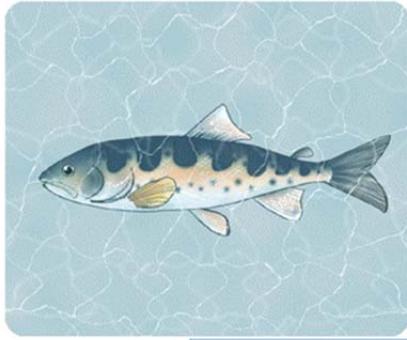
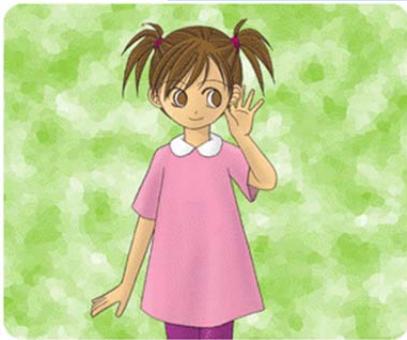


Let's go to a river together !





- What can be found in a river?
- Let's observe it together!



Water Environment Soundness Index (MIZU-SHIRUBE in Japanese) – The nickname, MIZU-SHIRUBE, comes from a word for road sign, MICHI-SHIRUBE, and means a sign giving information or instructions to river users.

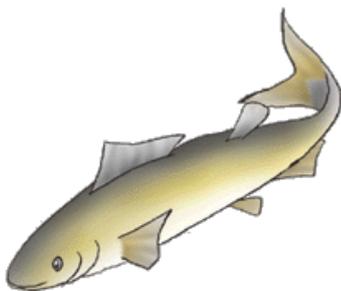


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<For instructors>

(1) Investigation period (2) Investigation site (3) Preliminary survey (4) Implementation of an investigation (5) Precautions for safety (6) How to use the investigation (results)



1. How to study the river environment

(1) What are the characteristics of rivers?

- Rivers vary in size from large to small: large rivers that we need to cross by boat and small streams that run near our homes.
River conditions vary from place to place from a river in a mountain to a river in a town.
- There are living things such as fish, crabs, insects, and aquatic plants in rivers.
Grasses and trees grow at the edge of the river and birds living there too.
- Rivers have long been used for various purposes, such as fishery, agriculture, and drinking water. In addition, it is an important place for local festivals and traditions, for example the floating lantern ceremony.
- Each river has a different characteristic according to flowing water, scenery, living things and relationships with our lives.
What are the characteristics of rivers near you?

(2) How to investigate a river environment

- Five indices are used to investigate the whole picture of a river environment, including the river water, the living things, the scenery, and its use in our daily lives.
- Each index has three to five items (called separate indicators) used to investigate the river condition.
Evaluate each separate indicator on a scale of 3 to 1 by observing the river conditions.
If possible, write the reasons why you chose your ranking.
- You can start with any indicator that seems appropriate.

Five Indices

1. Natural state

2. Rich in plants and animals
(Biological diversity)

3. Water clarity

4. Pleasant waterfront
environment

5. Regional water culture



(3) Five indices

1. Natural state

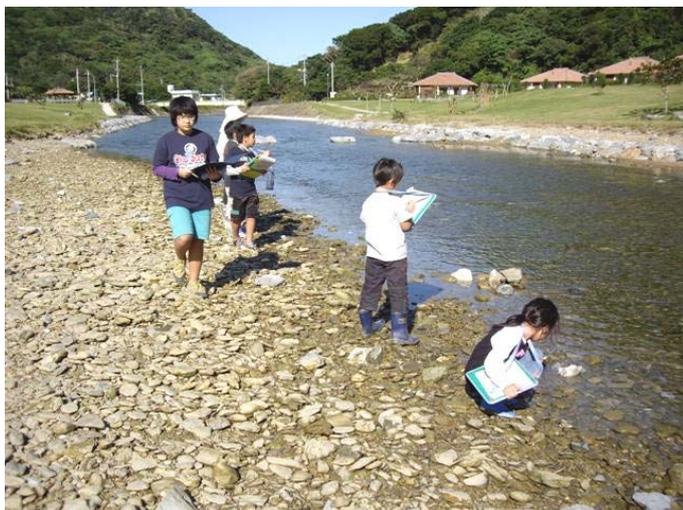
Investigate how much nature is preserved in the river.

The following are three separate indicators to investigate the river condition.

- Is there an abundant flow of water?
- Does the riverbank look natural?
- Can fish go upstream?

Choose the appropriate answer for each question on a scale of 3 to 1 according to the river condition. Write the reasons for your choice. The details on how to choose the scale are explained in the following pages.

Question \ Scale	3	2	1	Reasons for your choice
- Is there an abundant flow of water?	Abundant flow	Some flow	No flow	
- Does the riverbank look natural?	Natural	Restored, but looks natural	Restored with much concrete	
- Can fish go upstream?	Yes. Fish can go upstream.	Yes, by using devices such as a fish ladder	No. Fish cannot go upstream due to obstacles.	



1. Natural state

- Quantity of water

Is there an abundant flow of water?



Referring to the following pictures, observe the river condition. The numbers in parentheses are the scales. Choose the most appropriate scale.

Abundant flow (3)



Some flow (2)



No flow (1)



1. Natural state

- **Condition of the riverbank**

Does the riverbank look natural?



Observe how much of the riverbank is natural and how much is covered with concrete.

Bank protection functions to make the riverbank stronger against floods. It also has an important function for the lives of plants and animals and the relationship between people and the river.

Natural (3)



Restored, but looks natural (2)



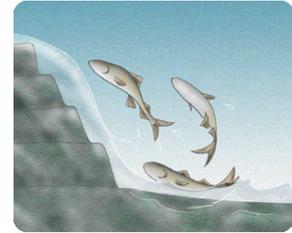
Restored with much concrete (1)



1. Natural state

- Can fish go upstream?

Are there any obstacles? Are there fish ladders?



If there are weirs or man-made structures in the river, fish or another aquatic animals cannot go upstream freely. Observe man-made structures that obstruct the movement of aquatic animals.

Fish can go upstream (3)



There are some devices such as fish ladders (2)



How can I go upstream?



Fish cannot go upstream due to obstacles (1)



2. Rich in plants and animals

Observe whether there are many living things in the river and its surroundings and whether it is biologically diverse. The following are four separate indicators to investigate.

- Are plants growing on the sides of the river and along the riverbank?
- Are there birds? *For “habitats,” see the columns on the following pages.
- Are there fish?
- Are there living things on the bottom of the river?

Question \ Scale	3	2	1	Reasons for your choice
- Are plants growing on the riverside and riverbank?	Abundant variety of plants	Plants are here and there	No plants	
- Are there birds?	Many water birds and bird habitats	Not many birds or habitats	No birds or habitats	
- Are there fish?	Many fish and fish habitats	Not many fish or habitats	No fish or habitats	
- Are there living things on the bottom of the river?	Sand and stones are slightly covered with algae. Insects can be found.	The surfaces of stones are slimy in the presence of many algae.	The bottom of the river looks dark, and no algae or insects can be found.	





What is a habitat for living things?



- What is a habitat?
It is a home for living things, and a place to live.
- What is the habitat for?
What do you do in your home?
We eat meals, sleep, and have fun.



Where in the river do fish eat meals and rest?

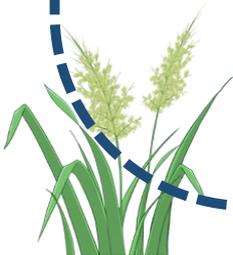


How about birds in the river?

How about small organisms in the riverbed?



A habitat is an important place for living things.

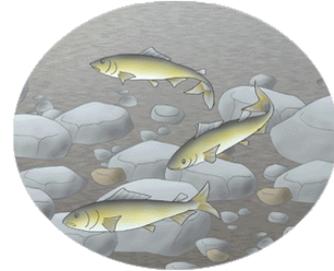




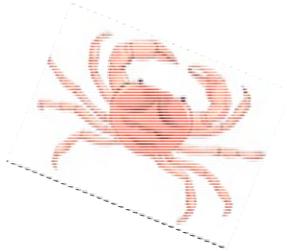
Let's find habitats!

- Where are fish habitats?

Behind stones where fish can find foods, such as algae and insects In the water plants where they can hide



- Where is a habitat for small organisms in the riverbed?



On the underside of pebbles and in water plants

Let's turn the pebbles in the riverbed upside down. Do you find small insects?

- Where are bird habitats?

In the river where they can find foods, such as insects, fish, and water plants

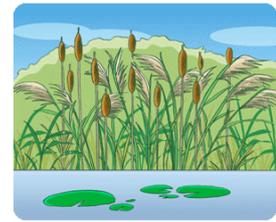
In water plants and grass or on trees where they can sleep or make nests



2. Rich in plants and animals

- **Plants along the riverside**

Are plants growing along the riverside?



Investigate the plants on the side of the river. Rich plants provide a place for many animals to live. Observe the condition of the plants along the riverside and the riverbank at the investigation site.

Abundant variety of plants (3)



Plants are here and there (2)



No plants (1)



2. Rich in plants and animals

- **Birds and bird habitats**

Are there birds?



Investigate the habitats available for birds and small living things to make nests, find food, and rest in the river and along the riverside.

Observe whether there are many habitats for living things at the investigation site.

There are many water birds and bird habitats (3)



There are not many birds or habitats (2)



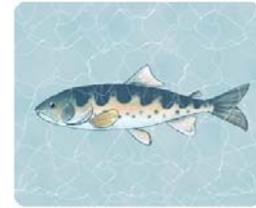
There are no birds or habitats (1)



2. Rich in plants and animals

- Fish and fish habitats

Are there fish?



Fish habitats are closely related to the water environment. When there are various types of habitats, various types of fish can live there. Because finding a fish is not easy, try to find their habitats. Ornamental fish, such as colored carps, should be excluded from your investigation.

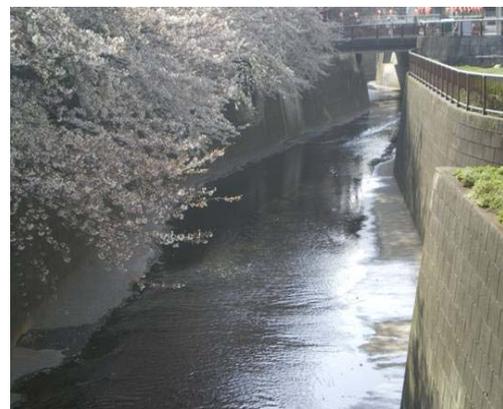
There are many fish and their habitats (3)



There are not many fish or habitats (2)



There are no fish or habitats (1)



2. Rich in plants and animals

- **Condition of the riverbed and small organisms**

Are there living things on the bottom of the river?



The conditions of the riverbed and of small organisms living there tell us about the water quality. Observe the riverbed conditions and the types of organisms.

Sand and stones are slightly covered with algae. Insects can be found. (3)



The surfaces of stones are slimy in the presence of many algae (2)



The bottom of the river looks dark, and no algae or insects can be found (1)



3. Water clarity

To know how clear and clean the water is, let's measure the transparency and the smell of the river water. The following are three separate indicators to investigate.

- Is the water clear?
- Does the water smell?
- Is the water clean? *This is optional for those who are interested in this item.

Question \ Scale	3	2	1	Reasons for your choice
- Is the water clear?	Transparency of 70 cm or more	Transparency of more than 50 cm but less than 70 cm	Transparency of less than 50 cm	
- Does the water smell?	No smell	A slight smell	A very bad smell	
- Is the water clean? (Measure COD using a simple method.)	3 mg/l or less	Between 3 mg/l and 5 mg/l	More than 5 mg/l	



3. Water clarity

- Transparency

Is the water clear?



Transparency is a visual parameter indicating how clear the water is. Let's measure it using a transparency tube (clean measure). When a transparency tube is not available, you can make one using an acrylic tube. Place a water sample in a transparency tube and put it in a place where there is no direct sunlight. Move a disk, which has a double-lined cross-shaped mark, up and down and stop it when the mark on the disk appears clear. The reading of the water depth in the tube is the transparency of the water.

Scale	Transparency
3	More than 70 cm
2	More than 50 cm but less than 70 cm
1	Less than 50 cm

3. Water Clarity

- Smell of the water

Does the water smell?



By investigating the smell of the water, we can identify the effect of wastewater (such as dirty industrial effluent flowing into the river). The smell of water is an index used to investigate the state of the growth/death of bacteria, algae, and microorganisms and the runoff from livestock farms, factories, and houses.

Place a water sample in a container and shake it. Bring your nose close to the container and sniff it. When it is difficult to take a water sample, stand near the riverside and sniff the air. Take a note of the smell.

Scale	Smell of the water
3	No smell
2	A slight smell
1	A very bad smell

3. Water Clarity

- COD

Is the water clean?



COD (Chemical Oxygen Demand) is a parameter used to investigate the level of water pollution by organic substances. This is optional and is for those who are interested in this item.

COD is measured using a simple method. Follow the instructions on the COD test kit (e.g., PACKTEST, manufactured by Kyoritsu Chemical-Check Lab. Corp. or SIMPLE PACK manufactured by Sibata Scientific Technology Ltd.). Read the instructions before starting your measurements because the details of the procedures and the readings of the measured values are different for each test kit.

Scale	COD
3	Less than 3 mg/l
2	Between 3 mg/l and 5 mg/l
1	More than 5 mg/l

4. Pleasant waterfront environment

This is an observation using your physical senses to determine whether the waterfront environment is pleasant. During the observation, think about the reasons for your choice and what is necessary to improve the water environment.

- Scenery (feel)
- Trash (visual)
- Touching the water (touch)
- Smell of the riverside (smell)
- Sound along the riverside (audial)

Question \ Scale	3	2	1	Reasons for your choice
- Are the river and its environment beautiful?	Beautiful	Average	Not beautiful	
- Is trash visible?	No trash	Some trash	A lot of trash	
- Do you want to touch the river water?	Yes, I want to touch it.	I don't mind touching it.	No, I don't want to touch it.	
- What do you smell along the riverside?	A pleasant smell	No specific smells	An unpleasant smell	
- What do you hear along the riverside?	The pleasant sound of the river	No specific sounds	Unpleasant sounds or noises	



4. Pleasant waterfront environment

- **Scenery (feel)**

Are the river and its environment beautiful?



Stand on the riverside and feel whether the river and its surrounding scenery are beautiful. Go to the following locations to observe the river.

- A place where you can observe the flow of the water
- A place where you can observe the other side of the river
- A place where you can observe the river from a higher position, for example, on a bridge

Beautiful (3)



Average (2)



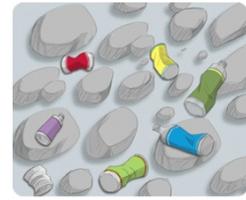
Not beautiful (1)



4. Pleasant waterfront environment

- Trash (visual)

Is trash visible?



Observe the amount of waste floating on the river or being dumped along the riverside and check whether the waterfront environment is visually pleasant.

No trash (3)



Some trash (2)



A lot of trash (1)



4. Pleasant waterfront environment

- Touching the water (touch)

Do you want to touch the river water?



On hot days in the summer, we often feel like going into rivers or touching the water.

Do you want to touch the river water? Touch the water and feel whether it is pleasant.

I want to touch it. (3)



I don't mind touching it. (2)



I don't want to touch it. (1)



4. Pleasant waterfront environment

- Smell along the riverside (smell)

What do you smell along the riverside?



The smell along the riverside is not the smell of water but rather the entire river's smell including the vegetation, forests, and paddy fields near the riverside. Investigate the entire smell and all the scents when you are on the riverside or riverbank.

Observe whether the smell is pleasant when you breathe the air including the smell of the surrounding greenery (nature) and wind.

Is it pleasant to breathe the air including the natural and artificial smells?

Scale	Smell
3	A pleasant smell
2	No specific smell
1	An unpleasant smell

4. Pleasant waterfront environment

- Sound along the riverside (audial)

What do you hear along the riverside?

You hear various sounds along the riverside: the sound of water flowing, the sound of overflowed water from weirs, the songs of water birds, the sound of wind blowing over the water surface, and the voices of children playing along the riverside. Investigate the various sounds including the pleasant sound of the river water flowing and the sounds coming from the surroundings.

Is it pleasant to hear the sounds including the natural and artificial sounds along the riverside?

Scale	Sound
3	The pleasant sound of the river
2	No specific sounds
1	Unpleasant sounds or noises

5. Regional water culture

Investigate how closely the river is related to the local area: how do the local people and visitors connect with the river and take care of it, and how is the river (the river water) related to the daily lives of the people?

- History and culture
- Accessibility to the riverside
- Daily use
- Industrial activities
- Environmental activities

Question \ Scale	3	2	1	Reasons for your choice
- Have you heard stories related to the river?	Have heard many stories	Have heard some stories	Have heard no stories	
- Is the riverside accessible?	Accessible and the water can be touched	Accessible but the water cannot be touched	Cannot see the riverside	
- Do many people use the river or riverside?	Used by many people	Used by a few people	Not used	
- Industrial activities	The river is fully used (e.g., for fishing and drinking water).	The river is used for some activities.	The river is not used.	
- Environmental activities	Many people are involved in many environmental activities	There are occasional or temporary activities	No activities	



5. Regional culture on water

- History and culture

Have you ever heard stories related to the river?

Investigate historical and cultural stories about the river, and how they are preserved and handed down. What are historical and cultural characteristics of the regional water environment and important things/matters for the local people? Investigate the relations between the river and the regional culture.

(Tangible resources)

Research on historical sites, monuments, structures inscribed with poems, monuments, museums, and literatures, etc. Let's ask the local people or visit the site.

1. Water control and water utilization

Old river channel, road, bridge, riverbank, ferry station, old water control structure (open levee, flood prevention forest, etc.), water intake weir, water diversion weir, moat, small bay

2. Plants and animals

Riverside forest, line of trees, historic tree, plants and animals of rare/precious species

3. Others

Cultural asset, shrine, stone Buddha, small shrine for water god, poem & haiku (Japanese poem) about the river, monument of literary works

(Intangible resources)

Scenic area, traditional event, custom, and festival which have been held for a long time in the river and its surroundings, the floating lantern ceremony, traditional work related to the river and its water, poem and literary work about the river, folktale, folklore, etc.

Let's ask the local people.

Scale	Stories related to the river
3	Have heard many stories.
2	Have heard some stories.
1	Have heard no stories.



5. Regional water culture

- Riverside accessibility

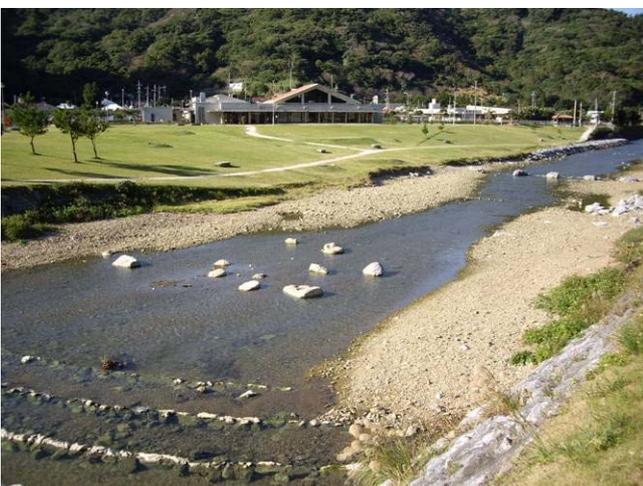
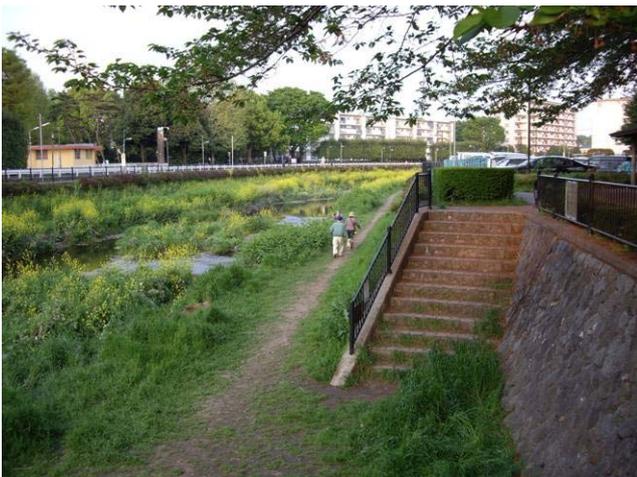
Is the riverside accessible?



A feeling of affinity for a river differs according to the accessibility of the river. Even if the riverside is accessible, you may feel a lesser affinity if you cannot go into the river and cannot touch the water. Investigate whether there are many access points to go to the river and touch the water.

Go to the riverside and observe whether there are any access points to the river and if you can touch the water easily. Are there any panels or signboards to introduce the river and the living things?

Scale	Accessibility
3	Accessible and can touch the water
2	Accessible but cannot touch the water
1	Cannot see the riverside



5. Regional water culture

- Daily use

Do many people use the river or riverside?



Investigate how the local people use the river and its water.

Do many people visit the river? How do they use it, for example, for walking, fishing, and sports?

And where (along the riverside or in the water) do they use it?

Scale	Daily use
3	Used by many people
2	Used by a few people
1	Not used



5. Regional water culture

- Industrial activities

Are there any industrial activities affecting the river water?



Investigate how the water is used. Is it used by the local people for various activities, such as drinking, agriculture, fishery, industry, transportation by ship, and tourism?

Where is the drinking water coming from and where is it going after we use it? Investigate what industrial activities occur on the river. Observe the river and read signboards along the riverside. (Do you see tourists coming to the river? Are people fishing in the river?)

Scale	Industrial activities
3	The river is fully used for important activities (e.g., for drinking water, agriculture, and fishery)
2	The river is used for some activities
1	The river is not used



5. Regional water culture

- Environmental activities

Are there any environmental activities on the river?



Are there any citizens' groups conducting environmental protection activities or environmental education programs on the river? Is the river used for integrated school studies? Let's investigate various environmental activities for the river.

(1) Before visiting the field

Go to the information center in the city office or the citizens' activity support center to read brochures/materials about environmental preservation activities and nature observation tours in which you can obtain information concerning environmental groups and their activities.

Access the websites of these groups to see the details of their activities. Make a map to show the locations of the activities (the locations on the river) of these environmental groups.

(2) Field survey

Investigate what environmental preservation activities and nature observation tours are being conducted.

If you have no opportunity to see their activities in the field, you may collect some information from a guide plate for visitors or a biotope signboard installed along the riverside.

Choose the appropriate scale according to the number of environmental groups and their activities.

Scale	Environmental activities
3	Many people are involved in many environmental activities
2	There are occasional or temporary activities
1	No activities

2. Let's go to a nearby river for investigation

(1) Before starting an investigation

1. Preliminary survey



- From where to where is the investigation site?

Check the location on a map on the Internet

Source: (C) Yahoo Japan

- Collect relevant information about the investigation site.

It is important to study not only the present state but also the past state if possible.

- Are there old stories about the river (below left)?
- Do many people use the river?
- Are there industrial activities such as fishery and drinking water intake (below right)?
- Are there any environmental activities for observation or cleaning?



Collect as much information as possible to make/review an investigation plan. Take safety into consideration.

(2) Let's make a preliminary inspection

1. Where is the river? How long does it take to get to the river?



On a map, check how to go to the river and how long it takes to get to the river.

(The left photo corresponds to the map on page 31.)

Source: (C) Yahoo Japan

2. What are the surrounding conditions near the investigated river?

- Check the best place to see the river, the access points to the river, and the outstanding landmarks.

Photos will be helpful to you.



3. What is the condition of the river?



4. Is the field safe?

Make sure that you can conduct the investigation safely.

(3) What tools are necessary?

Prepare the following before going to the field.

- Textbook
 - This textbook
- Observation Notes
 - Copy them from the textbook.
- Writing implements and board
 - Mechanical pencil that can be used even if it gets wet
 - Board for writing observation notes
- Clean measure (transparency meter)
 - Measuring tool for water transparency
- Others
 - Shoes that you don't mind getting wet
 - A thermometer to measure the atmospheric temperature and the water temperature
 - Other useful things: bucket, rope, camera, binoculars, water bottle, cap, and picture book



(4) Let's go to the field

1. Make a record of your observations

▪ How to write observation notes

While observing the river and its surroundings, write your observation notes (page 33)

1) Write the name of your school/group, your name, the river's name, and the landmarks at the investigation site (e.g., bridges).

2) Five indices (evaluation measures)

- For each question, there are three scales.
Choose the appropriate scale and circle it.
- Write the reason why you chose it in the right column.

▪ How to write an observation summary table

Organize every member's findings in the table (page 35).

1) How to organize the observation results

- For each item of an index, calculate the average of the scales that every member has chosen.

Sum all the members' choices \div the number of members = the average of each item

- Calculate the overall average for each index

Sum the average of each item \div the number of items = the overall average of each indicator

2) How to make a radar chart of the five indices

- Plot the overall average of the five indices on a radar chart and draw a line to connect all the points.

Observation notes

Investigation of Riverside Conditions

Name of school or group		Date of investigation: Year, Month, Day,	
Grade	Grade:	Time: from	to
Name		Today's weather	Yesterday's weather
Investigation site	River name:	Outstanding landmarks at the site:	

While observing the water, the plants and animals in the river, and its environment, circle the appropriate answer on a scale of 3 to 1 and write the reasons for your choice.

① Natural state

Question \ Scale	3	2	1	Reasons for your choice
<i>Is there an abundant flow of water?</i>	Abundant flow	Some flow	No flow	
<i>Does the riverbank look natural?</i>	Natural	Restored but looks natural	Restored with much concrete	
<i>Can fish go upstream?</i>	Yes. Fish can go upstream.	Yes, by using devices such as a fish ladder.	No. Fish cannot go upstream due to obstacles.	

② Rich in plants and animals

Question \ Scale	3	2	1	Reasons for your choice
<i>Are plants growing along the riverside and riverbank?</i>	Abundant variety of plants	Plants are here and there	No plants	
<i>Are there birds?</i>	Many water birds and bird habitats	Not many birds or habitats	No birds or habitats	
<i>Are there fish?</i>	Many fish and fish habitats	Not many fish or habitats	No fish or habitats	
<i>Are there living things on the bottom of the river?</i>	Sand and stones are slightly covered with algae. Insects can be found.	The surfaces of stones are slimy in the presence of many algae.	The bottom of the river looks dark, and no algae or insects can be found.	

③ Water clarity

Question \ Scale	3	2	1	Reasons for your choice
<i>Is the water clear?</i>	Transparency of 70 cm or more	Transparency of more than 50 cm but less than 70 cm	Transparency of less than 50 cm	
<i>Does the water smell?</i>	No smell	A slight smell	A very bad smell	
<i>Is the water clean? (COD)</i> <i>* optional</i>	3 mg/l or less	Between 3 mg/l and 5 mg/l	More than 5 mg/l	

④ Pleasant waterfront environment

Question \ Scale	3	2	1	Reasons for your choice
<i>Are the river and its environment beautiful?</i>	Beautiful	Average	Not beautiful	
<i>Is trash visible?</i>	No trash	Some trash	A lot of trash	
<i>Do you want to touch the river water?</i>	Yes, I want to touch it.	I don't mind touching it.	No, I don't want to touch it.	
<i>What do you smell in the riverside?</i>	A pleasant smell	No specific smells	An unpleasant smell	
<i>What do you hear in the riverside?</i>	The pleasant sound of the river	No specific sounds	An unpleasant sound or noise	

⑤ Regional water culture

Question \ Scale	3	2	1	Reasons for your choice
<i>Have you heard stories related to the river?</i>	Have heard many stories	Have heard some stories	Have heard no stories	
<i>Is the riverside accessible?</i>	Accessible and can touch the water	Accessible but cannot touch the water	Cannot see the riverside	
<i>Do many people use the river or riverside?</i>	Used by many people	Used by a few people	Not used	
<i>Industrial activities</i>	The river is fully used (e.g., for fishing and drinking water)	The river is used for some activities	The river is not used	
<i>Environmental activities</i>	Many people are involved in many environmental activities	There are occasional or temporary activities	No activities	

Additional comments (your thoughts on the investigation)

Table of observation notes

Investigation of Riverside Conditions

1. Investigation report on the river including the investigator and the date of investigation

Name of school or group		Name of writer	
Name of representative (teacher in charge)		Number of people in investigation	people
Grade of the participants (circle the number that applies)	1. Elementary school children (from first to third grade) 2. Elementary school children (from fourth to sixth grade) 3. Junior high school students (from seventh to ninth grade) 4. High school students and older 5. Others		
Name of the investigated river		Date of investigation	Year, Month, Day
Location of the river (between A and B) (e.g., near a bridge)		Start time and end time of the investigation	From until
Air temperature of the investigation site		Water temperature of the river	

2. Record of the characteristics of the investigated river and its environment

Please write freely about the characteristics of the site and the environment that you investigated, as well as the names and places of the plants and animals you found. (Drawing pictures will help a lot.)

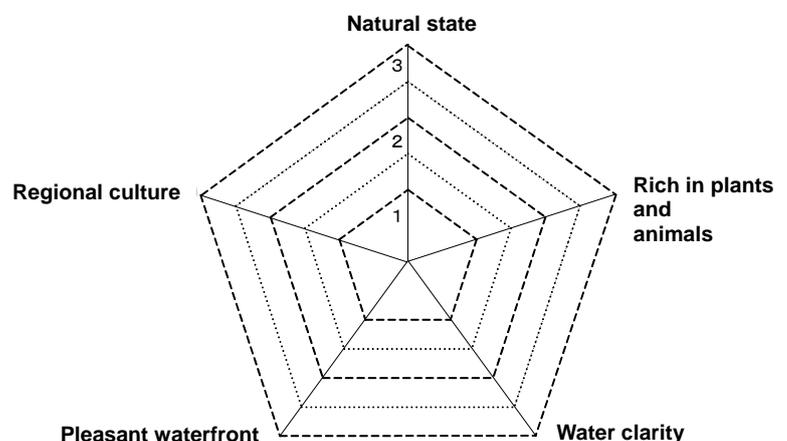
3. Summary of the findings

Calculate the overall averages by adding up each item after collecting all the investigators' findings.

Index	Item	Average	Index	Item	Average
Natural state	Quantity of water		Pleasant waterfront environment	Scenery (feel)	
	Condition of the riverbank			Trash (visual)	
	Can fish go upstream?			Touching the water (touch)	
	Overall average			Smell in the riverside (smell)	
Rich in plants and animals	Plants in riverside and riverbank			Sound in the riverside (audial)	
	Birds and bird habitats			Overall average	
	Fish and fish habitats		Regional culture on water	History and culture	
	Condition of the riverbed and small organisms			Riverside accessibility	
	Overall average			Daily use	
Water clarity	Transparency			Industrial activities	
	Smell of the water			Environmental activities	
	COD (optional)		Overall average		
	Overall average				

(Summary)

Organize what you have noticed about the river. For example, draw up a radar chart as below and see how pleasant the riverside environment is.



3. Dos and Don'ts in a River:



- **Don't go to a river alone**

- ◆ Always go with at least three to five people

- **Don't go into a river in the following cases**

- ◆ When the river's water level is higher than your knee
- ◆ When you can't see the bottom of the river
- ◆ When the flow of the water is fast

- **When you go into a river, pay attention to the following:**

- ◆ Don't go barefoot. Wear shoes that you don't mind getting wet. (There may be empty cans or glass bottles in the river.)
- ◆ Walk carefully. A river can unexpectedly become deep or the river bottom can be slippery.

Vocabulary

Indices and separate indicators

An index is an evaluation measure of the condition of the water environment in a river. Each index has three to five separate indicators. Using a common measure throughout a country helps us better understand the results of an investigation or activities. As a result, you can compare your findings with those made in the past or at other rivers. It is also helpful when thinking about future tasks.

Riverbank Protection

To protect riverbanks from being washed away by the flow of water, they are sometimes strengthened with stones or concrete. Trees such as willows are also sometimes planted to strengthen riverbanks. In addition, devices that encourage plants and animals to multiply may be used.

Fish Ladders

If a weir is built in a river, fish and other aquatic animals can't move upstream. To help them move freely, a path to move up the weir, called a fish ladder, needs to be constructed. There are various types of fish ladders.

Going upstream

Some fish have habitats both in rivers and in the sea during their growth process. Fish that have been living in the sea may go upstream to spawn or to grow.

Transparency and Transparency meter (Clean measure)

In this category, we investigate how clear the river water looks. A tool called a "clean measure," which is a transparency meter, is used to check the clarity of the water.

<For instructors>

When you instruct children, attention should be drawn to the following points regarding planning, implementation, and the use of the results during the course of the investigation.

(1) Investigation period

Implementation of the investigation is very important. It is desirable to conduct the investigation four times a year, if possible. By investigating the same indicators several times in a year, students will see the change in the river according to the seasons, and by accumulating such information, they will understand the river in more detail. Some indicators may show small seasonal changes or no change. The investigation must be well planned taking into consideration the investigation teams (the number of participants and their age). It is desirable to continue the investigation using the same indicators and to accumulate information about the secular changes of the river.

(2) Investigation site

To investigate riverside conditions, try to select a river that the investigators are familiar with. In addition, an investigation site should require an approximately half-day investigation. Make an on-site survey and select an area several tens of meters to several hundreds of meters long taking into consideration the characteristics of the river. The reasons why a river that the investigators are familiar with should be selected are the safe management of the investigators and a smooth investigation because some indicators require many preliminary surveys.

(3) Preliminary surveys

Some indicators require preliminary surveys. For indicators of “regional water culture” and “rich in plants and animals,” it is desirable to collect sufficient information by referring to the sources mentioned below or by asking the necessary questions to related people. The gathered information should be explained to participants in a simple manner during the course of the investigation. The details of the investigation are described in the “Investigation manual (detail version)” of the investigation report prepared by the Ministry of the Environment in the 2008 fiscal year. Refer to the following materials:

- “Report of the Investigation on Water Environmental Soundness Index,” 2008 by the Ministry of the Environment
- River information on the websites of the Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism, prefectural governments, and local governments
- History and regional area information available in prefectural libraries
- Information on “Clearing House” on the website of the National Land with Water Information Data Management Center
- Information on “Biodiversity Information Clearing House” on the website of the Ministry of the

Environment

- Information on “Research on Nationwide Aquatic Organisms” on the website of the National Institute for Environmental Studies, Ministry of the Environment
- Information on “Environmental Database, Global Environment Outreach Center” on the website of the Ministry of the Environment
- Map Information System (test service) on the website of the Geospatial Information Authority (refer to <http://watchizu.gsi.go.jp/>)

(4) Implementing the investigation

The investigation method needs to be explained to the participants. At the same time, try to talk about various stories, such as the river history and relationships with the local area.

(5) Safety precautions

There are several points to keep in mind for a safe investigation. To take all possible safety measures, it is necessary to receive advice from experienced people and to collect sufficient information. (This information is available on the websites of river administration organizations or relevant organizations.)

Prior to the investigation, it is important to confirm that the participants (children) have signed up for the necessary insurance. Make sure to tell them that they need to pay attention to the following points during the investigation for their safety.

(Precautions)

1. The investigation must be done in a group of several members. Going to a riverside alone is not allowed because it is very dangerous.
2. Be careful of the flow of the water when you enter a river. The water flow might be faster than expected. Check the water speed before entering a river.
3. An investigation in a river must be done in a place where you can see the riverbed and the water depth is less than 30 cm. Do not go into deeper regions of the river because it is very dangerous.
4. Don't go into a river barefoot because there may be empty cans or glass bottles in the riverbed. Wear shoes that you don't mind getting wet.
5. A river can unexpectedly become deep or you might get stuck in the mire. Walk carefully.
6. Wear rubber gloves when you touch the riverbed or trash.
7. Before starting the investigation, agree on a communication method or a place to contact (e.g., a hospital) in case of injury or accidents.

(6) How to use the investigation (results)

1. Implementation as an integrated study or environmental education

When the investigation is implemented as one part of an integrated study, a science class at a school,

or an environmental education program by citizens/NPOs, it offers opportunities for children and adults to access their nearby rivers and to learn about riverside environments that they have never noticed before. If seniors, residents, and specialists transfer their knowledge to children well, children will understand deeply the area where they live. And by continuing these activities, children and adults will become more interested in their nearby rivers, which will lead to an improvement of the water environment.

2. Use of the investigation results

After the investigation is implemented as one part of an integrated study, a science class, or an environmental education program, the findings can be presented at the school and in the community or be reported officially as research done by children, citizens, or NPOs. Parents and local residents will therefore also become more interested in the riverside environment. Furthermore, if teachers, citizens, and NPOs convey the information through their networks outside the community, the activity will be recognized and more information will be exchanged.

This Textbook was translated by the Japan Society on Water Environment (JSWE) from the original Japanese version (by Ministry of the Environment) .