KNOWLEDGE NOTE 5-3

CLUSTER 5: Hazard and Risk Information and Decision Making

Risk Communication

GFDRR
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THE WORLD BANK

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Risk Communication

Risk communication is an important component of disaster risk management (DRM) because it shapes people's perceptions of risk and influences their actions with respect to disaster preparedness and disaster response. It also influences the intervention decisions that are made throughout the disaster management cycle. The credibility of the information source takes a long time to build and needs to be well established before a disaster strikes. In Japan, the level of trust in government and other official communications was sorely tested following the nuclear accident at the Fukushima Daiichi nuclear power station.

Disaster preparedness is often perceived as being mainly a governmental responsibility, with information and directives traveling from the top down. That is the case to some extent, since local communities generally lack the tools and skills needed to conduct scientific risk assessments and fully understand the underlying risk in their localities without expert assistance. The problem with the top-down approach is that policies may be imposed on communities without taking local conditions onto account, and communities may become overly dependent on information coming from the government. Recent experiences from the Great East Japan Earthquake (GEJE) showed that when the local community was involved in planning for disaster preparedness, and people took ownership of their own safety plans, they were better prepared and better able to take the necessary actions to protect themselves.

Successful risk communication occurs when there is holistic learning, facilitation, and trust. In holistic learning, the gap in knowledge between the information sender and receiver is minimal (figure 1). Hazard maps, booklets, and videos can all help narrow that gap when it comes to disaster education and risk communication.

Normally, the information generators or senders are government agencies, universities, or research institutions that have the capacity to assess risk and the political mandate to implement DRM measures. The information receivers are the communities, businesses, and individuals who have knowledge of the local area and are the ultimate users of the risk information (figure 2).

FIGURE 1: **The concept of holistic learning: narrowing the gap between local and specialist knowledge**

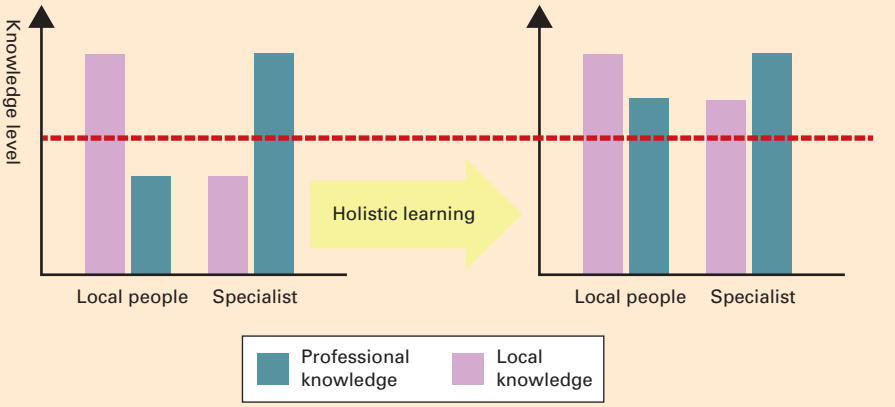
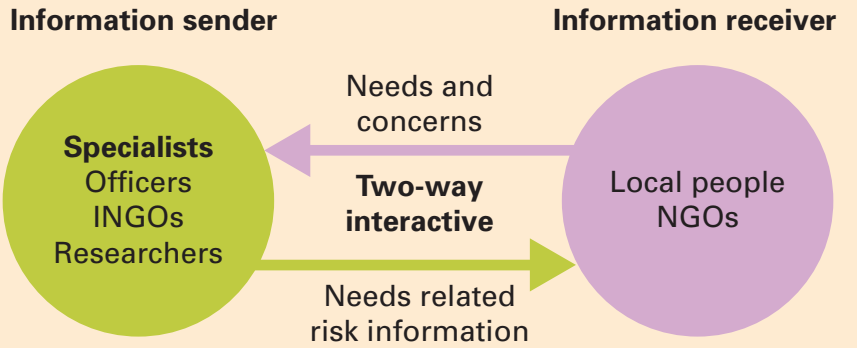


FIGURE 2: **The risk communication framework**



Source: Kikkawa 1999.

FINDINGS

THE IMPORTANCE OF TRUSTING THE INFORMATION PROVIDER

Early warnings greatly influence how people perceive and evaluate the risks from the imminent hazard and their subsequent decision to evacuate. In this respect, the level of trust in and the credibility of the person, institution, or medium issuing the warning is of crucial

importance. Furthermore, factors such as fatalism can affect evacuation decisions. People who have responded to too many false alarms may not take the warnings seriously.

In some cases, the underestimation of the height of the tsunami in the warnings that went out on March 11 likely delayed evacuation and possibly increased fatalities (KN 2-5). Japan's proposed new early warning scheme will not include any numerical values for tsunami height in the first warning but will use more descriptive expressions, such as "massive" or "very high" waves, in the event of earthquakes larger than magnitude 8. These terms will be further qualified by expressions such as a "tsunami height equivalent to the GEJE is expected."

OFFICIAL RISK COMMUNICATION TOOLS: HAZARD MAPS

In Japan, hazard maps indicate expected hazard levels and locations as well as the location of evacuation centers and routes (KN 5-1). The map shown in figure 3 was prepared by the village of Toni (Kamaishi City, Iwate Prefecture) in a local workshop with community members. It includes predicted inundation depths indicated by colors, historical records of inundated areas, lead times, evacuation shelters, and telephone numbers for warnings. The hazard map was printed and distributed to all families in Toni before the GEJE.

Developing this type of disaster map through a participatory process is an effective way of communicating risk to the community at large. A post-disaster survey in the Toni area identified citizens' motivations for participating in the mapmaking process (figure 4).

PROBLEMS WITH THE HAZARD MAPS IN USE

Mapping schemes differ in the colors and symbols used to convey hazard information. In the United States, efforts are being made to ensure the consistency of the content of hazard maps, as well as their design.

While hazard maps are useful tools to help communities understand the risks they face, there are, nevertheless, uncertainties associated with the assessment of the hazard risk itself—future disasters may exceed the levels indicated on the maps. In addition to producing and delivering the maps, their content should be presented to local communities, as was done in Toni Village. In the course of such presentations, governments and experts must explain the limitations of prediction technology. In the GEJE, the maps provided residents with a false sense of safety. Only 20 percent of residents utilized hazard maps for their evacuation in the GEJE (KN 5-1).

Another way of raising awareness of risk is through evacuation drills carried out under as many different scenarios as possible, for example, at night or in rainy weather (KN 2-6). Education at school is also effective to prepare for disasters (KN 2-3).

Although risks from tsunamis are now well understood in the wake of the March 11 event, communities must also become aware of the risks from other possible disasters, such as landslides or cyclones. A Web portal maintained by the Ministry of Land, Infrastructure,

FIGURE 3: **Hazard map produced by the village of Toni in Kamaishi City, Iwate Prefecture**

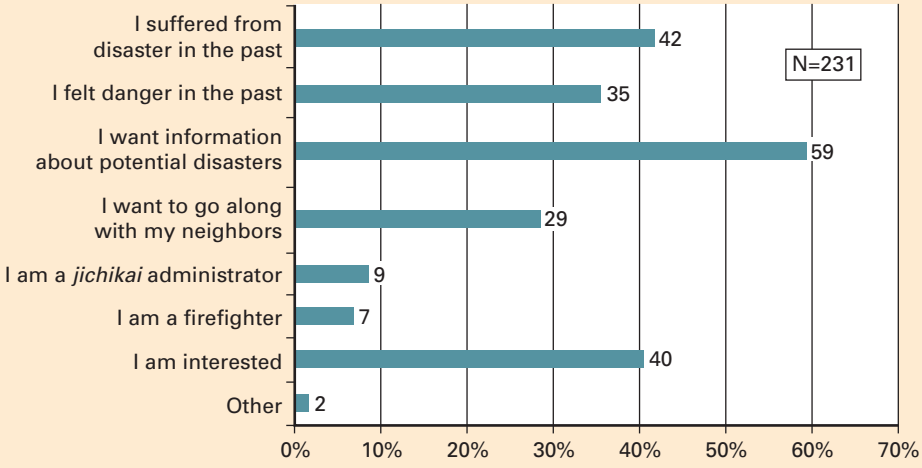
Source: Kamaishi City.

Transport, and Tourism provides access to all hazard maps created throughout the country. See KN 5-2 for details.

INFORMAL TOOL: LOCAL KNOWLEDGE ALONG THE SANRIKU COAST

The Tohoku region has two contrasting topographic characteristics: the Sendai plain, south of Sendai City, which is relatively flat and offers little access to higher ground close to the coast. The other is the Sanriku-rias coast north of Sendai, where the mountains are near the coast. These topographical characteristics influence the kinds of informal evacuation strategies used in the respective areas.

FIGURE 4: **Reasons given by people in Toni Village for participating in the hazard mapping exercise before the GEJE**



Tendenko is a term used in the Sanriku coastal area, referring to self-evacuation without stopping to look for family members, neighbors, or relatives. The assumption is that everyone will be self-evacuating, and therefore there is no need to be concerned about others. Depending on the location of an earthquake's epicenter, the lead time between the main shock and the arrival of the tsunami can be short. In these cases it is imperative that people self-evacuate without delay. This is practical in the coastal area of Sanriku because of the proximity of higher ground (figure 5).

But the *tendenko* concept does not apply in the Sendai plain because there is no higher ground nearby (figure 6). There, public buildings such as schools or community centers are used as evacuation centers.

RISK COMMUNICATION FOLLOWING THE ACCIDENT AT THE FUKUSHIMA DAIICHI NUCLEAR POWER STATION

The accident at the Fukushima Daiichi nuclear power station highlighted the issue of risk communication in nuclear emergencies. The Investigation Committee on the Accident at the Fukushima Nuclear Power Stations (2011) reported that "Communication from the government had been far from ideal. The government delayed providing urgent information, withheld press releases, and was unclear in its explanations. Neither those directly affected by the accident at the Fukushima station nor the public at large believed that the government was providing truthful and accurate information in a timely manner. Examples include the government's information about the status of the reactor cores—core meltdowns in particular—and the critical condition of unit 3, as well as the unclear statement, repeated several times, that the radiation 'will not immediately affect human bodies.'"

FIGURE 5: **Designated evacuation building (left) and evacuation road (right) in Kamaishi**

FIGURE 6: **Flat area in Sendai Plain offering no possibility of evacuating to higher ground**

Nuclear and Industrial Safety Agency (2012) reported that "Seventy-four percent of people at the affected areas were dissatisfied with the information provided because:

- The background and the reasoning behind the reports and recommendations coming from the official sources were not well explained and therefore could not be trusted.
- The briefings did not include enough detail."

Also, the government committee pointed out that "water contaminated by radiation was discharged into the ocean without notifying neighboring countries. Although this did not violate any relevant international conventions, it may have led the international community to question Japan's competence in responding to nuclear disasters."

LESSONS

EARTHQUAKE AND TSUNAMI RISK COMMUNICATION

Risk communication is meant to help people save their own lives. For communication to be effective, people must be able to trust the information and its source, and it takes a long time to build that trust.

There are formal and informal tools for communicating risk. Hazard maps and early warnings systems are the formal tools that Japan has used, both of which are being revised in light of the GEJE, since both underestimated the actual risk. Hazard risk information should be continuously updated.

Informal communication tools include local knowledge such as tendneko practiced on the Sanriku coast, where self-evacuation without waiting for family members and others is encouraged as soon as a large ground shaking is felt. These types of approaches and local knowledge based on experiences with large tsunamis should be preserved and passed from generation to generation.

Participatory DRM planning by the local community is an effective way of communicating risk. Different forms of communication may have to be used for different age groups. The local social structure can be leveraged to facilitate emergency planning, for example, by enlisting local leaders in their various roles and functions.

Regular drills and education also have an important role in shaping the perception of risk in local communities.

Complacency is a constant problem. Even people who have already experienced disasters need to be reminded of the importance of being prepared. People can also become overly reliant on early warning systems.

NUCLEAR ACCIDENT

Japan's Nuclear and Industrial Safety Agency, a government regulatory body, has proposed the following actions to improve risk communication in the event of nuclear accidents:

Develop technical capacity. The technical capacity of staff to analyze information on accidents and to implement countermeasures should be enhanced through specialist training programs.

Develop communication capacity. Communication officers should be trained in disaster risk communications. Preparing manuals, communication materials, and answers to frequently asked questions is also necessary. Communication channels should be established with the mass media, the public, embassies, and local agencies.

Develop coordination capacity. Mechanisms for information sharing should be established among relevant agencies such as the Office of the Prime Minister and the Ministry of Foreign Affairs. Communication equipment and manuals are also necessary.

RECOMMENDATIONS FOR DEVELOPING COUNTRIES

Establish trust between information senders (for example, the government) and receivers (local communities). Trust is a big part of effective risk communication. If the information source cannot be trusted, real communication is impossible—and it takes a long time to establish trust. Complacency is also an issue: Overreliance on early warnings, hazard maps, and incoming information should be discouraged.

Use a variety of tools to communicate risk. Risk communication tools range from sophisticated communication systems to participatory emergency planning, including community hazard mapping, disaster evacuation drills, neighborhood watches, instruction in schools, and the passing of experience from generation to generation based on previous events.

The way in which risk is communicated in the early warning system is also important. Although sophisticated early warning systems and technologies are important during a disaster, the public should understand limitations of prediction technology.

Leverage the interest that local leaders may have in community preparedness and be aware of social structures, which vary from country to country and place to place. Work with local change agents to provide training and to develop an appropriate risk communication strategy.

Take a multihazard approach. The difference in Japan's preparedness for the earthquake and tsunami versus its preparedness for the nuclear accident following the GEJE demonstrates the importance of considering all hazards, not just those that are most likely to happen. A good communication strategy is one piece of an overall response plan, which was lacking for the nuclear accident at Fukushima Daiichi.

Update and monitor. Risks are dynamic and change over time depending on population increases or decreases, the development of new industrial facilities and commercial properties, the availability of new hazard information, and scientific innovations (KN 2-8). Risk information should be updated regularly and reflected in risk communication strategies.

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