

Issues and Attitudes of Local Government Officials for Flood Risk Management

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1 Introduction

Flood risk management is currently in transition and there are several issues involved: 1) Not only flood control structures but also non-structure measures in flood risk management have been considered as being important. 2) A shift from the concept of building flood control structures in order to prevent flood disasters to the direction that allows a certain flood risks is emerging. 3) There is a social situation in which the necessity to offer risk information including flood risk, responses based on self-responsibility, and the importance of citizen participation have been recognized.

The objectives of this chapter are to analyze the awareness related to the current flood risk management issues among local government officials, based on the survey. Then, issues and attitudes of local government officials for promotion of flood risk management in the future will be examined.

2 Reviews of Current Issues with Regard to Flood Risk Management

2.1 Provision of public funds to disaster victims

The Natural Disaster Victims Relief Law, which was enforced in November 1998 to provide money for disaster victims in order to support their livelihood, was revised in April 2004. Following the revision of the law, a housing stabilization support system was implemented to assist with the expenses related to housing repairs and land leveling. However, the law does not cover the actual costs of reconstructing the main bodies of buildings. Also, there are income and age restrictions in the law. In addition, regarding the recognition of the damage, support is not provided to the victims of inundation above floor level, unless the building damage is recognized as “complete collapsed” or “large-scale half-collapsed”.

What the damaged areas want does not agree with what the support systems based on the law provide for them. In addition, support depends on how the local government recognizes the degree of the damage. Providing money directly to the victims is actually effective in advancing the reconstruction of the damaged area. On the other hand, generous support for the victims may

create moral hazards, and it may discourage the promotion of disaster reduction measures. Well-balanced systems in which support is fairly provided and the needs of the victims are taken into account are necessary.

2.2 Development of the awareness of self-responsibility among citizens

When a large-scale disaster occurs, it is impossible for administrative officials to carry out disaster-related responses only by themselves. Disasters have to be reduced through self-help by each citizen and cooperation by citizens. However, many citizens don't take disaster-reduction action, even under crisis and depend on the government to do that in Japan. So, in terms of disaster-reduction measures, citizens' awareness of their self-responsibility is a big problem. Therefore, disaster education is an important factor in increasing disaster-reduction awareness among citizens. However, it is also pointed out that local government officials tend to see the ineffectiveness of ordinary disaster education and material distributed to citizens (Terumoto *et al.*, 2004). Regarding disaster education, disaster-reduction measures and the roles of citizens in disaster-risk mitigations must be clarified.

2.3 Expansion of authorities of the local governments regarding river improvement

As rivers form a network, consistent management of river systems is effective. On the other hand, rivers have important functions in local areas, such as amenity facilities and landmarks. So rivers in local areas should be regarded as a part of land-use planning.

Local government authority over river improvement was expanded in 2000. As a result, local governments were able to carry out certain levels of river improvement to the first-grade rivers that are under their direct jurisdiction. However, items such as the establishment of primary river improvement plans are not included in the local government authorities. River improvement management should be linked with local areas and with each management unit, in terms of various functions related to flood control, irrigation, and the environment.

2.4 Publishing of flood hazard map

Publishing risk information on areas which might have high flood risk is requested from the social point of view. For instance, citizens should have the right to know, and should be able to choose some options for the disaster measures based on the information. Such information is also expected to raise disaster reduction awareness and increase citizens' knowledge.

Publishing risk information of high flood risk areas in designated rivers has been the obligation of local governments, through the revision of the Flood Prevention Law in 2001. Furthermore, based on the fact that many flood dis-

asters occurred in 2004, the Flood Prevention Law was revised again in 2005, expanding the range of designated rivers, which included small-to-medium-sized rivers. However, only 434 local governments had made and published flood hazard maps as of September 2005 (MLIT, 2005).

On the other hand, hazard maps have various problems. For example, 1) it is extremely difficult to identify property flood risks, 2) hazard maps reflect only some of the extreme cases, 3) ordinary hazard maps do not take into account internal flooding, 4) it is worrying that inaccurate information may affect the value of real estate, and, 5) there are other risks that the information on hazard maps may be treated as “safety information”. So, there are various barriers against using hazard maps effectively.

2.5 The disclosure of flood risk information on real estate transaction

Land which had been originally flood control basins is targeted as new development areas, because the number of designated developmental areas have decreased due to urbanization. Consequently, in some cases new development areas have high flood risks. Many citizens may choose such areas as their new places to live without knowing about flood risks and other characteristics. They want to know and should know how high the risk of flooding is in their area. Therefore, it is important that the sellers are forced to disclose any relevant hazard information to the buyers at the time of real-estate transaction.

Under the Real Estate Business Law in Japan, there are items related to the disclosure of important information at the time of real-estate transactions. A question of whether the land is in landslide disaster warning areas is also included among these items. However, other natural disasters are not included. The disclosure of the information on other natural disasters should be also discussed.

2.6 Land-use restrictions in flood risk mitigation measures

Damage caused through internal flooding is increasing in urban areas in Japan. This is caused by the fact that the ability to drain rainwater has decreased in river basins due to urban development. Another reason is the fact that river improvement projects and regional development projects have been planned individually under vertically-segmented administrative systems. For this reason, such projects have been carried out individually without any mutual consistency.

New development areas or high flood risk areas should be actually targeted at land use restriction areas in flood risk mitigation measures. Currently, some local governments, although the number of such local governments is limited, are imposing building restrictions in high flood risk areas, based on the Building Standards Law in Japan. Regarding land-use management for flood

disaster-reduction measures, the main issue is to appropriately control land-use to keep pervious areas from unregulated development. It is necessary to create such a scheme to manage urban and regional planning linked with the flood control measures.

2.7 Necessity to make plans based on citizen participation

It has become more and more necessary for citizens to participate in procedures in making plans regarding not only river improvement projects but also overall public projects. Major river improvement projects must reflect residents' opinions according to the River Law. Based on these social and systematic requests, river improvement projects reflecting citizens' opinions have been carried out in various areas. On the other hand, there are still more cases in which citizens only partially participate in the processes. In other words, in such cases project plans are completed in advance, and those plans will be hardly changed, even though residents receive explanations on the project at a meeting afterwards.

River improvement project with citizen participation is currently at its germinal stage in Japan. The accountability to citizens of related various projects and the transparency of planning procedures have become increasingly needed, and citizen participation has also become important. There is another aspect that river improvement planning requires high expertise. So decisions cannot always be made in terms of reflecting the ideas and opinions of citizens. It is necessary to match the citizens' ideas and opinions and experts' special knowledge.

2.8 Improvement of interface functions for planning support

In order to offer a common platform where citizens, administrative officials, and experts could cooperate to draw up the plans for flood disaster-reduction measures, some supportive systems are required. For meaningful discussions, residents' ideas and opinions, based on reasonable understanding of flood risks in local areas, cost-effectiveness regarding flood disaster reduction measures, and other important factors, are required.

Recently, many government authorities have been putting out information about flood hazards on websites, as the Internet is far-reaching. Some government offices are carrying out trials of holding discussions related to the project plans via online forums. Additionally, the provision of information regarding flood risks through the use of GIS is an effective function. There is a report that shows the information provided on disaster risks through GIS changed citizens' awareness of disaster risks (Kawasaki *et al.*, 2003).

Flood risks and cost-benefit of disaster reduction measures are generally unclear to citizens. So it is effective to offer the information by using var-

ious tools and to exchange opinions based on that information, in order not only to improve citizens' awareness of flood disasters, but also examine flood disaster-reduction plans that reflect citizens' ideas and opinions. These efforts are still at the infant stage, but similar efforts will be made in various areas in the future.

3 Methods and Materials

The survey was carried out among officials in river management and emergency response sections of local governments in Japan. (There were 3,238 local governments at the time of the survey, including the 23 wards of Tokyo.) Questionnaires were mailed to each local government on February 13 and 14, 2003, and they were to be returned by mail by March 24, 2003.

The official who has worked the longest in the section was requested to answer, regardless of his/her job class. In those instances where one section was in charge of both river management and emergency responses, each different official at the section took care of answering the questionnaires. The response rate was 40.2% among river management sections and 46.6% among emergency response sections.

In the awareness of flood risk management, it was anticipated that there would be differences between local governments with high flood risks and those with relatively low risks. Accordingly, the differences of the awareness based on their disaster experience in each local government were also analyzed. As to the records of flood disasters, the number of disasters (which had affected each local government for the last five years before the survey) was figured out, based on flood damage statistics (MLIT 2000–2004). In the analyses, the number of disasters was classified into three categories: zero disaster, one disaster, and two or more disasters. The attributes of respondents in terms of their age and disaster experience are shown in Figs. 1-1 and 1-2.

Eight questionnaire items related to flood risk management, which were reviewed in Section 2, were investigated in the survey. The items are as follows.

- i) To spend taxpayers' money to compensate damages for disaster victims.
- ii) To restrict building structures and uses in high flood risk areas to reduce flood risks.
- iii) To develop citizens' awareness of self-responsibility.
- iv) To impose disclosure about flood risk information for sellers or lenders of properties, relating to real-estate transactions in high flood risk areas.

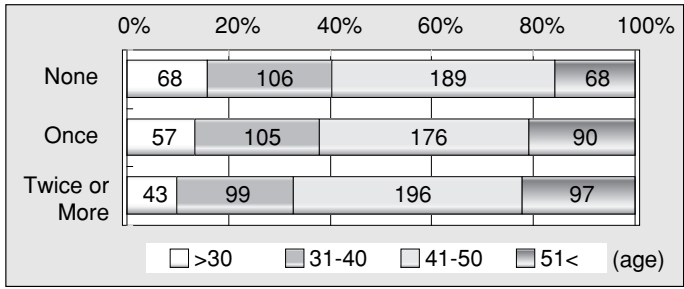


Fig. 1-1. Attribute of Respondents in terms of age and flood disasters experience (Officials in River Management section).

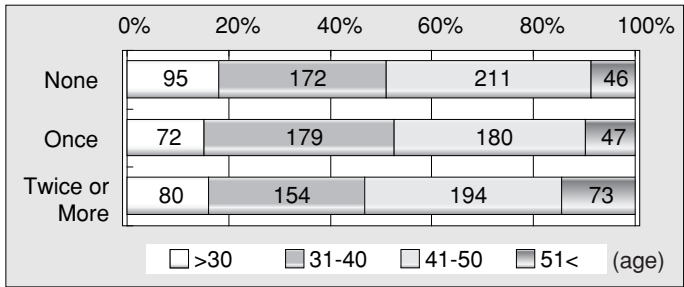


Fig. 1-2. Attribute of Respondents in terms of age and flood disasters experience (Officials in Emergency Response Section).

- v) To publish risk information on hazard maps or other materials.
- vi) To expand the local government authority for river improvement.
- vii) To make river improvement project plans through citizen participation.
- viii) To create interface functions to support planning activities for flood risk mitigation among citizens, administrative offices, and experts.

4 Results

4.1 The awareness of flood risk management

The responses were measured on a seven-point scale where “7” means “extremely necessary” and “1” means “not necessary at all”, for each item. In the following analyses, seven points were assigned to the answer “extremely necessary”, and one point to the answer “not necessary at all”. The ordinal scale was treated as an interval scale.

Table 1. The awareness to questionnaire items in relation to flood risk management.

Items	River Management Section		Emergency Response Section		
	Mean	SD	Mean	SD	
To spend taxpayers money to compensate damages for disaster victims.	5.08	1.41	5.23	1.26	f=9.278**
To restrict building structures and uses in high flood risk areas to reduce flood risks.	4.88	1.32	4.85	1.19	f=0.438
To develop citizens awareness of self-responsibility.	5.66	1.11	5.87	1.09	f=26.03***
To impose disclosure about flood risk information for sellers or lenders of properties, relating to real-estate transactions in high flood risk areas.	5.28	1.35	5.27	1.27	f=0.002
To publish risk information on hazard maps or other materials.	5.41	1.23	5.41	1.18	f=0.002
To expand the authority of local government for river improvement.	4.71	1.17	4.70	1.11	f=0.061
To make river improvement project plans through citizen participation.	4.57	1.18	4.59	1.13	f=0.137
To create interface functions to support planning activities for flood risk mitigation among citizens, administrative offices, and experts.	4.67	1.18	4.74	1.10	f=2.961

***p<0.1% **p<1% *p<5%

The means and standard deviations of responses to each item are shown in Table 1. One-way analyses of variance for each item were conducted between the awareness of river management section officials and emergency response section officials (see Table 1). Moreover, to see the differences between the attributes, one-way analyses of variance (multiple comparison: Tukey’s HSD test) were carried out in each section. The result of the analyses indicates a significant difference at the 5% level. The means and standard deviations and the results of one-way analyses for each attribute in each section are shown in Table 2.

Table 1 shows that item iii) marks the highest mean in both the river management sections and the emergency response sections. Especially among emergency response sections, the mean is relatively high. And also, Table 2 shows that the attribute of the “two or more disasters” is higher than “none”. This result seems to be caused by local government officials’ perception of the effectiveness in the experience of flood-disaster responses.

Item v) marked the second highest mean (see Table 1). Regarding item v), Table 2 shows that the local government officials in the attribute of the “two or more disasters”, tend to be more aware of the necessity for the disclosure of high flood risk areas, compared to other local government officials.

Item iv) marked the third highest mean both among river management sections and emergency response sections. This result indicates that making

Table 2. Comparisons among disaster experience.

Items	River management section				Emergency response section			
	None	Once	Twice or more		None	Once	Twice or more	
	5.10	5.12	5.00	n.s.	5.29	5.26	5.14	n.s.
	4.78	4.82	5.03	None, Once<Twice or more	4.78	4.87	4.90	n.s.
	5.54	5.70	5.73	None<Twice or more	5.71	5.94	5.98	None, Once<Twice or more
	5.18	5.23	5.43	None<Twice or more	5.22	5.31	5.30	n.s.
	5.25	5.43	5.55	None<Twice or more	5.30	5.40	5.53	None<Twice or more
	4.61	4.69	4.83	None<Twice or more	4.63	4.76	4.72	n.s.
	4.56	4.57	4.59	n.s.	4.57	4.58	4.62	n.s.
	4.62	4.64	4.75	n.s.	4.66	4.75	4.83	None<Twice or more

it mandatory to disclose the information on high flood risk areas is required by local government officials. In addition, item ii), “building restrictions in high flood risk areas”, shows a relatively low mean compared to item iv) ($t = -10.915$, $p < 0.001$ for river management sections; and $t = -13.82$, $p < 0.001$ for emergency response sections). Local government officials tend to be disinclined to impose building restrictions than to make it mandatory to disclose the information.

Item i) related to compensation for damage was also high means. The mean value was higher among emergency response section officials than river management section officials (see Table 1). As to item vi), local government officials in the attribute of the “two or more disasters” of river management sections tend to perceive it more necessity to expand local government authorities (see Table 2).

Compared to the other items, items vii) and viii) scored relatively low means. This result seems to show that citizen participation is less attention by local government officials.

4.2 Relations among the awareness of each flood disaster measures

In order to find the relevance between the items, correlation analysis was used. The correlation coefficients of the river management sections and emergency response sections are shown in Tables 3-1 and 3-2 which indicate that there is a strong correlation between items vii) and viii), items vi) and vii), items vi) and viii), items iv) and v), and items ii) and iv), respectively. The correlation coefficient between items vii) and viii) is the largest both among the river management sections and emergency response sections. These two items and item vi) are related to river improvement planning and citizen participation. The correlation between items iv) and v) is the relevance to disclose risk information. In addition, the correlation between items ii) and iv) is re-

Table 3-1. Correlation Coefficients (River Management Section).

Items	i)	ii)	iii)	iv)	v)	vi)	vii)	viii)
i) To spend taxpayers' money to compensate damages for disaster victims.	1.00							
ii) To restrict building structures and uses in high flood risk areas to reduce flood risks.	0.35	1.00						
iii) To develop citizens' awareness of self-responsibility.	0.20	0.40	1.00					
iv) To impose disclosure about flood risk information for sellers or lenders of properties, relating to real-estate transactions in high flood risk areas.	0.21	0.52	0.46	1.00				
v) To publish risk information on hazard maps or other materials.	0.19	0.42	0.46	0.58	1.00			
vi) To expand the authority of local government for river improvement.	0.23	0.33	0.30	0.38	0.46	1.00		
vii) To make river improvement project plans through citizen participation.	0.27	0.29	0.23	0.30	0.39	0.51	1.00	
viii) To create interface functions to support planning activities for flood risk mitigation among citizens, administrative offices, and experts.	0.26	0.36	0.31	0.37	0.47	0.53	0.73	1.00

Table 3-2. Correlation Coefficients (Emergency Response Section).

Items	i)	ii)	iii)	iv)	v)	vi)	vii)	viii)
i) To spend taxpayers' money to compensate damages for disaster victims.	1.00							
ii) To restrict building structures and uses in high flood risk areas to reduce flood risks.	0.29	1.00						
iii) To develop citizens' awareness of self-responsibility.	0.25	0.35	1.00					
iv) To impose disclosure about flood risk information for sellers or lenders of properties, relating to real-estate transactions in high flood risk areas.	0.20	0.52	0.44	1.00				
v) To publish risk information on hazard maps or other materials.	0.24	0.41	0.43	0.50	1.00			
vi) To expand the authority of local government for river improvement.	0.26	0.37	0.27	0.37	0.43	1.00		
vii) To make river improvement project plans through citizen participation.	0.19	0.27	0.20	0.29	0.37	0.44	1.00	
viii) To create interface functions to support planning activities for flood risk mitigation among citizens, administrative offices, and experts.	0.22	0.31	0.30	0.34	0.45	0.47	0.68	1.00

lated to the restrictions.

5 Discussion

5.1 Citizen participation in flood risk management

Developing citizens' self-responsibility is a crucial issue among local government officials. This tendency was especially strong among local governments stricken by flood disasters. Publishing risk information is also relatively crucial. In the current hazard maps, however, there are many problems to be resolved in this respect (Section 2.3).

Currently, new efforts, such as making new hazard maps through citizen participation and outreach activities, are being made in various areas in Japan.

When citizens made hazard maps by themselves as a part of flood disaster reduction measures, they would come to understand the nature of flood risks in each area. It is also effective to develop citizens' self-responsibility through these outreach activities. So, it becomes more necessary to provide the information regarding flood risks and other matters to citizens, as river improvement plans produced with citizen participation is going to be more frequent and be diversified. However, the requirement of citizen participation by local government officials was relatively low. It seems that the importance of risk communication between citizens and local government officials has not been well recognized so far by government officials.

5.2 Provision of public funds for disaster victims and the trend of local governments that suffered natural disasters

The result of the survey showed that compensation for victims is considered to be necessary by local government officials. This result is different from the basic concept of the national government's system that does not compensate private property.

On the other hand, regarding the conditions of the application of the Natural Disaster Victims Relief Law, for example, Tottori Prefecture instituted its own regulations after the Western Tottori Prefecture Earthquake and provided a maximum of 3 million yen for each household to cover its rebuilding costs. And other local governments have individually expanded support systems for victims after great disasters. This seems to be caused by the fact that the details of the restrictions under the law do not correspond with the needs of disaster-stricken local governments. The problem was seen in the awareness of local government officials. Arrangements are necessary to implement support measures under appropriate local conditions and disaster situations.

5.3 Importance of flood risk information

Currently in Japan, the disclosure of flood-risk information is not necessarily obligated at a time of real-estate transactions. The survey results, however, show that the necessity of obligation related to disclosure was perceived by the local government officials. Local government officials tend to think that the disclosure of information about high flood risk areas at the time of real estate transactions should be mandatory.

There are examples of this practice in foreign countries. In California, when a parcel of land or a building subject to high flood risk is traded, the seller must notify the buyer that the property is in special hazard area. If the buyer suffers damage to the property and the seller failed to provide enough information, the seller will be liable for the damages in some cases.

There remain many problems in making accurate hazard maps in terms

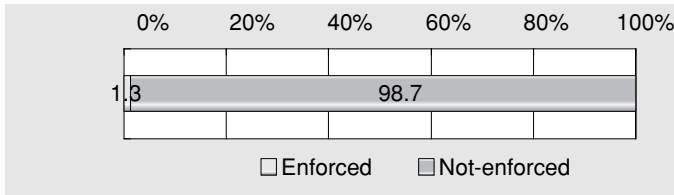


Fig. 2. Enforcement of Building Restrictions in Areas prone to be flooded.

of flood risk information, as indicated in Section 2.4. However, in order to enable buyers to receive risk information in Japan, making it mandatory to provide flood risk information at the time of a real-estate transaction must be examined.

5.4 Building restrictions in flood risk management

The response for “enforcement of building restrictions for flood risk mitigation in the areas prone to be flooded” is shown in Fig. 2. This result was based on another questionnaire item for officials in the river management sections. Approximately 1% of local governments have imposed building restrictions in areas prone to be flooded (see Fig. 2). Results indicate that an extremely small number of local governments have imposed building restrictions, while many local government officials considered it necessary to impose restrictions in areas prone to be flooded.

It seems really difficult to implement building restrictions which restrict public rights at the level of local government in Japan. Nevertheless, building restrictions for flood risk mitigation was considered necessary by local government officials who are to be responsible for protecting the lives and properties of citizens. If the necessity of building restrictions in local governments was recognized based on careful consideration, building restrictions should be examined with sufficient explanations of flood risk to residents.

6 Concluding Remarks

This chapter examined problems and prospects of flood risk management based on a survey and reviews. The results of the survey showed that there are still a number of gaps between the requirements of local government officials and current regulatory institutions in Japan. Bridging the gaps is a future task in the integrated flood risk management. For that purpose, clarifying the government authorities’ and citizens’ responsibilities is an essential problem.

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