Chapter 6
Role in Framing in Sustainability Science — The Case of Minamata Disease

Motoharu Onuki

Abstract This chapter discusses multiple framings employed in Mainamata disease. Minamata disease is one of the major health problems caused by industrial pollution during Japan's high economic growth in the 1950s and 1960s. By conducting a historical review of Minamata disease, this chapter discusses typical framings applied in sustainability discourses in Japan, which have been led by pollution discourses. Two typical interpretations of Minamata disease are identified. One is that Minamata disease is a past event in Japanese history. It was a bitter experience, however thanks to this experience, the once-damaged Japanese environment became clean as environmental governance became stricter, regulations were established, and new environmental technologies were developed. Thus, one framing to Minamata disease is a historic event that Japan has learned lessons from the event, and something can be proud of how quickly Japan has recovered from such disaster. In contrast, even today, large-scale health examinations to understand the overall picture of methylmercury-derived health damage and to discover people with unrecognized symptoms continue. Therefore, Minamata disease remain unresolved and the local and national governments as well as Japanese society ignore the potentially hidden victims. The gap between these two framings is widening as the majority of the general public is unaware of the existence of the latter and some even believe that such humanitarian-conscious people are exaggerating their claims in an effort to obtain excessive compensation. To move forward, it is necessary to careful examine which part of framings people agree and disagree. By doing so, the essential nature of Minamata disease becomes clearer and collaboration among the people having different views may be possible. The ability to elicit and understand the true feelings of different stakeholders, the ability to apply different types of framings, and the ability to connect the people with different views, are critical when discussing a sustainability challenge that can be framed in diverse ways.

M. Onuki (✉)
Graduate Program in Sustainability Science - Global Leadership Initiative,
Graduate School of Frontier Sciences, The University of Tokyo, Tokyo, Japan
e-mail: onuki@k.u-tokyo.ac.jp

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6.1 Introduction

This chapter discusses "framing" by using the Minamata disease as a case study. Minamata Disease is one of the major pollution diseases that Japan has experienced. Health problems – caused by industrial pollution during Japan's high economic growth in the 1950s and 1960s and that are treated as pollution diseases today – continue to plague the country. Since damage to the environment and people's health was severe, the overall impacts on Japanese society was considerable. These industrial pollution problems are exactly what gave birth to environmental engineering, environmental governance, environmental sociology, and many environmental-related academic disciplines including "environmental studies" in Japan as an integration of these disciplines. In the same vein, Japan's major emphasis on environmental aspects has led to the popularity of sustainability science in Japan as well. Thus, it follows that Minamata disease is one key factor leading to the origins of environmental studies and sustainability science in Japan. All the more because of this dubious history, I chose Minamata disease as a case study for discussing the issue of "framing" in sustainability science for this chapter.

In addition, Minamata disease not only represents part of the origin of sustainability science in Japan, but also represents one of the typical, ongoing current sustainability issues that involve several different framings even now. Although many people may be under the misconception that Minamata disease is an event of the past, several different ways of interpreting the Minamata disease case persist depending on different viewpoints and lingering disputes. When people encounter the term "lessons", they often feel that a misinterpreted nuance in that "lessons" generally implies that the matter in question no longer exists. However, the case in hand, Minamata disease, is yet to be resolved. To properly address the problems of Minamata disease, the skills and a sense of framing are necessary. This is another reason for choosing the Minamata Disease case as a case study.

This chapter explains the outline of Minamata disease case first, several framings of Minamata disease and then the importance of "framing" in sustainability science.

6.2 Overview of Minamata Disease

6.2.1 What is Minamata Disease?

Minamata disease is a disease of the central nervous system caused by eating seafood contaminated by methylmercury; in other words, a form of methylmercury poisoning. This was first officially acknowledged in May 1956, in Minamata City,

located on the Kyushu island about 1000 km west from Tokyo; thus it came to be known as Minamata disease. Methylmercury damages specific parts of the central nervous system in the brain, each part with its own function. Depending on which functions become damaged, several types of symptoms appear: gait disturbance; loss of balance (ataxia); speech disturbance (dysarthria); muscle weakness; muscle cramps (disturbance of movement); decreased peripheral vision (constriction of visual fields); hardness of hearing (hearing disturbance); disturbances of sense of pain, touch or temperature (disturbance of sensation); and the inability to identify the form, size, weight, and texture of objects (stereo anesthesia, disturbance of sensation) by touch. In addition, another type of Minamata disease, *Congenital Minamata Disease*, is methylmercury poisoning of the fetus via the placenta caused when the mother consumes contaminated seafood during pregnancy. Such infant victims were born with a condition resembling infantile paralysis. (Minamata City 2007; George 2002; Harada 1995, 2004).

The methylmercury that caused Minamata disease was a product of a facility of the Minamata plant of Chisso Corporation that manufactured acetaldehyde, a raw material used in paint and plastic production. It was contained in the wastewater and discharged into the sea. Chisso Corporation, one of Japan's largest chemical companies at the time and still today, manufactured acetaldehyde at their plant in Minamata City in the 1950s. Unfortunately, however, Chisso unconscionably discarded the methylmercury that caused Minamata disease into the seawater. As a result, fish and shellfish in the sea became contaminated, and the people who ate them subsequently developed Minamata disease.

6.2.2 Delayed action

Minamata disease was caused by industrial pollution more than 60 years ago. However, even after official acknowledgement of the disease in 1956, Chisso Corporation continued unconscionable manufacturing of acetaldehyde for 12 more years. It was not until 1968 that the national government announced a consensus that the disease had definitely been caused by the methylmercury generated by Chisso Corporation.

During these 12 years, the spread of Minamata disease was left unabated. New victims emerged, and all victims have continued suffering not only from the disease itself but also from a social discrimination stigma. Several studies discussed why 12 years were required for proper action to be taken; but first, the rationale behind the failure to prevent the spread of the disease is attributed to the major impact the Chisso Minamata Plant had on the local economy. **The major portion of local taxes came from Chisso; and what is more, the mayor and many city council members were former Chisso employees [UN** Archives, 1992**].** Also prevalent were concerns that any actions taken against the company and its Minamata plant would adversely affect Japan's strong economic growth at the time.

The second point concerns how to deal with scientific uncertainty. In 1959, the Minamata Disease Study Team of Kumamoto University's Faculty of Medicine

reported that it had conclusive evidence that Minamata disease was caused by, methylmercury. However, scientists opposing this theory proposed other hypotheses, thus prolonging the scientific discussion and the search for commonly-agreed-upon causative substances. In addition, Chisso Hospital withheld announcing results of an experiment using a cat, although they confirmed the development of Minamata disease in the cat after feeding the cat the factory wastewater drainage. The government and manufacturing corporations have a moral responsibility to regulate and control pollution as soon as possible. However, Chisso's strong impact on the local and national economy which, under such circumstances, caused the government to be overly cautious for the wrong reasons and required more solid scientific evidence to develop an action plan. Science, on the other hand, always has its uncertainties. When a new hypothesis is proposed, scientists are compelled to validate it regardless of the time required and regardless of the urgency of needed attention victims. The government, unfortunately, delayed taking any constructive action for want of more conclusive results. In this way, government and scientists alike had no incentive to expedite the process. This "resonance between science and governance" is one cause of tardy for the delayed action (Shigeo Sugiyama, 2005).

6.2.3 Compensation and Relief for the Victims

The current scheme of compensating Minamata victims was established in 1973. This scheme requires that sufferers must be certified as a "Minamata disease patient" and approved by the governor of Kumamoto prefecture. A lump-sum conciliatory payment ranging from 16–18 million JPY was paid to these "certified patients" depending on the severity of the symptoms. To be certified, having a combination of several symptoms (disturbance in sensation and ataxia, etc.) is required; that is, those with only a single symptom remained uncertified.

More than 3000 sufferers have been "certified". However, depending on the level of methylmercury intake, more sufferers exist who have only one symptom such as disturbance of sensation or who have atypical symptoms. These types of sufferers have never been certified nor has any compensation ever been provided. Many have filed lawsuits petitioning to be certified, unfortunately with little or no success.

To resolve this situation, two political settlements were initiated in 1995 and 2010 to provide some relief to single-symptom sufferers. Even though such sufferers were not officially certified as "Minamata disease patients", they were recognized at least as "Minamata disease sufferers", and became able to receive some monetary relief in a lump-sum payment. About 11,500 sufferers received such relief in 1995 from the Japanese government, and some 65,000 sufferers applied for some form of settlement after the 1995 settlement.

The history of compensation and monetary and medical relief of Minamata disease is rife with the repetition of lawsuits and such settlements. Some lawsuits still continue by those who want to be certified, and others continue by those who will settle for some kind of monetary relief quickly. Even now, the exact number of total

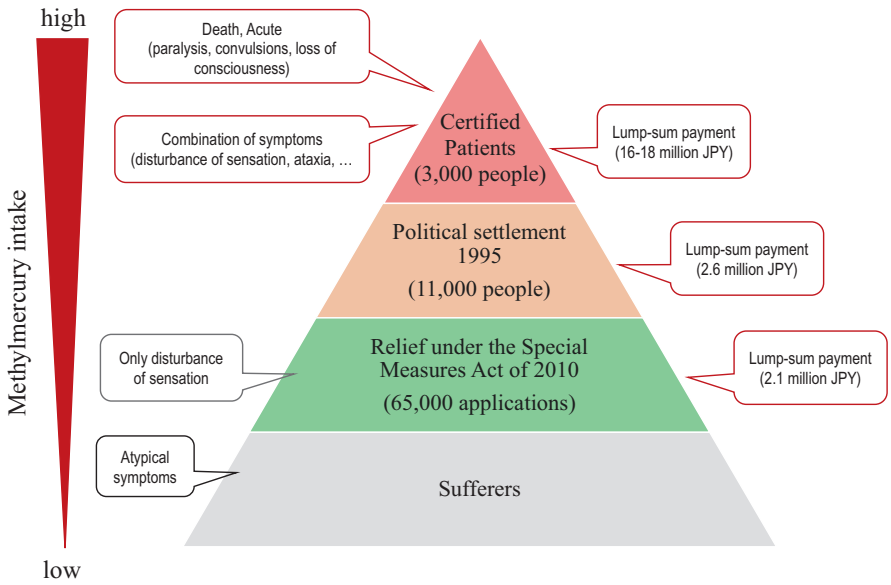


Fig. 6.1 Compensation and relief. (Adopted from Harada 2004). ∗Numbers have been rounded to thousands for easier understanding

victims suffering from disease. Methylmercury poisoning in the Minamata area remains unknown as shown in Fig. 6.1 (Harada 2004). Updating the knowledge on methylmercury poisoning must be continued.

6.2.4 How to Frame the Problems of the Minamata Disease

Based on the aforementioned circumstances, this section explains how people have interpreted the problems of Minamata Disease based on different framings.

6.2.5 What Was the Cause of Minamata Disease? (Scientific Framing)

The first way of framing the problems of Minamata disease focuses on what caused ~~of~~ Minamata disease. The answer to this question is clear now, although it took an inordinate amount of time (12 years) before the Japanese government officially declared that methylmercury is, with no doubt whatsoever, the substance acknowledged as the cause of the disease.

6.2.6 *Why Did Environmental Governance and Pollution Control Technologies Fail? (Techno-Legislative FRAMING)*

The second way of framing the problems of Minamata disease is how environmental governance and pollution control technologies worked. In reality, no environmental governance or regulation was in place when Minamata disease was first officially acknowledged in 1956. After many years, people finally realized the huge sacrifice – health damage to the victims and the social discrimination they were forced to endure – and public opinion supporting victims finally formed. Once this public opinion formed, the national government established environmental administration systems including enforcement of The Basic Law for Environmental Pollution Control in 1967 and other related environmental laws such as the Water Pollution Control Law and the Air Pollution Control Law in the following years, and foundation of Environmental Agency (predecessor of present-day Japanese Ministry of Environment) (1971). Moreover, enterprises also started following the new regulations designed to protect the environment or face consequences.

Industry and enterprises also started developing technologies to minimize pollution which led to rapidly and dramatically improved environmental quality. The technology and social system established in this way still functions well, achievements of which the Japanese can be proud; and what is more, of which developing countries might very well consider worth using as a role-model when confronting their own pollution and environmental protection issues.

6.2.7 *How Much Does It Cost to Prevent or Recover from the Damage? (Economic Framing)*

The third way of framing applies an economic viewpoint to Minamata disease. A study was done by a researcher group formed within the Japanese Environmental Agency, Japan (Study Group on Global Environment and Economy, 1991), in which the (estimated?) costs of preventing or recovering from the damage of Minamata disease were compared. The results indicated that the Costs of pollution control and the costs of prevention were significantly less than the costs of compensation for the caused damages and restoration of the polluted environment (see Table 6.1).

Table 6.1 Comparison of the cost of damage caused by Minamata disease in the area around Minamata Bay to the cost of pollution control and preventive measures

(million JPY per year)	
Cost for Pollution Control and Prevention Measures	123
Yearly average paid by Chisso Co.,Ltd., in the form of investments to control pollution	
Total damage amount	12,631
Health damage	7671
Yearly average of compensation benefits paid to patients under the Compensation Agreement	
Environmental pollution damage	4271
Yearly average amount of expenditure for dredging work in Minamata Bay	
Fishery damage	689
Compensation paid to the fishery industry computed as equal redemption of principal and interest prorated as yearly payment.	

Source: "Pollution in Japan – Our Tragic Experiences", ed. by Study Group for Global Environment and Economics, 1991

6.2.8 *Were the 12 Years Required for Stopping the Acetaldehyde Process Long or Short? (Scientific Uncertainty Framing)*

Another way of framing is considering whether the period of 12 years was long or short. The answer to this question is not simple. One view on this framing is "Not short, but there was no other way". As explained in the previous section, when neither environmental regulation nor previously available scientific knowledge was in place, "resonance between government and science" occurs (Shigeo Sugiyama, 2005). Taking 12 years was definitely a bitter experience, but valuable lessons were learned. First, science is a dynamic process. A certain level of uncertainty always remains, and science is always updating itself. Thus, government and society must not just wait for the "final conclusion" put forth by scientific study. Government must not use "remaining uncertainty" as an excuse for not taking any action. While science is ongoing research, society should prioritize human life, health, human rights, and the environment. Second, the polluter should bear the "costs of pollution prevention and control measures". This is known as the "polluter-pays principle" (OECD 1972). Thus, the company which has caused the pollution should pay for the recovery of the environment and compensation for the victims.

Another view is "12 years was long". Despite the lack of environmental governance and knowledge, the government should have reasonably been able to take some measures, at least measures to restrict the fish consumption soon after Minamata disease had been officially acknowledged. People of this framing are still fighting in court claiming that the government had the responsibility, and the authority, to prevent the spread of the disease in the early stage in the 1960s and 1970s.

6.2.9 *Is the Mechanism of Minamata Disease (Methylmercury Poisoning) Fully Understood and are the Victims Properly for Damages? (Medical Framing and Its Social Implications)*

Another way of framing is whether the entire mechanism of the disease was sufficiently understood from a medical point of view. Even though the substance causing the disease ~~is~~ has been clearly identified, the extent and condition of health damage of the methylmercury varies significantly according to the amount of exposure to methylmercury. However, as explained in the previous section, even today the relationship between the degree of exposure and the effect is not fully understood, except the cases of high dosages with acute and lethal effects. This is partly caused by insufficient data. Although mercury concentrations in hair and umbilical cords were used for estimating the level of methylmercury, collecting data from those whose symptoms were relatively milder was difficult. This is not only because such mild-symptom sufferers hesitated ~~to~~ at taking health examinations, but also because they had no inkling that they might have been affected by methylmercury in the first place. It has been pointed out that the certification criteria of Minamata disease victims tend to be limited to serious patients because this judgment resulted from political and administrative issues related compensation certification criteria. For this reason, scientific elucidation of how much damage has been caused by methylmercury poisoning became more problematic, and the total number of victims who suffered health damage by methylmercury, including those with relatively mild damage, remains elusive. Thus, a large-scale health investigation regarding the effects of methylmercury ~~is~~ has been carried out recently, accumulating more knowledge about the overall picture of mercury-derived health damage, and trying to "discover" people who suffered health damage by methylmercury, but who have neither come forward nor have become aware of personal damage.

However, compared to severe methylmercury poisoning symptoms found in the 1950s and 60s, the health damage found in today's health examinations is milder in comparison, and situation surrounding such health examinations differs greatly from those when the serious Minamata disease patients were discriminated against and persecuted in the early years in the 1960s and 1970s. In addition, when considering milder health damage (for example, numbness of hands), it becomes more difficult to distinguish such milder health damage from other health problems such as diabetes caused by non-methylmercury factors, which can also cause numbness in the hands, and becomes even more difficult to distinguish the impact from methylmercury derived from Chisso-polluted waters and other sources. Accumulating scientific knowledge is indispensable. It is also necessary to draw a line of administrative guidance on how far to compensate. It is important to "settle" at a certain

level, rather than keeping "discovering hidden patients" forever, and to direct society towards looking ahead by promoting the rebuilding and redevelopment of divided local communities.

6.2.10 *Who Must Decide the Criteria to Certify Victims for Compensation Before Relevant Scientific Knowledge is Sufficiently Accumulated, and How? (Time Consuming Nature of Science)*

Time is needed to scientifically clarify something. Therefore, it is necessary to ask who must decide the criteria ~~of~~ for certifying victims for compensation before relevant scientific knowledge is sufficiently accumulated, and how. Some people believe that when problems occur, the cause must be scientifically identified first, and then actions must be taken to resolve problems by taking proper and sufficient measures based on scientific evidence. They expect that the certification criteria for victim compensation must be based on, and decisions made according to scientific evidence. Although some time is required, science must identify the cause and develop the countermeasures in the end. Accordingly, a certain level of risk must be tolerated for the sake of society's overall progress (including economic growth).

Others believe that science is always a dynamic process and that scientific clarification is time-consuming. Thus, such people think that society must decide the certification criteria from the viewpoint of other social values such as ethics and human rights, before science provides a clear knowledge base for humanitarian reasons. In the case of Minamata disease, scientific knowledge is important for explaining the cause(s) of the disease and for describing the extent of damage. However, science does not tell which level of damage must be compensated. These criteria have changed over time because people in society have gradually prioritized individual human rights and health more and more.

Society tends to wait for more convincing (conclusive) scientific evidence. From the perspective of the aforementioned first type of people who can tolerate the risk caused by insufficient scientific knowledge, the other type of people who prioritize human rights, and including the right to a safe environment conducive to good health, appear to incite society by raising unrealistic concepts, and **"**do not recognize how the society as well as its economy actually behaves. However, reality and truth are positioned just between the views of these two types. Thanks to the people with the more practical, humanitarian view, the number of victims finding relief has increased over the years. Thanks to the people with the more theoretical, society-first view, society has somehow managed to move forward.

6.2.11 *Interpretations of the Problems of Minamata Disease and Importance of Understanding Framings Behind Them*

Simply speaking, two typical interpretations of the problems of Minamata disease can be found nowadays. For most of the general public, the Minamata disease disaster is an event etched in Japanese history. This was a bitter experience. Thanks to this experience, however, the once-damaged Japanese environment became clean once again environmental governance became stricter, regulations were established, and new environmental technologies were developed. Thus, they believe that Japan has learned many lessons from these problems of Minamata disease, and can be proud of how quickly Japan has recovered from such disaster.

On the other hand, some people continue conducting large-scale health examinations on the effects of methylmercury for accumulating knowledge regarding the overall picture of methylmercury-derived health damage, and trying to "discover" people who are not yet known or recognized certified as victims by the government (or even not by themselves) because of their milder degree of damage. Because some people who have suffered from Minamata disease-like symptoms but are not yet been treated recognized as such, concluding that problems caused by Minamata disease have been resolved would be committing a most grievous error (Minamata City 2007). Some have taken their pleas to court to raise awareness of the government's responsibility to have taken measures to restrict fish consumption after Minamata disease was officially acknowledged. They also claimed that the local and national governments and Chisso Corporation tried to make the certification criteria for Minamata disease victims stricter so as to reduce compensation costs (Harada 2004). In their belief, the problems of Minamata disease most definitely remain unresolved, because uncompensated victims still remain and also because the local and national governments and society still ignore or pay insufficient attention to the potentially hidden victims.

The gap between these two typical interpretations is now widening. The majority of the general public having the first interpretation seems unaware of the existence of the latter interpretation. Several ongoing law cases and periodic Minamata disease-related health examinations seem to remain unnoticed by those waiting for scientific evidence to provide a conclusive solution, and putting humanitarian aspects as a lower priority. Some of them even believe that the latter humanitarian-conscious people are overexaggerating their claims in an effort to obtain excessive compensation (Higashijima 2010).

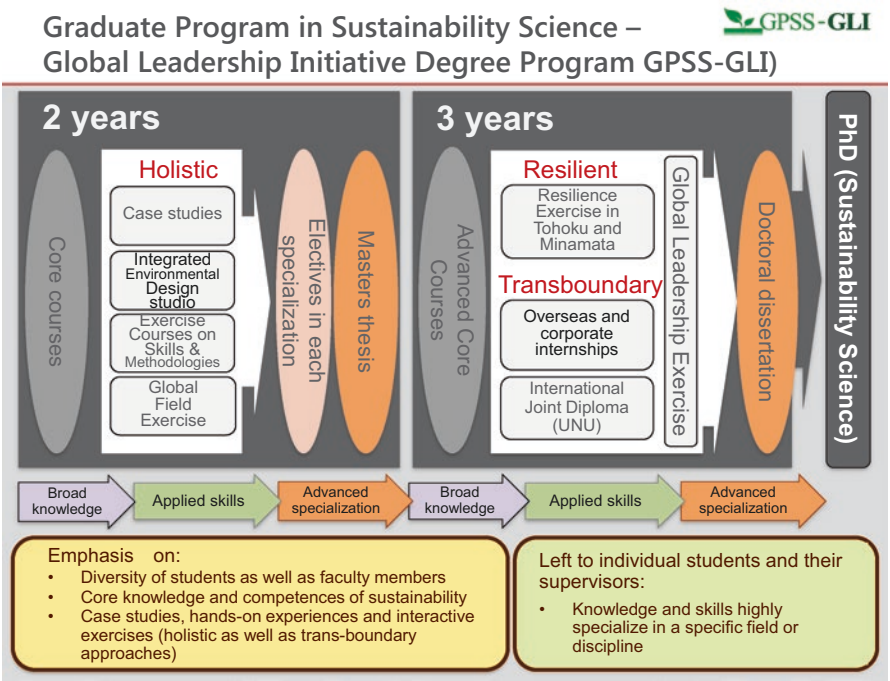
However, many interpretations are created from a combination of the several framings that I introduced in the previous section. Even if the interpretations completely differ from one another, all of them are apparently recognized as problems caused by Minamata disease. The difference is which part is being stressed as the

crux of the problem, or what problems are identified. By carefully examining which framings people agree on and which framings people do not, the essential nature of Minamata disease should become clearer. And, this tends to lead to collaboration among the people having different views.

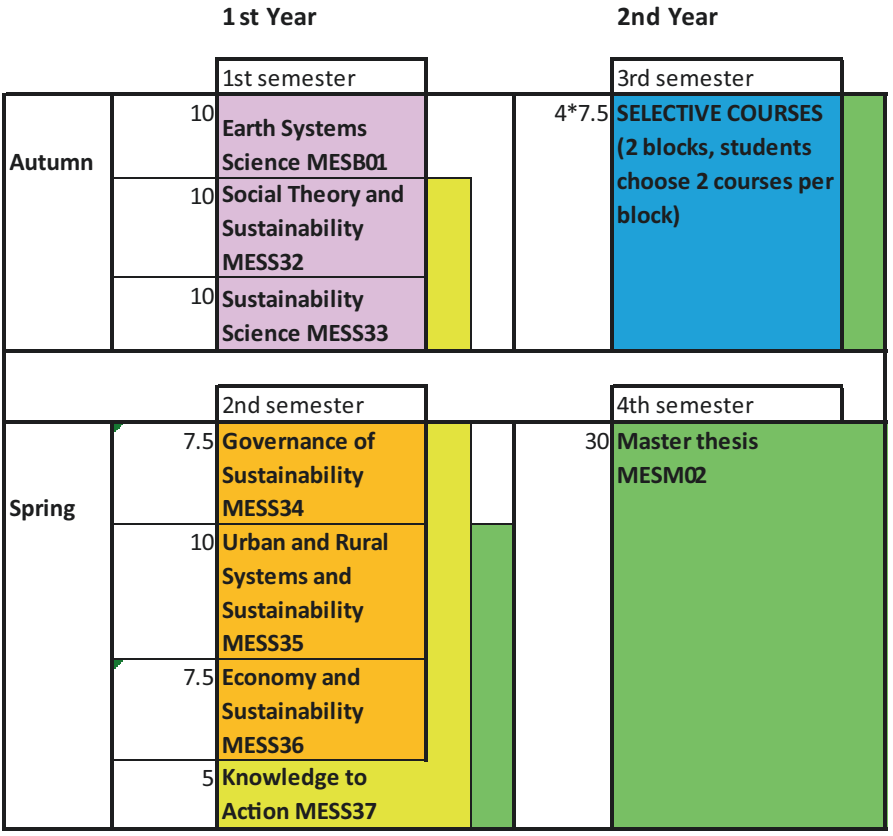
Important skills that are required when working with problems in the real world include the ability to elicit and understand the true feelings of different stakeholders and their views on a problem, the ability to be able to use different types of framings, and the ability to connect the people of different views. These are important skills regarding framing, especially for sustainability science.

Appendices

Appendix 1



Appendix 2



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References

George TS (2002) Minamata: Pollution and the Struggle for Democracy in Postwar Japan. (Harvard East Asian Monographs) Harvard University Press

Harada M (1995) Minamata disease: Methylmercury poisoning in Japan caused by environmental pollution. Crit Rev Toxicol 25(1):1–24

Harada M (2004) Minamata Disease (trans. By Tsushima S and George TS). Kumamoto Nichinichi Shinbun Culture & Information Center, translated from「水俣病」原田正純 (1972) Iwanami Shinsho/Iwanami Shoten

Higashijima (2010) Naze Minamata-byo ha kaiketsu dekinainoka 「なぜ水俣病は解決できないのか?」[Why can't we solve Minamata Disease Problems?] Genshobo弦書房

Minamata City (2007) Minamata disease: its history and lessons. http://www.minamata195651.jp/pdf/kyoukun_en/kyoukun_eng_all.pdf Accessed on 25 Aug 2018

Study Group on Global Environment and Economy (ed) (1991) Japan's experiences of environmental pollution – uneconomical economy that does not consider the environment. Godo Shuppan Publisher; 地球環境経済研究会(1991)"日本の公害経験ー環境に配慮しない経済の不経済ー"、合同出版

Sugiyama S (2005) *Minamata jirei ni okeru gyousei to kagakusha to media no sougo sayou*水俣病事例における行政と科学者とメディアの相互作用 [Interactions among administration, scientists, and the media in the case of Minamata Disease] in "Methodologies in Science, Technology, and Society", University of Tokyo Press, Yuko Fujigaki (ed) (in Japanese)

UN Archives (1992) Industrial pollution in Japan. ed. by Jun Ui http://archive.unu.edu/unupress/unupbooks/uu35ie/uu35ie0c.htm