

Flood Risk Communication with Pafrics

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1 Introduction

An approach of integrated flood risk management is needed to protect society against flood disasters. Residents, local communities, and government agencies will all be involved in the flood risk management. For effective flood risk management, risk communication between residents, local communities, and government agencies will be necessary. Therefore, the disaster prevention knowledge available to each of these groups should be improved. To support risk communication to prevent flood disasters, the Research on Social Systems Resilient to Natural Disaster project team at the National Research Institute for Earth Science and Disaster Prevention (NIED) has developed a new system: the Participatory Flood Risk Communication Support System (Pafrics). Pafrics includes three support functions; i.e. a learning support system for flood risk literacy, making a choice of flood disaster mitigation measures, and supporting to hold workshops. This chapter is concerned with the examination of effective Pafrics from the questionnaire survey result to the participant by using Pafrics in the university lectures and the workshops in local communities. Examines are three; the educational effectiveness of the Pafrics learning support system for flood risk literacy, the workshop conducted using Pafrics, and the use of web version of Pafrics at the residents meeting.

2 Effectiveness of Pafrics for improving Flood Risk Literacy

2.1 Case of university lectures

The purpose of the learning support system for flood risk literacy is to help users better understand flood risks. To test the effectiveness of this learning support system, its application in a university lecture has been examined.

The lecture was held in 2004. There were 93 participants who ranged from second-year to fourth-year students of the university. The lecture title was “A lesson on integrated flood risk disaster prevention and hazard maps”, and the goal was for the audience to fully understand flood mechanisms, the natures of disaster risk and as well as the use of hazard maps as one of the important soft measures to prevent disaster damages. For the 60-minute lecture, 21 slides were chosen from the learning support system for flood risk literacy in Pafrics.

The lecture first dealt with flood prevention measures and explained that the frequency or probability occurring floods of floods is an important factor to implement flood prevention measures. Then explained the purpose of hazard maps and the process through which they are created. As teaching materials, Pafrics and the Shonaigawa -Shinkawa flood hazard map which are prepared for Nagoya City were used. Copies of the map (reduced to A4 size) were distributed to the participants.

A 15-minute questionnaire survey was conducted before and after each lecture to check how well the lecture was understood. The questionnaire also asked about the respondents' background information and flood disaster experience.

2.2 Method

The questionnaire results before and after the lecture was designed to examine whether the respondents gained a better understanding of flood disasters and a basic understanding of the main points concerning the distributed flood hazard map.

The questionnaire focused on risk information provided by the map. To measure basic understanding of the flood risk information from the Shonaigawa-Shinkawa flood hazard map, the questionnaires asked about landform conditions that affect whether a flood disaster is likely to occur, a flood scale and its speed, the occurrence frequency of flood disasters, and the uncertainty involved in the simulation used to prepare the hazard map.

The questionnaire asked each respondent to choose the best response from five choices: strongly disagree, disagree, do not know, agree, and strongly agree.

2.3 Results and discussion

The differences of the participants' understanding about the pre- and post-lecture on flood risk are shown in Fig. 1. There was not a large change in the responses regarding the flooded area. However, the responses for "usage attention", "method of map reading", "map making aim", and "original memo about disaster prevention", and another item provided by Pafrics were significantly positive. Those for "usage attention" increased drastically. These changes are probably due to the explanation of how the hazard map was produced and the fact that it was distributed among the students and explained in detail through Pafrics.

The changes in flood risk information before and after lecture are shown in Fig. 2. The degree of understanding about "featuring landform possible flood disaster", "flood disasters frequency", and "the uncertainty involved in the simulation" increased. The students' understanding of "a flood scale and its

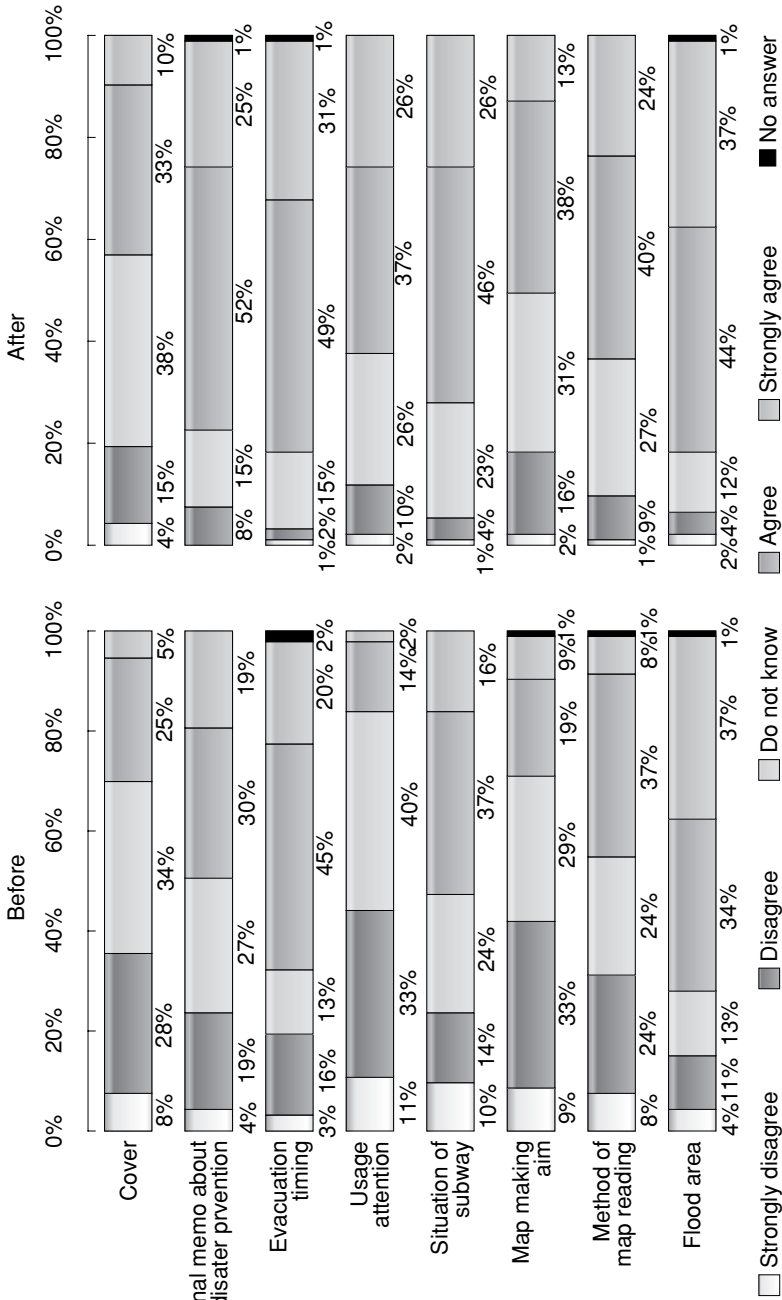


Fig. 1. Comparison of the knowledge of participants before and after the lecture on flood risk information.

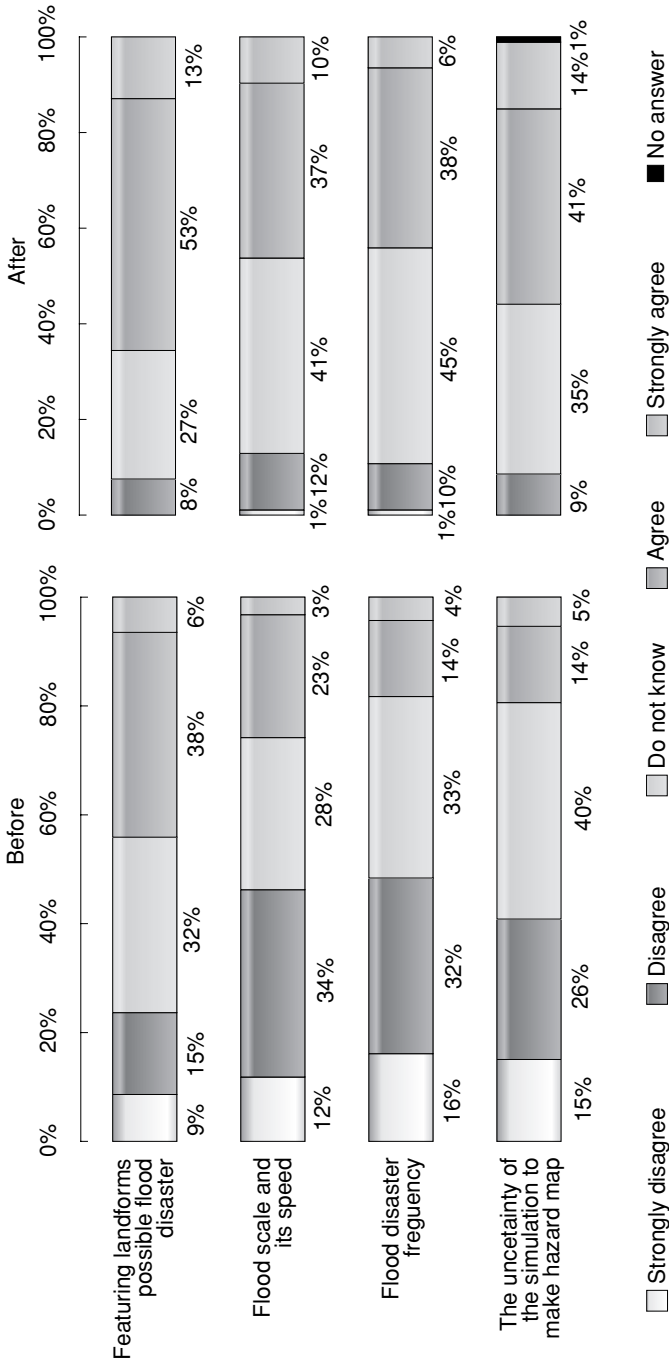


Fig. 2. Pre- and post-lecture flood characteristic understood by the participants.

speed” and “the uncertainty of the simulation to make a hazard map” deepened considerable. These changes also appear to have been partially the effect of the use of Pafrics to explain these risk issues.

The results from the questionnaires suggest that the Learning Support System for Flood Risk Literacy is useful for disaster prevention education. This system can thus be used to provide education in places where knowledge about namely flood risk is needed, such as in schools or within local communities. The results also suggest that much of the overall educational effect comes from Pafrics itself. The Learning Support System for Flood Risk Literacy provides a content collection which allows users not only to learn about a particular area but also to gain a general knowledge about flood risk. For risk communication to take place local areas, specific area content must be prepared. However, area information varies in its form, precision, and available quantity. During the system construction, it was thought that each local workshop organizer would be able to register the necessary local area content on Pafrics. It was decided, though, that the content has to be registered in a way that ensures reliability, objectivity, and public access, while also taking into account privacy and copyright concerns. Therefore, registering local area content creates many problems. We think that it is best to prepare local area content individually possibly by residents, themselves at present.

Integrated communication about risk is an effective way to implement risk management. In the United States, the National Research Council (1989) defined risk communication as “an interactive process of exchange of information and opinion among individuals, groups, and institutions”. The smaller the differences in the knowledge held by all parties and the greater the awareness of differences, the smoother communication is likely to be. To enable smooth flood risk communication, Pafrics may contribute to even out the differences in knowledge of individual involved in flood risk management.

3 Pafrics Workshop

3.1 Case of river management

During the process to develop a river management plan, which included the participation of the local area residents, our project conducted a Pafrics-based workshop on flood risk communication. This workshop was called the Tokigawa-Shonaigawa Korekara Project (the Korekara Project).

Tokigawa-Shonaigawa is an urbanized river in the Chubu area of Japan. It flows into Ise Bay after crossing the Noubi plain from the Gifu Prefecture ravine area. In Gifu Prefecture, it is called the Toki River; while in Aichi Prefecture it is called the Shonai River. Urbanization in the basin has proceeded

rapidly since the 1950s, and about 4,000,000 people now live there.

The purpose of the project was to create a river management plan for the Toki River and Shonai River based on discussions between experts, city representatives, and residents. The revision of the law concerning the river management was part of the project background. Local area residents (from both the upper and the lower reaches of the river), government agencies, non-profit organizations (NPOs), and experts in this field participated in the project.¹

The Korekara Project consisted of the basin conference, a local area discussion meeting, and then a river administrator and Tokigawa-Shonaigawa meeting. The river management plan was developed in five steps:

1. Determination of the project direction
2. Ranking the priority of problems
3. Getting goals of the river management goal
4. Examination of the river management plan
5. Decision regarding the river management plan

The basin committee was established to hear opinions from river-management experts. The first committee meeting was on March 3, 2003. The river administrator and Tokigawa-Shonaigawa met to hear opinions from the Aichi and Gifu prefecture governments and communities within the basin. The first meeting was on February 4, 2004. An area residents meeting led to citizens' opinion-exchange meetings, open houses, and a "Kurumaza"² meeting. The open houses were display events where visitors were directly asked about their opinions regarding the information of the river; they were held at the town hall, in local shopping centers, etc. Opinions were gathered and put together as the Korekara Voice or the Report of the Korekara Project, and, consequently, were reflected in the river service plan. The "Kurumaza" meeting was to hear the concerns and specific needs of people living in the basin. This meeting was carried out in a face-to-face style. Ten citizens' opinion-exchange meetings were held to discuss and exchange local information and proposals regarding river maintenance. The participants included residents,

¹The participants, apart from residents, were from the Ministry of Land Infrastructure and Transport (the river administrator), the Rescue Stock Yard (an NPO based in Nagoya City), a university faculty, and the Disaster Prevention Research Group, National Research Institute for Earth Science and Disaster Prevention (NIED), Japan.

²Kurumaza-meeting is open exchange meeting public.

representatives from resident groups, people who worked in the basin, and those who had some interest in the management of the river. They exchanged opinions regarding four themes: having a beautiful river that supports various ecosystems; utilization of virgin landscape, history, resources, and space; “To tell the large stock of experience about the river, make the river a place for relaxation”; and how basin residents and the local communities can think about flood control and prevention. Activities included collecting opinions and ideas regarding the river plan and the joint enterprise plan, making a map, and walking along the river. The consulting staff and NPO provided management and a facilitator for each citizen’s opinion-exchange meeting.

3.2 Case of the workshops at local community

Our project team conducted two workshops supported by Pafrics for flood control and prevention work groups as part of the Korekara project. The participants were river basin residents and a river administrator. A member of the consulting staff, an NPO, or the NIED project team served as the facilitator. Each workshop lasted about 30 minutes and was based on one of two themes. After that, a participant takes part in group discussion referring to the workshop and gathered opinions, and forms an opinion.

3.2.1 First workshop: Flood control measures

The first workshop, on flood control measures, took place in Nagoya City on August 1, 2004. The theme was how residents can prepare against severe large-scale flood damage. The participants were six local area residents, two river administrators, three NPO members, and three NIED project members. Basis maps, vellum paper, memo pads, and Pafrics were used as learning materials.

Pafrics used workshop scenario 1, “learning about the flood damage risk reduction plan and the role of area residents”, which was described in Chapter 13. After the learning session, the participants discussed the theme to identify problems that could occur during normal times; such as an emergency, a disaster, and the recovery phase and possible countermeasures to each problem.

3.2.2 Second workshop: Hazard map

The second workshop, on hazard maps, was also held in Nagoya City on October 3, 2004. The purpose of the workshop was to explain what information can be obtained from a hazard map, how a hazard map can be used, and to discuss local area community awareness of disasters and preventive action. The participants were six residents, four NPO members, and four NIED project members. The learning materials were a local area hazard map, vellum paper, memo pads, and Pafrics.

Pafrics used workshop scenario 3, “learning about flood risk and haz-

ard mapping in the local area”, which was described in Chapter 13. After the learning session, participants extract and categorize the information they could, and could not understand from the hazard map. They discussed ways to provide flood risk information and the measures a local person in charge of protection against disasters in the area should take to reduce the risk of area damage.

3.3 Results and discussion

Risk communication has been defined as “an interactive process of the exchange of information and opinion about flood risk among individuals, groups, and administrative”. Conventional risk transmission has been more of a one-way information communication process from experts to local area residents. The current approach to risk communication, though, emphasizes that opinions and information should be exchanged in ways that encourage clear expression and mutual confidence. Therefore, three aspects of risk communication require careful consideration: 1) instead of information being provided in one direction only, there should be a two-way exchange of information and opinions; 2) an expert must be willing to provide enough information to non-experts for them to make reasonable choice among proposed measures; and 3) building a trusting relationship.

The workshop was evaluated with respect to these three aspects. There are four reasons why this was necessary. First, at previous meetings where river administrators and river-management experts stated an intended policy and provided information in a one-sided manner to local residents, they were unable to persuade the residents to support the policy. When information was shared in a two-way exchange and the resident’s or opinions were expressed, both sides gained a deeper understanding of the present situation and the necessity of the river management plan. Second, awareness of flood risks was improved through mutual dialog. Specific risks recognized by some participants were sometimes apt to be neglected by others. Also, the river administrator and the experts could explain risks which residents were unaware of. Third, an effort was needed to build up a trusting relationship through the mutual understanding of participants. Although criticism, personal wishes, and problems are often expressed in open dialog, opposition could be managed and hopefully a consensus could be reached. Participants might established amity through such discussion. Fourth, an effort was needed to ensure the river maintenance plan reflecting the outcomes of discussions. Such outcomes were gathered together as a proposal of the residents and presented to the river administrator.

As for the risk communication, the facilitator played an important role.

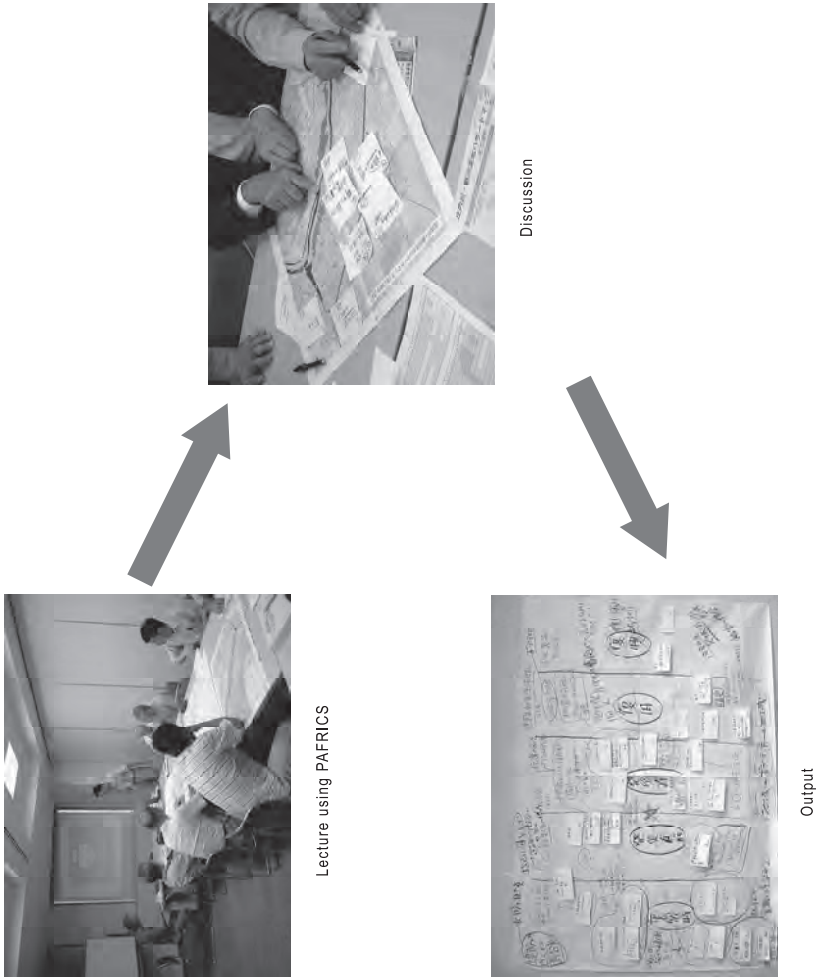


Fig. 3. Flow of Pafrics Workshop.

In addition to showing knowledge and experience, the facilitator took note of the main points of the participants' opinions and was able to use this middle ground to encourage consensus among the participants. In this way, the risk communication could proceed smoothly.

Out of the purposes of Pafrics is to promote this sort of smooth risk communication at workshops and assist the facilitator. The staff involved in this workshops says that compared to the former discussion, the workshops using Pafrics were more specific in terms of clarifying the issues of river flood management. Throughout each workshop, residents showed a conviction that they should work on disaster prevention in the local community and not be overly reliant on NPO activities. There was also a desire to disseminate the knowledge and interests of residents to others. Although these results will be analyzed further to confirm the effectiveness of Pafrics, they acknowledged that Pafrics can promote risk communication and support workshop facilitators.

In the future, it is important that the residents become a mainstream to continue a discussion about river management plans and prevention about flood disaster.

The participants showed a deep interest in reducing flood risk and had considerable experience and knowledge during the workshops. However, the questionnaire results showed that they were resistant to becoming a mainstream leader in a locality. The effective use of Pafrics or other study tools, though, should enable residents to continue useful discussions on river management plans and flood disaster prevention measures in cooperation with NPOs and similar organizations.

4 Evaluation of the Pafrics Workshop Support System

4.1 The Pafrics workshop support system on the Web

When planning a workshop, in addition to deciding on a theme and finding an objective person to facilitate, it is necessary to prepare the workshop content. In addition, while the workshop facilitator plays an important role in making sure a workshop proceeds properly, a good facilitator can be hard to be obtained because of the preparation and knowledge needed. Therefore, even if people recognize a workshop is needed, it might be hard to realize. To alleviate this problem, the Web version of Pafrics provides various items needed to hold a workshop. For example, it provides a manual with information about the preparation content, the schedule, and the workshop theme. Based on a report on workshops held using the Web version of Pafrics, the workshop support system of the Web version is discussed below.

4.2 Evaluation of workshop support system

This report was provided by NPO which conducted a workshop using the Web version of Pafrics. This workshop used scenario 1 (described in Chapter 13) of the Web version of Pafrics. The workshop topic was the fear of flood disaster and awareness of the role of residents in prevention. There were 25 participants. After the workshop, the NPO members completed a questionnaire about the Web version of Pafrics. The questionnaire (free description) was chosen from the web version Pafrics.

The questionnaire results revealed that in one part of the workshop it was difficult to understand the content and in one instance there was a problem with the color and size of the screen. However, the results pointed out the possibility of holding a workshop without preparatory practise. Moreover, it is feasible that the workshop can be held even if the facilitator has no experience. From these answers it was suggested that the existence of a manual has extensively supported the facilitator to organize the workshop. Besides, it is though that, implementation of workshop without practising show that there is a certain progress of the workshop support system of Pafrics. It suggests that the improvement of the manual leads to the perfection of the workshop support system.

5 Concluding remarks

Based on the questionnaire survey, we evaluated the educational effectiveness of learning support system for flood risk literacy, the effectiveness of workshops support, and the usefulness of Pafrics as a workshop support system. The results from the lecture suggest that the learning support system for flood risk literacy is useful for the understanding of risk information and build up the workshop for disaster prevention education. In addition, Pafrics appeared to promote two-way risk communication and aid the facilitator during the workshops. Finally, the questionnaire responses from the NPO which held the workshop using the Web version of Pafrics indicate that the support system of Pafrics was useful. The performance of Pafrics will be improved with repeated use. To enable support of many other types of risk communication in the future, Pafrics will be extended to reflect more opinions and operations in terms of other disasters.

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