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EFFECTS OF LOCAL COMMUNITY ACTIVITIES ON VIEWS CONCERNING FLOOD RESPONSES AND COUNTERMEASURES

by

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SYNOPSIS

The effects of participating in local community activities on people's views about floods, restoration, and countermeasures are examined by means of a questionnaire survey in the Arasaki area. Initially, we analyzed the effects of local community activities on flood responses and countermeasures by chi-square tests. Secondly, we evaluated the types of respondents by the mathematical quantification theory class III and by cluster analysis, and then analyzed the factors influencing flood responses and flood measures. The results demonstrate that gender, age, and length of residency affect involvement in community activities. Furthermore, people actively participating in community activities tend to participate in flood disaster reduction activities and expect neighborhood flood countermeasures. Finally, the acceptance of flood risk affects flood responses and flood countermeasures, but not involvement in community activities.

INTRODUCTION

In recent years, a quick government response to floods, such as ascertaining damage and announcing evacuation information, has become a pressing issue due to the unpredictable torrential rains. For instance, the rain that occurred due to the typhoon the 9th of August 2009

in Sayo, Hyogo Prefecture set the record at the Sayo Observatory for heaviest rainfall in an hour (89 mm) and a 24-hour period (326.5 mm). From 7 pm to 9 pm on August 9th, the water level at the Sayo observation point increased by 2 m, and rapidly reached the dangerous flood levels. During this time, as government facilities were becoming inundated by dyke break of Sayo River, the government officials were pressed with responsibility of assessing damage in each district within the area. Consequently, the evacuation orders were issued only after human and property damages had been inflicted (1). Although this type of situation is not specific to this study, it is an important issue for examining torrential rains in various locations in Japan (2).

While the government's flood responses are being re-examined, local community disaster prevention activities are becoming increasingly important. However, using only fire brigade members as an example of local disaster prevention activities is insufficient in Japan because the number of fire brigade members has decreased by approximately 10% from about 983,000 in 1995, the year of the Great Hanshin–Awaji Earthquake, to about 885,000 in 2009 (3). On the other hand, the number of voluntary organizations for disaster prevention has increased since 1995. In 2009, there were over 139,316 voluntary organizations in 1,658 municipalities and their activities covered 73.5% of all the households within these municipalities. However, due to the aging population and the collapse of local communities, issues have arisen concerning active routine disaster prevention activities and their effectiveness during disaster responses (4).

Previous studies have examined the impact of local communities, particularly their characteristics and activities, on disaster prevention. For instance, Fujita et al. (5) and Okanishi et al. (6) investigated the relationship between local community activities during normal times and voluntary disaster prevention activities in the cities of Akita and Yokohama, respectively. They suggested that organizations actively implementing local community activities also tends to be active as voluntary organizations for disaster prevention. Also, they found that the presence of a local leader greatly impacts voluntary disaster prevention activities. Similarly, Asada et al. (7), Chigusa et al. (8), and Matsumoto et al. (9) revealed that opportunities for local residents of all age groups to interact with each other during social gatherings, such as festivals and disaster drills, improve the awareness of the local community, and result in continued disaster prevention activities even during normal times. Moreover, Choi et al. (10) studied the effects of living environment on disaster prevention activities, and suggested that a local community with a high homeownership rate, mainly of independent houses, and long-term residents tends to be active in both local community activities and disaster prevention activities. Furthermore, Haruyama et al. (11) examined the relationship between disaster prevention activities before and after the 2004 flood in Fukui Prefecture through an interview survey, and by examining the tendencies according to residential area type, they clarified that the local community activities before a flood affect the activities after a flood. For example, a new residential area, which has fewer local community activities before a flood, continues to be less active in disaster prevention activities after a flood.

Thus, previous studies have focused on the effects of local community activities on disaster prevention during normal times. However, no studies have investigated the effects on the responses at the time of a flood or analyzed these effects on the views about future plans for flood countermeasures.

Although it is important that vigorous local community activities lead to vigorous disaster prevention activities during normal times, with many torrential rains occurring recently, such

activities must be expanded and used during a flood and restoration activities post-flood period. Moreover, to improve a local community's ability to prevent disasters and damage, both an understanding of the current situation and an awareness of the limitations of government aid, such as providing flood controls, are crucial. Hence, discussions about role division with mutual and self-assistance of the local community are necessary to improve the effectiveness of disaster prevention and awareness.

To help resolve these issues, in this study we initially evaluated the relationship between local community activities and residents' attributes such as their living environment and understanding of floods. This study focuses on examining the effects of participation in local community activities on flood responses from the time a flood occurs until restoration is completed as well as views about the division of roles for future flood countermeasures.

METHODS

We surveyed the Arasaki District, Ogaki, Gifu Prefecture (Fig. 1) in which 482 houses were damaged when the overflow weir failed in 2002. The Arasaki District is surrounded by the Ai River (a tributary of the Ibe River) and the Otani River (a tributary of the Ibe River), but the right bank of the Otani River did not exist until 1958. In this district, an embankment, an overflow weir, and drainage pumps were constructed as part of an agricultural land improvement project from 1954 to 1958, and then the population increased. Fifteen floods occurred from 1958 to 2001. The flood in July 2002 caused the most damage to residential properties. One characteristic of the 2002 flood was that more than 100 mm of rainfall was recorded per hour, and on July 9th and 10th, 2002, between 400 and 500 mm of rain fell in 24 hours upstream of the Ibe River, causing flash floods in the Ibe River system. The Otani River rose above the overflow weir from 6:10 AM on July 10 to 7:00 AM on July 11, and widely flooded the Arasaki District.

Table 1 shows the characteristics of the communities in each settlement of the district based on detailed interview surveys about flood responses (for the flood in 2002) and local community activities during normal times completed by heads of community associations (12). As shown in the Table 1, the populations in Nagamatsu and Shima increased in the 1960s and 1970s, and new residents in both these settlements have difficulties participating in resident council activities. Such conditions have led to non-participation in the flood prevention system, making cooperation in flood prevention activities, such as sharing roles, difficult. Consequently, working together during the 2002 flood was hindered in these settlements. In contrast, Juroku has a high number of long-term residents, and the resident council activities are more vigorous than in the above-mentioned two settlements despite the fact that Juroku has a successor (leadership) issue. Moreover, Juroku has its own flood prevention system and performs flood prevention activities.

Based on the previous study, herein we aim to verify the following hypothesis by means of surveys and quantification methods: People who are more involved in local community activities during normal times tend to manage better during floods without relying on the government. Furthermore, they also tend to undertake future flood countermeasures based on individuals, households, or local communities, rather than relying on the government.

Herein inquiries about "who was or should be responsible" for flood responses and flood countermeasures are made to determine and clarify role division of flood responses and

countermeasures in flood-prone areas. This study employed a survey aimed at heads of households to inquire about actual involvement in local community activities, flood responses, and countermeasures. Initially, we examined the effects of individual attributes or regions on local community activities. Next, we assessed the effects of local community activities on flood responses, such as collecting information during a flood or participating in flood-fighting activities. Then we analyzed the effects of local community activities during normal times on views about future flood countermeasures. Moreover, we discussed ways to encourage mutual and self-assistances to aid in future countermeasures that could be incorporated into local community activities during normal times.

In the analysis, we initially evaluated the effects of local community activities on flood responses and flood countermeasures by using cross tabulations and chi-square tests. Also, we divided the respondents using the mathematical quantification theory class III and cluster analysis, and examined the factors influencing flood responses and flood countermeasures.

Table 1. Characteristics of the communities in three settlements in the Arasaki District (Amendments made on the work by the authors) (12)

Settlement Name	Nagamatsu	Shima	Juroku
Population (2005/1965)	Increased since 1960s (3.46)	Increased since 1970s (11.25)	Same level since 1960s (1.04)
Number of Households	Increased since 1960s	Increased since 1970s	Increased slightly since 1960s
Settlement Issues	New residents issue	New and old residents issues	Depopulation
Issue on Flood Prevention	Non-participation of apartment residents	Inability to perform consolidated flood prevention activities	Successor issue

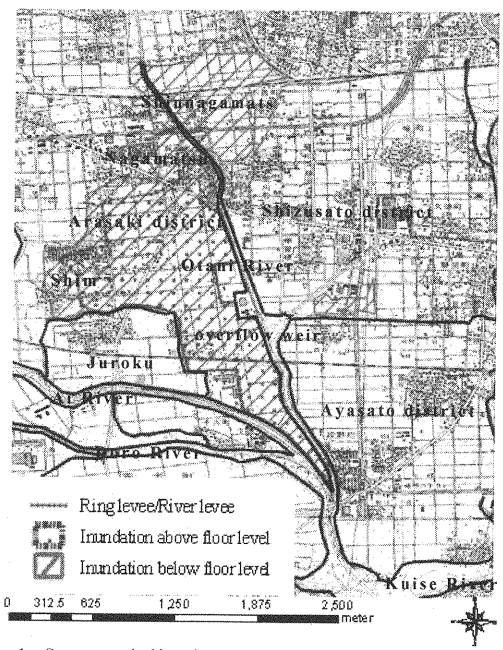

Figure 1. Surveyed districts and areas inundated in 2002

OUTLINE OF THE SURVEY

Contents of the survey

The questionnaire was designed in accordance with the aforementioned hypothesis, and is outlined in Table 2. The questionnaire consisted of four items: (1) individual attributes, (2) local community activities, (3) flood responses in 2002, and (4) views concerning future flood countermeasures.

Each item was asked in the following manner: (1) Indvidual attributes were selected from a list of choices. (2) Local community activities were ranked on a four- or five-point scale with regard to participation in resident council activities or the activities of a voluntary organization for disaster prevention. (3) Flood responses in 2002 were asked in a manner such that role sharing between individuals and households (self-assistance), mutual assistance in local communities, and public assistance through the government were clear. (4) Finally, views about future flood countermeasures were sought on a five-point scale ranging from "I agree" to "I disagree" for self-assistance, mutual assistance, and public assistance.

The questionnaires were mailed to 1,987 households in four settlements in the Arasaki District in September 2009 and were collected via mail. We received 781 valid responses (valid response rate = 39.1%). For the analysis, we used 544 responses from the three settlements located on the right bank of the Otani River, which was the same area in our previous study (12), to investigate the actual involvement in local community activities and flood responses.

Table 2. Survey Outline

Survey outline		
Date		September 14 and 16, 2009
Subject		Four settlements in the Arasaki District, Ogaki, Gifu, Japan
Number questionnaires distributed		1996
Response rate		39.1%
Number of valid responses		781
Main questions and items of the survey		
(1) Individual attributes	Gender, Age, Years of residence. Why live there. Flood water depth Understanding of floods in the area Understanding of floods exceeding the designed level Understanding of land risk	
(2) Community activities	Participation in resident council activities during normal times Participation in voluntary disaster prevention activities Participation in fire brigade activities	
(3) Flood responses in 2002	Attitudes toward collecting information about weather and river water flow Participation in flood prevention activities such as stacking sandbags and monitoring levees Participation in restoration activities such as cleaning the area and helping out with damaged houses	
(4)Views concerning future flood countermeasures	Self-assistance	Safe shelters and evacuation routes should be checked An emergency kit should be prepared Flood prevention measures such as an embankment should be performed Flood insurance coverage should be encouraged
	Mutual assistance	Relationships with neighbors should be maintained on a regular basis People should participate in fire brigade activities People should participate in voluntary disaster prevention organization activities People should participate in resident council activities
	Public assistance	Urbanized regions (land use) should be reviewed; systems for victims' relief should be examined Information distribution system should be established Regional evacuation should be publicly announced River and flood control projects should be promoted

Respondents' attributes

Table 3 outlines the respondents' attributes. According to Table 3, more males than females participated, and most respondents were 50–60 years of age. As for the years of residence, 42.8% of the respondents lived in the settlement for 20–39 years. However, there were two main reasons why a specific locale was selected; 26.8% indicated they lived on "ancestral lands" and 22.6% answered "reasonable land price."

Table 3. Main survey results

Gender (n=544)	Male (67.8%) Female (32.2%)
Age (n=544)	20s (0.9%), 30s (5.7%), 40s (13.8%), 50s (27.4%) 60s (32.5%), 70s (16.9%), 80s or older (2.8%)
Years of residency (n=530)	9 years or less (11.0%), 10–19 years (16.7%), 20–29 years (21.1%), 30–39 years (21.7%), 40–49 years (16.0%), 50–59 years (6.4%), 60 years or more (7%)
Reason for living in the place (n=660)	Ancestral lands (26.8%), Close to one's parents' house (10.3%), Convenient transportation (7.0%), Reasonable land price (22.6%) Comfortable green environment (8.9%), Few disasters (2.4%) Low crime rate (3.6%), Other (18.3%)
Flood water depth (n=525)	Never experienced a flood (39.6%) Experienced an inundation below floor level (25.3%) Experienced an inundation above floor level (35.0%)
Understanding of flood (n=533)	Floods are man-made disasters (68.1%), Floods are inevitable (31.9%)
Understanding of flood exceeding the designed level (n=533)	Floods exceeding the designed level are preventable (76.4%) Floods exceeding the designed level are unpreventable (23.6%)
Understanding land risk (n=537)	The land is safe (10.1%) The land is dangerous (89.9%)

Regional comparisons of participation in local community activities

In this section, we compare and analyze the participation in local communities activities in various regions, which is important index in this study. The scoring for this analysis is explained later. Figures 2–4 show the participation in resident council activities, voluntary disaster prevention activities, and fire brigade activities, respectively. Figure 2 (participation in resident council activities) shows that over 70% of the respondents attend even the council meeting regardless of settlement, and in Juroku, over 80% of the respondents actively attend events. According to Fig. 3 (participation in voluntary disaster prevention activities), 81.0% of the respondents in Juroku, 64.8% in Nagamatsu, and 53.1% in Shima participate, whether actively or to some extent, in voluntary disaster prevention activities. Figure 4 (participation in fire brigade activities) indicates that while 78.6% of the respondents in Juroku have participated in fire brigade activities, only 27.0% have in Shima. These figures suggest that participation in local community activities varies from settlement to settlement and that people who actively attend meetings and events of their resident councils during normal times also tend to actively participate in voluntary disaster prevention activities and have joined fire brigades.

For the analyses in the following section, we scored these three statuses concerning local community activities as a sum, and hereafter this score is referred to as the "local community activity point." For scoring, active participation in activities was more important than belonging to an organization. Thus, one point was awarded for each responses of "attend

events and/or meetings of the resident council," "participate in voluntary disaster prevention activities to some extent," and "have joined a fire brigade," and 0 points for any other response. The sum of these three items, which is represented on a four-point scale from 0 to 3, is used in the analyses.

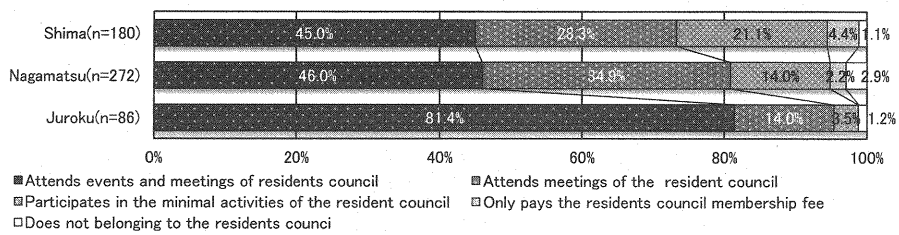

Figure 2. Participation in the resident council by settlement

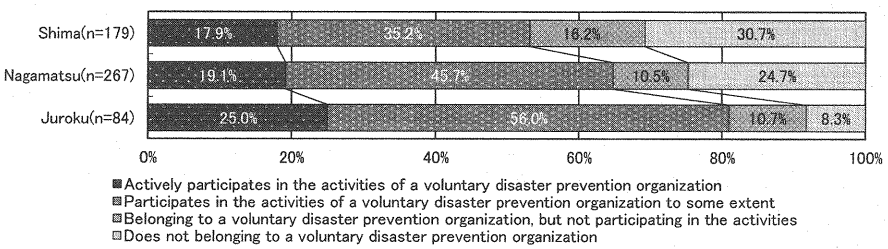

Figure 3. Participation in voluntary disaster prevention activities by settlement

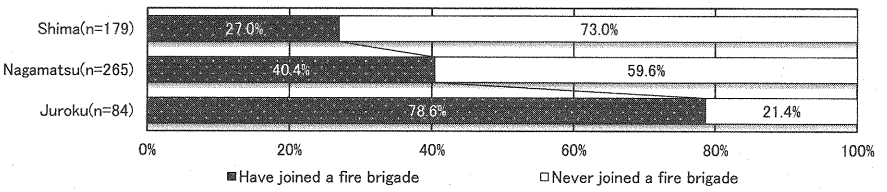

Figure 4. Fire brigade participation by settlement

EFFECTS OF LOCAL COMMUNITY ACTIVITIES ON DISASTER PREVENTION ACTIVITIES

Factor analysis of individual attributes that affect participation in local community activities

Table 4 shows the results of chi-square tests on the eight individual attribute items and the local community activity point (hereafter, ** represents 1% and * represents 5% significance levels). According to Table 4, gender, age, years of residency, and reason for living there affect participation in local community activities, but flood water depth and flood acceptance (whether it is natural or man-made), understanding of a flood exceeding the designed level (whether it is preventable or not), and land risk (whether it is safe or dangerous) do not. Figures 5 and 6 show the relationships of involvement in local community activities with the reasons for living there and the number of years of residency, respectively. According to these figures, people who live on their ancestral land or have lived in the same place for a long time tend to be more involved in local community activities.

Table 4. Results of chi-square tests on individual attributes and participation in local community activities

	Local community activity point		
	χ^2	Freedom	*P* value
Gender	21.8335	3	0.0001**
Age	54.2073	15	0.0000**
Years of residency	125.258	18	0.0000**
Reason for living there	78.5303	3	0.0000**
Flood water depth	10.6271	6	0.1006
Understanding of a flood	7.6252	3	0.0544
Understanding of a flood exceeding the designed level	2.6959	3	0.4409
Understanding of land risk	1.1411	3	0.7672

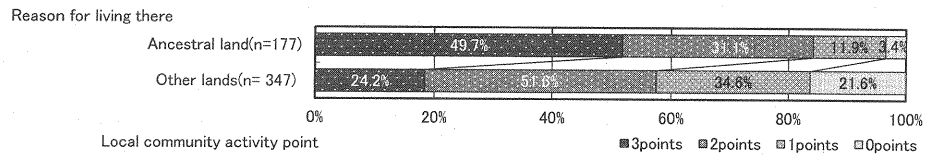

Figure 5. Participation in local community activities and the reason for living there

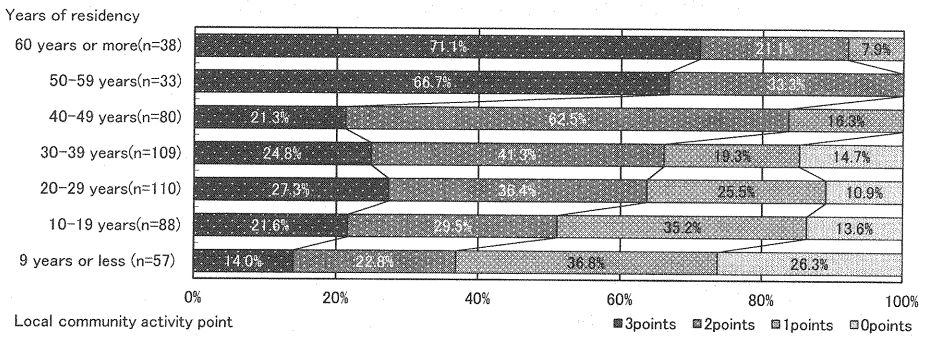

Figure 6. Participation in local community activities and years of residency

Factor analysis of local community activities that affect flood responses

In this section, we examine the factors of local community activities that affect the three phases of flood responses: collection of information on weather and rivers, flood fighting activities such as monitoring levees and stacking sandbags, and restoration activities such as cleaning the area or helping with the damaged houses. Additionally, we discuss flood responses from the viewpoint of role division as activities for individuals or households (self-assistance), responses through local communities (mutual assistance), or government responses (public assistance).

Table 5 shows the results of the chi-square tests on the local community activity points and flood responses. Local community activities show relevance with flood fighting activities and subsequent restoration activities. Figures 7 and 8 show the participation of flood fighting activities and restoration activities, respectively. These figures, indicated that people who become more involved in local community activities during normal times tend to participate in flood fighting activities during a flood and subsequent restoration activities on an individual and household (self-assistance) or regional (mutual assistance) basis. On the other hand, people who become less involved in these activities tend to rely more on the government.

Therefore, local community activities, especially during normal times, affect participation

in flood fighting and restoration activities. Moreover, the results suggest that people who are more involved in local community activities tend to participate in flood responses on an individual, household, or regional basis, and do not just rely on the government.

Table 5. Results of chi-square tests on local community activities and flood responses

	Attitude toward information collection			Participation in flood fighting activities			Participation in restoration activities		
	χ^2	Freedom	*P* value	χ^2	Freedom	*P* value	χ^2	Freedom	*P* value
Local community activity point	8.3951	6	0.2106	56.0134	6	0.0000**	31.1555	6	0.0000**

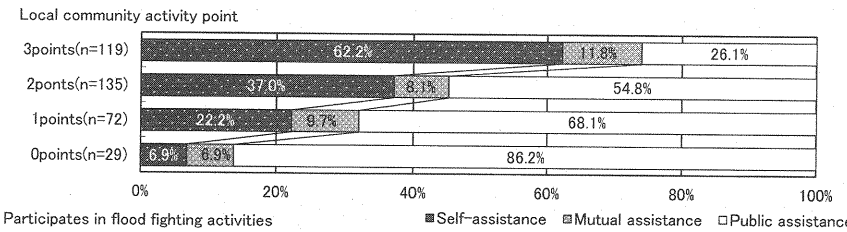

Figure 7. Participation in local community activities and participation in flood fighting activities

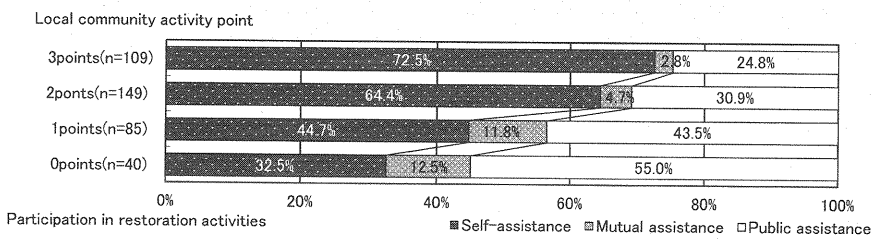

Figure 8. Participation in local community activities and flood participation in restoration activities

Factor analysis of local community activities that affect future flood countermeasures

In this section, we examine the factors of local community activities that affect people's views concerning future flood countermeasures in flood-prone areas. Table 6 shows the results of chi-square tests on the local community activity point and views concerning future flood countermeasures. Table 2 shows the details of the questions corresponding to self-assistance, mutual assistance, and public assistance. We represented scores on a five-point scale from 5 ("I agree") to 1 ("I disagree"), and calculated the average for each item. Based on this calculation, local community activities showed relevancy to the items regarding mutual and public assistances.

Figures 9 and 10 show the relationships between local community activities and mutual and public assistances, respectively. These figures, suggest that people who are more involved in local community activities tend to emphasize the importance of mutual assistance such as participating in voluntary disaster prevention activities (Fig. 9). On the other hand, the tendency between participation in local community activities and views concerning flood countermeasures based on public assistance is unclear (Fig. 10), and somewhat contradicts the hypothesis that those who are more involved in local community activities tend to act on a mutual assistance basis without relying too much on the government. Therefore, factors other than local community activities, which affect the views concerning flood countermeasures based on public assistance, are extracted and so their effects are examined in the next section.

Table 6. Results of chi-square tests on participation in local community activities and flood countermeasures

	Self assistance			Mutual assistance			Public assistance		
	χ^2	Freedom	*P* value	χ^2	Freedom	*P* value	χ^2	Freedom	*P* value
Local community activity point	11.8079	15	0.6935	89.8445	15	0.0000**	27.8679	15	0.0224*

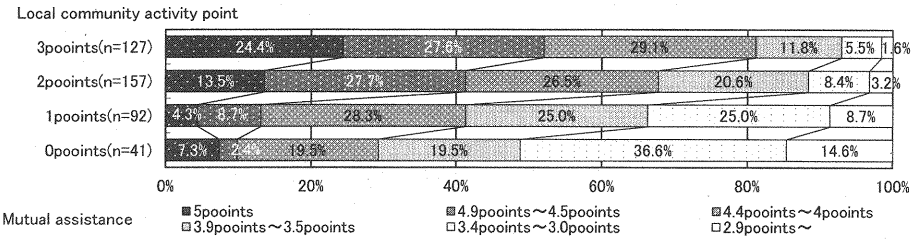

Figure 9. Participation in local community activities and flood responses based on mutual assistance

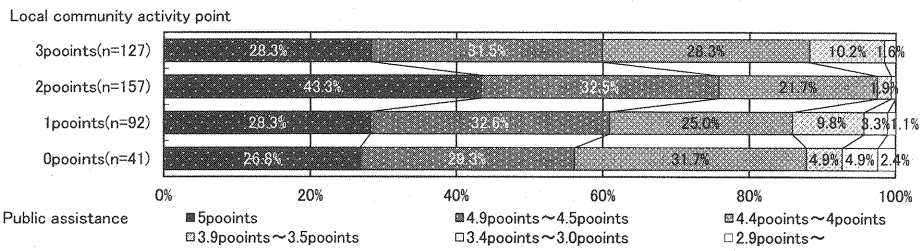

Figure 10. Participation in local community activities and flood responses based on public assistance

EXTRACTING THE FACTORS THAT AFFECT THE VIEWS CONCERNING FLOOD RESPONSES AND COUNTERMEASURES

In this section, we categorize the respondents using mathematical quantification theory class III and cluster analysis. Then we extract the factors other than local community activities that affect views concerning flood responses and countermeasures, and analyze their effects. After categorizing the items as shown in Table 7, we used the mathematical quantification theory class III in a manner where the cumulative contribution ratio is 60%. Table 8 shows the results. "Active in resident council activities" and "Active in voluntary disaster prevention activities" contribute to the positive side of the first axis, while "Not active in resident council activities" and "Not active in voluntary disaster prevention activities" contribute to the negative side; we attribute the first axis to be the "local community activities axis." Similarly, since "floods are inevitable" and "floods exceeding the designed level are unpreventable" contribute to the positive side, whereas "floods are a man-made disaster" and "floods exceeding the designed level are preventable" contribute to the negative side; we attribute the second axis to be the "flood awareness axis."

Figure 11 shows the category scores obtained by quantification, and Fig. 12 shows the plotted results of cluster analysis (Ward's method) of the sample scores. According to Fig. 11, items of community activities contribute to the first axis, but items of flood awareness contribute to the second axis. Figure 12 indicates that there are three possible interpretations: (1) active in local community activities and risk acceptance, (2) active in local community

activities and risk non-acceptance, and (3) not active in local community activities.

We placed the characteristics of the flood responses and flood countermeasures of these into three groups, and then compared the factors that affect flood responses and flood countermeasures.

Table 7. Outline of other possible factors and categories

Items	Categories	Responses
Local community activities	Not active in resident council activities	95
	Active in resident council activities	395
Voluntary disaster prevention organizations	Not active in voluntary disaster prevention activities	174
	Active in voluntary disaster prevention activities	316
Participation in fire brigade activities	No experience	282
	Some experience	208
Understanding of flood	Floods are man-made	334
	Floods are inevitable	156
Understanding of flood exceeding the designed level	Floods exceeding the designed level are preventable	371
	Floods exceeding the designed level are unpreventable	119
Understanding of land risk	Safe land	48
	Dangerous land	442
Gender	Male	332
	Female	158
Age	40s or younger	105
	50s–60s	300
	70s or older	85
Years of residency	19 years or less	139
	20–49 years	283
	50 years or more	68
Reasons for living there	Ancestral land	166
	Other land	324
Flood water depth (inundation experience)	No experience of inundation	194
	Experienced an inundation below floor level	124
	Experienced an inundation above floor level	172

Table 8. Results of the mathematical quantification theory type class III

Categories	First axis	Second axis	Third axis	Fourth Axis	Fifth axis	Sixth axis
Not active in resident council activities	−1.858	0.316	1.121	2.793	−1.531	3.048
Active in resident council activities	0.447	−0.076	−0.270	−0.672	0.368	−0.733
Not active in voluntary disaster prevention activities	−1.924	0.921	0.573	0.674	−0.471	1.045
Active in voluntary disaster prevention activities	1.060	−0.507	−0.316	−0.371	0.259	−0.575
Not participated in a fire brigade	−0.998	−0.665	−0.407	−0.309	−0.693	0.008
Have participated in a fire brigade	1.353	0.902	0.552	0.419	0.939	−0.011
Floods are man-made	−0.136	−1.123	0.865	0.187	0.037	−0.234
Floods are inevitable	0.291	2.404	−1.851	−0.401	−0.078	0.502
Floods exceeding the designed level are preventable	−0.030	−0.833	0.559	0.356	0.314	−0.621
Floods exceeding the designed level are unpreventable	0.094	2.597	−1.741	−1.111	−0.979	1.938
Safe land	−0.285	−0.208	−3.453	5.284	3.176	−3.382
Dangerous land	0.031	0.023	0.375	−0.574	−0.345	0.367
Male	0.634	−0.248	0.276	0.374	0.147	0.109
Female	−1.333	0.521	−0.579	−0.785	−0.308	−0.229
40s or younger	−2.107	2.032	1.744	−0.966	2.174	−1.494
50s–60s	0.452	−0.321	−0.725	−0.164	−1.703	−0.706
70s or older	1.007	−1.378	0.404	1.774	3.325	4.337
Lived there for 19 years or less	−1.824	1.552	1.765	−0.084	0.968	−1.432
Lived there for 20–49 years	0.040	−1.266	−1.267	−0.409	−0.380	0.579
Lived there for 50 years or more	3.562	2.098	1.664	1.872	−0.398	0.515
Ancestral land	1.860	1.452	0.833	−0.021	−0.343	−0.243
Other land	−0.953	−0.744	−0.427	0.011	0.176	0.125
No experience of inundation	−0.457	0.711	−1.752	1.699	0.166	−0.586
Experienced an inundation below floor level	0.107	−0.566	−0.121	−3.094	2.540	1.415
Experienced an inundation above floor level	0.439	−0.394	2.063	0.314	−2.019	−0.358
Eigenvalue	0.219	0.148	0.133	0.105	0.096	0.094
Cumulative contribution ratio	0.172	0.288	0.393	0.475	0.550	0.624
Correlation coefficient	0.468	0.385	0.364	0.324	0.310	0.307

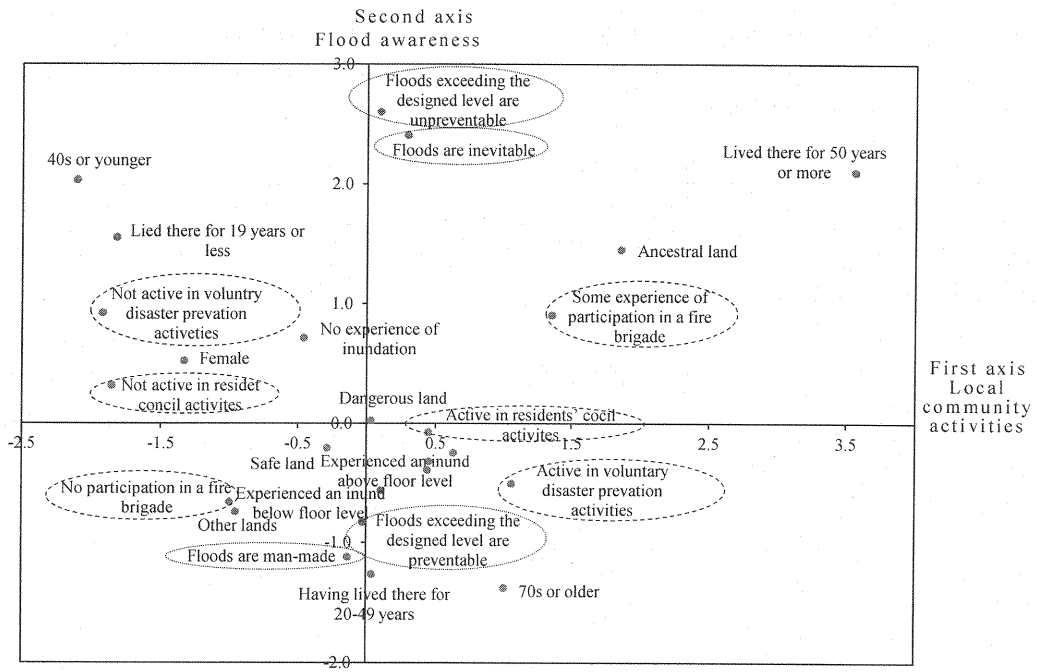

Figure 11. Category plot

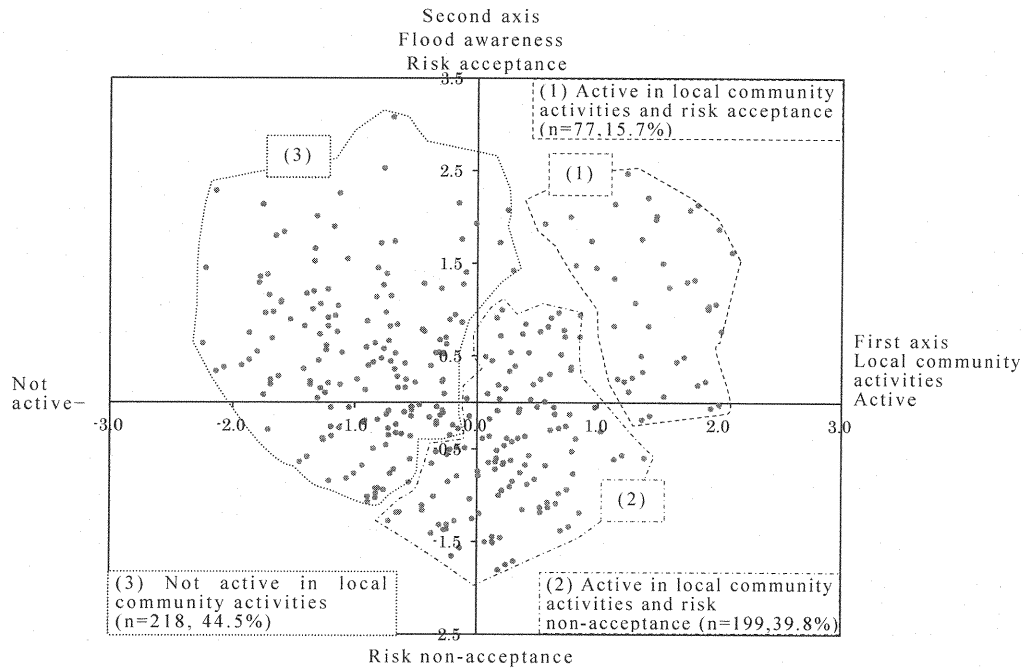

Figure 12. Sample plot and categorization

Figure 13 shows the flood responses of the three groups. For all three responses, people in groups that are highly involved in local community activities [i.e., (1) and (2)] tend to act on a self-assistance and mutual assistance bases without relying on the government compared to the group that is seldom involved (3). Moreover, people in the group that accept flood risk (1) tend

to participate in flood prevention activities compared to people in the group that do not accept flood risk (2).

Figure 14 shows the views of respondents the three groups concerning future flood countermeasures. Groups active in local community activities [(1) and (2)] consider future countermeasures more important than the mutual assistance than group (3). Furthermore, for groups involved in local community activities, group (2) considers public assistance to be more important than group (1).

As described above factors affecting flood responses and future flood countermeasures are acceptance of flood risk and participation in local community activities. People who are more involved in local community activities during normal times tend to respond to floods through individual, household, and local efforts instead of through government efforts, whereas people who do not accept flood risk place more importance on flood countermeasures based on public assistance.

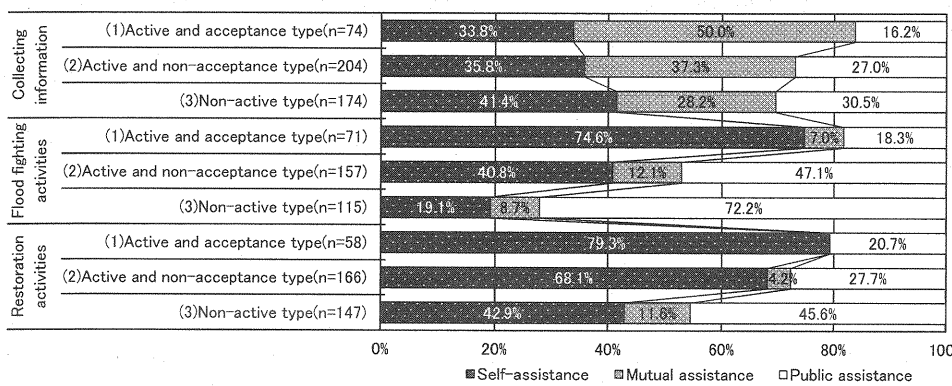

Figure 13. Flood responses of the three groups

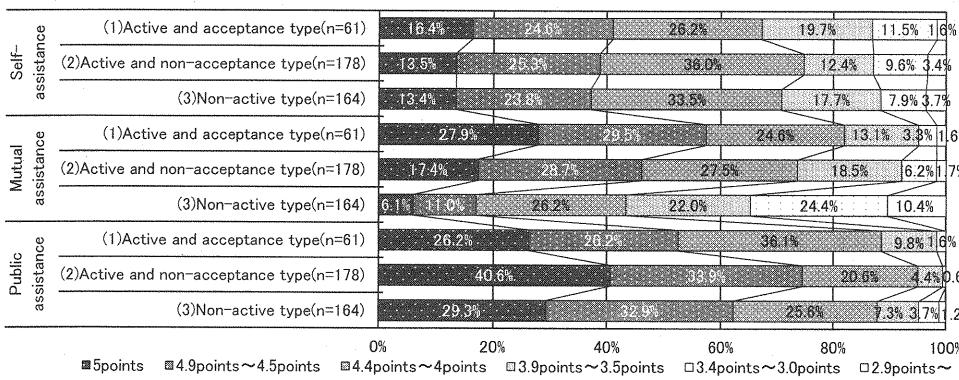

Figure 14. Views of respondents concerning future flood countermeasures of the three groups

CONCLUSION

In this study, we examined the effects of participation in local community activities on flood responses from the time the flood occurs until restoration is complete. Additionally, we analyzed the views on role division concerning future flood countermeasures. The results of this analysis are as follows.

(a) Local community activities are affected by gender, age, years of residency, and the reason for living there. People who live on ancestral land or have lived in the same place for a long time tend to be more involved in local community activities.

(b) People who are more involved in local community activities tend to act on an individual and household (self-assistance) and regional (mutual assistance) bases when dealing with all three types of flood responses (collecting information about weather and river water flow, flood-fighting activities such as stacking sandbags, and restoration activities such as cleaning the region and helping with the damaged houses).

(c) In regard to views (emphasis) concerning future flood countermeasures, people who are more involved in local community activities tend to believe mutual assistance measures are more important.

(d) In addition, local community activities and acceptance of flood risk affect the views concerning flood response and future flood countermeasures; people who do not accept flood risk tend to place importance on flood countermeasures based on public assistance.

Therefore, to achieve an independent flood response based on local communities, the initial step is to encourage both activities specifically for disaster prevention such as emergency drills and campaigns to encourage participation in community activities such as resident council activities. In the future, factors affecting the acceptance of flood risk such as experiences or knowledge of floods should be analyzed and compared to the same factors in non-flood prone areas.

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