

# **Decreasing Water Usage and Preventing water contamination in the Japanese Household**

Chinae Higashiura, Minami Yamamoto, Saki Kawai

*Makuhari Senior High School , Japan, [kokusai@shibumaku.jp](mailto:kokusai@shibumaku.jp)*

## ***Abstract***

Japan is one country that is blessed with an ample water supply that everybody has access to. However, because it is so abundant, people are more prone to wasting it. This is why we aim to reduce the amount of water wasted, and to minimize the amount we use. In addition, the number of contaminants that can be removed from wastewater is limited, so we also aim to keep the water we discharge as clean as possible. To fulfill our aims, we will research and verify ways in which households can reduce water usage and prevent water contamination.

We would also like to investigate effective means to educate the public about methods of conserving water and preventing its contamination. Because individuals are limited in what they can do, it is necessary to impart the knowledge to give people the tools to reconsider water problems.

Although these may be small things, we believe that if each individual contributes in their own way to solving the problem, we can conserve water so that it is safe for the generations to come.

## ***Keywords***

Water conservation, taking action, education

## **1. Introduction**

In Japan, we live a life where we can easily access water by simply turning on the tap, so it is not surprising that most Japanese people are not concerned about access to water. Of course, while it is unlikely that water itself will disappear from the earth, Japanese people do not seem

aware of the fact that it is only possible to access very little of all the water there is.

After we decided to participate in this conference and started to research Japan's present water conditions, we realised that in order to cherish the limited water resources we do have, it is vital for us to reduce the amount of water we use, and keep the water we discharge as clean as possible. If each and every one of us makes an effort to do so, our efforts together can make a big difference. However, not many Japanese people enthusiastically strive to save water in their daily lives, so we thought that there was a need to educate people on what we can do to improve water problems facing the world. This is why we decided to do a project on how we can best educate people on water issues and water conservation.

## **2. Background Research**

### **2.1 Current water conditions facing Japan**

Japan's precipitation rate is twice the world average. However, because of the large population, the amount of water available to each person is limited. Globally, the average person consumes approximately 8600 tons of water each year, but only 3200 tons can be used in Japan. Even though we think that there is sufficient water, Japan's water resources are actually limited when compared to other countries around the world.

In Tokyo, the average amount of water consumed by one is 240 liters (2007 Bureau of Waterworks Tokyo Metropolitan Government), and 330 liters when including the water used in public such as restrooms, fountains in parks, hotels, and malls. Africa's 63 liters per person in a day is the smallest

amount of water that is used in the world, but an average Japanese person uses 5 times that amount.

In 2009, 80% of contamination (BOD) in Osaka was caused by household wastewater. This shows that one major factor of water pollution is the wastewater we discharge from our households.

## 2.2 Saving water: methods and effectiveness

### 2.2.1 Methods of water conservation

According to estimates by Japanese manufacturer TOTO, it is possible to make significant water savings using seven everyday actions (control the toilet flush accordingly / use a cup when brushing one's teeth / be careful not to use too much water at the sink / wash dishes in contained water / turn off the shower frequently, and not keep it running / lessen the amount of water used for baths / reuse the bath water for something else, such as for laundry). By doing each of these for one month, it is possible to save 3579 L of water; a saving of almost 43000L per annum.

### 2.2.2 Verification of the effects of water conservation during cooking

To verify the effects of saving water in our daily lives, we experimented the difference of the degree of water contamination and the amount of water consumed that a change in our daily routines can bring. Our experiment aimed to discover various ways to save water during cooking.

Method: We made a typical Japanese dinner for two. We did this twice: the first time, we made it without consideration for the amount of water that was used. The second time we were more careful to save water and to keep the water we discharge as clean as possible.



Figure 1: washing dishes in contained water



Figure 2: wiping dishes with unneeded cloth

Specific ways to save water:

- Wash vegetables in a container with water, in order of their cleanliness
- Wipe the dishes and cooking utensils with a small piece of unneeded cloth before washing them
- Use diluted detergent
- Wash dishes and cooking utensils in a container filled with water.

Results:

- When cooked as normal, the COD was 2077.5mg, but when we cooked using the 5 ways to save water stated above, it decreased by 42.71%, to 1190.1mg.
- Phosphoric acid ( $\text{PO}_4^{3-}$  mg/L) decreased from 76.5mg to 10.04mg
- The amount of water used decreased rapidly (14.9L) from 37.15L to 22.25L
- The COD of the water we discharged when we washed dishes normally was 1080mg, but it decreased by 62% to 410 mg when we wiped the dishes before washing them.

COD: COD is short for Chemical Oxygen Demand. It is one of the indicators of water pollution. It shows how much materials such as organic matter is contained in the water by indicating the amount of oxidizing agents such as potassium permanganate, and converting it to the amount of oxygen consumed. The higher the value of COD, the more organic matter there is in the water, which results in a higher degree of water pollution. It is indicated using units such as ppm or mg/l.

Phosphate ions: Phosphoric acid ions are used in a wide variety of things ranging from synthetic detergents to fertilisers to food. The higher the number of phosphoric acid ions, the richer in minerals and organic nutrients the test sample will be, resulting in a reduction of dissolved oxygen.

### 3. Current Investigation

#### 3.1 The Purpose of the Current Investigation

We predicted that because Japanese people are not aware of many of the water problems facing the world, they do not actively try to save water. If we provide the necessary information, then maybe people will be more proactive in conserving water.

In our study, we will aim to educate the people of Japan to make efforts to conserve water.

The current investigation has two parts:

- i) To ascertain the level of awareness students had of the water problems facing Japan currently.
- ii) Test which methods were most effective in promoting action toward these issues

We predicted that because Japanese people are not aware of many of the water problems facing the world, they do not actively try to save water. If we provide the necessary information, then maybe people will be more proactive in conserving water.

#### 3.2. Method of the Investigation 1

To authenticate this hypothesis, we performed a survey at our school to acquire information on what people know about the water problems that the world and Japan faces. The school, a private high school, is located in Chiba, Japan. We asked 383 students aged 15 and 16 and received 351 answers.

Survey 1 (Appendix 1)

#### 3.3. Results of the experiment and discussion 1

Number of people/question	①		②		③		④		⑤		⑥		⑦	
		%		%		%		%		%		%		%
1	268	77.5	38	11.0	4	1.2	17	4.9	5	1.4	8	2.3	6	1.7
2	205	60.1	136	39.9										
3	35	10.2	140	40.8	123	35.9	45	13.1						
4	160	45.8	189	54.2										
5	48	13.8	299	86.2										
6	○	74	22.0	57	17.0	21	6.2	33	9.8	68	20.2	84	24.9	
	△+○	135	18.8	129	18.0	96	13.4	95	13.2	136	18.9	127	17.7	
7	193	55.8	146	42.2	7	2.0								
8	161	47.2	78	22.9	54	15.8	39	11.4	9	2.6				
9	41	11.7	183	52.3	112	32.0	14	4.0						
11	133	38.6	212	61.4										
12	126	36.2	154	44.3	54	15.5	14	4.0						

77.5% of the people answered Global Warming as the “environmental issue” that first comes to their mind, but on the other hand, only 1.2% (4 people) associated water problems with environmental issues. Most people do not pay attention to or are concerned about water issues. 60.1% of the people answered that they make an effort to be eco-friendly, but only 38.6% of people save water. Out of the 60.1% that answered they are eco-friendly, 46.8% answered that they do not conserve water. It can be inferred that although people are mindful of the environment, there are only a few people who think about protecting water resources. About half the people who try to be green do not consider saving water. The students we surveyed were not aware that water problems are one of the environmental issues facing the world, and were not alert of the fact that water is a limited resource.

There was also a difference between knowing the information and taking action. Although there were 158 people who knew about the world’s water issues, only 68

people (43.0%) tried to save water. While 46 people said they knew about Japan’s water problems, only 24 people (52.2%) were trying to save water. Japan is on a closer scale to our lives than the world, and 9.2% more people who knew Japan’s water problems answered that they were trying to save water than those who knew about the world’s water problems. From this, we can interpret that the more the problem closely affects a person, the more likely they will be aware of it.

80.5% of people thought that an individual’s effort to save water will positively influence the water problems that Japan and the world face, but only 38.6% of people took action. Out of the 173 people who understood that water is a limited resource, only 84 people (48.6%) made an effort to conserve water. Despite having an awareness of the problems, these results suggest that many do not take the necessary action to eliminate these problems.

## **4. Effects of education**

### **4.1 Hypothesis**

The first survey showed that despite the fact that many people have the knowledge, very few of them take the step forward and act to save water. We came up with two possible explanations as to why people do not take the necessary action.

1. The knowledge they have is incomplete and/or vague, so they do not feel the immediate threat of the water problem
2. They have the knowledge but do not take the necessary action because they do not actually feel the reality of the problem

### **4.2. Method of investigation**

Three modes of instruction were used in order to test how effectively student behavior could be manipulated. Each mode was evaluated in two areas; i) how effectively it taught students information about the problems ii) how effective it was in conveying the urgency of the problems. After a week, we performed a survey and examined if there were any differences between their awareness. We asked 307 people and received 246 answers.

Survey 2 (Pamphlet/Poster) (Appendix 2)

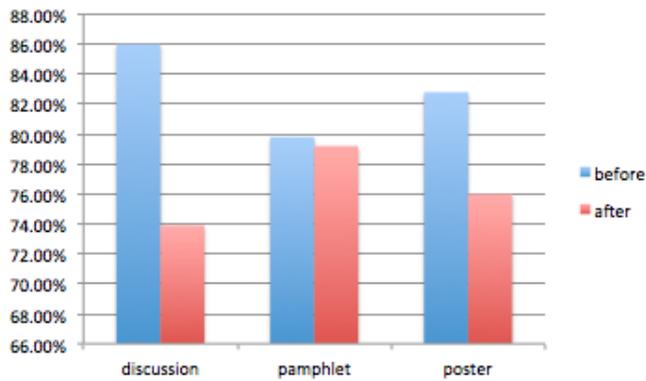
Survey 2' (Discussion) (Appendix 3)

Results of the experiment and discussion 2



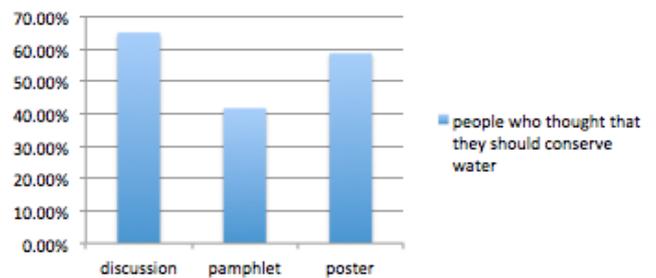


Graph 2; the percentage of people who answered that an individual's effort would affect the water problems the world and Japan face



Graph 3

people who thought that they should conserve water



number of people who answered that an individual's effort would affect the water problems the world and Japan face decreased in all three educational activities. By becoming aware of the problem and the intensity of it, many people thought that it is important for everyone to take action, not just individuals. Discussion may have declined the most because students were not able to visually see the changes an individual can make.

- 19% of the people read the distributed pamphlet
- 35.6% of people read the displayed poster
- The percentage of people who thought that water problems are closely related to them

pamphlet...69.9%

poster...85.6%

- People who thought that they should conserve water

discussion...65.2%

pamphlet...41.8%

Poster ...58.8%

The students who participated in the discussion felt that they should conserve water compared to those who read the poster or the pamphlet. By examining the problem from many perspectives and considering a solution together, the students were able to perceive the importance of their actions

#### 4.4 Discussion

##### Confirmation of hypothesis

It can be said that providing correct information in some form was effective in raising awareness toward water conservation. By being presented the effects of water conservation, students were able to realise that their efforts can have a positive effect. However, despite the fact that the number of people who claimed that their knowledge increased, the number of people who actually took action were still very low. This shows that being able to really feel the problem motivates students to actually act.

##### Differences of effectiveness comparison

Those who answered that the individual's efforts were the most significant countermeasures against water consumption was the highest for the pamphlet. The poster group was also high. The group that read the pamphlet answered that the individual's efforts were the most significant countermeasures against water consumption. The group that read the poster answered similarly. This shows that it is effective to address individuals to take action. For

example, the pamphlet was given out to each person. Organizing the facts so that the students could learn visually were effective to make the content more memorable for the students.

For all three educational activities, the number of people who agreed that an individual's effort to save water will positively affect water problems decreased. The one that showed the most decline was the discussion. This suggests that after realising how intense the problem was, the students felt that it was necessary for many people, and not just one person, to make efforts to save water.

To the question: "Did you think that the contents of the pamphlet/poster directly relate to you and your life?", 69.9% of those who read the pamphlet responded with a "Yes", whereas 85.5% of those who read the poster responded with a "Yes". The layout of the poster that emphasised the effects of water conservation may have made students feel that the water problem was something that directly affected them.

People who participated in discussions were the most likely to make efforts to save water. It is important to voice one's own opinions, because this activity makes the experience more memorable.

Students may have felt that the problem discussed directly affects them because the topic of the discussion was "What we can do to save water", something that they can directly relate to their daily lives. Also, by exchanging ideas and expanding it, they were able to relate their daily lives to water problems and effectively remember the experience

For the students who read the pamphlets or the posters, these methods were effective to educate them with the basic knowledge. However, many people did not read the poster

or the pamphlet. There is a need to present information in an engaging way that would attract the reader's attention.

## 5. Conclusion

### Advantages and disadvantages of different education activities

All three methods of educational activities have different characteristics, which lead to various effects on the student. Every student can participate in discussions, and individuals can develop their own ideas and share them with peers so it is easier to feel close to the problem. Also, by delivering the information to others, one is more likely to remember it. However, compared to the poster and the pamphlet, it is difficult to appeal visually to the students to make the content more memorable. In a poster, words and images can be emphasized so they appeal to the visual sense, but the problem can not be addressed to everyone. It is likely that there are people who won't read it, and it is difficult to write specific details because posters are more effective when they are brief. A lot of details can be presented at once in pamphlets. They can be distributed to everyone, but it is up to the individual to read it. It may be hard for the readers to select the information that is the most important, and they might find it wordy and tedious.

The most effective way to influence a group to conserve water is by having everyone participate and develop their own ideas, and share them with their peers. It is also important to tell accurate information in a visually engaging way. One method that meets these requirements is conducting a lesson.

## Lesson Plan

### Learning Objectives

To understand water problems accurately  
Know the importance of using water thoughtfully  
To experience the effectiveness of such water conserving actions.

### Target Audience

A senior high school class with about 40 students

### Primary focus of the lesson

- Address individuals to take action
- Present information using visual aids
- Emphasize the significance of individual efforts to conserve water
- Deepen the awareness of the issue through peer discussion

### Lesson Overview (60 minutes )

- ① Introducing the topic: Talk about the finiteness of water resources, the importance of saving water and keeping the water we discharge clean (3 mins)
- ② State learning objective(1 min)
- ③ Explanation of the experiment (2mins)
- ④ Have the students write a hypothesis(2mins)
- ⑤ Prepare the experiment(5mins)
- ⑥ Conduct the experiment in groups of 3 or 4 and write observations on the worksheet (10mins)
- ⑦ Share with the class (5mins)
- ⑧ Conclusion(the importance of saving water and keeping the water we discharge clean; part 2)(3mins)
- ⑨ Explain the topic of the group discussion and overview(2mins)
- ⑩ Have the students write their ideas for the discussion topic on a worksheet(2mins)
- ⑪ Group discussion(5mins)
- ⑫ Presentations(10mins)

⑬ Explanation of Japan's traditional water conservation system(2mins)

⑭ Conclusion(5mins)

### Lesson Example

① Here's a question for all of you: How much water do you think can be accessed without difficulty out of the water resource on Earth?

A 10%    B 1%    C 0.1%    D 0.01%

The answer is D.

Most of the water that exists on this planet is seawater, and freshwater only accounts for 2.5%. Furthermore, a majority of that 2.5% exists in the form of ice or icebergs near the North and South Pole, so only 0.01% of water is available in easily accessible forms such as freshwater from rivers and lakes. It is unlikely that water itself will disappear from the face of earth, but Japanese people are not really conscious of the fact that it is only possible for us to use a very little portion out of all the water there may seem to be. Nowadays, desalination technology and technology to treat used water so it is drinkable again are developing. However, the amount of water that can be made with these technologies are slight, and the majority of the water that is used is drawn from rivers or from underground. However, the amount water that is drawn from underground exceeds the water supplied by rain, so there are areas that are dried up and desertified or where the ground subsided. Therefore, we should minimize the amount of water resources we use, and the closest solution we can take to do so is to conserve water.

There may be people who doubt that water conservation in Japan will affect the water problems that the world faces. It is true that in most regions of Japan there is an abundant

amount of water, and even if Japan cherishes water, the water will not be provided to areas facing water problems. However, if Japan saves water, water pollution can be prevented and .

Here is another question. Wastewater is drained into rivers and oceans, but which of the following is the main reason of water pollution?

- A Agricultural wastewater                      B Industrial wastewater  
C Household wastewater

The answer is C. In Osaka, 80 percent of the contamination of water was caused by wastewater from households. Most of the water is treated before it is drained, but wastewater can not be completely purified. In reality, water that contains contaminants are drained into the rivers and the oceans. To decrease the amount of contamination, it is essential for us to reconsider the way we use water in our daily lives.

① Today's learning objective is to be able to accurately understand the water issues that we face today, and to recognise the importance and effects of each and every one of us making an effort to conserve water.

③ First, we would like to conduct an experiment in groups of 3 or 4 to reexamine water usage. The topic of the experiment is "the use of detergent". I think most of you use a lot of detergent when you are in the kitchen or using the washing machine, but do you know that when a large amount of detergent is drained into rivers, lakes, and marshes as wastewater, organic matter increases abnormally and results in water pollution? For example, detergent is thought to be one of the reasons for water quality worsening or bacteria growing unnaturally. Today, we would like you to learn the adequate amount of detergent and review it in your house as well.

Here are the steps to conduct the experiment.

1. Pour chili sauce into the watch glass, and soak the edge (0.5cm) of the kite string in the chili sauce.
2. Drop the six kite strings into the test tubes at once, and start recording the time
3. Measure the time it takes for the chili sauce to rise to the surface.

④ Before we start the experiment, I would like everyone to make a prediction. Please fill out the "prediction" section of the worksheet.

⑤ When you finish writing, please start preparing for the experiment.

⑥ (When some groups start observing the chili sauce rise) Write down the results into the "result" section on the worksheet as you are observing. Please discuss in your groups what you thought through the experiment, and have someone from each group write the thoughts down on the blackboard. We would like to discuss as a class in 10 minutes.

⑦⑧ (Comment on the students' thoughts that were discussed)

From the discussion, I think you noticed that we tend to overuse detergent even though it is effective when the quantity used is small. When you go home, please share your findings with your friends and family.

⑨ Next, I would like you to discuss in groups. The aim of the discussion is to exchange and expand on your ideas about saving water regularly.

⑩⑪ Now, I would like you to discuss in your groups about the methods we can take to conserve water in the house, at

school, or outside. First, please think by yourselves and make a list on your worksheet. After two minutes, share them with your group and write down at least two or three ideas. Use the paper and post-its freely, and be prepared to present your ideas in five minutes.

⑫ Please present your ideas to the class in roughly a minute.

⑬ (Comment on the presentations)

There are many things you can do in your everyday life. Even if they are little things, they will add up to make big changes if you continue them everyday.

I would like to introduce a little bit of traditional systems to conserve waters. Some of them are still used today. For example, this is a Kabata...

⑭ Through today's lesson, I think you all learned something new. What we can do as individuals or as groups may be limited, but if many people continue to take action, it is possible for us to make big changes. All of us have different lifestyles, and what we can do may differ between each of us, but it will be wonderful if you can educate other people on what you learned today, and be the one to take and spread the action.

Thanks for your eagerness today!

## References

「化学的酸素要求量 (COD)」とは - ビジネス - 緑のgoo." *緑のgoo*. 緑のgoo, n.d. Web. 26 Feb. 2016.  
<<http://www.goo.ne.jp/green/business/word/ecoword/E00277.html>>.

"どうして生活排水対策が必要なの?." 大阪府. 大阪府, 7 Oct. 2015. Web. 14 Apr. 2016.

<[http://www.pref.osaka.lg.jp/kankyohozen/sei-hai/sei-hai\\_w hy.html](http://www.pref.osaka.lg.jp/kankyohozen/sei-hai/sei-hai_w hy.html)>.

鳥谷, 明弘, and 卓也 傳谷. "水質データの基礎知識." *ISAHAYA HIGATA NET*. ISAHAYA HIGATA NET, n.d. Web. 3 Feb. 2016.

<<http://www.isahaya-higata.net/isa/libr/lb971030suishitu.html>>.

"節水で、節電。[水と環境] | TOTO." *節水で、節電。[水と環境] | TOTO*. TOTO, n.d. Web. 16 Jan. 2016.

<<http://www.toto.co.jp/greenchallenge/value/setsuden>>.

"節水や汚さないための工夫." *サントリーのエコ活*. サントリー, n.d. Web. 20 Jan. 2016.

<[http://www.suntory.co.jp/eco/teigen/jiten/keep/ke\\_10\\_01.html](http://www.suntory.co.jp/eco/teigen/jiten/keep/ke_10_01.html)>.

吉村, 和就. "映画『ブルー・ゴールド-狙われた水の真実』公式サイト|狙われた水の真実." *映画『ブルー・ゴールド-狙われた水の真実』公式サイト*. グローバルウォーター・ジャパン, n.d. Web. 15 Jan. 2016.

<<http://www.uplink.co.jp/bluegold/production/>>.

## Appendix

.1 Survey 1

(1)What do you consider an “environmental issue”? Please circle the first thing that comes to your mind.

- ①Global warming ②Air pollution ③Water Problems  
④Deforestation ⑤Wildlife species diminishing  
⑥Desertification ⑦Others ( )

(2)Is there anything you do to be eco-friendly? (If “Yes”, please write specifically)

- ①Yes ( ) ②No

(3)Do you keep in mind that water is a limited resource?

- ①Yes ②Most times ③Sometimes ④Never

(4)Do you know about the water problems that the world faces today? (If “yes”, please write in detail what you know)

- ①Yes( ) • ②No

(5)Do you know about the water problems that Japan faces today? (If “yes”, please write in detail what you know)

- ①Yes( ) • ②No

(6)On what scale should countermeasures be taken to solve water problems? Please circle the one you think has the greatest effect. Please draw triangles around any more that you think are necessary.

- ①Individual ②Household ③Community (eg: school/the workplace) ④Local government ⑤National government  
⑥International organizations - such as the United Nations

(7)Which of the three do you think pollutes water the most?

- ①Industrial Wastewater ②Household Wastewater  
③Agricultural Wastewater

(8)Out of these five, where do you think we discharge the greatest in amount out of household wastewater?

- ①Bathroom ②Restroom ③Kitchen ④Washing Machine ⑤Around the Sink

(9)Do you ever feel that you use too much water?

- ①Yes ②Most times ③Sometimes ④Never

(10)If you answered “①Yes” or “②Most times”, in which situation do you feel that you use too much water?

( )

(11)Is there anything you do daily to save water? (If yes, please answer specifically)

- ①Yes( ) • ②No

(12)Do you believe that an individual’s effort to save water will affect the water problems that Japan and the world face?

- ①Yes ②A little ③Not so much ④No

.2 Survey 2 (Pamphlet/Poster)

(1) On what scale should countermeasures be taken to solve water problems? Please circle the one you think has the greatest effect. Please draw triangles around any more that you think are necessary.

- ①Individual ②Household ③Community (eg: school/the workplace) ④Local government ⑤National government  
⑥International organizations - such as the United Nations

(2) Do you ever feel that you use too much water?

- ①Yes ②Most times ③Sometimes ④Never

(3) Do you believe that an individual’s effort to save water will affect the water problems that Japan and the world face?

- ①Yes ②A little ③Not so much ④No

(4) Did you read the pamphlet/poster?

- ①Yes ②No

(5) —If you chose “①Yes”, please tell us the thing that left the biggest impression on you.

( )

(6) —If you chose “②No”, please tell us why you didn’t read it.

( )

(7) Were you able to relate the discussion to your daily life?

①Yes ②A little ③Not so much ④No

(8) After reading the pamphlet/poster, did you feel you want to save water?

①Yes ②No

(9) —If you chose “①Yes”, did you make efforts to save water?

①Yes ②No

(10) —If you chose “①Yes”, please write in detail what you did to save water.

( )

(11) Lastly, if there was anything you thought about the pamphlet/poster, or about water problems and saving water, please write freely in the space below.

### .3 Survey 2’ (Discussion)

(1) On what scale should countermeasures be taken to solve water problems? Please circle the one you think has the greatest effect. Please draw triangles around any more that you think are necessary.

①Individual ②Household ③Community (eg: school/the workplace) ④Local government ⑤National government  
⑥International organizations - such as the United Nations

(2) Do you ever feel that you use too much water?

①Yes ②Most times ③Sometimes ④Never

(3) Do you believe that an individual’s effort to save water will affect the water problems that Japan and the world face?

①Yes ②A little ③Not so much ④No

(4) Were you able to connect the discussion with your daily life?

①Yes ②A little ③Not so much ④No

(5) After the discussion, did you feel that you want to save water?

①Yes ②No

(6) If you chose “①Yes”, did you make efforts to save water ?

①Yes ②No

(7) If you chose “①Yes” in (6), please write in detail what you did to save water.

( )

(8) Lastly, if there was anything you thought about the discussion, or about water problems and saving water, please write freely in the space below.

4 Example Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

Learning Objective :

●Detergent Experiment

< Tools >

Test tube, kite strings, detergent, chili oil, paper clips, watch glass, test tube rack, stopwatch

< Preparation >

In the 6 test tubes, put 3 ml of the undiluted solution, 1.5 fold dilution, 3 fold dilution, 5 fold dilution, 10 fold dilution, and water

Cut the kite strings into six 2cm pieces, and clip them at the edge with the paperclips

< Procedure >

1. Pour chili sauce into the watch glass, and soak the edge (0.5cm) of the kite string into the chili sauce.
2. Drop the five kite strings into the test tubes at the same time, and start recording the time
3. Measure the time it takes for the chili sauce to rise to the surface.

< Prediction >

○The effect of the detergent

	Undiluted solution	1.5fold dilution	3 fold dilution	5 fold dilution	10 fold dilution	Water
Does it rise to the surface (○×)						

Water <

<

<

<

< Results >

	Undiluted solution	1.5 fold dilution	3 fold dilution	5 fold dilution	10 fold dilution	water
Did it rise to the surface(○×)						
Time it took						

< Examination > Calculate the reciprocal of the time and consider it as the effectiveness of the detergent. Find the relationship between the effectiveness and concentration of the detergent.

●Discussion

Topic : methods we can take to conserve water

< My Ideas >

< Group Discussion Notes >

< Notes from other groups >

- Summary

Did your thoughts toward water change after the lesson? If so, how did it change?

# Decreasing Water Usage and Preventing water contamination in the Japanese Household

Chinae Higashiura, Minami Yamamoto, Saki Kawai

## Question 1

How much water on Earth can we use can be easily accessed?

A 10%

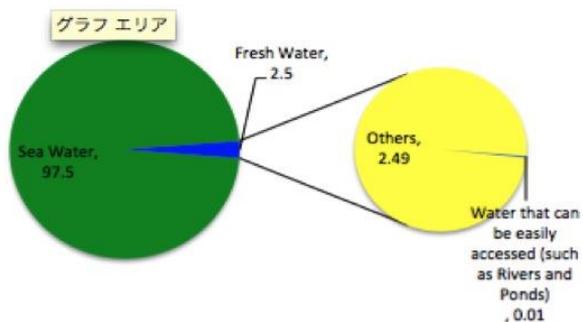
B 1%

C 0.1%

D 0.01%

**The Answer is...**

## Usable amount of water



## Question 2

What is the main cause of water pollution?

A, agricultural wastewater

B, industrial effluent

C, domestic sewage

The Answer is...



## Learning objective

To understand water problems accurately as well as understanding the importance of using water thoughtfully and experience the effectiveness.

## Let's do the experiment!!!

objective; to review the usage of detergent and to learn correct amount of it





## Group discussion

Topic; devices we can do in our daily lives

Overview; 1, write your ideas on the worksheet

2, discuss it with group members and write a poster

3, share all ideas with the class



**Every little bit  
counts!!!!**