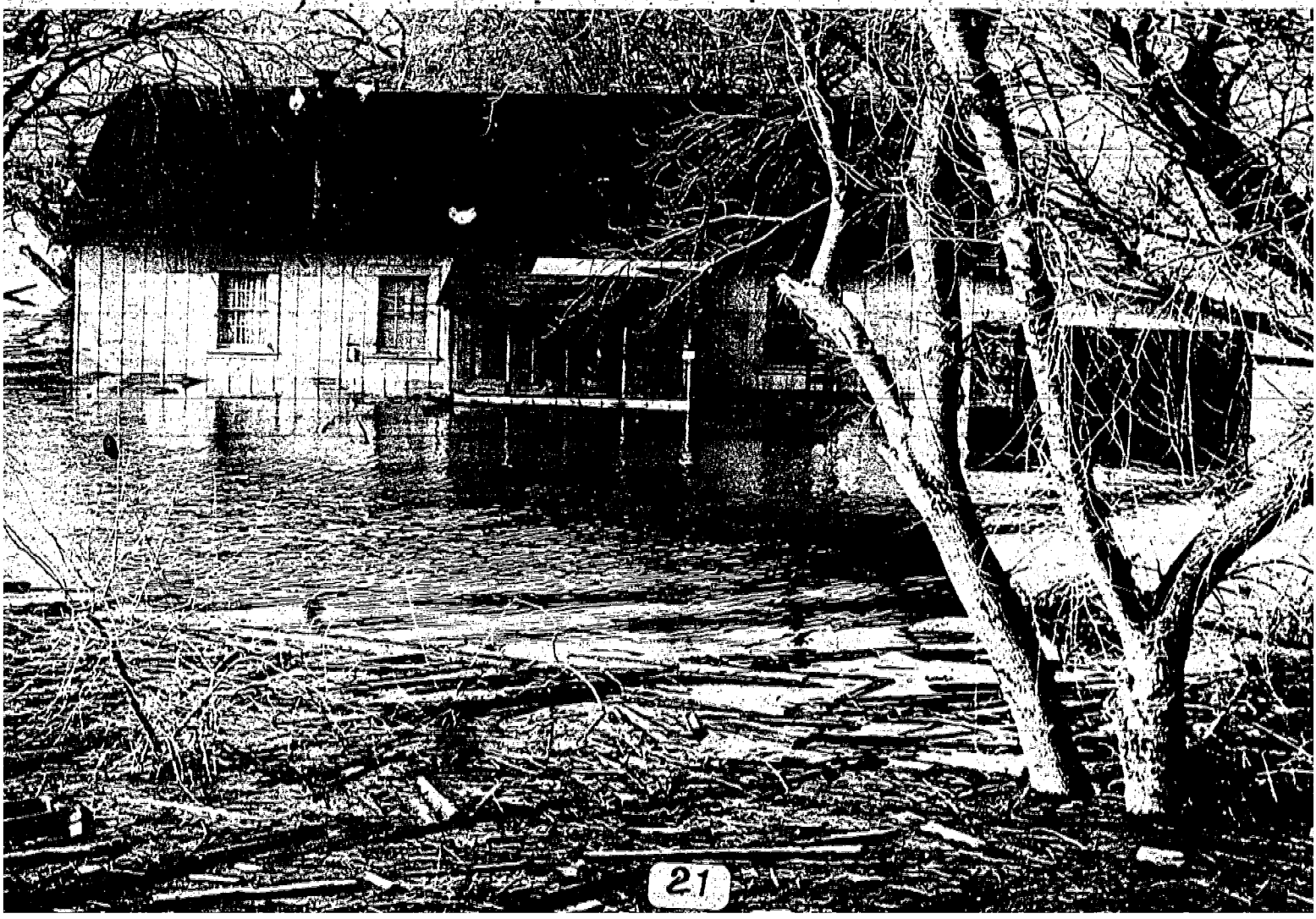
2. Discuss the safety measures to be taken when flooding is possible.

3. Conduct research on floods that have occurred in your State. Discuss measures that might have prevented the floods or lessened the damage.

4. As a class project, build a model of a community with a river flowing through it. Use soil and grasses to form the riverbed and the riverbanks. Place miniature houses and people in the model. Using a garden hose, fill the riverbed with slow running water. Note the effects. Increase the flow of water in the hose. Note the effects on the soil, grasses and the overall appearance of the community. What happened?

5. Discuss the effects of flooding on soil, crops and wildlife.

6. Construct an exhibit of different kinds of soils and grasses showing how they are affected by water. Design a landscaping project that would provide the best protection against flooding and soil erosion.



MATCH THE TERMS

1. desert
2. irrigate
3. hydro
4. reclamation

5. reservoir
6. dam
7. generator
8. conservation

9. Major Powell
10. hydroelectric
11. environment
12. refuge

a. to supply with water
b. a term meaning water
c. to make something better and more useful
d. land with little water

e. a wall or barrier built across a river
f. wise use of something
g. artificial or manmade lake
h. produces electricity

i. power produced by water
j. protected area
k. western explorer
l. surroundings

ANSWERS 1. (d) 2. (a) 3. (b) 4. (c) 5. (g) 6. (e) 7. (h) 8. (f) 9. (k) 10. (i) 11. (l) 12. (j)

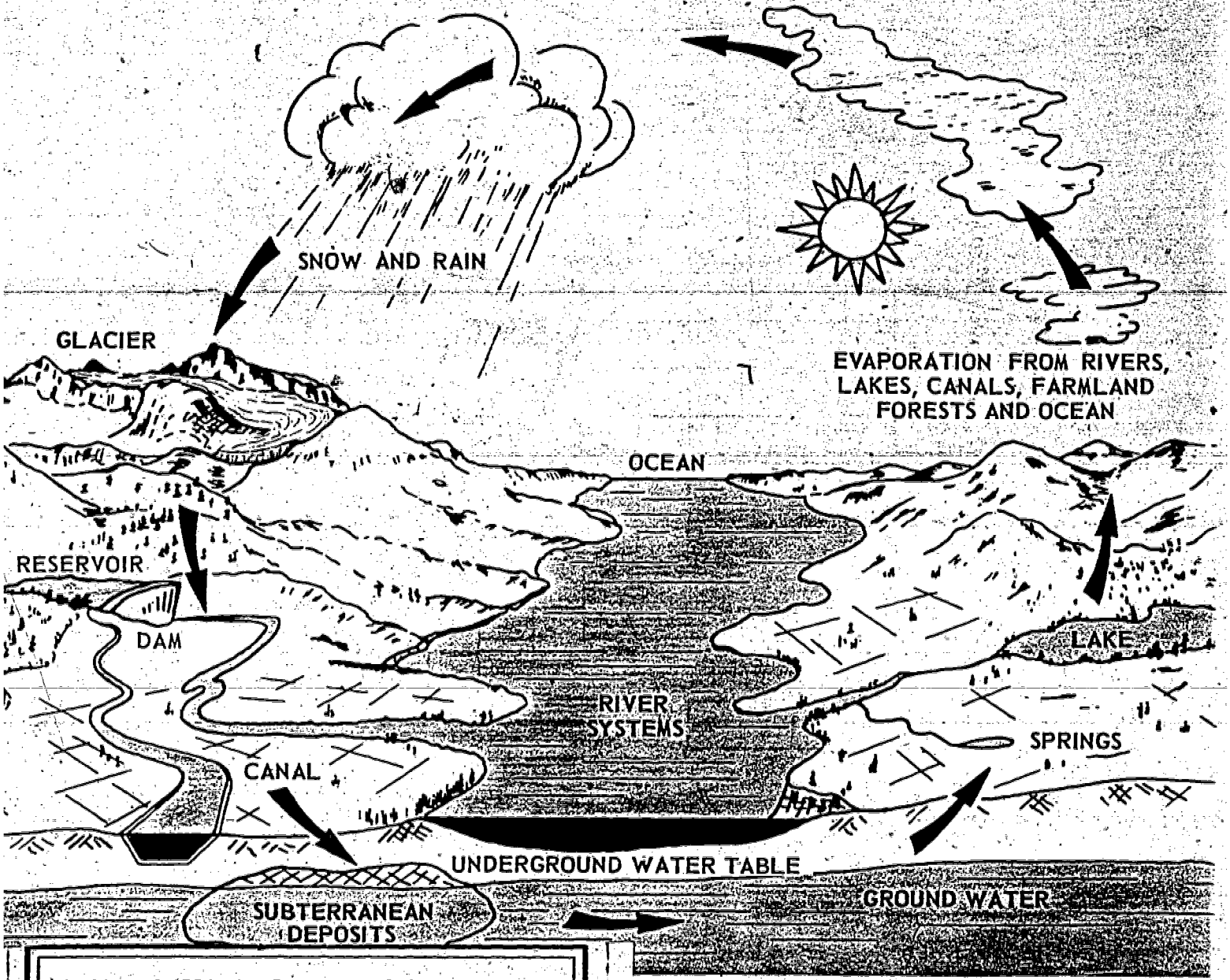
As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources.

This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation.

The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people.

The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

NATURE'S WATER CYCLE



In May of 1981, the Secretary of the Interior approved changing the Water and Power Resources Service back to its former name, the Bureau of Reclamation. All references in this publication to the Water and Power Resources Service should be considered synonymous with the Bureau of Reclamation.

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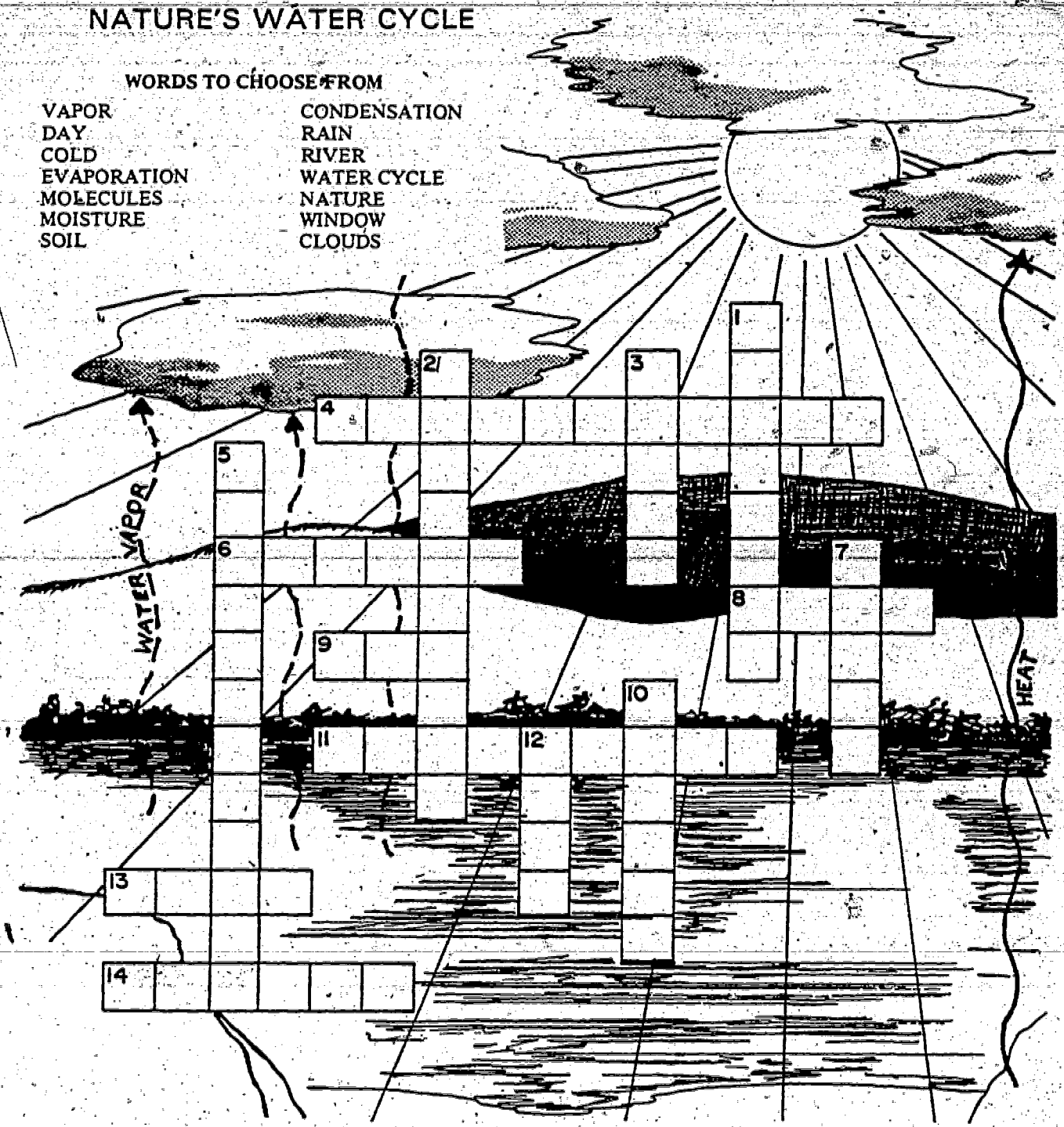
NATURE'S WATER CYCLE

WORDS TO CHOOSE FROM

VAPOR	CONDENSATION
DAY	RAIN
COLD	RIVER
EVAPORATION	WATER CYCLE
MOLECULES	NATURE
MOISTURE	WINDOW
SOIL	CLOUDS



ACROSS

4. The process of liquid water changing to water vapor is called _____.
6. The water cycle of _____ is very important.
8. Precipitation.
9. Opposite of night.
11. Very small particles.
13. Top layer on our planet's surface.
14. An opening in a wall that allows air or light in.

DOWN

1. Dampness.
2. The constant movement of water between earth and our atmosphere.
3. The gaseous state of water.
5. The process of water vapor changing to liquid water is called _____.
7. A large stream of water.
10. Millions of condensed water droplets floating in the sky.
12. The opposite of hot.