



Title	What is fuhyohigai ?
Author(s)	Sekiya, Naoya
Citation	Fukushima Journal of Medical Science. 57(2): 93-99
Issue Date	2011
URL	<a href="http://ir.fmu.ac.jp/dspace/handle/123456789/310">http://ir.fmu.ac.jp/dspace/handle/123456789/310</a>
Rights	© 2011 The Fukushima Society of Medical Science
DOI	10.5387/fms.57.93
Text Version	publisher

This document is downloaded at: 2022-08-11T05:41:54Z

## WHAT IS FUHYOHIGAI?

NAOYA SEKIYA

*Associate Professor, Department of Media and Communications, Faculty of Sociology, Toyo University,  
Tokyo, Japan*

(Received December 6, 2011, accepted December 21, 2011)

### WHAT IS FUHYOHIGAI?

Since the accident at the Fukushima Daiichi Nuclear Power Plant took place, a social problem called *Fuhyohigai* has continued to occur.

Prior to the events of March 11<sup>th</sup>, *Fuhyohigai* could be defined as economic damage caused in an area stricken by incident, accident, environmental pollution, disaster, or recession. Such problem circulates in the area through the media, leaving people feel threatened and consequently leads to the halt of local product consumption, trade, or the decline in tourism within the area.

*Fuhyohigai* is not attributable to rumor generated by human communication but actually to media blitz. Those who are outside the disaster-stricken area are affected by such media reports cause this *Fuhyohigai*.

Rumor is generated and passed on among people with anxiety who are usually located nearby the incident, accident, or disaster. This eventually may lead to discrimination or the spread of incorrect information which flusters the society.

*Fuhyohigai* is a unique Japanese word and Kasperson et al. have submitted a concept of "Social Amplification of Risk" which presents a phenomenon similar to *Fuhyohigai*. This Social Amplification of Risk implies that the whole social process is generated due to actual threat such as in nuclear accidents or global warming. However, *Fuhyohigai* specifies the damage occurred in spite of "safety". Social Amplification of Risk analyzes processes of various social effects such as economic, psychological, and political, while the Japanese word, *Fuhyohigai*, basically applies to economic damage. *Fuhyohigai*, nowadays, may also include psychological damages.

The word "Fuhyohigai" has been created from that Nuclear power generation in Japan will be no

accident.

As a phenomenon, *Fuhyohigai*, is closely related to nuclear power. The origin of *Fuhyohigai* came from the fact that the Atomic Energy Damage Compensation Law does compensate for economic damage caused by accidents related to nuclear power. This has become problematic because, despite safety, economic damage affects people involved in the food industry, product manufacturing and trade, not only locally but with clients or partners out the region. The local fishing businesses have been especially affected.

The economic damage that we refer to as *Fuhyohigai* dates back to 1954 when "Radiation Panic" occurred after the H-bomb test at Bikini followed by the exposure of Daigo Fukuryu Maru. After the test, radioactive particles settled into soil nationwide, contaminating fish and shellfish. Nobody bought tuna even after inspection for radiation. In 1974, a radiation leak occurred in a nuclear-powered ship, Mutsu. And in 1981, an accident at the Tsuruga Nuclear Power Plant led to an issue as to where nuclear-related facilities should be set up.

In Japan, Atomic Energy Damage Compensation Law compensates economic damages caused by "the effects of the fission process of nuclear fuel, or of the radiation from nuclear fuel etc., or of the toxic nature of such materials." Therefore, financial losses, which are caused by the plunge in sales of vegetables or fish, or by the refusal of dealings, even when there is no contamination, have not been covered.

Atomic Energy Damage Compensation Law did not compensate the damage caused by the accident at Tsuruga Nuclear Power Plant in 1981 as the radioactive contamination was not seen as the cause of harmful effects on the human body. The compensations were paid by Japan Atomic Power Company,

---

関谷直也

Corresponding author : Naoya Sekiya E-mail address : [naoya@toyo.jp](mailto:naoya@toyo.jp)  
<http://www.jstage.jst.go.jp/browse/fms> <http://fmu.ac.jp/home/lib/F-igaku/>

Ltd. (JAPCO) for those who filed lawsuits against JAPCO or who had direct negotiation with JAPCO according to the civil code, not to Atomic Energy Damage Compensation Law.

To solve such problems, *Fuhyohigai* has been explicitly written in a safety agreement and compensations are to be made when necessary. For example, *Fuhyohigai* is expressed in an agreement on "The safety agreement and environment agreement of Hokkaido Electric Power Co.'s Tomari Nuclear Power Plant" in 1986, "The safety agreement of Tohoku Electric Power Co.'s the Onagawa Nuclear Power Plant" in 1978, and "The confirmation on countermeasures against *huhyo-higai*", and "The basic cooperative site agreement for Japan Nuclear Fuel's nuclear fuel cycle facility" for the Rokkasho-mura nuclear waste treatment facility" in 1991.

As doses of radioactive substances can be measured by a Geiger counter, a monitoring post, and so on the distribution of radioactive substances can be scientifically confirmed to some extent at the initial stage. Therefore, when radioactive substances are not scattered, we can scientifically say that it is safe or whether only rumor labels it is as dangerous. The economic damage caused then is called *Fuhyohigai*. In short, damage caused by disregarding safeness is the premise of *Fuhyohigai*.

The word, *Fuhyohigai*, was beginning to be used in the second half of the 1990s for accidents that were not related to nuclear power but related to environmental issues or disasters. For instance, it was used for the Nakhodka oil spill in the Sea of Japan and for the dioxin problem report from Tokorozawa.

When the JCO criticality accident happened in Tokai-mura in September, 1999, radioactive substances were not widely dispersed. However, the economic damages suffered were large and the paid compensation alone reached 15.4 billion yen. The economic damage suffered then was mainly referred to as *Fuhyohigai* and the word has started to take root.

The Atomic Energy Damage Compensation Law was first applied to the JCO criticality accident in Tokai-mura in 1999. This was due to the then Science and Technology Agency having changed its policy and included *Fuhyohigai* in nuclear damage as there was a considerable causal relationship between *Fuhyohigai* and the nuclear accident.

#### CAUSES OF FUHYOHIGAI

Main causes of *Fuhyohigai* are classified into

three types :

The first is media. This is a social problem being reported over and over with the use of bad images of a place, a product, or a company. Reports on incidents or accidents with negative messages such as "This place is dangerous.", "This product is dangerous.", or "This company is dangerous." can lower the value of the targeted company or product from the financial and marketing point of view. Thus negative effects of advertisement or PR are created.

To resist *Fuhyohigai* means to deny "media value = advertising effects" which is what the media industry is based on. As long as people put value on the media, it would be difficult to restrain *Fuhyohigai*. Therefore, in this information-overloaded society, we can say that *Fuhyohigai* is a type of damage related to natural disaster, environmental problems, food contamination, and the worsening of business, etc.

The second is distribution. Japan as well as many advanced countries has a highly sophisticated distribution system. This indicates interdependency of national markets and the possibility of acquiring replacements from all around the country.

Upon occurrence of an accident or an environmental pollution problem, people concerned with marketing or distribution consider matters in a certain way. They assume that consumers will not buy the questioned product as long as its safeness is not assured. Consequently, those people will decrease the price and stop dealing the product.

Fewer reports on an incident, accident, environmental pollution, or disaster will affect fewer people. However, the people concerned with the matter (including those involved in marketing) are curious and many people around them talk about the issue. Those involved in marketing or distribution often obtain information on a matter when ordinal citizens have no idea of it. This availability of information lead those concerned with marketing or distribution to respond to the matter excessively.

In the distribution terms, there is an expression called "Bullwhip effect". A bullwhip is a whip nomadic people use to drive their domestic animals. The movement given to a whip to crack is small but it becomes large as the force conducts through the whip. In the same way, the further the distance from a store becomes, the larger the oscillation in the supply chain becomes in the distribution. As moving up the distribution, the need to forecast long-term demand rises and consequently businesses respond to changes in the market exces-

sively whereas variations in demand are amplified at the upstream in the supply chain. Thus, if there is any concern over the safeness of certain food or product, overreaction can occur at the upstream in the distribution.

On the other hand, in a society with such highly sophisticated distribution, consumers have freedom of choice. Consumers buy what they want and they do not have to buy if they do not want to. Therefore, once a product loses its good image, consumers will exclude that product from their choices, resulting in a decrease in value.

The third is the safeness.

Japan holds a safe society and people there consider the safeness is a major premise to live along in the society. The Japanese often use a phrase, “a sense of safety and security.” Rather than requiring them, they take that for granted.

Occurrence of *Fuhyohigai* is inevitable as long as our society is overloaded with information from the mass media. A highly advanced distribution system and people’s safety consciousness also contribute to its occurrence. It is more appropriate and practical to regard *Fuhyohigai* as a kind of damage caused by environmental problems, disaster damages, infectious diseases, and nuclear accidents in the modern society.

*Fuhyohigai* is sometimes referred to as an indirect damage implying that it is economic damage, rather than physical or health damage. However, such definition is made only by including economic damage in indirect damage. We have to recognize in the first place that *Fuhyohigai* is economic damage that is caused by a direct effect of an accident.

#### FUHYOHIGAI AND SAFENESS STANDARD

Here I would like to argue the meaning of “safeness” I described above.

As I mentioned, *Fuhyohigai* originally means economic damage caused in spite of the safeness and no radioactive contamination in relation with nuclear power plants.

To be recognized as *Fuhyohigai*, foods, products, lands, and companies, which are suffering economic damage, need to be safe. In order to make judgment on *Fuhyohigai*, three patterns have to be looked at.

The first pattern is called “ripple effect” in the term of “Social Amplification of Risk”. This economic damage is caused by entanglement. Even when there are no concerns with regards to the contamination of certain foods, products, or lands has

from the very beginning of a matter, and there have been no reports on the safety issue, they can be refused and therefore involved in *Fuhyohigai*. The reason for this only comes down to the location being close to ‘those in question’ or because their foods or products being in relation with ‘those in question’.

People’s general knowledge of geography is not always perfect. We laugh at the ignorance shown by TV stars when they are unable to name Prefectures, however, our knowledge is not so different. We too are unable to give precise locations when asked questions to name cities, towns or villages. Unless we have been to the place, we are limited to what we know. This lack of knowledge is the first pattern of *Fuhyohigai*.

The second pattern of *Fuhyohigai* is caused by self-imposed control. People refrain from visiting a sightseeing spot not through safety concern but due to the fact that the area was stricken by disaster. People are fully aware of the safeness of the sightseeing area and the area itself has been primarily safe but they hesitate to visit. This is also often referred to as *Fuhyohigai*.

The third pattern of *Fuhyohigai* is based on “scientific safeness”. This *Fuhyohigai* is caused when certain food, land, and products are scientifically and stochastically judged as having almost no risk or extremely little risk. People belonging to the Central and Municipal Governments, people at related companies, and scientists are desperately trying to assure the safety of food, land and products. However, the public does not believe or remains uncertain about the safeness due to the lack of available information, or to the misunderstanding of safeness, or even because they do not believe the safety agreement declared by untrustworthy organizations. Many people do not have the tools to measure the safeness and this creates “information asymmetry”. This third pattern was typically seen in marine and agricultural products harvested after the JCO criticality accident, the Mutsu accident, and the Tsuruga nuclear power plant accident.

Apart from those related to the nuclear power, toxic substances and bacteria contained in the foods have also often disturbed the public and caused *Fuhyohigai* since 2000. Representative examples are *Escherichia coli* O157, the dioxin report from Tokorozawa, Bovine spongiform encephalopathy (BSE), the South African Revenue Service, avian influenza, and norovirus detected in oyster.

In this way, *Fuhyohigai* is often attributed to accidents, pollution, or disasters which ordinal peo-

ple cannot observe themselves or cannot differentiate between safeness and risk.

When we argue about safeness in relation to *Fuhyohigai*, we need to understand the concept of tolerance.

The Japanese government made the “provisional regulation values” but in reality radioactive substances have been dispersed and detected at the Fukushima Daiichi Nuclear Power Plant accident. Moreover, some scientists and specialists have not agreed on planting restrictions or annual radiation exposure doses concerning the safeness. Rather than *Fuhyohigai*, this can be a matter of tolerance that how far a society or an individual can allow the risk. We need to consider this tolerance problem independently of *Fuhyohigai*.

Some claim *Fuhyohigai* for a product since it is below the permissible doses suggesting its safeness. Others have a different idea of *Fuhyohigai*. They say that is not *Fuhyohigai* because it is not safe even though it is below the permissible doses. What we can see from such argument is not the confusion in the definition of *Fuhyohigai* but uncertainty of safeness provided by permissible doses and tolerance.

When it is obvious that radioactive substances have not been scattered, the possible economic damage must be prevented by sweeping away people’s anxiety on safeness.

On the other hand, no one can stop people from becoming anxious when actual radioactive substances are scattered as with the accident at the Fukushima Daiichi Nuclear Power Plant in 2011. The characteristics of *Fuhyohigai* occurred is different from those of earlier *Fuhyohigai*.

When we look at *Fuhyohigai* that was caused in the past, such as by the JCO criticality accident, BSE, or the dioxin report from Tokorozawa, we can recognize that people forget *Fuhyohigai* as time passes and as their memories fade. People start to buy the product which once suffered *Fuhyohigai* before being aware of it. The damage caused by *Fuhyohigai* often makes a recovery with the passing of time or when the media stops making an issue of it.

Several months have passed since the accident at the Fukushima Daiichi Nuclear Power Plant took place. The sales of some effected products have recovered in Ibaraki and other prefectures whereas in Fukushima, the volume of business and the value of transaction have yet to regain to the state prior to the accident.

## **FUHYOHIGAI AFTER THE GREAT EAST JAPAN EARTHQUAKE**

Mainly, there have been three types of damage referred to as *Fuhyohigai* after the Great East Japan Earthquake.

### *1. Insufficient supply of everyday commodities*

Everyday commodities did not reach the cities, towns, and villages that are located within 30 km of the Fukushima Nuclear Power Plant such as Soma, Minami Soma, or Iwaki. The governors of those municipals call that phenomenon *Fuhyohigai*. They interpreted the stagnation of daily commodity delivery as people involved in transportation had the fear of possible spread of radioactive substances. However, the nuclear accident may not have been the only cause. For example, suspension of businesses, shreds in roads, shortage of gasoline, or safety agreement of employees may also have contributed to the stagnation.

Nonetheless, the inability to obtain daily necessities was a serious problem for the residents in places where the government assured safeness.

### *2. Rumor damage to safe food*

Radioactive substances were detected in some agricultural products in Northern Kanto and their shipments were prohibited. After this incident, other safe agricultural products suffered economic damage. The government emphasized the safeness of foods of restricted distribution but resulted in creating the Japanese people’ distrust and further fostered *Fuhyohigai*. People stopped purchasing the food even when radioactive substances were not detected or contained less than the provisional regulation values.

The same type of *Fuhyohigai* also occurred when radioactive substances were detected in young lancefish that had been caught off the coast of Fukushima and Ibaraki leading to the refusal of whole seafood dealing.

### *3. Regarding Japan as dangerous*

Foreign countries cause *Fuhyohigai* in Japan.

The Great East Japan Earthquake and the nuclear power plant accident made foreign countries regard Tokyo and Japan as dangerous. In Aomori prefecture, apples for export have been labeled as containing radiation doses as a safety certificate. This measure was started in order to respond to an inquiry by importers from Taiwan. Some embas-

sies ordered their staff and families to go back to their own countries. Australia and Germany transferred their embassy functions from Tokyo to a consulate general in Osaka.

Immediately after the disaster, the Japanese media focused on dispatched rescue teams and cooperation work for the nuclear power plant provided by foreign countries with an exaggerated feeling like in the book *A Paradise Built in Hell*. At first, the overseas media expressed sympathy, however, as the accident at nuclear power plant had taken time to settle, they started running reports that fueled lasting fear.

The accident at the Fukushima Daiichi Nuclear Power Plant that occurred after the Great East Japan Earthquake is the largest nuclear accident the media has ever experienced. The nuclear accident in Chernobyl was disclosed by Sweden two days after the accident. Sweden detected radioactive substances and started interrogating the Soviet Union. On the other hand, the accident at the Fukushima Daiichi Nuclear Power Plant occurred when the whole world was watching the Tsunami following the massive earthquake. People overseas were watching the transition in real time. This media effect was undeniably huge.

In addition, distrust of communication and information provided by the government and specialists widely spread. In a press conference, Edano, former Chief Cabinet Secretary, said that there was no immediate risk to the human body regarding with the intake of food containing radioactive substances. Some specialists who majored in nuclear engineering or nuclear medicine also said that there would be no effects on health. Contrary to the claims and explanations on the safeness and assurance given by politicians and experts, it was difficult for people to believe in such words on an emotional level while being in a serious nuclear situation.

People's distrust was further extended by the media. When radioactive substances were detected in tap water in Tokyo, newspapers and TV programs reported this problem one after another. However, at the same time they tried to avoid causing panic and inspiring fear by reporting many more other news stories emphasizing safeness. This resulted in making people have more fear and doubt. Because of the excessive seriousness of the situation, the media unnecessarily moderated the reports and consequently fostered suspicion among people.

## DISTRIBUTION PROBLEMS

Retailers and distributors cut procurement when they forecast that consumers will restrain from buying. Wholesalers follow accordingly. Supply routes are closed not due to the actual restrained buying but by the anxiety of probable dead stock. This can not only take away the chance of economic recovery in the disaster-stricken area but leave it as impoverished.

Compensation for products in which radioactive substances were detected and for those which suffered *Fuhyohigai* are to be proceeded as a matter of course. Besides that, people and companies in Fukushima prefecture, and companies concerned with products in Fukushima including consumers need to get through another phase.

*Raddish Boya*, a company which delivers food and groceries to its members, voluntarily measures radiation doses, has the analysis of radioactive contamination done by a third party, and releases the results. The company also indicates the place of production on their products. According to *Raddish Boya*, their week sales increased to 150% when they started this indication compared to the week without indication. The sales of shiitake mushrooms produced in Fukushima also became 2.3 times higher than in the previous year. Another increase also has been recorded in two types of assorted products of specified locations since the company started selling them simultaneously. One is a set composed of products made in Western Japan, Koshinetsu, and Hokkaido. The other is a set made for the sake of supporting Northern Kanto and Tohoku. *Raddish Boya* mentioned that many elderly people buy products of Tohoku (*Shogyokai* for October in 2011). U Coop Jigyo Rengo also analyzes their products and announces results of radioactive contamination with "Not detected" or "Within the provisional regulation values" labels.

It is not my intention to say that we have to believe the provisional regulation values announced by the government. At the same time, I do not value a bargain with decreased prices nor a campaign of safeness and security. Also I do not deny the preventive measures taken for children and pregnant women against ingesting foods that may cause low-dose exposure or internal exposure.

Based on the premises of admitting diverse senses of value and freedom of consumption, thorough inspection and measurement of doses, and its disclosure are needed. Specific products or companies must not be discriminated, but be fairly

treated. There will be no social justice if one is influenced by preconceptions and does not buy or sell a particular product or does not do business with a particular company.

Campaigns and sales to support the revival of the damaged areas, which were held immediately after the disaster, had important roles to distribute and appeal the safeness of products at the initial stage. What more important in the next stage is not to purchase a product which is substantially cheaper than normal but to purchase a product which is normally distributed and normally priced.

Active involvement is required to let products to be distributed normally. As long as products are safe, it is a social responsibility to have them circulated in order.

#### PREVENTIVE MEASURES FOR *FUHYOHIGAI*

How can we prevent *Fuhyohigai*? Based on the definition of *Fuhyohigai* made in the past and on the premise of safeness, I would like to consider countermeasures in general.

##### 1. Countermeasures against foreign *Fuhyohigai*

There has been suspension of business deals and a decrease in tourists regardless of products and places.

Some of these *Fuhyohigai* were caused due to a lack of geographical knowledge of Japan. Without knowing which part of Japan is suffering radioactive pollution, they may prefer to avoid dealings with Japan.

In 2002, more than the maximum residue limit of agricultural chemicals was detected in frozen vegetables that had been shipped to Japan from Hebei and Jiangsu provinces in China. What we viewed as a problem then was not “made in Santo or Kozo Province” but “made in China”. There must have been decent Chinese farmers but we avoided them all.

In the same way, “made in Japan” and “Japanese products” is not being accepted. Most People abroad don’t have geographical knowledge of Japan or don’t understand the safeness of a product.

Primarily the government has to provide scientific explanations in order to persuade other countries, which overreacted during the accident, to understand the reality. It is said that not just a few Japanese companies have been asked to provide inspection results from their trading partners. Therefore, the central and municipal governments need to come up with a way to issue such results in

a simple manner.

##### 2. Countermeasures against domestic *Fuhyohigai*

What countermeasures can be taken for domestic *Fuhyohigai*?

There are some elements which contribute to *Fuhyohigai*. As I wrote above, they are mass media that conveys massive information (media), distribution networks that reach nationwide (distribution), and safeness that everyone requires (safeness). Although *Fuhyohigai* cannot be fundamentally eliminated unless changes are made in the systems of the Japanese society, the three elements above can help to find a solution of *Fuhyohigai*.

Mass media must convey accurate and detailed information thoroughly. Mass media is required to promote proper measurement of doses, an establishment of a traceability system and a society agreeable permissible value, and smooth proceeding for compensation.

##### 3. Compensation system

The final preventive measure is to enrich the safety net. Currently in principle, *Fuhyohigai* is compensated to a certain extent by Indemnification of Nuclear Damage Compensation, which is based on the Law on Compensation for Nuclear Damage and insurance made by nuclear-related companies.

A safety net such as a mutual aid system or an insurance system needs to be properly prepared to support people suffering *Fuhyohigai*, within the same industry or the same market. Needless to say, a victimizer must primarily pay victims for the damage. In the past, people engaged in agriculture, forestry, fishing, and tourism often had *Fuhyohigai*. Decrease in sales of one region makes an increase in sales of other regions. Prices and the volume of business of agricultural products of Western Japan have been on the rise due to the effects of the current *Fuhyohigai*. A concept of work sharing may be necessary in distribution.

Public administration and producers will tend to minimize *Fuhyohigai* when there is no safety net and when they depend only on uncertain compensation. However, this only leads them not to openly disclose the information they have and to make consumers suspicious about the information. Distrust and anxiety may begin to spread.

#### CONCLUSION

In a society where information is overloaded, people require safeness, and distribution is

advanced, it is impossible not to generate *Fuhyohigai*. Therefore a required approach for the future is probably to control damage caused by possible *Fuhyohigai*.

In any case, what we currently require is ; the measurement of detailed radiation doses in relation with scatter of radioactive substances, announcement of the information for consumers' options, the establishment of food traceability, the detailed indication of the production area and society agreeable permissible value.

Compensation needs to be implemented smoothly and promptly either for the real harm (above the permissible value), and for *Fuhyohigai* (below the value). When the compensation is assured, it will promote the disclosure of information, therefore meaning that compensation is a key to such disclosure.

People, companies, and products in Fukushima must not be discriminated against and Japan has to be fairly treated.

#### REFERENCES

1. Sekiya N. *Fuhyohigai* and its mechanism. Koubunsha, 2011.
2. Sekiya N. Social Psychology of "Image Contamination (*Fuhyohigai*)" — The fact of "Image Contamination (*Fuhyohigai*)" and its mechanism. Disaster Information Studies, No. 1, Japan Association for Disaster Information Studies, 78-89, 2003.
3. Sekiya N. Policy Management of the Compensation about "Image Contamination (*Fuhyohigai*)", Disaster Information Studies, No. 2, Japan Association for Disaster Information Studies, 102-113, 2004.
4. Kasperson RE. The Social Amplification of Risk : Progress in Developing an Integrative Framework. In : Krinsky S, Golding D, eds. Societal Theories of Risk. Westport, CT, London, Praeger, 153-178, 1992.
5. Pidgeon NF, Kasperson RE, Slovic P, eds. The Social Amplification of Risk. Cambridge, Cambridge University Press, 2003.
6. Jeanne XK, Roger EK. The Social Contours of Risk : Publics, risk communication and the social amplification of risk. London ; Sterling, Va, Earthscan.
7. Kawakami Y. Uwasaga hashiru — Johodenpa no shakaishinri. Saiensusha, 1997.
8. Miyake Y, Hiyama Y, Kusano N. (supervisor). Bikini suibaku hisai shiryoushu. Tokyo daigaku shuppankai, 1976.
9. Kurasawa H. Genshiryokusen 'Mutsu' kyokou no kouseki. Gendaishokan, 1988.
10. Hiroi O, et al. 1999 nen JCO rinkaijiko to jumin no taiou. Tokyodaigaku shakaijohou kenkyujo Chousa kiyou 15, 2001.
11. Hayakawa H. Ryugen no shakaigaku — Keishiki shakaigaku karano sekkin. Seikyusha, 2002.
12. Tateno A, Noguchi K, Aoyagi N. Tetteikaimei Toukaimura rinkaijiko. Shinnihon shuppansha, 2000.
13. Hiroi O. Ryugen to dema no shakaigaku. Bungeishunju, 2001.
14. Renn O, Burns WJ, Kasperson JX, Kasperson RE, Slovic P. Social Amplification of Risk. Journal of Social Issues, 48(4) : 137-160, 1992.
15. Yokota H. Tokorozawa daiokishin houdou. Ryokufu Shuppan, 2001.