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ハイスクール平和提言

Climate Change and Peace-Building
平和構築による気候変動の解決に向けての提言

平和グループ

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私たちは、気候変動が誘因となって引き起こされる水問題についてリサーチを行いました。なお、リサーチ内の「争い」については、コミュニティレベルの緊張状態を指します。その争いの解決策を示すため、緯度、気温、降水量、そして生活水準の4点において類似点を持つアメリカのサクラメント市、オーストラリアのパス市で起こっている水問題と争い、そして日本の香川県の干ばつに焦点を合わせて研究しました。例として、サクラメント市では気候変動による三角州の水位の下降が引き金になり、灌漑で使う農家と、三角州内の魚の住処の保護と環境保護を訴える漁師や環境保護団体の間に争いが起こっています。またパス市で起こっている対立の1つには、ウォーターパークの水の過度の水の使用に対し、節水を法的に強いられるパス市民の抗議の声が上がり、緊張状態が続いていることが挙げられます。そこで、私たちは干ばつによって発生する緊張状態を解決する方法を探るため次の3つの設問を考えました。

香川県が干ばつに見舞われた時に用いられた緊張状態の解決策を、サクラメント市とパス市の緊張状態を解決するために用いるのは可能か。

水の利用をより持続的なものにするために用いられるシステムや技術は存在するか。

それらのシステムや技術はサクラメント市とパス市で起こる干ばつによる緊張状態を解決するためにどのようにして適応できるか。

私たちは11月初旬に7人の専門家に水問題と気候変動に関するインタビューをメールを用いて行い、そのうち5人の専門家から返事を頂くことができました。また、日本の香川県、アメリカのカリフォルニア州とオーストラリアのパス市の干ばつについて事例研究を行いました。インタビューより私たちは、人々の生活の中でどれくらい水が使われているかを「見える化」することが重要だと思いました。また、香川県に住む人々の干ばつの経験から、協力こそが干ばつを乗り越える上で必要な力であると結論付けました。よって、私たちは水管理システムを家庭や公共施設に取り付けることを提言します。このシステムには、①水の使用量と使う目的を見える化する、②適当な水の使用量の提案をする役割があります。そして、このシステムのおかげで市民、政府、企業が協力しあい、水の使用や節水への意識を高めることができます。最後に、水は地球上の全ての生き物にとって必要不可欠なものです。その大切な水の資源を私たち人類が責任をもって、気候変動の脅威から守るべきではないでしょうか。

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While human beings pursue economic growth, environmental effects have been disregarded. The environmental effects triggers abnormal weather patterns and destroy ecosystem of the earth. Due to the changes in the ecosystem, many creatures are endangered, and human activities, such as fishery and agriculture, are affected. In order to solve climate change, many measures have been carried out. Among many solutions for climate change, we shall focus on climate change from the peace perspective.

Literature Review

Definition of Conflict and Peace-building

According to Peacebuilding Support Office of United Nation, peace-building efforts should be taken during conflict, not after conflict. Also, national development should be the first step of any peacebuilding measures. In other words, the purpose of peace-building is to reduce the risk for countries to go back to conflict by making nations resistant against conflicts through better conflict management and strengthen the foundations for sustainable peace and development. Any peacebuilding measures should be suitable for the country. Also, Global Partnership for the Prevention of Armed Conflict (2017) said peacebuilding should address social and political sources of conflict as well as reconciliation. Based on these findings, we define peacebuilding as taking action to reduce risks of conflict in order to strengthen the foundations of a peaceful community.

At first, in order to understand what peace means, we researched about conflicts over water, which are happening around the world. Many violent conflicts are triggered by political and economic causes. As cooperation with governments is necessary to solve problems at international level, we felt it was beyond what we as high school students can do, and therefore we excluded water problem at the international level from the target of this

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research. For the purpose of this proposal, we define conflict as tension between two parties over water issues caused by climate change.

Current Solution

Currently, many measures are applied to tackle climate change and the effects caused by climate change. According to NASA (2017), there are two major categories of solutions for reducing and overcoming climate change: mitigation and adaptation. Mitigation refers to the reduction of the flow of greenhouse gases released into the atmosphere. Greenhouse gases are emitted by using fossil fuel through driving cars, flying airplanes, etc. By reducing the emission of greenhouse gases caused by human development, the pace of global warming will be slowed down.

Adaptation refers to adjustments to present or expected future climate, and also one of the ways to build resilience to climate change. Even if the measures to stop global warming and mitigate the pace of global warming are successful, the effects of climate change will still give tremendous impact on human lives for a certain period of time. Therefore, people's lifestyle need to adapt to climate change so that people can survive and make a living in the face of abnormal weather. In order to tackle the effects of climate change, some measures such as adaptation and mitigation are currently being carried out.

Research Questions

We shall focus on what happened in the United States and Australia, which are the top countries that export virtual water to Japan, as case studies. Virtual water refers to the volume of fresh water used to produce a particular product, measured at the place where it was actually produced. Kenji Fuma (2014) said that Japan has been importing virtual water because Japan's agricultural production cannot meet its food demand. Compared with other developed countries, Japan's food self-sufficiency ratio based on calories is low. However,

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Japan has to face world's water shortages from now, since water demand around the world will continue to increase in the future. In addition, droughts can decrease the amount of crops and virtual water, and it will give a large negative impact on Japanese life. Although Perth and California export a lot of virtual water, which leads to less water available for other human activities as a result, farmers have no choice except to export crops which use lots of water to earn higher profits. Thus, there is a strong relationship between Japanese life and drought in Australia and California. However, we have some limitations to our research because we are high school students. Therefore, we are interested to find out what kind of adaptation approaches can be taken as high school students. In the course of our research, we found that Kagawa, which had overcome its own water conflict, is very similar to Sacramento and Perth. Thus, we will also research how people in Kagawa, Sacramento, and Perth can combat environmental damage caused by climate change. In the following section, we shall explain why we chose these three places for further analysis; and before we begin, here are our research questions:

1. Is it possible to apply the experience of conflict resolution in Kagawa to conflicts in Sacramento and Perth?
2. Are there any systems or technology to make water usage more sustainable?
3. How can this be applied to resolve conflict in Sacramento and Perth?

Now, we shall compare the features of these three places.

Similarity and Differences between Kagawa, Sacramento, and Perth

The basic information in Kagawa, Sacramento, and Perth were described as following. There are some differences among these places. The population is about 0.968 million people in Kagawa, 0.485 million people in Sacramento, 2.04 million in Perth. The geographical size is about 1,877 km² in Kagawa, 254 km² in Sacramento, 6418 km² in Perth. The population density is about 515 people/km² in Kagawa, 191 people/km² in Sacramento, 318 people/km² in

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Perth. The latitude is about north 34 degree in Kagawa, north 38 degrees in Sacramento, south 32 degree in Perth. On the other hand; these three areas have similarities related to climate. The monthly mean precipitation was about 2.6 inch in Kagawa at the time drought arose in 1994; this was similar to the current precipitation in Sacramento (about 2.0 inch), and Perth (about 2.3 inch) 2016. The annual average temperature is about 17.0 °C in Kagawa, 16.1 °C in Sacramento, 18.8 °C in Perth.

In our interview with Mr. Tetsuo Kondo, he mentioned that HDI (Human Development Index) is one of the good index to find countries that are comparable, as it not only measures economic growth, but also welfare, education, and income levels of the countries' inhabitants. The HDI of these areas' country is about 0.903 in Kagawa, 0.920 in Sacramento, 0.939 in Australia (2015). In addition, these areas produce similar crops, such as olives. There are similar type of conflict in Kagawa, Sacramento, and Perth. In all three places, while citizens have a desire to preserve water for their daily lives, official institutions such as government and water parks have tried to dominate the water resource. Thus, we conclude that although there are differences in terms of the scale of population, geographical size, and latitude, the climate condition--which is an essential element for climate change problem--and social conditions are sufficiently similar to make comparisons. We hope that by researching on the solution of drought in Kagawa, Japan, we can discover new approaches to solve water issues in Sacramento and Perth.

Methodology

Interviews on water issues and climate change via email were conducted to several experts in order to find the answers to our research questions since the beginning of November. Mr. Junji Hashimoto was asked about important points on how to convey the importance of water issues to high school students. The second interviewee was Ms. Kanako

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Tanaka, and answers about feasible technologies to mitigate greenhouse gases in short time were gotten from her. To inquire adaptation to drought in California and Perth, Mr. Tetsuo Kondo was the third interviewee. In addition, Mr. Seigo Nasu was interviewed about the conflict over water resources between Kagawa and Tokushima prefecture in Japan. Mr. Glen MacDonald was asked for ideas on possible action plans that high school students can undertake to resolve conflicts over water resources. To learn more about the action taken in the Soka University of America, Dr. Archibald E. Asawa was interviewed as well, in order to gain ideas that are feasible for adaptation to high schools. These interviews were conducted in Japanese and English, and the questions were listed in Appendix. We also interviewed other experts of climate change, but we were not able to get replies from them. In addition to the interviews, we also did a case study to compare Kagawa, Perth, and Sacramento to see if there are solutions in Kagawa that can be applied.

Case study of Sacramento

First, we shall examine the water issues in Sacramento. In California, even though serious droughts due to climate change have been caused, the state is exporting a lot of virtual water to Japan. Since the mid-1980s, California has been supplying Japan hay to feed cattle. Davis (2008) said that California exported between 617000 and 765000 tons of hay, and most of it was shipped to Japan. A minimum 45000 acre-feet of water was required to produce the exported hay. United States Drought Monitor (2014) observed that drought in California is at the worst level in 2014. On the other hand, there is a flood problem. On January 3 and 4 in 2017, extreme flooding has occurred due to heavy rain. This heavy rainfall is supposed to mitigate water scarcity. In fact, this flood is related to drought. Excessive groundwater had been pumped due to water shortage caused by drought in California but excessive groundwater pumping caused subsidence which increased the propensity for flooding.

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California has had cycles of drought and flood for a long time and climate change has intensified this cycle.

The damage of drought is divided into two types: long term effect and short term effect. As a short term effect, declines in surface water flows due to drought can be detrimental to water supplies for agriculture, cities, hydropower production, and rivers. The rivers in California function as routes of some ships and famous sightseeing sites. As a long term effect, ground subsidence is caused by excessive pumping ground-water. As a result, infrastructure is damaged and the probability of occurring flood increases. Moreover, the number of wildfire incidents increases in areas where the weather tends to be dry, hot, and windy. In addition, fresh groundwater cannot be gotten because saltwater is mixed with fresh water. While fresh water is in shallow underground, deep groundwater is not fresh water, it is saline. Under natural condition, freshwater and saltwater are divided, but pumping can cause saltwater to migrate inland and upward, resulting in them becoming mixed.

Also, from such effects of drought, conflicts over water sources arise. The local farmers had long struggled with a lack of water for agriculture because of the drought caused by climate change. In order to meet the demand for water, according to Kathleen Miles and Carolyn Lochhead (2014), the governor, Mr. John Andrew Boehner, introduced a new bill in 2009 to improve agricultural production, in view of the recent decreases in agricultural output. The bill allows the government to pump water from the delta for agricultural use. However, this new bill was not passed because some conflicts over water resources occurred between farmers who need water to grow crops and fishermen who need to save the fish habitat in the delta. Also, the environmentalist was against the bill, because of the potential impact on the environment. As an alternative solution, Mr. Andrew restricted the available time for the citizens to water grass in Sacramento and Folsom. In 2016, the amount of water consumption

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in Sacramento area was cut down by 22% compared to the same month in 2013, and this scheme to save water has continued to this day.

Case study of conflict in Perth

Next, we shall examine Australia which has water problems too. The rainfall for the area around Tambellup where is located in Western Australia has declined by 125ml over the past fifty years. Department of the Environment and Energy of the Australian government (2009) said the reduced amount of rainwater in recent years along with drought have made government and businesses focus on water security. Australia's Climate Council (2015) estimates that the flow of water from rain in Perth's dams has slumped by 80% since the 1970s. The government of Australia forecasted that the rainfall will drop by up to 40% by the end of the century. As a result, land that can be used to produce crops is being lost each year. This situation creates a negative impact on Australia because Australia cannot export food to the world without productive land. Moreover, Australia is a key food-exporting country in the world and Australia's contribution to international trade in wheat, meat and dairy products is substantial and could affect global food prices. Therefore, we think Australia is as area where water management is heavily influenced by climate change.

Due to the water shortage caused by climate change, tension between citizens and public institutions over water usage existed as a matter of course. Since the population is increasing and the seriousness of drought is getting worse, the level of water in dams is currently dropping, and the amount of water is not enough to meet people's demands. As a result, citizens are becoming sensitive toward how water is used by government and firms. In Australia, although people in Perth are forced to reduce the amount of water that they can use, Adventure World amusement park, which opened in 1982, uses lots of water. In Perth, people are well aware of the need to save water. Thus, citizens pay attention to action taken by the parks. As a result, conflict between citizens and the amusement park was caused.

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As a solution, recycled water is being pumped into the underground aquifers that provide drinking water against climate change by local government at June 12 in 2017. It is said that the aquifer also provided a “very large, very cheap storage tank,” which allowed the Water Corporation (an organization which supplies water to many houses, businesses and especially farms) to replenish groundwater at a steady rate and only withdraw water when it is necessary.

Case study in Kagawa

In Kagawa, droughts have arisen since ancient times because of topographic conditions. Rivers in Kagawa are short and have steep slopes. Hence, rainwater pours into the river too quickly and little water is saved even if it rains. Consequently, people in Kagawa cannot rely on the river to save water for daily use. In addition, the amount of precipitation is decreasing and the range of fluctuation of precipitation is getting larger recently because of climate change. As the graph below shows, while the standard variation of rainfall during 1900 to 1906 in Takamatsu, which is a city in Kagawa, is 167ml, the amount of rainfall was increased by 113ml during 1996 to 2005. As a result, the amount of dam water for human activity is not stable. Currently, Kagawa is attempting to decrease the effects of climate change by routinely checking the Hozan Lake, which plays a role as a reservoir connected to Kagawa artificial ditch.

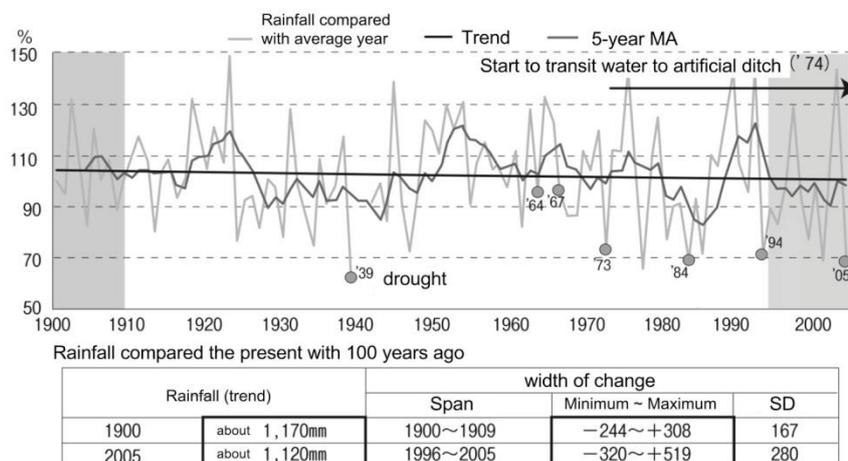


Figure: Change tency of Rainfall in Takamatsu

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In order to ensure the lives of people in Kagawa are not disrupted, Kagawa artificial ditch management, which is a part of Kagawa-Yousui land improvement committee, provides water from Yoshino-river with throughout Shikoku-region since 1974. Thanks to this facility, though effects of climate change on Kagawa are beginning to intensify, people in Kagawa did not suffer from serious water scarcity problems.

In Kagawa, as you can see from the figure above, there was a drought which is also known as “Heiroku-Kassui” (平六渴水 which translates to The Drought of 1994). This water scarcity is caused by one of Kagawa’s biggest droughts in 20th century. At that time, there are few public taps available for domestic use in urban areas. To make up for the lack of water for daily use, farmers made much efforts to save water for agriculture and distributed some water to domestic use of water to help the citizens. From this example, it is clear that cooperation between different parties is essential for people to live peacefully, and visible cooperation successfully avoids conflict from happening.

In order to find out more about the situation of the tension over water demand, we conducted interview to Mr. Nasu from the Society for the Study of Water in Shikoku region in Japan, since we could not get the credible information on the Internet. According to him, there is no tension over water rights, although he believes there may be a need for citizens to rethink water rights of Kagawa and the areas around Kagawa.

Results

As mentioned earlier, these three areas have similar conflicts over water. In this section, we would like to describe and compare in detail the relationship of the parties in conflict with each other. First, the conflicts which happened in Sacramento and Perth occurred between two communities (farmers and fishermen in Sacramento and citizens and amusement park in Perth) over the use of water because of droughts caused by climate

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change. Also, although these conflicts do not involve violence, there has been significant tension between the parties.

Although Kagawa had the same situation such as California and Perth, people in Kagawa managed to prevent tension from escalating into open conflict. As mentioned above, one of the most serious droughts occurred in Kagawa in 1994. This drought caused the decline of tap water. To solve this problem, farmers in Kagawa offered some of the agricultural water to citizens, following traditions handed down by elderly people. At that time, the amount of water taken from Kagawa's artificial ditch was restricted to 40%. Under such a situation, the head office addressing the drought in Kagawa requested farmers to provide citizens with water. Despite the drought's impact on their farms, they agreed to it and decreased the amount of water they took from the artificial ditch, thus allowing citizens who were short of water to live by providing water in waterworks. As a result, conflict did not occur.

Dr. Lee, who is a researcher on peace-building issues (2017), said that "Problems offer opportunities for people to collaborate with each other." Although Sacramento and Perth do not have such traditions, similar modes of "collaboration" can be promoted through using Water Monitoring Systems (WMS). This system enables people to save water by encouraging them to collaborate with each other. As these three areas have similarities in their climate and also have the same type of conflict, we would like to propose that California and Perth adopt a similar solution that was used in Kagawa though using WMS. The following describes how this can be done in more detail.

Based on the answers from experts, we analyzed their comments to seek answers to our research questions. First, Mr. Kondo said people who tackle climate change need to know the differences in lifestyle and consider measures suitable for each place. Second, Mr. Hashimoto said that people should think about the water issues by starting from places that

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they are familiar with and identify problems that they can solve by themselves. Third, Mrs. Tanaka said that the most important thing is to have an awareness of climate change, and know the situation well. Lastly, Mr. Asawa said that the principle of fostering leaders for the creative coexistence of nature and humanity inspired him. From these response, we concluded that the most important thing when people address the issue of climate change is having the consciousness as a member of the world. In addition, if more information is provided to people, it will prompt people to take action towards solving water problem and climate change.

Discussion

Based on the solution in Kagawa, we suggest one way of cooperation to resolve conflicts in Perth and Sacramento. Among many adaptations, two types of adaptation can be applied to reduce the effects of climate change in Perth and Sacramento.

First, we propose using a Water Monitoring System (WMS) to facilitate collaboration in the community in Perth and Sacramento. This system has two major functions. Firstly, WMS can visualize how much water is used and for what purpose. This will encourage users to notice any water wastage. The second one is that WMS can suggest how much water should be used for different purposes. For example, this system provides basic information on household water usage and the best time of day with people to undertake water-intensive activities. This program will help local governments AND citizens to decide whether to install water meters, water-conserving appliances, and rainwater harvesting tanks. As a result, water can be distributed to people effectively and they can raise awareness toward utilizing water effectively. By following instructions from WMS, people in Sacramento and Perth can easily contribute to water saving. These two functions in WMS will allow the citizens to be conscious of water usage and water savings effectively.

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In addition, WMS is divided into 3 levels: Community Water Management System (CWMS), Building Water Management System (BWMS) and House Water Management System (HWMS). BWMS and HWMS provide instructions for effective water usage in individual houses and individual building respectively. CWMS, which is similar to BWMS and HWMS, has an additional function due to its larger scale: it facilitates cooperation among citizens, farmers, government, and businesses. With CWMS, both individuals and large organizations can monitor how much water is used. This function helps visualize how collaboration is done within the community regarding water saving. Thus, CWMS can encourage not only citizens, but also local government and businesses to cooperate with each other when there is a water shortage. Unlike Kagawa, there is no tradition of collaboration in Sacramento and Perth when drought is occurring. Therefore, the author concluded that sharing a sense of collaboration within a community is important not only to save water, but also prevent conflicts in the community. By visualizing water usage, CWMS successfully helps build a sense of collaboration within the community.

Limitations

In this year, we have researched and looked for solutions to conflict over water usage caused by climate change from the peace perspective. However, while working on the research, we faced considerable limitations to our research. First, “peace” and “peacebuilding” is a concept that is usually associated with violent war; however, we chose to focus on non-violent conflicts only at the community level. As mentioned earlier, violent conflicts often include political and economic issues, and students do not have enough funds and authority to solve violent conflicts. Therefore, we thought it is difficult to tackle the issue of violent conflicts as a high school student, and this made it difficult to find relevant information that fits our research. Second, although our research is a case study on Perth,

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Sacramento and Kagawa, we could not go to these three places to understand the lifestyles and actual situation of conflict in each place. Therefore, it was difficult to ascertain if our recommendations to adopt Kagawa's method of conflict resolution is suitable for adaptation in each place. Despite these limitations, which might affect the persuasiveness of our research, we believe that this is a good start and further studies can be done.

Conclusion

Climate change is very complicated and it takes a long time and requires tremendous efforts to solve. However, if people begin to think and take actions toward the common goal: people can find opportunities to solve problems with other countries to save our earth from climate change. As demonstrated in Kagawa, when people cooperate to save water, which is a common precious resource for all human beings, they can overcome water scarcity problems and live together without conflict in a sustainable society. In order to build solidarity for peace in our world, we have mission to take actions toward climate change from now and here with this proposal.

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Appendix A

Interview questions to Mr. Tetsuro Kondo

Q1: チャドについて私たちが調べたところによりますと、雨量に変動があり、農業が盛んな地域だとありました。したがって、私たちが調べておりますカリフォルニアやパースも大きな雨量の変動があり、農業が盛んな中で水問題があるという類似点があるように思えたため、チャドで実施されていた気候変動の適応策が、カリフォルニアやパースでも適応できるのではないかと推測しました。チャドで行われている適応策について調べたところ、経済を促進する農業、漁業、水の確保、医療などで、包括的で持続可能な策が講じられていると述べておりました。そのような包括的で持続可能な適応策を行う上で重要となることは何でしょうか。

それらの策を国レベルとコミュニティレベルで実行する場合の利点、不都合な点は何ですか。

Q2: UNDP はその地域に合った解決策を考えていると伺いました。私たちのグループも、その地域のコミュニティレベルで実行可能なその地域に合った気候変動、水問題に適応するための対策を探求しています。その上で、近藤さんのチャドでの活動で実際に大切だと感じたステップ、またその際に、注意すべきことや大切なことは何でしょうか。

Appendix B

Interview questions to Mr. Junji Hashimoto

Q1: 橋本様は高校生に世界の日本の水問題の重要性や深刻さを伝えていらっしゃるとお聞きしました。水問題の解決は高校生にとりまして、身近なようで身近ではないと感じております。日本の高校生に水問題を身近に感じてもらうため、どのように水問題の理解の重要性を高校生に伝えていらっしゃいますか。また、日本の高校生に伝える上で、どのような姿勢で、またどのようなことに留意して講義されていらっしゃいますでしょうか。

Q2: 専門家の立場から、若い世代が水問題に対してどのような意識を持つことを求めているのかを伺いたいと存じます。

Appendix C

Interview questions to Mrs. Kanako Tanaka

Q1: 私たちは現在、コミュニティレベルで実行可能な地球温暖化の緩和策、もしくは専門家の方々が行っているようなバイオマス発電や CO2 自体を吸収するような技術でコミュニティレベルでも適応可能な技術を探求しています。低減策を草の根レベルでも実行し、浸透させるために、地域・個人レベルで温室効果ガスを削減するための実用的な技術をなにかご存じでしょうか。もしご存じでしたら、ご教授いただければと思います。

Q2: 気候変動を緩和するために、私たちは一人一人の意識と行動が大切だと考えているのですが、緩和策において地域・個人レベルで実行しなければいけない最も重要なステップは何であるとお考えになりますか。

Appendix D

Interview questions to Dr. Archibald E.Asawa

Q1: Where do you gain your inspiration for your activities?

Q2: How do you gain support or cooperation from professors and other students?

Q3: Are there off-campus activities that Sustainable SOKA is currently involved in? If so, what are some of the eco-friendly activities done with the surrounding community?

Mr. Seigo Nasu

Q1: 早明浦ダムは四国地方の各県で共有で使用されていると理解しているのですが、早明浦ダムの利権などをめぐる対立などは存在したのでしょうか？インターネットによる記事では、信憑性に欠けていたため、しっかりとした証明として、お言葉を頂きたいと思い質問させていただきます。

Q2: 具体的にいつごろから対立がみられているのでしょうか？早明浦ダムの建設前の1973年に起こった香川県の干ばつが原因でしょうか？国土交通省と管理者ホームページで建設完成年に1年ほど誤差があるのですが(国土交通省,1978年完成,管理者ホームページ,1975年完成)、正しくは何年なのでしょうか？

Q3: 最近では香川県や徳島県の干ばつが起りやすい時期の水不足の被害状態は改善されてきているのでしょうか？もし改善されているのなら、具体的にどのようにして改善されたのでしょうか？

Q4: 対立とは関係ありませんが香川県は特に干ばつの頻度が多い地域であったと思われます。調べていくなかで、稲作において使用できる水の量が例年よりも少ない場合、水田を畑のようにして水を有効に使うという、香川県水田農業振興協議会の取り組みや、香川県環境森林部環境政策課が作成された「家庭のCO₂削減ハンドブック」などを拝見しました。様々対策が練られていると思いますが、地域の住民の方々は、水田を畑のように使うことや、ハンドブックの作成以外で、どのように対策をして干ばつを乗り越えてこられたのかご存知でしょうか？もしご存知でしたらご教授下さい。