Qualitative Evaluation of Information Display in a Regional Safety Map "Hamādo-map"

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Abstract: In this paper, we improve information on our regional safety map and evaluate it by conducting interview surveys with representatives of local residents and city officials. We have been studying toward practical application of the map based on the local residents' perspective. We have made improvements to make the danger information easier to understand by changing the design of the danger information display and the explanation of the footnotes of the map created last year. We have also created a new electronic map using an online map service so that we can provide detailed information that cannot be displayed on a paper map. We made a qualitative evaluation from the perspectives of residents and city staffs by conducting an interview survey on the revised paper map. The results show the importance of continuous collection of local information, examination and sharing of information, and information update at appropriate times.

Keywords: Regional disaster prevention, safety map, voluntary disaster prevention, historical local town, community participation

1. Introduction

We have been developing a system that supports creation of the regional safety map using ICT in collaboration with local voluntary disaster prevention organizations, and have been studying toward the practical application of the map (Okazaki, Y. et al., 2016; 2017; 2018; 2019, 2020). We selected Hizenhamajuku, Kashima City, Saga Prefecture, where the streets of the Edo period remain (Agency for Cultural Affairs, 2017; Saga Trip Genius, 2014), as a model district

Many Efforts have been made to deal with natural disasters (ICTDSE2020 in ICCE2020, 2020; Mitsuhara, H., 2018). Hazard maps have been created and distributed in response to growing awareness of disaster prevention. Furthermore, systems that support the creation of city-walking disaster prevention maps where residents themselves collect and register information are also being studied (Yoshino, T, 2017; Enokida, S, 2018).

In the local town that retain historical townscape targeted in this study (hereinafter referred to as historical local town) (Japan Guide.com, 2012), there are restrictions such as preservation of traditional landscapes and aging. Therefore, it is necessary to take advance disaster prevention measures according to the actual conditions of the area (Mishima, N. et.al, 2014).

In historical local towns, there may be dangers in places that do not considered as criteria when creating a hazard map, such as old folk houses, narrow paths, and waterways. For disaster prevention and mitigation in the area, which each resident considers as his or her own, it is desirable to highlight the dangers that the residents feel in their daily lives from the perspective of the local residents and share them with all the people in the area and the municipal government.

In this study, we improve the design of information display and display items based on the evaluation of local residents and city officials toward the practical application of the paper version of the safety map previously created. Moreover, we conduct interview surveys by local residents and city officials to evaluate the improved map and its information collecting/updating process. Furthermore, for the purpose of providing the information to tourists visiting the area, we make a prototype of an electronic version of the area safety map using an online map service.

2. Improvement of Information Display in Regional Safety Paper Map "Hamādo-map"

2.1 Improvement of Information Display

We held an information review meeting on July 17, 2020 with five voluntary disaster prevention members in the region. In addition to the A2 size regional safety map, we surrounded the A0 size local Zenrin paper map and collected and examined danger information.

As a result, we changed the design based on the results of last year's questionnaire (abolish of icon, add of explanations with speech balloons and photos) and changed display items (deleted items to bring out, added emergency contact information). We have also improved the information, including the river overflow damage caused by the heavy rain in July 2nd year of Reiwa, and the addition and correction of the information associated with the river improvement work. Figure 1 shows a regional safety map that reflects these improvements.

2.2 Prototyping of a New Electronic Map

Supposing the use of tourists, we made a prototype of an electronic version of the regional safety map using LOCAMO-MAP provided by Locamo AI(Locamo AI, 2017). In the electronic version, it is possible to display and select the information depending on the situation. It can provide a wider variety of information than the paper map. In addition, it is possible for users to evaluate and exchange opinions with each other. Furthermore, it is expected that information will be collected from the tourist's perspective and that the map itself will be evaluated.

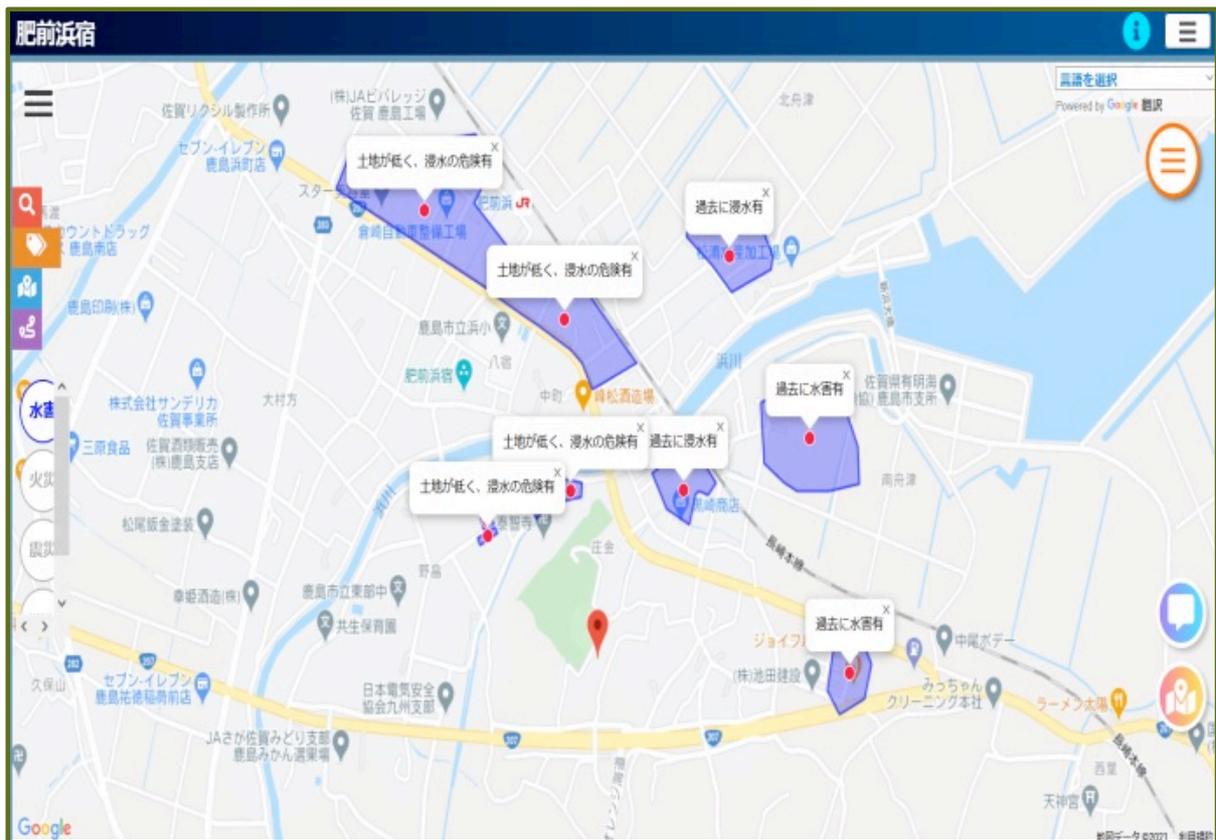*Figure 1.* Revised regional safety map (Paper version).

Figure 2. Prototype of an electric regional safety map.

3. Qualitative Evaluation by Interview Survey

We conducted an interview survey to obtain what the people involved think and feel, which are difficult to grasp as numerical data.

3.1 Survey Method

The purpose of the interview survey is to evaluate the map of the people involved, which is difficult to grasp by questionnaire survey, based on specific opinions and ideas, and to evaluate our activities for practical use. This map will be used as a material for voluntary disaster prevention activities, and will play a role in informing the local residents of the resulting danger information in the region. This time, we evaluated it by the parties involved taking actual operation into account.

There were three interview items: opinions and requests regarding the safety map itself or activities, involvement with voluntary disaster prevention activities / involvement with administrative initiatives, and the current situation and issues regarding disaster prevention and mitigation in the region.

The target people were two members of the NPO Hizen Hamajuku Mizutomachinami no Kai, which is working on the preservation of the historical landscape of this area and town development as representatives of local residents, and three staff members of the City Construction Division of Kashima City, who are in charge of city planning and disaster prevention in this area.

On March 18, 2021, we held a face-to-face meeting with the two members of the Miztomachinami no Kai, one by one. They play a leading role in voluntary disaster prevention activities. They have been involved in our research from the beginning. The interview times for the two were about 45 minutes and about 30 minutes, respectively. In addition to the memo recording, the audio recording was made with prior approval.

On March 15, 2021, we held an online group meeting(Webex meeting) for three people from the City Construction Division of Kashima City. In addition to taking notes, we made video recording with prior approval.

3.2 Survey Results

3.2.1 Results for Local Residents

The first person expressed the following opinions and impressions in the approximately 45-minute interview: "I am satisfied with the quality of the map.", "The map is more familiar than the hazard maps provided by the government.", "Easy to see and understand." and "This map is well-balanced, although it can be difficult to understand if it is overloaded with information."

He noted that activities were previously limited to those involved in voluntary disaster prevention. He hoped that more people, such as the local welfare officer and the ward mayor, would confirm it, and based on the results, distribute it to all houses in the next fiscal year.

He said that by having many people in the district see the map, it would be possible to increase the interest in the safety map and improve the accuracy of the information.

He has also realized the following through the activities so far. "By collecting and displaying the information obtained by walking around the area, we could understand the current state of danger perception in each district by the people in the district." and "By continuing these activities, I feel that the awareness of disaster prevention among the participants has increased."

The second person expressed the following opinions and impressions in the approximately 30-minute interview: "The map has almost reached the stage of completion, and the rest is a fine brush-up.", "I feel closer than the hazard maps distributed by the city authorities." and "The danger of flood damage is easy to understand, and it is expected that it will lead to the awareness of the residents."

He also gave the following opinions: "Fires are not natural disasters, so it may be better to distinguish them.", "In a densely populated area, there is a concern about fire, so it is better to have some expression." and "I think it is necessary to ask the volunteer fire department for their opinions on fires."

In addition, he said, it would be desirable to describe the characteristics of the Hama River (the river that runs through the center of the town) as shown below: "The water level may rise suddenly. " and "It is dangerous if the spring tide and heavy rain overlap."

3.2.2 Results for City Officials

The three persons who responded to the group interview were, a manager, a chief and a regular member of the City Construction Division of Kashima City. All of them are people who have been involved in disaster prevention in the target area. They expressed the following opinions and impressions in the approximately 25-minute interview: "The safety map is meaningful as a detailed version of the hazard map focusing on the Hama area." and "It is necessary to ensure the consistency of the information on the safety map and the hazard map."

They also proposed improvements for practical use as follows: "Since the safety map is quite well made, we would like you to provide more information that will lead to actual evacuation behavior.", "It would be better if information could be added to help people meet in each district before evacuating to the evacuation center.", "It would be good if more detailed information could be provided in cooperation with the voluntary disaster prevention organization." and "Since a fire is not a natural disaster, it is not necessary to describe it on the map, but it is desirable to record and describe past fires."

In addition, they said that it would be convenient to have an information service that utilizes smartphones, assuming that information will be provided not only to local residents but also to tourists.

3.3 Discussion

As a result of the interview, a concrete evaluation of the map was obtained, and its significance was clearly shown.

Due to the continuous activities since 2014, the map has finally reached a level where it can be widely used. The map information is generally valid, and the design is easy to see. It was reconfirmed that these were the achievements so far.

In addition, the representatives of the residents and the city officials clearly showed the significance of the safety map as a detailed version of the hazard map that is familiar to the residents. Hazard maps are damage prediction maps. It does not show past cases. Their comments suggest that information on past disaster locations and information on alerts, that is missing in the hazard map, is also necessary for the map.

It has long been suggested that the information needs to be reviewed on a regular basis. This interview also confirmed that. In this interview, it was evaluated that the heavy rain damage in July 2020 was added, and it was indicated that such timely reflection is effective.

Based on this, in this study, it is necessary to constantly repeat the following three processes as a process for continuous improvement of the regional safety map:
1.Picking up danger information in the area.
2.Careful selection of information (meeting with local voluntary disaster prevention and city disaster prevention staff).
3.Information update at the right time.

It is thought that the prompt reflection of information after a disaster will increase interest in maps, and as a result, it will be easier to collect new information. This will lead to improvements in the information provided, and it is thought that this cycle will continue to develop an effective community-based safety map. Examine the effectiveness of this process is issues in the future.

The importance of cooperation with the city's disaster prevention department was also confirmed. In this interview survey, it became clear that the viewpoints of local residents and the government were different. The administration grasp from a macro perspective, that is, from a broad perspective, while the local residents grasp from a micro perspective, that is, from the perspective of the field.

Of course, there is a common perception of danger, but it has also become clear that there is a difference in the perception of dangerous points. It turned out that there are two reasons for this. One is the danger that has been resolved. Although the danger was improved after the river was repaired, there were cases where the residents were still worried because it was not known. The other is micro-danger. It has become clear that there are dangers in places that the government cannot grasp, such as places where waterways are likely to collide and overflow, and places where landslides are likely to occur even in a narrow area. It is important to understand the dangers of the area from multiple different perspectives.

The area has been very careful about fires, including areas with densely populated wooden buildings of high historical value. Although the fire is not a natural disaster, it is printed as a warning along with the danger of traffic accidents from the viewpoint of local safety. Opinions are divided on fire in this interview. It became clear that further consideration was needed.

To clarify what are the essential elements of safety map that are actually useful in the region, we believe that it is necessary to evaluate from the following viewpoints through actual operation: information accuracy, easy to grasp information on dangerous places, utilization as basic data for voluntary disaster prevention activities, and information sharing in the area by providing and posting to local households.

4. Conclusion and Future Works

In this study, we improved our regional safety map of A2 size paper map created based on the information collected through past activities and evaluated the revised map by interviewing local residents and city officials. To improve the information display, we changed the presentation design based on the results of last year's questionnaire (abolish of icon, add of explanations with speech balloons and photos) and changed display items (deleted items to bring out, added emergency contact information).

We also added and revised information on flood damage caused by heavy rain in July 2nd year of Reiwa and river repair work. Furthermore, assuming the use of tourists visiting this area, we made a

prototype of an electronic version of the regional safety map using an online map service. In the electronic version, it is possible to display and select the information according to the purpose, and it is possible to flexibly provide more variety of information than the paper version map.

As a result of the interview survey, the significance and usefulness of our regional safety map were confirmed. It was also confirmed that the continuous evaluation and improvement process, which is updated at an appropriate time, is effective, based on the collection of danger information in collaboration with the local community and examine the information by community members.

In the future, we will continue this improvement process, have people in a wider area look at the map, listen to their opinions on the map, and expand information updates in collaboration with the people in the area. It is also our future tasks to raise awareness of the map, attract the attention of the region to the map, and further raise disaster prevention awareness by distributing the created paper version of our regional safety map to all houses in the target area.

Acknowledgements

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