

The Future of Tokyo Bay

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1.1 Abstract

In past years, Tokyo Bay had been the fundamental center of aquamarine culture and business, until the sudden waves of modernization in the 70s polluted the water to a severe extent. Since the events of the 2020 Tokyo Olympics will be held partly in Tokyo Bay, we researched the current situation through interviews with the government and NPOs coming up with solutions to improve the water quality.

The causes of the pollution are heavily connected with our daily routines, which directly affect the waters that were once abundant in marine life. By educating the people in our communities and raising awareness to prevent pollution, we can take some steps towards a cleaner, purified Tokyo Bay.

Through this project, the next generation is going to be our target audience. We plan on giving presentations to elementary school students residing around the Tokyo Bay area, outlining the basic issues of water in the Bay, and encouraging them to start taking initiatives for its recovery. Involving the students in our plan will help contribute to water purification in the future generations, and raise awareness in the local communities.

1.2 Keywords

Tokyo Bay, contamination, awareness, sewer, education

1.3 The Purpose of the Research

The main purpose of the research is to recreate a flourishing Tokyo Bay, abundant with marine life and unpolluted water. Despite a number of efforts by local communities and

government, currently, Tokyo Bay is a marine dumpster for sewage waste. This is due to the government ignoring the harmful effects resulting from water pollution back in the 1960s, when Japan kicked off its rapid economic growth and the peripheral areas of Tokyo Bay industrialized heavily. In addition, Tokyo Bay is also used for overflowing sewage and rainwater waste. In cases of flooding, the contamination has worsened significantly in the past 10 years. Thus, the water quality has now deteriorated to the point where people are prohibited from even merely wading in the water, because the absorption of bacteria, such as E.coli, in the water jeopardized human health

Although it is apparent that Tokyo Bay has numerous issues, we frequently hear about the possibility of its hosting water sport competitions such as triathlon in the 2020 Tokyo Olympics. However, the poor water quality and the safety hazards the contamination may pose to the athletes is a serious matter that must be solved immediately. In order to make the 2020 Olympics a success, and an enjoyable time for all participants, it is vital for Japan to provide an absolutely safe environment for each competition. Not only in the case of the Olympics, but for the benefit of future generations, reviving Tokyo Bay to the extent of it being a rich fishing ground, supplying the market with plentiful seafood, and a pleasant place for entertainment is desirable. Therefore, as students representing Tokyo, Japan, we decided to contribute to this matter by presenting a solution to the problem.

1.4 Method of the Research

Our Original Plan

In order to meet our goal, in the first stage of the research, we planned to organize a community project concentrating on children, especially those in elementary schools, whose

actions in the future would decide the fate of the bay. Our project originally consisted of delivering a simple presentation outlining the causes of deterioration in water quality, the effects contamination has on our society, as well as methods of purifying the water. By doing this, we hoped that we would be able to emphasize and raise awareness of the importance of purifying Tokyo Bay. After this presentation, we aimed to carry out a discussion with the children reflecting on our topic, surveying their interests and how they perceived the problems of Tokyo Bay. Then, we hoped to link the result of the survey to a community project that would be taking in account the children's perspectives, so it would thoroughly and profoundly grab their attention and boost their motivation to participate. For example, the survey and discussion could have told us that children showed interest in purifying the bay with clams, and this would give us an idea to concentrate our project on that specific topic in ways such as an experience releasing clams to Tokyo Bay. Taking into account that we would need support in the means of money, specialists, as well as the permission of the government for the final project, our goal was to present our project idea thoroughly to the government, and involve the whole community by holding a fundraiser to raise money.

In order to create the aforementioned presentation that focuses on the core of the issue and is easy to understand for elementary school students, we wanted to carry out detailed research focusing on two methods to purify water in Tokyo bay. The first one is a method using an underwater screen that can separate purified water and contaminated water by using plastic and high-tech pumps. This water screen has been considered for the triathlon games in the 2020 Olympics as a temporary measure to clean the water used in the games. However, not only can the underwater screen be used as a temporary measure in the Olympics, but it can also be used as a permanent measure to prevent the water quality in Tokyo bay from deteriorating. By making a collapsible underwater screen and using it whenever heavy rain falls, the screen can prevent sewage from diffusing into the bay. When the water level is back to normal, pipes take in the stored sewage back and carry it to the sewage disposal

plants. Although organizations including the Olympic committee have taken interest in water screens, it is yet in discussion and has not been created in Tokyo Bay.

Therefore, to examine whether an underwater screen acting as a blockade in the Olympics and a facility to store water as a long-term solution is feasible, we planned on creating a mini underwater screen with the help of our science teachers, and interview experts on this topic to get a view of how they are planning on putting this plan into act.

The second method we planned to focus on is the release of shellfish, such as clams, that have the ability to purify water. Naturally, these shellfish have the abilities to absorb phytoplankton and particulate organic substances with seawater, and filter it to use the substances for food, releasing the purified water back into the bay. Although this method was declined by the Olympic committee due to its cost and inability to serve as a short-term solution, in the long term, this method is highly effective because it is based on the power of nature. Some communities, such as fishermen, have already started programs using this method. To examine the outcome of this method, we planned to research how much purification shellfish are capable of doing in an hour, and what species of shellfish are most effective, using the school laboratory as well as interviewing specialists and organizations who have already started similar projects.

The first method is based on cutting-edge technology that Japan prides itself on, while the second method—though more primitive—embodies Japan's traditional approach towards the importance of sea life. Therefore, not only would this be an interesting contrast when creating the presentation, we hoped that it would spark the other countries in WIL2018 with new ideas applicable to their countries in solving contamination of water.

Visits to NPOs and the Government

In order to create an inspiring, persuasive presentation, we concentrated on assembling solid facts and first-hand information, as well as gaining profound understanding of this problem for ourselves. Thus, we held meetings with

NPOs and Tokyo Metropolitan Government Tokyo Bay branch that has devoted efforts in this matter. Below is the summary of each discussions we held with the organizations.

Furusato Tokyo wo Kangaeru Jikkou Inkai

This organization aims to reclaim a Tokyo Bay suited for beach activities such as swimming. Taking in consideration the current situation of Tokyo Bay, they have so far organized few events. We mainly heard about the activities which are listed below, which they create in order to meet their goal.

Table 1: Activities created by Furusato Tokyo wo Kangaeru Jikkou Inkai

Name of activity	Content	Result
Opening a forum	Discuss matters relating to Tokyo Bay.	Raise awareness in citizens, and emphasize the importance of improving water quality in Tokyo Bay.
Marine gardening experience	An activity which involves raising marine life such as clams that have the ability to purify water. So far, they have organized a session to raise clams with children in Kaihin makuhari park, and seaweed production.	Raise awareness in children participating in the activity. Purify water quality by releasing marine life.
Sato-Umi-festival	An annual festival held in summer involving	Making participants feel

	marine activities. Popular activities include playing in tide pools.	familiar with Tokyo Bay and to make them understand the status quo.
Kasai-Kaihin-park west beach water purification facility	Held an experience on how well marine life which can purify water attach itself to five different materials. As a result, used bamboo as a base to attach marine life. Water that go through this filter becomes purified.	Directly improving the water quality in Kaihin area of Tokyo Bay.
Swimming experience in Tokyo Bay	Held a two day swimming experiment in kasai kahin park part of Tokyo Bay in 2012. As a result, the board which stated “no swimming” altered to “no swimming without permission”. It is gradually improving and in 2016, the days allowing swimmers increase to 33.	Creating a sustainable entertaining environment for Tokyo Bay.
Sea and mountain cooperation project	Use bamboo create filters. After its use, burn dead clams and use the shells as nutrients for mountain plants.	Improve environments as well as raise awareness of connection between mountains and sea.

In the discussion they emphasized the diverse changes which occurred in the last half century and the importance of regaining the former environment. In addition, we were able to understand the process of water purification by marine life in detail from their explanation. According to the organization, “clams absorb phytoplankton from their gills and decrease nutrients by releasing phytoplankton-free water as excrement resulting in the raise of transparency in water. It is said that clams purify approximately 240-400 liters of sea water a day. Similar to this, in the process of growing, seaweeds also absorb nutrients. Therefore by cultivating clams and seaweed it is possible to exclude nutrients that directly result in water contamination.” They also explained to us the history of fishing industry in Tokyo Bay. “In the past, Tokyo Bay was placed first place in the country for natural and cultivated clams. As well as this, Tokyo Bay had been a home for meretrix until 1955 when it faced extinction due to contamination. Seaweed cultivation was also popular in the past but after fishing rights were abandoned due to severe contamination of the Bay, this industry also became extinct.”

Tokyo Metropolitan Government Department Bureau Tokyo Bay

The motto of this department is to create a beautiful Tokyo Bay. Unlike the NPOs we visited, due to this organization being a government department, rather than creating projects and events which involve local communities, we understood that they focused on properly funded scientific approaches. Their distinctive approaches are listed below.

Table 2: Activities created by Tokyo Metropolitan Government Bureau of Environment

Name of activity	Content	Result

Regular scientific measurements of water quality in Tokyo Bay.	Measurements taken on: existing E. Coli, transparency etc. in different parts of Tokyo Bay. Create maps and graphs to show areas that need more purification.	By analyzing areas that needs improvement, the department and other organizations can specifically concentrate on these areas. Lead to further research.
Water filter and screens	Place filters and screens which separates purified water and contaminated water to stop the spreading of contamination.	The areas surrounded by the screens become temporarily clean but rain can easily flood the screen and fails the system. Ships entering the area also pollute the screens.
Purification using the methods of marine life	Releasing marine life such as clams that have the ability to purify water.	Cannot gain instant result. Some marine life fail to adjust to the environment and dies. Financial difficulty.

In contrary to the NPOs which emphasized the deterioration of water quality and the need to purify water, the department presented us with a new perspective on the matter. They stressed that Tokyo Bay in fact, is not as contaminated as everyone believes it to be. They first stated that compared to resort destinations like Okinawa, due to the dead-end shape of Tokyo Bay, along with the extremely slow flow of water, Tokyo Bay an ideal dwelling place for bacteria and plankton. Therefore, we cannot expect Tokyo Bay to

transform into a dream resort in the first place. Although these colors are gradually improving in recent years, when people witness the murky color of the water or the red tides, it is natural for them to feel disgusted, these colors are gradually improving in recent years. In fact, it is apparent that compared to 20-30 years ago, it has become clean according to scientific measurements, and recent measurements have revealed that the water in Tokyo Bay will not harm humans. Even if humans are still prohibited to swim in the bay, marine life is recovering and some fishes have returned to the bay. They stressed that we must always take into account that many people and organizations are putting together efforts to create a clean Tokyo Bay and the measurements show clearly show the results. On the contrary, they also told us that there is not enough money to create a proper method to improve water quality. This is due to the lack of awareness in citizens of Tokyo, resulting in the funds being used elsewhere. In the past, some of the methods were stopped due to lack of funds. They told us that the direct approach to the matter of Tokyo Bay is to improve the sewage system which directly flows into Tokyo Bay. As for the Olympics, they hinted that in the current situation, it is highly unlikely it will be possible to secure a safe environment in Tokyo Bay, but the Japanese government itself is denying this fact. They concluded with the importance of raising awareness in the locals, which connected with our first purpose of this research.

NPO Umi Juku (an organization to think about the marine environment of Tokyo Bay)

Similar to the furusato organization, this NPO concentrates on raising awareness among locals that reside in areas which use sewers that directly link to Tokyo Bay. They create informative and clear leaflets as well as hold sessions to deepen the knowledge of the local community. Their approaches are listed below.

Table 3: Activities created by Umi Juku

Name	Content	Result
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Marine life experience	a classroom based session for families to learn about marine life in Tokyo Bay, and the environment	Deepen understanding of Tokyo Bay
Family canoe experience	Families explore and detect marine life by rowing canoes	Create an image of Tokyo Bay as fun and important
Creating houses for ducks	Research habitats of ducks which were once abundant in Tokyo Bay, and to create ideal nests for them. Regular checks to sustain the environment.	Bring back ducks to Tokyo Bay. Connect local people to the bay by asking for volunteers.
Seawall to protect crabs	Create seawalls that has tidelands that create tide pools. This environment gathers diverse marine life.	Used by local elementary schools as a destination for field work and environment classes
Spreading blue carbon	Spreading the idea of UN's blue carbon(explained in the next section)	Explain the fundamental importance and the benefit of cleaning Tokyo Bay.
Clam water purification experiment in Odaiba park	Place clams on screens to purify water.	The clams extinct in a year due to failure to adjust to constant changes of temperature, lack of oxygen, and extremely high nutrient rates. Limit to natural

		methods of purification.
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Umi juku organization, just like the other two organizations, stressed the need to raise awareness in local communities especially in areas where sewers directly link to Tokyo Bay. They noted that although many people understand the contamination of the Bay, the majority of people do not know that the reason links directly to their sewers. With trivial efforts made at home, they believed that the current situation of Tokyo Bay would change. As well as this, they also told us that water screens are not as effective as a long term solution. However, in its place, massive underground tanks to temporarily store rain water during floods or monsoons may help stop the sewage from overflowing into Tokyo Bay.

Our Conclusion after the Interviews

After these interviews, we changed several parts of our original plan. We realized that the two methods we planned to focus on, purification based on the power of marine life such as clams, and water screens are not as effective as we had hoped. Instead, we learnt about other more effective solutions such as underground tanks and different types of sewers that help lessen contamination. This made us rethink what our presentation content should be. In addition, prior to the interviews, we judged Tokyo Bay as dirty due to its colour and the fact that we are prohibited to swim in the Bay. However, in reality, we understood that over the years, compared to the 1960s, the water quality had significantly improved and some forms of marine life that were once endangered are gradually recovering. This was contrary to our expectations, and we decided that in the presentation, we will mention the efforts taken to reach this step right now. Other than knowledge on marine life in Tokyo bay, we came across different perspectives and possible bias towards the topic of Tokyo Bay. This is because while some organizations stressed Tokyo Bay's cleanliness, others

stressed the need to make Tokyo Bay a clean place. From this experience, we decided to take both sides' information fairly in our presentation.

The Presentations

The interviews and research made it evident that our main objective was to raise awareness. Thus, we devised a plan to ultimately deepen the understanding of the water contamination in Tokyo Bay and how a community's daily efforts could impact the water quality. We narrowed the target audience to elementary-school children, as they would take the role of leaders of our country in the future. Although it is extremely difficult to suddenly change someone's ideas and beliefs if they've already completed the development of their brain, influencing them with education from an early age would make it possible.

We would start off by conducting presentations about Tokyo Bay in elementary schools to find out the students' current level of knowledge and to directly ask what kinds of community involvement projects they would be interested in participating in. After our presentations are over, we would carry out a survey asking how their ideas have changed, and what efforts they would be willing to conduct in the future. Their ideas would be incorporated into our final project, the proposal of a community-involved event intended to raise consciousness about Tokyo Bay.

Because it aligned with their yearly social studies curriculum focusing on environmental issues, we created our presentations aimed at 5th & 6th grade students. We went to two schools in Tokyo, Akabane Elementary School and Takaban Elementary School. We had a student audience of around 25 students in the former school, and around 75 in the latter. Using a PowerPoint presentation, we focused on the seriousness of water contamination in Tokyo Bay, and how to cooperate to improve the conditions. The second slide questioning them about their impression towards Tokyo Bay introduced them to the next slide, talking about the harsh reality of water pollution and contamination indirectly caused by people. Through historical timelines

and animated slides, we elaborated on how exactly our waste water affects the bay and the phenomena it triggers. Describing each of the stages to eventual environmental damage, we touched on many subjects like the cause of oxygen deficient water, red/blue tides, and the overflow of phytoplankton.

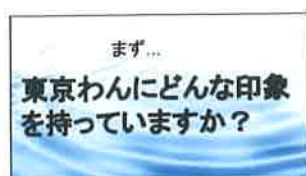
Now that the students have learned about the chemical chain reactions of water contamination, we explained why our waste is directly dumped into the bay, utilizing sewage system maps of the students' community to make it more easily relatable. Comparisons between the environmental impacts of newly developed sewage systems and old ones emphasized the significance of a need to reform society. In addition, we listed some possible solutions to improve the water quality, pointing out on the lack of awareness that makes it so difficult to fund and proceed with the solutions. Examples such as natural purification by certain marine animals and establishments of underground reservoirs were mentioned.

Towards the end, we encouraged the students to actively take part in improving the quality of Tokyo Bay's condition by presenting them with water-conserving methods anyone could do, and information about different organizations that are dedicated to solving this problem. We introduced them to Blue Carbon Initiative, a UN program working to improve water ecosystems and the absorption of CO² in the sea. As the sea intakes 55% of the world's CO², we stressed on how important it was to not only care about our contribution to the environment on land, but to be conscious about improving underwater ecosystems. To sum up the presentations in an entertaining way we included a quiz at the end and tested their level of understanding.

Table 4: slides for our presentation



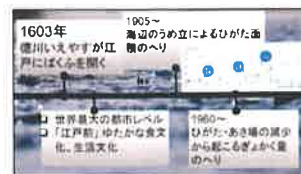
Cover Page



What impression do you have towards Tokyo Bay?



Reality of Tokyo Bay



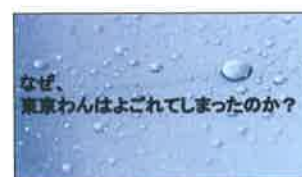
Historical Timeline



Red Tide/Blue Tide



2020 Olympics



Why is Tokyo Bay contaminated?



Sewage system



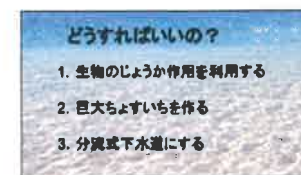
Sewage Map



Sewage Map



Types of sewage systems



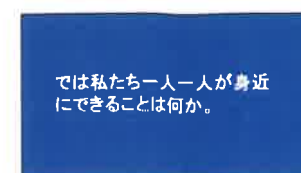
Scientific solutions



Solution using marine animals



Underwater tanks



Quiz: which system is better?

How we can contribute



Reducing food waste



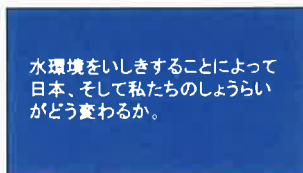
Spreading awareness



NPOs' contributions



Different activities



Why it's important



Blue Carbon Initiative



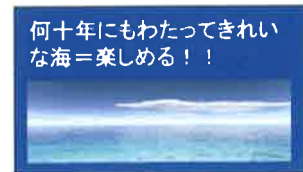
How money would be saved



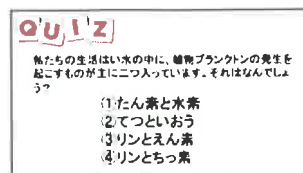
The amount of money saved



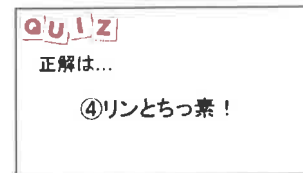
Abundance of aquaculture



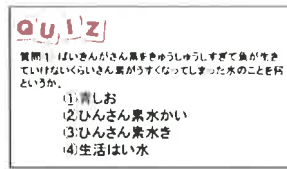
A beautiful ocean for everyone



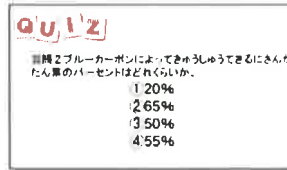
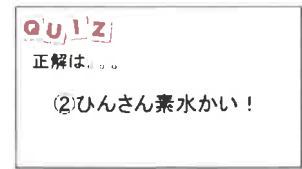
Q: Elements of phytoplankton



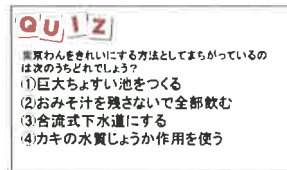
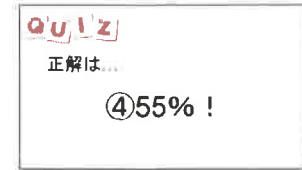
A: Phosphorus and nitrogen



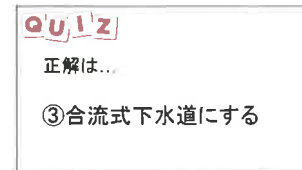
Quiz about oxygen-deficient water



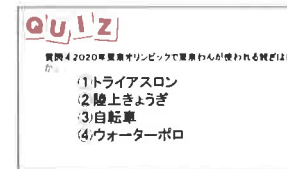
Quiz about the percentage of oxygen absorbed by bodies of water



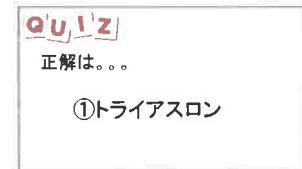
Which one of these choices to purify Tokyo Bay is incorrect?



A: establish combined sewer systems



Which sport is going to be played in Tokyo Bay in the 2020 Olympics?



A: triathlon

Response from the Students

One of the two elementary schools we presented at had an audience of around 25 students while the other had around 75. Unsurprisingly, the attitudes and responses from the students differed greatly based on the number difference. At Akabane Elementary School (the one with only 25 students as the audience) everyone was seated at their desks facing forward, resulting in a mannerly, calm silence whenever someone was doing their presentation. On the contrary, the

students in Takaban Elementary School (with 75 people) were seated on the floor in front of the projector screen, which led to constant whispers and giggles. However, viewing from another aspect the response rates of the students in Takaban were very high, always asserting their opinions and answers whenever we questioned them. Akabane students although very attentive were less willing to raise their hands, presumably because of the scarcity of the number of students.

Picture Story Show at Shibuya Preschool

In addition, we presented a picture story show regarding food waste and water to a few classes in Shibuya Preschool. We based our storyline on a simple lesson: don't waste food. We led them through the picture show following a little girl who was given her most disliked dish, Miso soup. The preschoolers actively participated when asked questions like "What is a food that you don't like?", "What would happen to the ocean if she dumps her soup in the drain?", and "So, what should you do?"

1.5 Results of the Surveys

In both of the elementary schools, we conducted a survey focusing on the effects the presentation had on the students. The content and result of the survey are as follow.

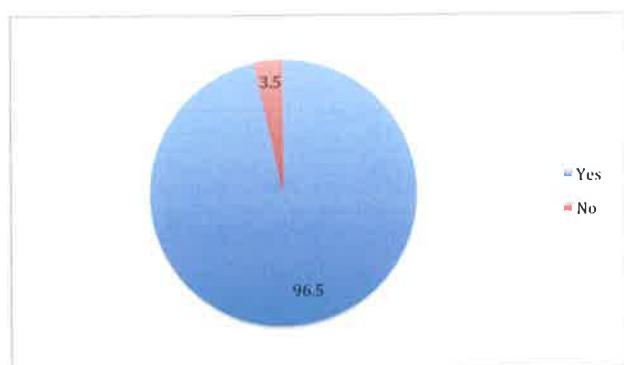


Figure 1: Did this presentation change your thoughts or bring new discoveries about the water contamination in Tokyo Bay?

It can be seen that almost all the students got new thoughts or discoveries on water-related issues from our presentation. This shows that although some of the concepts in the

presentation were complicated, elementary students understood them and learned new ideas from them.

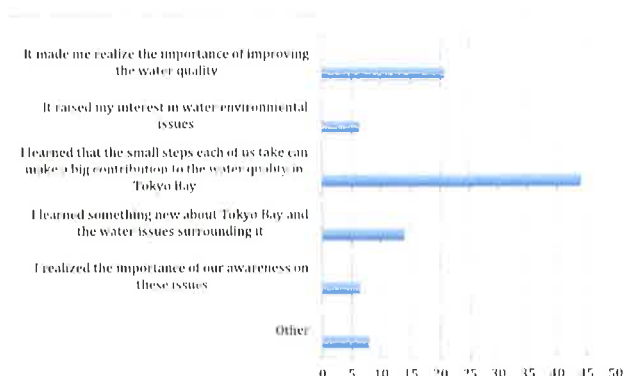


Figure 2: In what way did this presentation affect you?

Below are some of the detailed answers.

Table 5: Detailed answers to Question2

<p>It raised my interest in water environmental issues.</p> <ul style="list-style-type: none"> I got interested in Tokyo Bay. It made me want to know more about other issues relating to water.
<p>I learned that the small steps each of us take can make a big contribution to the water quality in Tokyo Bay.</p> <ul style="list-style-type: none"> Try to eat all my food and don't throw it away. Wipe dirty plates with kitchen paper before rinsing them with water.
<p>I learned something new about Tokyo Bay and the water issues surrounding it.</p> <ul style="list-style-type: none"> I learned the different ways to improve water quality. Understanding how the sewer works deepened my understanding of Tokyo Bay's water issue. I didn't know that 55% of the animals which absorb CO2 live in the ocean. It was interesting that shells in the ocean can purify water.

- I was surprised that it takes such a large amount of clean water to purify a small amount of oil on our plate.

I realized the importance of our awareness on these issues.

- I realized that talking to my parents and friends about what I learned in the presentation is important.
- Learning that the politicians' policies on water issues depend on us citizens made me realize that we are deeply involved in this issue.
- I thought we should be thinking more about these issues.

For this question, we had the students write free answers instead of having answer choices. We divided the answers into categories based on the content, and the chart above shows the result. This indicates that many students were affected by our presentation most by learning that the small steps each individual takes can make a big contribution to the water quality in Tokyo Bay.

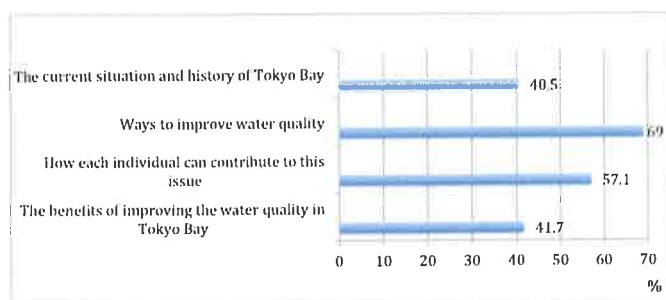


Figure 3: Which part of the presentation did you find interesting?

It can be seen that although all the sections of the presentation were relatively appealing to the students, the ways to improve water quality and how each individual can contribute to the issue were the most interesting parts for many students. From this result, we can infer that the students are more interested in the solutions to water contamination and how they can get involved and contribute to the issue than the history and statistics.



Figure 4: Did this presentation make you want to improve the water quality in Tokyo Bay?

Almost all the students felt that the presentation made them want to improve the water quality in Tokyo Bay. The results were very similar to that of Q1 (Did this presentation change your thoughts or bring new discoveries about the water contamination in Tokyo Bay?), and we can infer that the presentation had a positive effect on the elementary students and was meaningful.

Table 6: What do you think can be done in order to make people more aware of these water related issues?

- Talk to parents and friends about the issue.
- Take actions ourselves. (Eat all our food, wipe the dishes before rinsing them, don't waste water, etc...)
- Make posters.
- Give presentations.
- Hand out flyers.
- Make a homepage on the Internet.
- Make a TV commercial.
- Hold volunteer events.
- Raise awareness in public the issue to many people on the streets.
- Advocate the issue on social media.

For this question, we had the students write freely answers instead of having answer choices; therefore, we got a wide

variety of answers. However, the majority of the answers were related to talking to people about the issue or taking actions themselves, such as eating all their food, wiping the dishes before rinsing them with water, and not wasting water. Talking to people and taking actions themselves are both ways students can take initiative, whereas the other answers need time, preparation, and are more difficult to do. Therefore, it can be inferred that the students thought through about what was realistically possible for them to do at the moment.

Table 7: What kind of water related activities would you be interested in participating in?

- Experiments (water purification, purification using shells, etc...)
- Volunteer work such as picking up trash
- Canoeing, riding jet boats
- Making manga, anime, and books on water
- Quizzes on water
- Going on a tour on water
- Spending time with marine animals on the beach
- Visiting a water museum
- Listening to presentations about water
- Handing out flyers

Many of the responses on what kind of activities the students would be interested in participating in were fun leisure activities children would enjoy during summer vacation, such as swimming, going to the beach, and canoeing. At the same time, there was also a considerable number of responses mentioning they would enjoy experiments on water purification. As an overall tendency, more students preferred active outdoor activities than indoor classes or lecture-type activities.

Survey with Sophomore Students

In addition, to further support our research and affirm our objective, we carried out a survey for our fellow 10th grade high school students to speculate their past water education.

We asked them several questions regarding their water education in elementary school, and if it benefited them in any way.

3.

1で「はい」または「一時期」と答え...問題についての授業はありましたか？

2020年6月調査

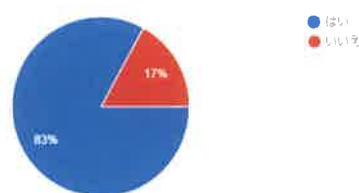


Figure 5: In your elementary school, did you get educated about water and water issues?
(Blue=yes, Red=no)

It can be seen that most of the students received education regarding water and water issues. However, from further speculation, the curriculums of the students who did get educated about water were mostly focused on sewage systems and dams. Few people had learned about water contamination in underwater ecosystems, and it is evident that elementary schools pinpoint their education on mostly information about sewage systems.

7.

これまでに水環境に関連づいた取り組み等、学校としての社会科見学なども)

2020年6月調査

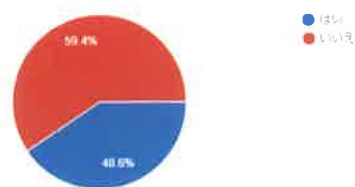


Figure 6: Have you ever taken part in any water environment-related activities such as field trips, volunteering, going to a water museum, etc.? (Blue=yes, Red=no)

Pie-chart indicating the percentage of students that have participated in water environment related activities

Surprisingly, over half of the all the students had not been involved in any water environment-related activities. For the students that had participated in these activities, most of them were from school excursions. Around half of the

students that had been involved wrote of their field trips to water purification plants or dams.

5. 4. で記入していただいた内容は今役に立っていると思いますか？

図7 結果の分布

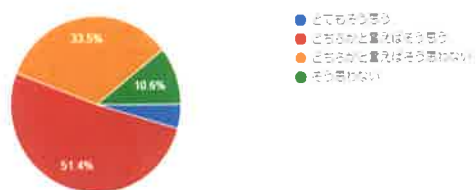


Figure 7: Do you think that the information you obtained benefited you in your daily lives?

(Blue-It benefited me a lot. Red-It kind of benefited me. Yellow-if I had to choose, it didn't benefit me that Much. Green-It didn't benefit me)

Around half of the students answered that the information they obtained sort-of benefited them, but not completely. The results imply that their attained knowledge gradually faded or had no impact on their lives. This shows how the information they absorb isn't really relevant to their lives, explaining how so few of them are benefited by the education.

9. 水環境問題についてどれくらい興味を持っていますか？

図8 結果の分布

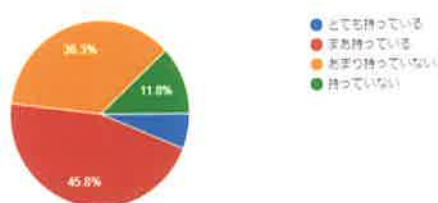


Figure 8: How interested are you in water issues? (Blue-Very, Red-A little, Yellow-Not that much, Green-Not at all)

Interestingly, the outcome of this question proved one point: their interest in water issues were related to how the information benefit them. The percentages turned out to be almost exactly the same as the previous question, making it evident that irrelevancy of the information they intake affects how they perceive water issues.

1.6 Conclusion and future works

From the result of the surveys we took from elementary students, high school students, and our research, we came up with a solution. By taking into account the surveys done from elementary school students we understood that presentations are effective in raising awareness for the students. However, we also realized students are interested in activities such as canoeing where they can learn firsthand about the situation in Tokyo Bay.

On the contrary, from the surveys we collected from high school students, we understood that the majority of students that have experienced education in Japanese elementary schools have had some experience of learning about water quality, many of them visiting water purification plants to deepen their knowledge. As a result, over half of these students mentioned that these lessons helped them understand about water quality in general. However, in contrary to the elementary school students who showed interest in activities in Tokyo Bay, the most popular way to address the contamination of Tokyo Bay for sophomore students was through in-class presentations.

By comparing the two surveys, we concluded that presentations about Tokyo Bay that we held in elementary schools were effective ways of raising awareness, and when these students become sophomores, many of them would still remember these contents and benefit from these lessons. However, in addition to the presentations, we believe that we should plan events based in Tokyo Bay such as a water sports competitions or canoeing experience since surveys showed presentations were more suited for older students, and elementary school students favored direct activities.

Therefore, in the future, our suggestion is to create a proposal to the government where we describe the results of our surveys, research contents and outcome, and create a two day water related camp within the Japanese government course guidelines. This camp will include in class

discussions and presentations on the first day, where students can learn in depth about the problems of Tokyo Bay. On the second day, they would actually visit Tokyo Bay and participate in activities such as canoeing to understand first-hand about the issues, simultaneously experiencing an enjoyable time, thus gaining connections to the bay. By proposing this to the government we hope we will be able to contribute to the solution of water contamination in Tokyo Bay.

1.7 Acknowledgements

Throughout the process of our research, we were greatly supported by many people and organizations, and we could not have reached our goal without their help.

First of all, we would like to thank Shibuya Preschool, Akabane Elementary School, and Takaban Elementary School for providing us with the opportunity to give a presentation to the students and interact with them, exchanging thoughts on water related issues. Interacting with the elementary students face-to-face and watching the students listen to the presentations with interest raised our motivation in creating a new educational plan that both interests the children and acquaints them with water-related issues at the same time.

We would also like to pay our regards to NPO Furusato Tokyo wo Kangaeru Jikkou Iinkai (An organization to think about hometown Tokyo), NPO Umi Juku (an organization to think about the marine environment of Tokyo Bay), and the Tokyo Metropolitan government Department of Tokyo Bay for enlightening us about the current issues concerning Tokyo Bay and the approaches that are being taken to improve the situation. Not only were we able to deepen our understanding on the topic, but we were also able to view the issue from the perspective of those who are taking the lead and making an effort in resolving the issue.

We appreciate all the students at Akabane Elementary School, Takaban Elementary School, and Shibuya High

School for kindly answering our surveys. The results we got from the surveys were very valuable and helpful for us to understand the interests of students at different ages, and we were able to use the results as reference when coming up with educational plans on the topic.

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1.8 References

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