
A Journey of Mizuki and Walter to Water World

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This teaching material was designed for upper elementary school children to promote cross-cultural education concerning environmental issues.

Among the planets in the solar system, the blue, beautiful earth is the only star that has the basic necessity for life: water, air, and moderate temperature. Recently, however, we have been threatened by worsening environmental problems at the global scale, such as sea pollution, greenhouse effect, acid rain, reduction of rain forests. Under these circumstances, the environmental issues are no longer the problems of a single nation; we need to seriously consider the way we should individually deal with the nature from a global viewpoint.

We hope this material will help our children understand how people feel about and relate to water and why these awareness and attitudes have been formed in Japan and the United States. Moreover, we wish this material will provide children with opportunities to think about an ideal way of living with the nature and develop practical attitudes.

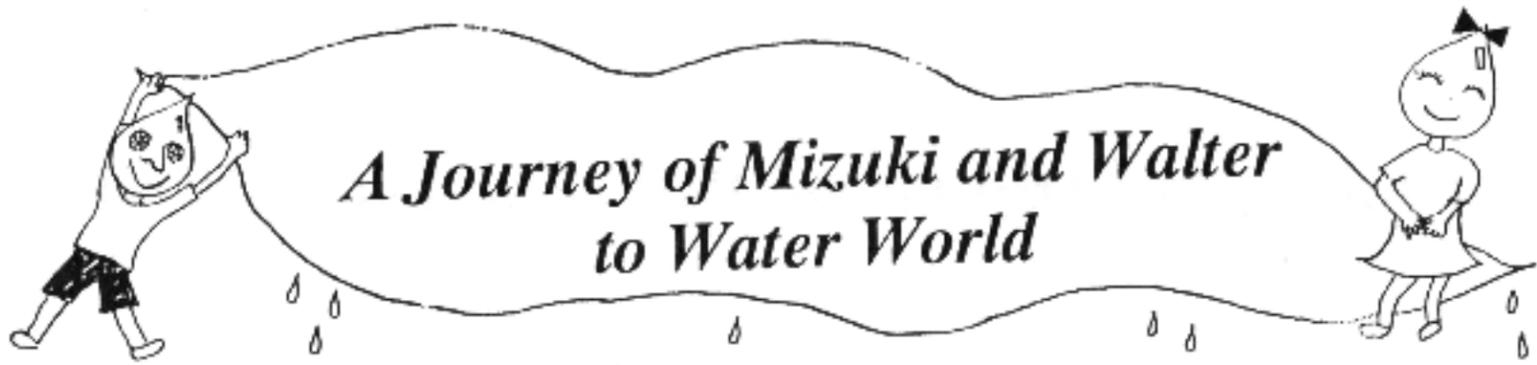
In the material development, the following two scenes are adopted.

- scenes where people enjoy water
- scenes where people use and dispose water necessary for life

Furthermore, we paid special attention to the following points so that children can promote self-initiated learning with interests.

- (1) Two cartoon characters, Mizuki and Walter, a Japanese girl and an American boy, were introduced and the story was given in a conversational style so that children can easily find it familiar to them. (*Mizu* means 'water' in Japanese)
- (2) A variety of learning tasks were included such as writing in guesses and ideas.
- (3) A lot of cartoons and pictures were used to make the material visually appealing.

The present material was produced based upon a field research in the cities of Minneapolis and Greenville, and also cities nearby Lake *Shinji* and *Gonokawa* River, where people can get a plenty of fresh water supply. But no matter how blessed our present natural environment is, we will not be able to solve the environmental problems unless we give a serious consideration to an environmentally-friendly way of life. You can select and present the materials in the way you like depending upon your goals and your students so that every student can realize how important water is to them and not only understand the facts of water problems but also practice an environmentally-friendly way of life. Some additional explanations and related information are attached in the appendix for your reference.



A Journey of Mizuki and Walter to Water World

One day a twin fairies of water, Walter and Mizuki, were born in the middle of the Pacific Ocean.

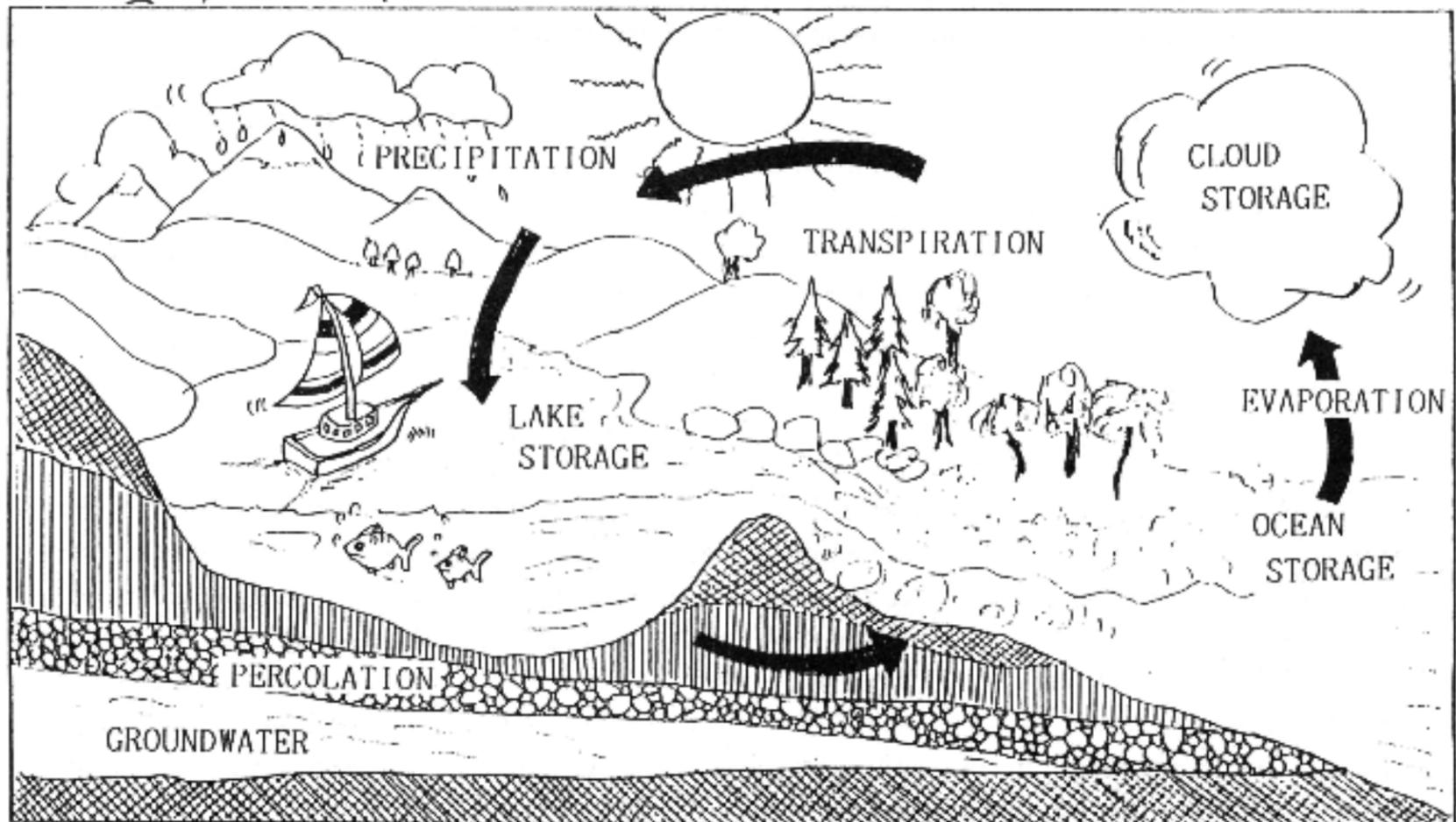


My name is Walter. My friends and I fall down to the earth as rain or snow, and run through rivers and groundwater.

My name is Mizuki. My friends and I travel from rivers, oceans, grasses and tree leaves into the air, form clouds in the sky, and again fall down to the earth as rain or snow.



Look at the chart of the water cycle between the earth and the air below.



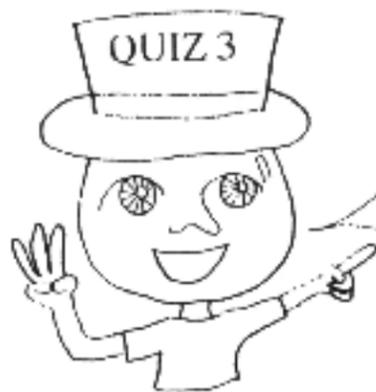


About what percent of the earth's surface is covered with water?

- (1) 30 % (2) 50 % (3) 70 % (4) 90 %

About what percent of water is used as drinking water?

- (1) 1 % (2) 5 % (3) 10 % (4) 20 %



How many times a year does water travel between the earth and the air in average?

- (1) 3 times (2) 7 times (3) 15 times (4) 19 times

Walter and Mizuki haven't seen each other for a long time after traveling together between the earth and the air some times. They have been worried about each other, but were able to see each other again in the middle of the Pacific Ocean a long time after.

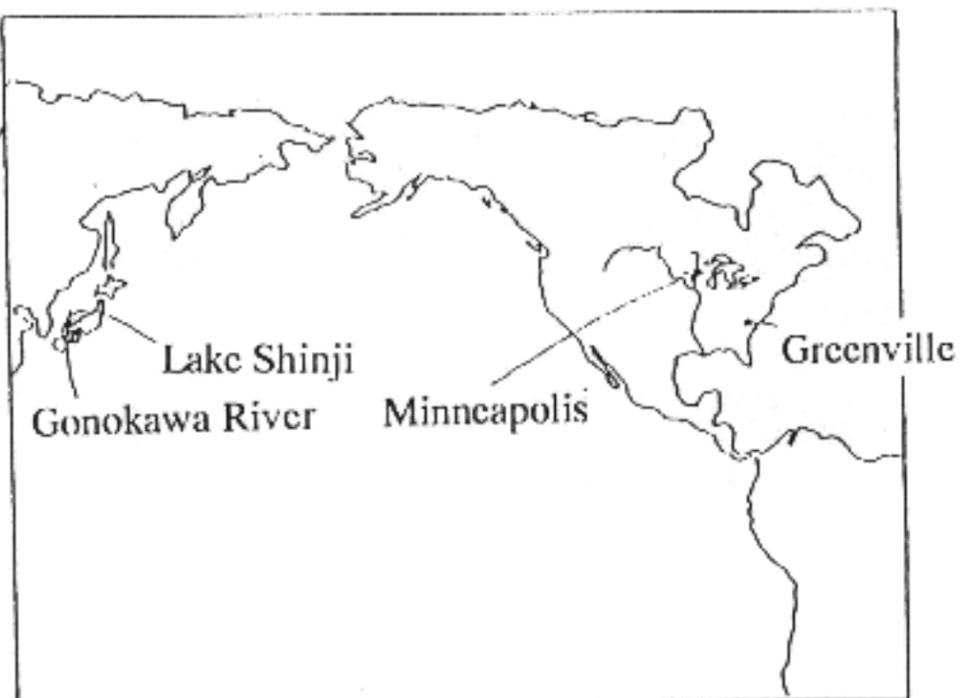


Mizuki, I haven't seen you for a long time. Where have you been?

I've been in Japan and traveled in Lake Shinji and Gonokawa River. Where have you been?



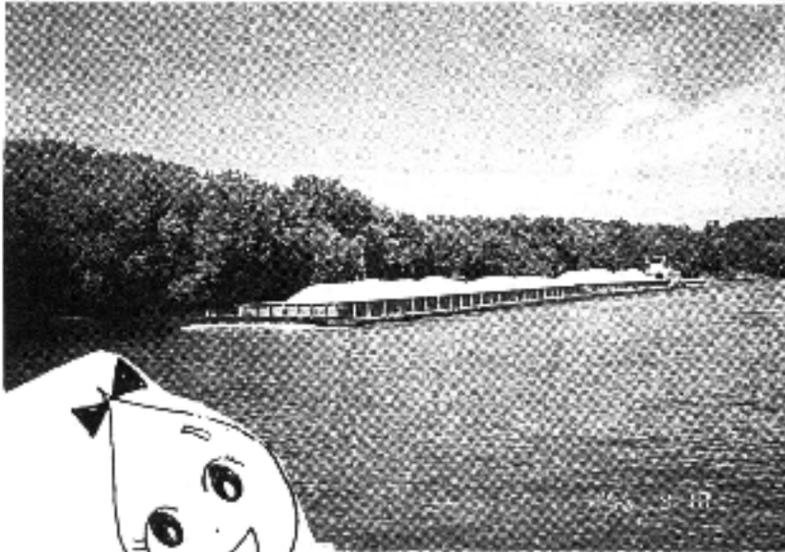
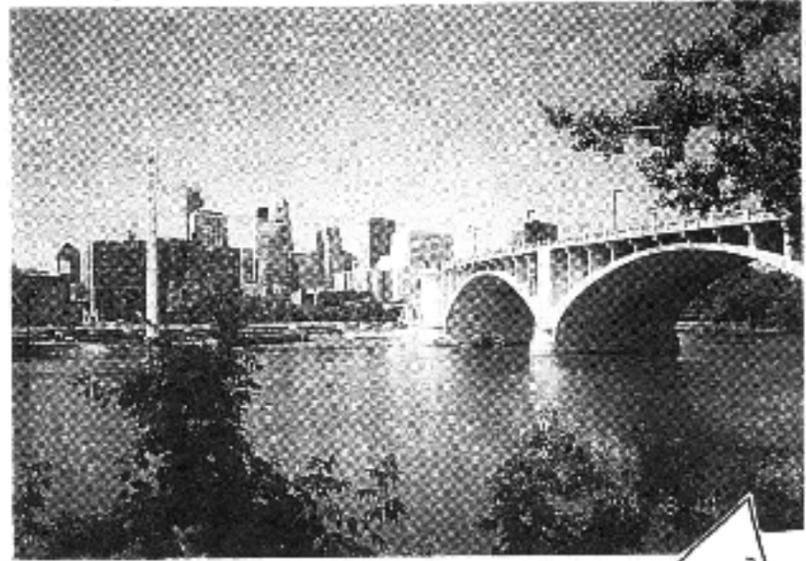
To the United States. I've been to Minneapolis and Greenville.



Soon they began to talk about what they had experienced.



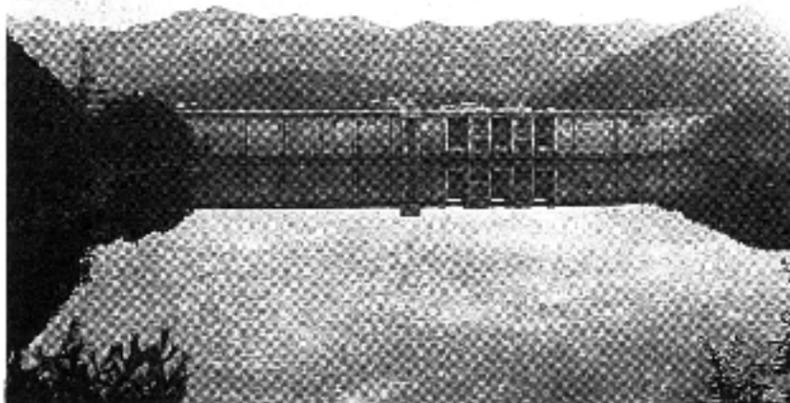
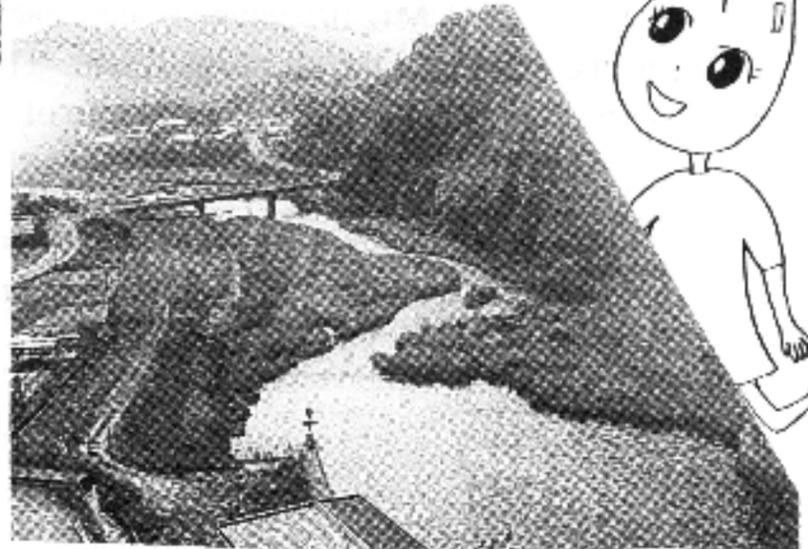
I have been to Minneapolis, which is located on the upper reaches of the Mississippi River. The river there is very wide and runs slowly even in the upstream.



I have been to Yachiyo Town, which is located in the upstream of Gonokawa River. The river is narrow and runs fast meandering.

That's-a barge. It is carrying a lot of gravels or wheat.

You're right. The Mississippi River is used as a canal as well.



That looks like keeping back the river water. What's that?

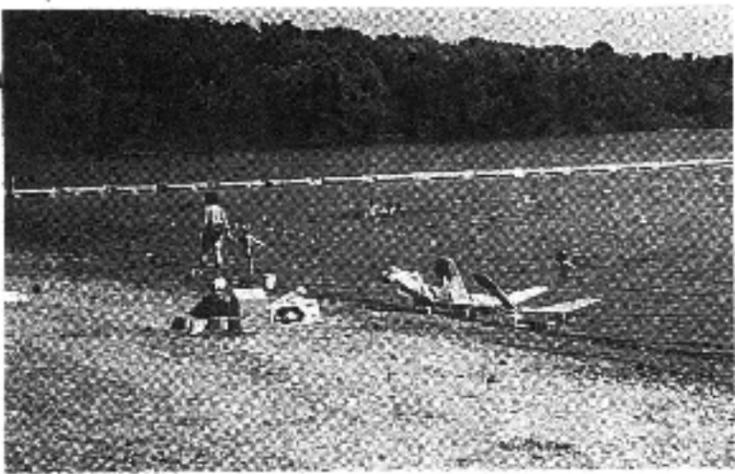
That's called a dam. I hear there are not that many in the U.S., but you can find a lot in Japan.

What are the dams in the picture above built for?

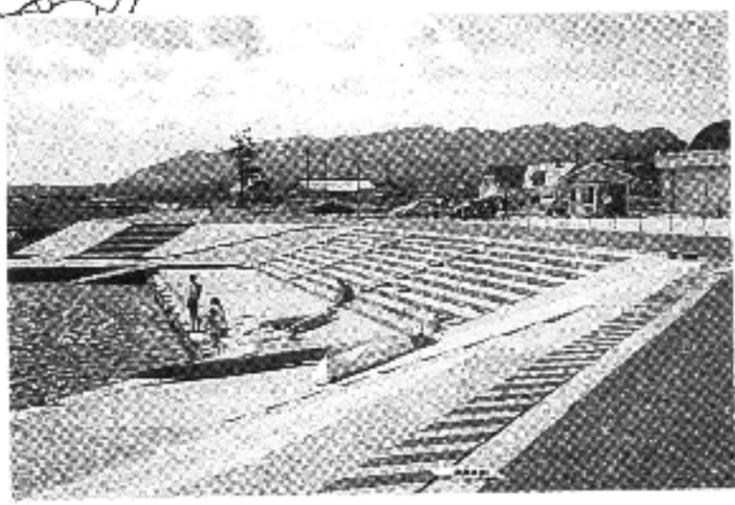




I've been to lakes. You can find a lot of lakes in Minneapolis. You see? Look at these pictures. People seem to be enjoying themselves.



I've been to lakes, too. As you see in the pictures below, The lake shore is beautifully constructed and maintained, and people looked relaxed as well.



People seem to relate to water in many ways both in America and in Japan. What's different is, I guess, the way the river banks and lakes shores look.



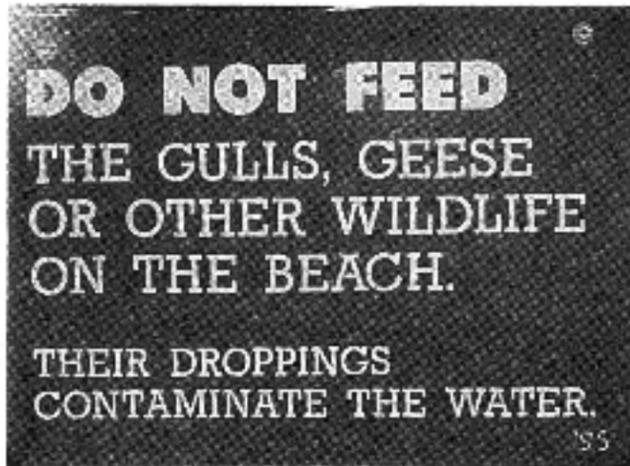
I guess you're right. Many of the river banks and lake shores in Minneapolis and Greenville are maintained as natural as possible. On the other hand, concrete levees are built along Gonokawa River and around the shore of Lake Shinji, and many facilities for amenities are built.

The rivers in Japan are narrow and run so fast that a heavy rain is likely to cause a flood. So, there has been a long battle between people and water. But, because of the maintenance of river banks, there are fewer floods and river-side facilities have been built one after another.





By the way, near the rivers and lakes in Minneapolis you can see bulletin boards, which give a lot of instructions. Can you say why? Let's think about.



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You can see a similar type of bulletin board near Lake Shinji like in the right picture, but one in Minneapolis, gives a more specific instruction.

In many places in Minneapolis, you can see not only bulletin boards but trash cans.



Clean the lake



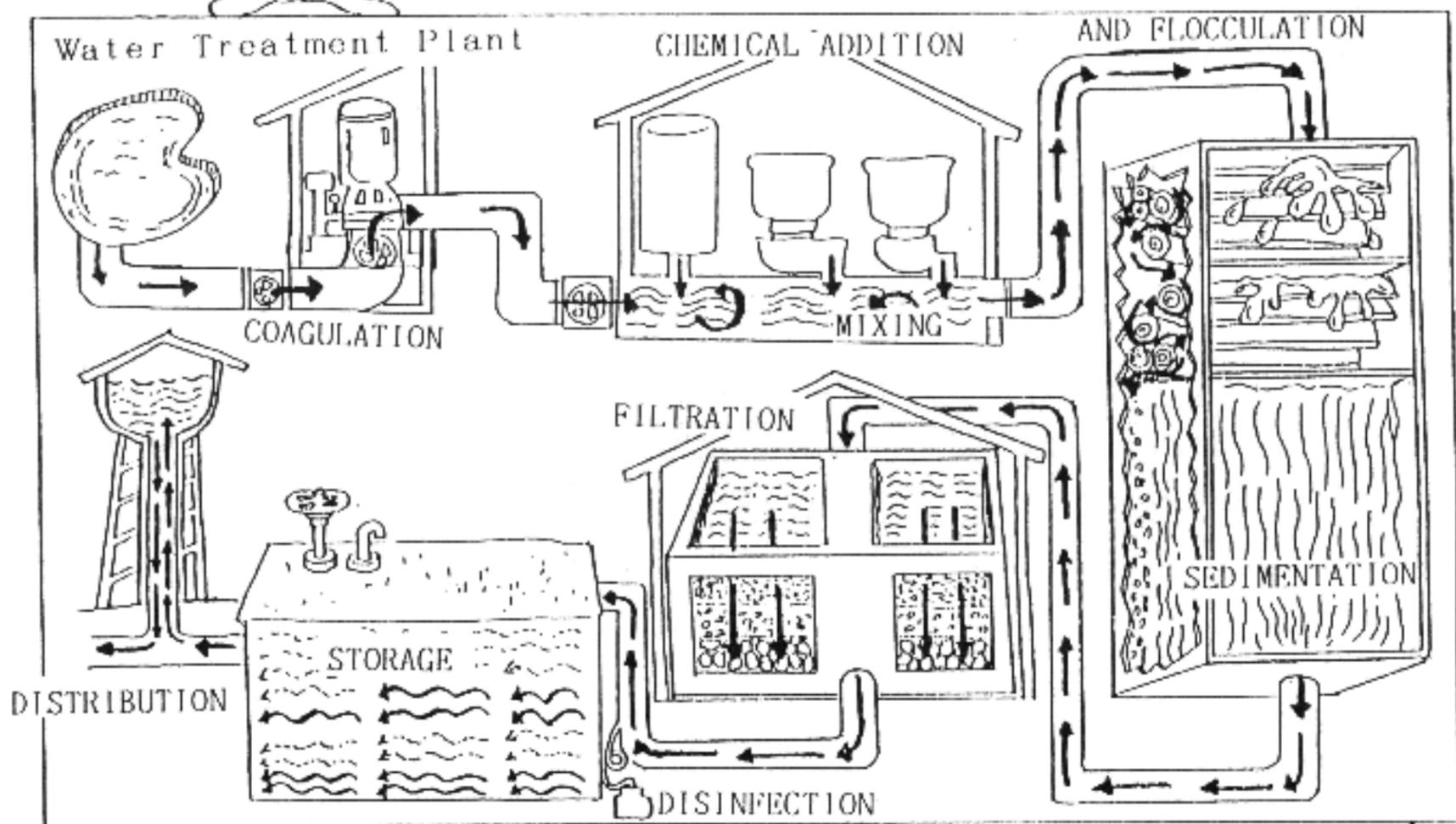
I've traveled from a river to a water treatment plant. Have you, Mizuki?



I've had the same experience.



In Minneapolis, most of drinking water is pumped in from the Mississippi River. Water is cleaned at a water treatment plant and distributed to homes. This is how the treatment plant looks like.



It looks almost the same as the one I saw near Gonokawa River. One difference I noticed was that the water in Minneapolis is hard water containing calcium or magnesium salt, so it has to be changed to soft water for people to drink.



In Minneapolis, calcium and magnesium, which settles to the bottom of the sedimentation basin, are recycled. Can you guess where this truck loaded with the deposit goes to?

- (1) farm
- (2) chemical firm
- (3) road construction site





I have seen a large water treatment plant in Greenville, which takes water from the Tar River nearby. Some regions use ground water for drinking. The water is stored in a closed tank in the picture and then flows into the distribution pipes to homes and factories.



How is the water from a water treatment plant used at home? Try to think of the occasions you use water at home.

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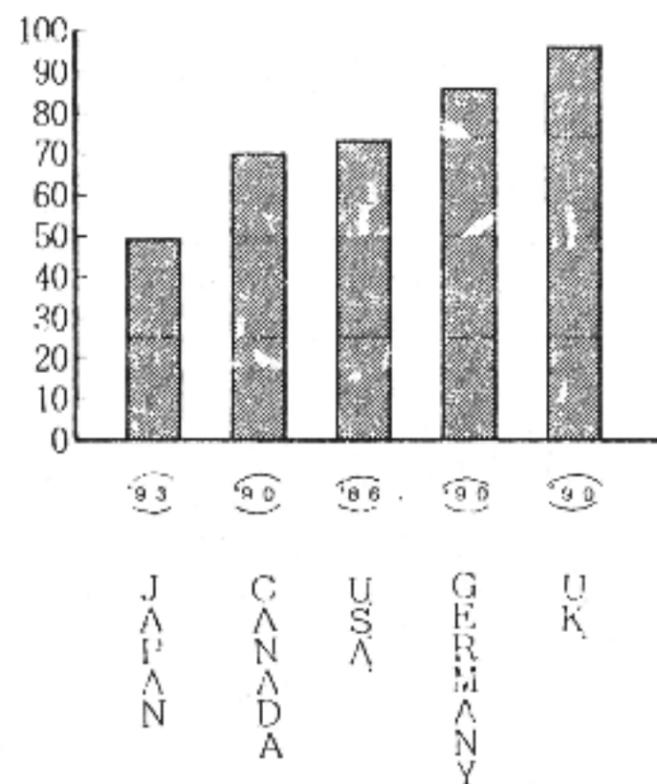
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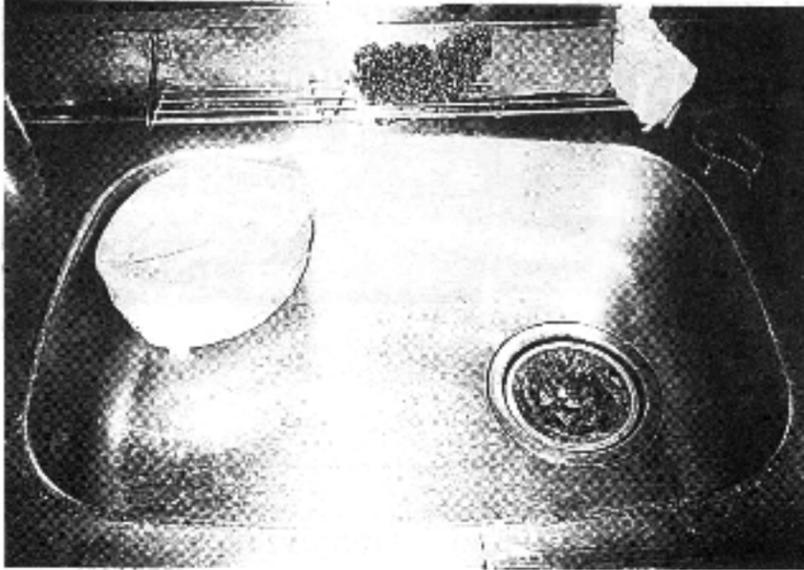
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The water used at home is very dirty and causes pollution in rivers and lakes. As you see in the bar graph, right, waste water treatment system is not available in Japan as widely as in Europe or the U.S. Particularly in Japan, quite often waste water from home is discharged straight into rivers and lakes. So, it is very important to pour used water wisely.





In Japan, people try to wisely flow the water used at home. Look at the pictures below and think what they do.



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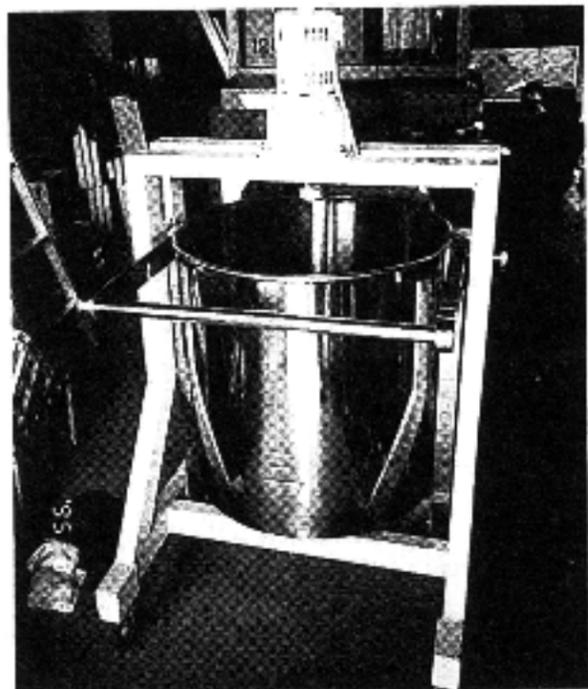
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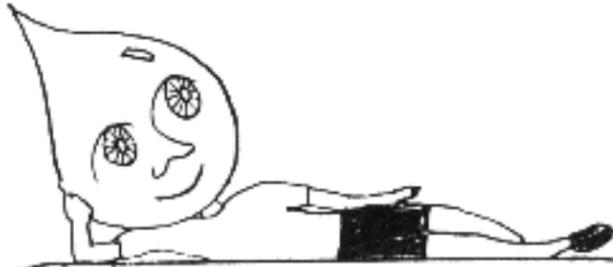
You can borrow this machine in the picture at the city office. You put used cooking oil in the tank of this machine. Can you guess what you are going to make?



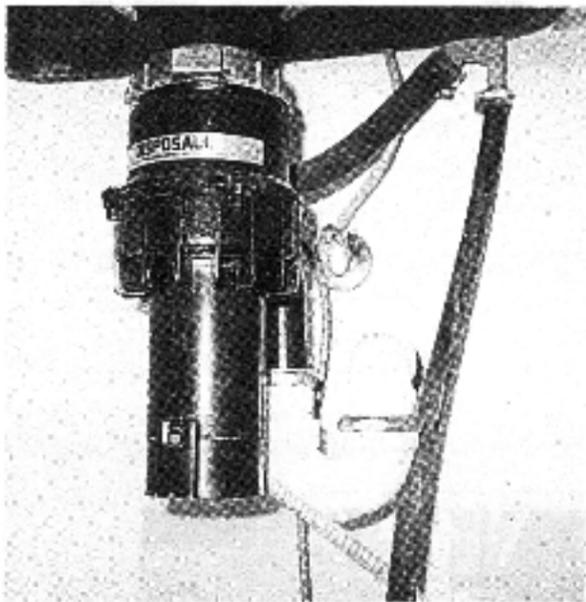
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Look at the picture in the right. As you see both in Japan and the U. S., most of the detergents for laundry do not contain phosphorus these days. The water containing a lot of phosphorus can grow water weed, which consumes oxygen, so fish and other wildlife cannot survive.



In Minneapolis and Greenville, a machine in the picture, left, is installed underneath the kitchen sink in each house. It is called a disposer. It crashed garbage like vegetables with water and flow it down into the drain.

Doesn't that stop up the sewer? Moreover, don't people in the wastewater treatment plant have difficulty in disposing water?



Why?

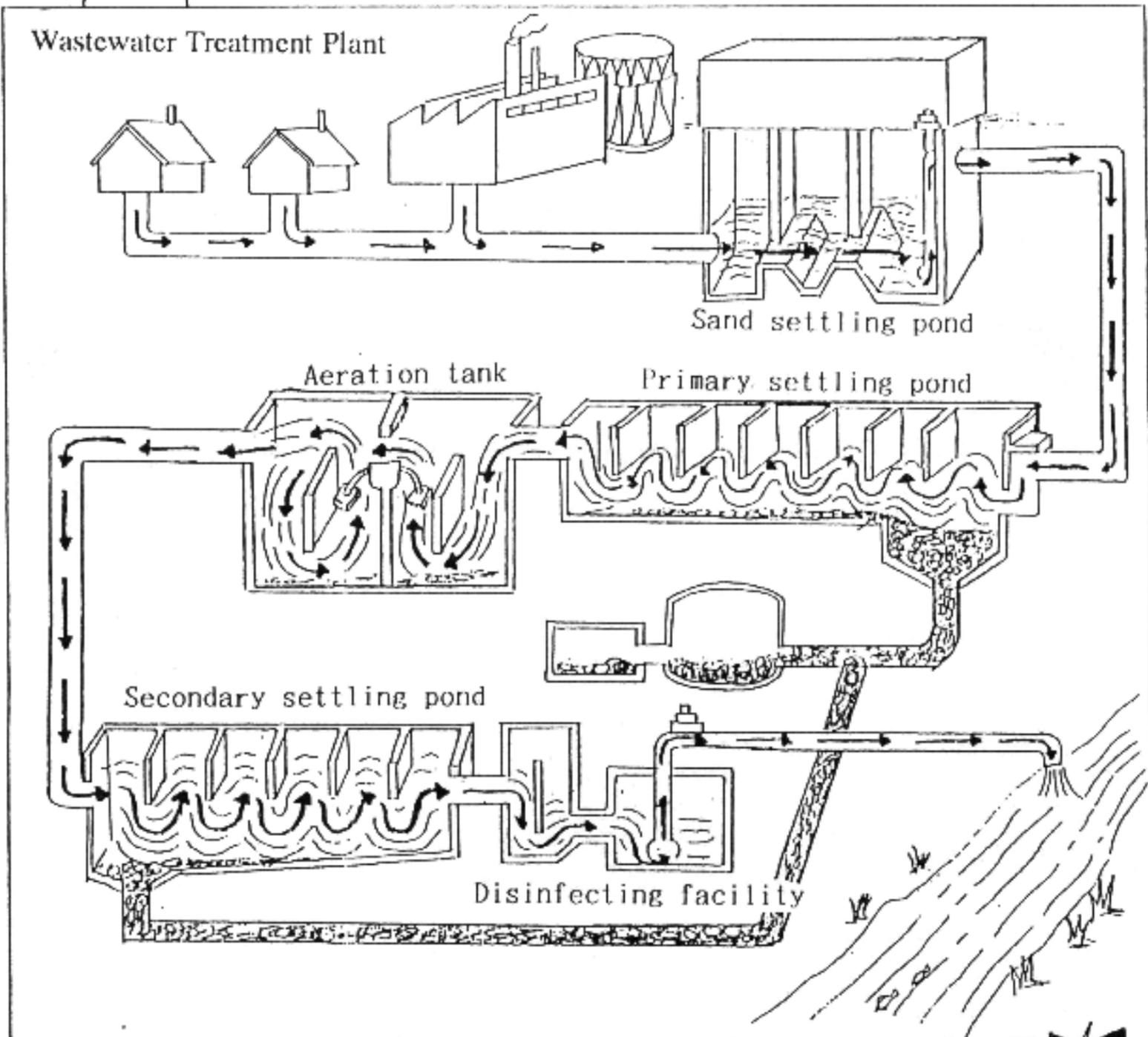
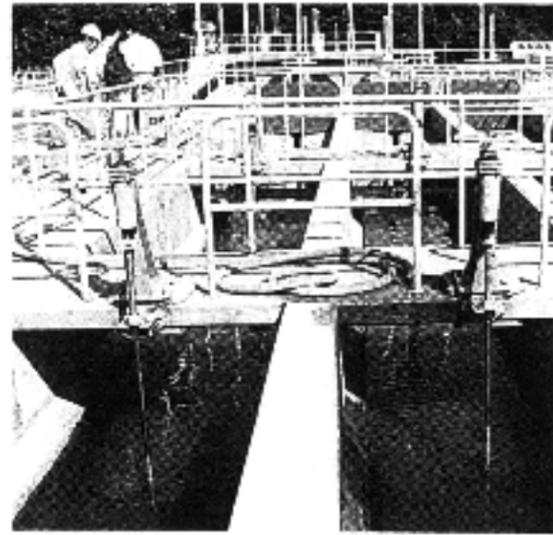
Because in Japan a lot of people live in a small district, so if they use a disposer at home at the same time, a lot of dirt might stop the water flow in the sewer. So you cannot use a disposer in Japan.



I hear the wastewater pipes are never clogged up in Minneapolis and Greenville, so you may not use disposers in Japan, but it's all right to use them in Minneapolis and Greenville.



After used at home, I was sent through the sewer to the wastewater treatment plant. It looked like the picture below.



I've been to this kind of place, too. The way the wastewater is cleaned is almost the same both in Japan and the U. S. In modern wastewater treatment plants in Japan, they have bacteria digest the organic material in waste water.





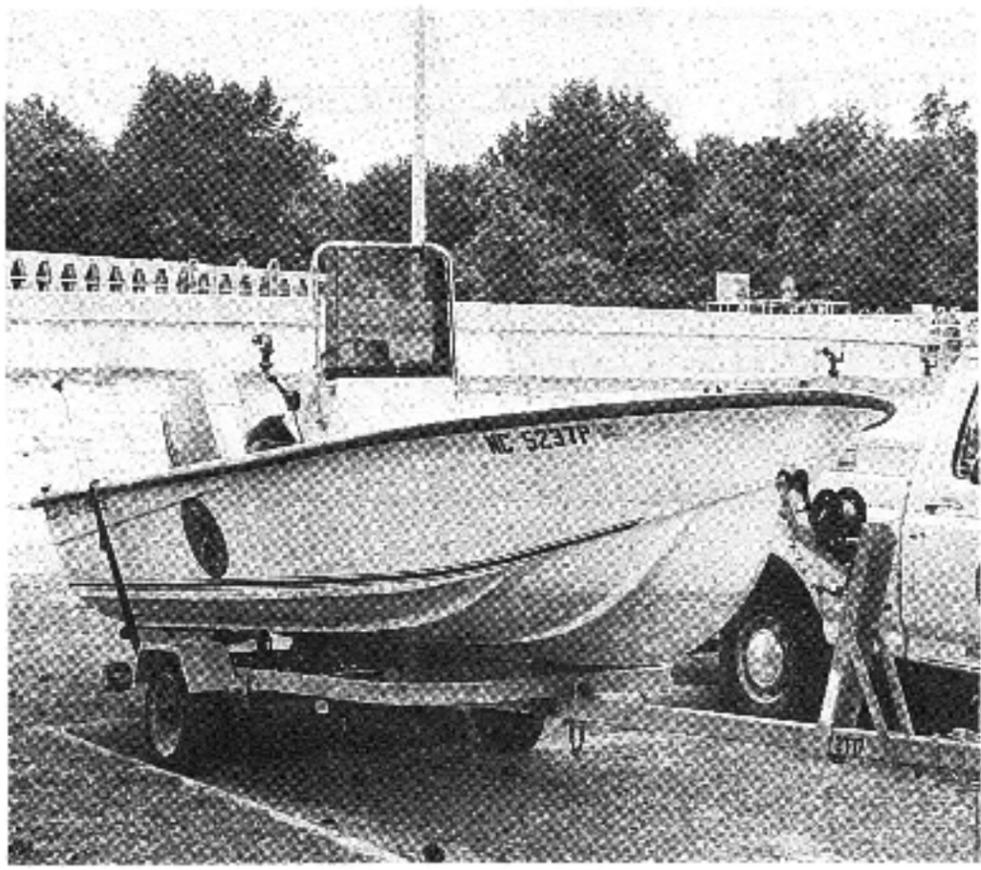
In Greenville, after wastewater is cleaned, remaining sludge and bacteria are dried and used as fertilizers.

It's the same in Japan.



After cleaned by bacteria, the water is mixed with a chemical called chlorine, which kill germs, before it is discharged into rivers. To make water much safer according to EPA standard, the plant in Greenville is introducing a breakthrough water treatment system of using ultraviolet rays, which have no harm to human beings.

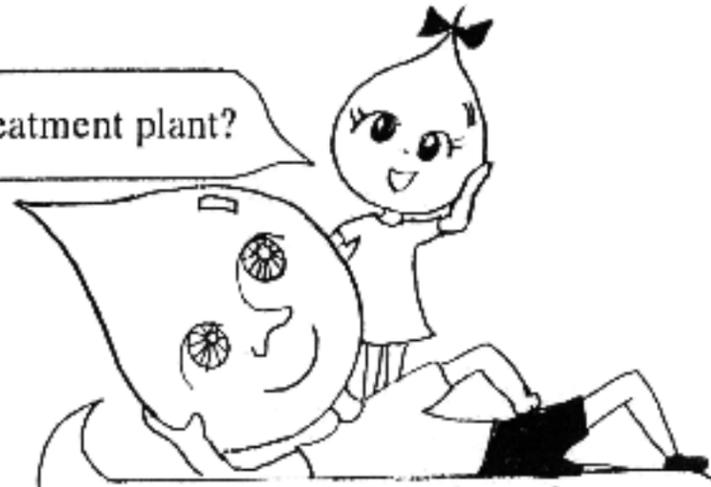
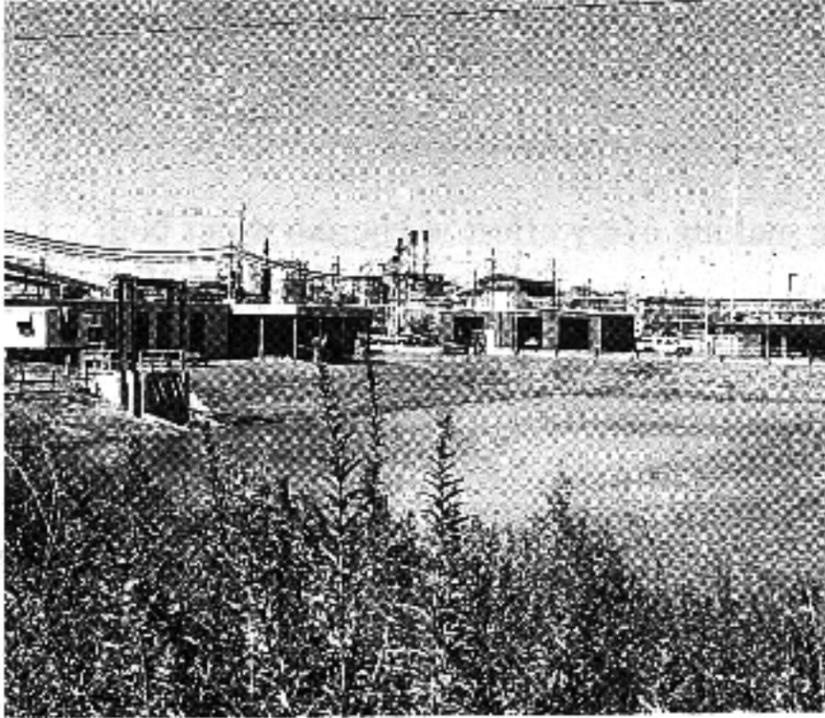
That's good for wild life in the river. Ultraviolet rays are safe and water will be cleaner than now.



I found a motor boat in this wastewater treatment plant. It is used to check the quality of river water.



Is the wastewater cleaned only in the water treatment plant?



No. Some factories clean the water on their own after they use. One of the examples is a fertilizer company located in the lower stream of the Tar River. It has its own water recycle plant and not a single drop of used water flows out of the factory. Since this facility was built, there has been no water pollution and no complaints from the nearby community.

People think a lot about the ways of protecting natural environment. Now I see a large pond near the factory.

I'm glad you noticed it. The waste water is disposed in the factory and then collected in this recycle pond for reuse.

Can you tell me some other ways of protecting water?



This is a small test garden in the factory. The water processed in the factory is used to grow vegetables and flowers here. There has been no harm reported and fresh vegetables are growing.

That proves that water has been cleaned.

There is a similar corporate water treatment system in Japan as well. In one building in Shinjuku, Tokyo, the waste water is processed and recycled as flush toilet water in the building.



Now I see people are making every effort to cherish water both in America and Japan.



You're right. I hope I can see you again in the clean water. See you!



Walter and Muzuki have seen various forms of water. All living things need water to live. What can you do in your life so that you don't pollute and waste water? Write down what you should be careful about.

Handwriting practice area with multiple horizontal dashed lines for writing.

Supplementary material

Answer keys

QUIZ 1 (3)

QUIZ 2 (1)

Most of the water on earth is in seas, rivers, and lakes. Almost all of it is salt water containing lots of salt. The water which contains little salt is called fresh water, only 3% of the water on earth. Only 1 % of all the water on earth is fresh water that we can actually drink because about 2% of the fresh water is in Arctic and Antarctica.

QUIZ 3 (4)

● Purposes of building dams

There are a lot of dams built in the main and sub streams of Gonokawa River mainly because dams can:

- control flood and stop the water damage in the downstream and save lives and property of the people living along rivers
- provide water for irrigation. They can retain and develop the proper functions of river
- provide water for various uses to the regions in and around cities.
- generate electricity by using water

● Explanations of bulletin boards

- **DO NOT FEED THE GULLS, GEESE OR OTHER WILDLIFE ON THE BEACH.**
Feeding animals is banned because food may contaminate the water.
- **NO PETS ALLOWED**
Pets are not allowed to enter beaches because their droppings may contaminate the water and the nearby environment.
- **PROHIBITED IN BEACH AREA** (glass containers, fires, intoxicants, boats etc)
Things which might cause pollution and damage are banned there to protect the natural environment in the beach. In some areas called BAWA (Boundary Waters Canoe Area), only the boats without engines such as canoes are allowed.

● Contaminations and cleaning of the water in Lake Shinji

About 25 percent of water pollution is caused by the water used at home. We need plenty of fresh water to make the river clean enough for fish to live in. For example, 10 bathtubfuls* of fresh water is necessary to water down 200 milliliters of milk whereas you need 200 bathtubfuls of water to water down the same amount of used cooking oil. (*A bathtub can contain approximately 300 liters of water)

Municipal governments are distributing sink strainers to be placed in the kitchen to residents for free and pamphlets to raise people's awareness toward cleaning of water. As a result of this campaign, more and more people are trying not to pour used cooking oil by solidifying it or wiping it with paper. Also, most people have installed sink strainers in the kitchen so that leftovers will not be dumped into the drain.

● Producing soap from used oil

Some cities and towns purchase soap producer machines and provide local groups of residents with them for free. You can make 40 kilograms of soap out of 20 liters of used cooking oil. If you don't have a machine, you can make soap this way.

- (1) Strain the used cooking oil
- (2) Resolve 36 grams of caustic soda (sodium hydroxide) with 0.1 liter of water (per 0.2 liters of used cooking oil)
- (3) Heat used cooking oil in a pan up to 70-80 degrees Celsius.
- (4) Add the water solution of caustic soda to the heated oil little by little and mix slowly.
- (5) Stop heating when the oil looked soft like jam and pour it quickly into a container (ex. empty milk cartons or paper cups)
- (6) Dry it in the shade for about 10 days.

● EPA

EPA(Environmental Protection Agency) is a national organization in the U.S. established to protect the natural environment, which corresponds to Japan's Environmental Agency. This agency sets the standards for the protection of natural environment, such as the standard for water pollution, chemicals contained in detergents. The water treatment is done based upon the standards by EPA.