

# Sustainable Community Disaster Education in Saijo City and its Effectiveness in Landslide Risk Reduction

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**Abstract.** Many of the Japanese small and medium size cities are located in the coast, and become vulnerable to both coastal and mountain hazards. The vulnerability is increased due to increasing aged population, low resources and lack of capacity in the local governments. In this scenario, it is important that the community's potential should be utilized in its fullest form through proper awareness raising and capacity building. Town watching and mountain watching are considered as useful tools to reduce urban risk in small and medium sized cities, where participation of local schools, its students, teachers, parents, resident associations and local government members collective watch both good and bad (vulnerable) parts of their cities. This collective watching and participatory mapping helps the engagement of school children and communities in risk reduction activities. This type of neighborhood watching is a process, and it is important to continue the initiative for effective risk reduction at community levels. Through sustainable community disaster education, it is possible to reduce the risk of landslide, and thereby making the small and medium size mountain cities safer to both geological and hydro-meteorological hazards.

**Keywords:** Community education, Town watching, Mountain watching, Small and medium size cities, Saijo

## 1. Background

### 1.1 Small and medium sized cities in Japan

In Japan, there are a lot of small and medium sized cities. Two thirds of all cities in Japan have less than 100,000 people as population. Recently, such local cities had many problems, for example, faltering local economy, sagging and hollowing local industry, tight local finance, functional decline of urban area, and so on. These problems are closely related to each other. This study belongs to the Master Thesis in the GSGES, Kyoto University<sup>1</sup>.

All over the country, declining birth rate and aging is proceeding, and population decrease in coming thirty years is quite certain. In 2030, it is estimated that the population would be about 112 million and aging rate is about 32.4%. Especially, local cities have the pronounced tendency because young people are going out of the area. The main reason is educational advancement and getting employment. At the same time, old people prefer staying back in the place where they have lived for a long time. So, the living base and economic base will become poor.

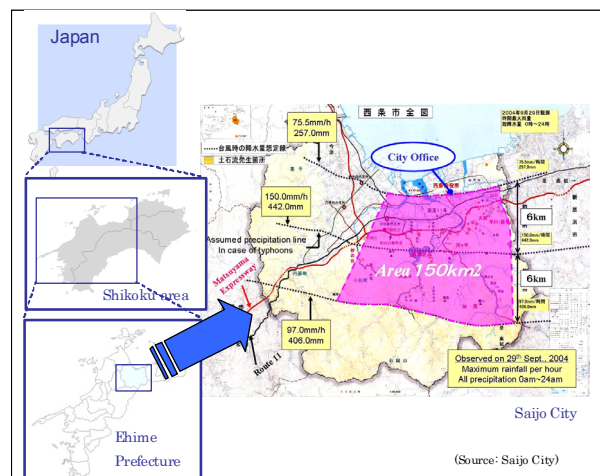
Aging in local cities affects not only financial problems, but also disaster prevention. In case of a disaster, young people's help is essential. According to the proposal of MLIT (Ministry of Land Infrastructure and Transport), characteristic of recent heavy rain disaster is that, many people who need help in case of a disaster are affected, system of mutual assistance in case of a disaster is poor, risk awareness is low, and so on. So, it is important for community people to work

together for disaster prevention. But the relationship between urban area and mountainous area becomes poor. Many people living in urban area have never been to mountainous area and don't know about the area. Saijo City in Ehime Prefecture is one of such cities.

### 1.2 Background of Saijo City

Saijo city is located in the eastern part of Ehime prefecture. It has an area of 509.04 square kilo meters, with a population of 116,059 (2006.10). On the 1st of November, 2004, Saijo City, Toyo City, Tanbara Town and Komatsu Town from Shuso County merged to form the new "Saijo City" (Figure 1).

The geography of the city is classified broadly into four parts; plain area along the coast, hilly area between Saijo City and Nihama City, hilly terrain ranging in the north side of median tectonic line along the south side of the plain, and precipitous mountains in the southern side of median tectonic line. There is Mt. Ishiduchi, the highest mountain in the western part of Japan. Two big rivers, Kamo River and Nakayama River, flow in the center of the city.



**Fig. 1** Location of Saijo city and its the rainfall contour of 2004 Typhoon 21

Saijo city is famous for its spring water called "Uchinuki". The river water soaks into underground and pools, then spouts above ground under pressure. Just by driving a pipe into underground, water comes out. The amount of the flowing water is about 90,000m<sup>3</sup> per day. Due to the little temperature change through all seasons, it is used as daily life water, agricultural water and industrial water. "Uchinuki" is one of the 100 best waters in Japan.

There is a traditional annual festival called "Saijo Matsuri" in October, when almost all people, the young and

the old, get wildly excited. Each Jichikai (neighborhood association) has their own “Danjiri” (floats) and relationships among people in the communities are strong. “Jichikai” is neighborhood association which is organized in each area within municipality at their own initiative. There are 540 Jichikai in Saijo city and they make 28 Jichikai union.

## 2. Saijo’s Emerging Disaster Issues

In summer and autumn in 2004, 6 typhoons (no.4, 6, 10, 11, 21, 23) at record high hit Shikoku area. (In Shikoku area, 2 was the most since 1995 and 1.5 is average.) In Seto Island Sea area where they have little heavy rain damage basically, there were many concentrated downpours and landslides, high tide and they cost much precious possession like 61 people’s valuable lives and houses. Especially, typhoon no.15, 16, 18, 21, 22, 23, numbering 6 typhoons caused damages to Saijo City and no.21 and 23 caused larger damages.

On 29th September, 2004, typhoon no.21 moved across Shikoku area. Because of this, in Saijo City, they had record concentrated heavy rain, 75.5~150mm rainfall per hour. Avalanche of rocks, earth and driftwood surged which seemed to have occurred due to slope destruction of intermediate and mountainous area and forming destruction of natural dam. A lot of driftwood got stuck with bridge pier and water was held back and overflowed. As the water level rose suddenly, surrounding houses were flooded. In the flat part, each area was flooded above or below floor level. In the mountainous area, landslide disaster occurred frequently, roads were severed, many villages were isolated and house destruction and human suffering were caused. The dead in Ehime prefecture by typhoon no.21 numbered 14 people and this was the worst record in human suffering caused by typhoon.

Emerging problems due to the typhoon are as follows.

(1) Ill-maintained forest and thinned wood in the mountains. Frequent small slope failure by the concentrated heavy rain of typhoon no.21 added to the damage. While “deep-seated landslide” which each ground slides is not related to the form of forest, “shallow landslide” which surface soil slides directly results from the extent of maintenance. In addition, in artificial forests which are not thinned for a long time, sunlight doesn’t reach ground and bottom weed and young trees are difficult to grow. When it rains there, surface soil is hit directly by raindrops and clogged, and rain water which cannot soak through the ground runs on the surface. The “water road” caused by the erosion forms valley and finally draws mudslides involving surface soil and fallen trees. Abandoned thinned wood were also the problem. They flew into the river by the heavy rain, got stuck with bridge pier and water was overflowed downstream (Figure 2).

(2) Concentration of elderly people in mountainous area. According to the rate of aging in each area of Saijo City, the first to fourth areas are mountainous areas and it means there are many elderly people there. In the typhoons of 2004, especially mountainous area was seriously affected. Some areas were isolated because the roads were blocked. In such areas, young people’s help is needed for elderly people to evacuate.

(3) Dangerous shelter. Some designated shelters turned out to be dangerous. For example, in Ofuki area, the mountainous area, some people evacuated to the community center which was a designated shelter.



**Fig. 2** Disaster issues in Saijo: from top left clockwise: Landslide in the mountain areas, uprooted trees block the river, and causing damages to buildings in the downstream.

But one person noticed that the river nearby the center suddenly changed muddy, so they escaped to a different building. One minute after they evacuated, the center was buried in the mud. In Funakata area, mid-mountainous area, the designated shelter was at the head of the hill and difficult to get there. So residents evacuated to near meeting house. Therefore, the designated shelters built by the municipality should be reexamined and residents should know better about the area.

(4) Low awareness for disaster prevention. Referring to disaster history of Saijo City, there had been no such large typhoons in these days. These typhoons caused first dead since 1976 in old Saijo City. Fading memory of disasters leads declining awareness for disaster prevention. Also, judging with one’s own experience is dangerous. According to the questionnaire survey in Ofuki area (OYO, 2005)<sup>1)</sup>, many people didn’t evacuate for the reason that they just thought it was not dangerous or judged from their long experience and thought it was not so dangerous as to evacuate.

## 3. Education as a tool to enhance participation

### 3.1 Participatory Learning

Yamori<sup>iii</sup> (2006) states that it is necessary for disaster education in the future to focus on the process of restructuring “communities of practice” (J.Lave 1993), and not only just transfer of knowledge and skill between individuals. That is, it should be an important goal of education or learning to establish community in which educator and learner can “participate” together. For example in school, it will be all right just to involve pupils, teachers or school system itself to network with those who teach what one doesn’t know and organization or group to work with on disaster prevention. Teachers or school itself don’t need to have all things about

disaster prevention. One of such learning tools will be “town watching”.

### 3.2 Town Watching

Town watching is a participatory technique used in community or neighborhood planning in the context of a larger administrative unit (such as municipality or city) in order for residents to recognize problems as a group and put forward solutions together. The problem solving process is guided by at least one expert or professional trained in one or more aspects of planning<sup>iv</sup> (Ogawa, 2005). Town watching which has been developed as a technique practiced by Japanese urban planners from the 1970s, has become popular as a participatory tool in machizukuri<sup>v</sup> (Setagaya Machizukuri Center 1993). “Machizukuri” has been translated as “community planning” by Evans<sup>vi</sup> (2001), and as “town making” participatory community building<sup>vii</sup> (Yamda 2001). “Machi” means town, district, community and “zukuri” means making or building. The origins of “machizukuri” can be traced as a movement associated with organized citizen actions to fight against pollution in the 1960s in Japan; local authorities needed to adapt to include consultation with its citizens. Lately, machizukuri in some localities evolved into partnerships<sup>viii</sup> (Yoshimura 2002). In recent years, the “machizukuri” movement emerged from Japanese planning practice with a predominant focus on urban design that encourages citizen involvement. Concerns in machizukuri such as access to public road, open space, land use, etc. are well taken into account by town watching. The use of town watching has been extended to dealing with disaster and safety related physical issues such as safe or unsafe places and evacuation routes; we shall call this disaster town watching.

## 4. Participatory disaster education as a risk reduction measure

### 4.1 Relevance of Town/Mountain Watching in Saijo City

At the time of the typhoon no.21&23 in 2004, mountainous area of Saijo City was especially damaged. Land condition and concentrated heavy rain are major factors, but there are other reasons concerning so-called software. In the mountainous area, there live many elderly people and few young people.

So some elderly people had difficulty in evacuating and needed help of young people. Low awareness of disaster prevention is also a problem. According to the research of OYO cooperation<sup>ix</sup>, not a few people didn't evacuate at the time of typhoon. The same problem is faced in the plain area.

Plain area is rather urban and there are many young people. So, it is necessary to make “disaster prevention network” (see figure 3) between the plain area and the mountainous area, so as to help elderly people in the mountainous area in case of a disaster. As the driftwood stuck with bridge pier caused flood to the plain area, disaster in the mountainous area have bearings with that in the plain area. Both residents have to know each other about the circumstances.

For these reasons, mountain watching is proposed to be implemented in Saijo City. Mountain watching is just like town watching and it is conducted in the mountainous area.

Main target is children, and also residents in the mountain, teachers, municipal officials and forest workers are involved.

The working field is upper area of a river along school. Participants watch the site damaged by the typhoon in 2004 and hear the story from victims (Figure 4)

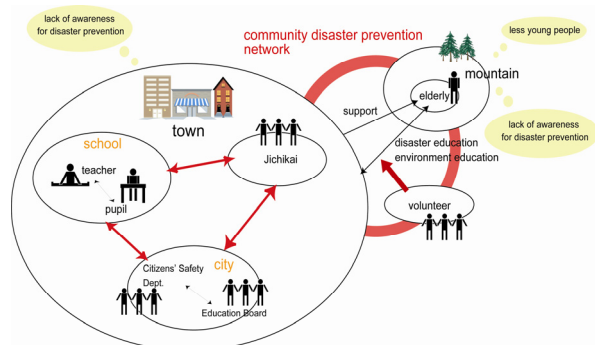


Fig. 3 Conceptual framework of town and mountain watching

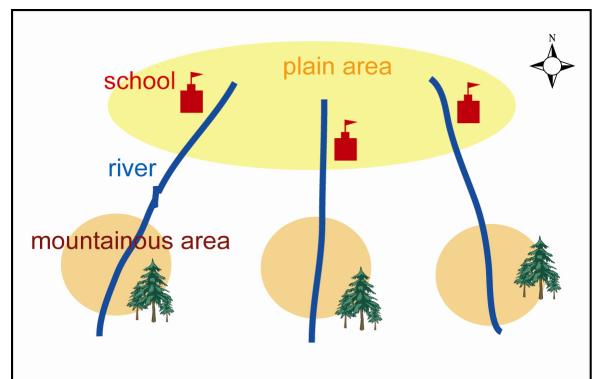


Fig. 4 Areas of mountain watching

At the same time, town watching is proposed to be implemented in the plain area. The main target is pupils and teachers, parents, Jichikai and municipal officers. They walk around the school zone and search for dangerous places, useful facilities in case of disasters and favorite places which they don't notice otherwise in daily life.

This time, town watching is to be implemented in five elementary schools and mountain watching in three junior high schools as “disaster education program”, which is an activity of 12-year-old education project.

### 4.2 Outline of Questionnaire Survey

The questionnaire survey is conducted to evaluate the impact of town/mountain watching. Target is all participants; pupils, teachers, municipal officers, parents, Jichikai, residents in mountain and forest workers.

The questionnaire survey was conducted both before going to field and after the whole process on the implementing day. It took about 20 minutes each, and was not read out. For two elementary schools, another questionnaire was conducted in November to evaluate pupils' awareness a while after town watching.

Pupils are to describe what they know about the typhoon in 2004. The answers are categorized in 4 groups; a) impact on typhoon itself (e.g., it rained heavily, it caused great damage, etc.), b) impact on land and infrastructure (e.g., the river was overflowed, there were lots of mudslide in mountains, etc.), c) impact on houses and properties (e.g., the houses were flooded over the floor level, rice fields were flooded, etc.), d) impact on human beings (e.g., people evacuated to the school gym, there were a few dead, etc.).

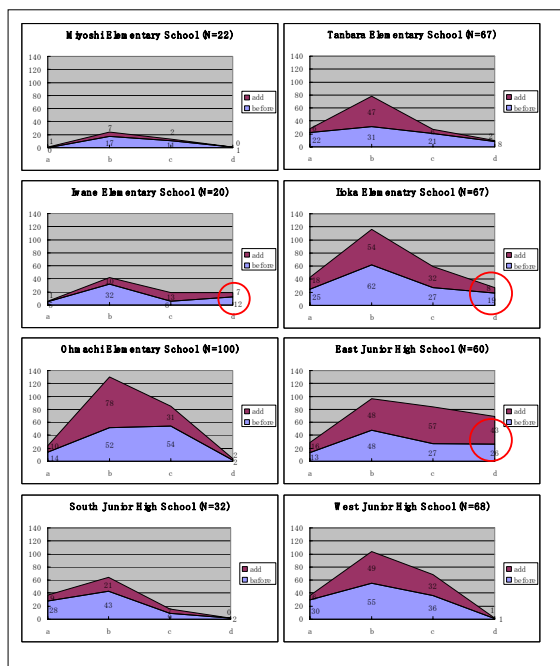


Fig. 5 Impact of town watching and mountain watching

Figure 5 shows the number of the answers in each school. “Add” area shows the post-answer, excluding the same answer as pre-answer. So, it will be the impact of town/mountain watching. Each school has characteristics and it is considered to have resulted from the background of the area.

## 5. Conclusion

Local cities in Japan have some common problems. Young people leave mountainous areas and go to towns, so declining population and aging become serious problems in mountains. Also declination of forestry increases ill-maintained forests. When a disaster happens in such areas, the damage would be serious. Landslides are easy to occur because of the weak ground condition and some elderly people have difficulty in evacuation without the help of the young people. In such cases, help of people in the town would be great. But there is often little relationship between mountainous area and town. It is important for community to work together on disaster reduction.

In the meantime, the importance of disaster education becomes well-recognized and the number of schools which adopt it increases. But there are some problems in current disaster education, for example, lack of teachers’ training, time pressure in school curriculum, lack of involvements of parents and family, lack of linkage of scientific studies with

social issues, in-school education and events-oriented education.

Town watching or mountain watching is a suitable tool to resolve these problems. It involves many stakeholders, such as pupils in elementary schools and junior high schools, teachers, parents, Jichikai, residents in mountains, forest worker, Citizens’ Safety Dept. and Education Board. So, it provides a good opportunity to them to communicate with each other. In case of a disaster, such relationship is very important. Through town watching, participants get interested in the local area and also get knowledge about disaster prevention.

But town/mountain watching should not end up with only one time event. Through a series of continuous actions, it will become better and develop disaster resilient area. So, clear implementing body and guideline is necessary for continuing town/mountain watching.

In Saijo City, a “teachers’ association of disaster education” has been set up. This association consists of teachers who have incentive to promote disaster education. They study on the way of disaster education and share information. Now they have several meetings and make a guideline of town/mountain watching, making use of the past experience.

In addition, “Kids Disaster Prevention Club” is proposed to be set up here. It is different from boys and girls fire club. It consists of students, teachers, parents, community people, and so on who get interested in disaster prevention through town/mountain watching. Students suggest what they want to know more about or questions arise in their minds through town/mountain watching in the club activity.

Also with daily learning, they study about disaster prevention. A forum of disaster prevention such as Kids Summit is held once or twice in a year and students from each school in Saijo City make presentations about what they have learnt.

In this way, sustainable disaster prevention will start from school and involve the entire city.

## References (End Notes)

- <sup>i</sup> Yoshida Y. (2007): Study on effective and sustainable community disaster education through town watching in Saijo City, Master Thesis, Kyoto University
- <sup>ii</sup> OYO Corporation Survey 2005
- <sup>iii</sup> Yamori Katsuya, et.al: Frontier of disaster education, *Natural Disaster Science*, 24-4, pp.343-386, 2006
- <sup>iv</sup> Ogawa Yujiro, Antonio L. Fernandez, Yoshimura Teruhiko: Town watching as a tool for citizen participation in developing countries: application in disaster training, *International Journal of Mass Emergencies and Disasters*, vol.23, no.2, pp.5-36, August, 2005
- <sup>v</sup> Setagaya Machizukuri Center, Tool box of Participatory Design. Tokyo, 2003
- <sup>vi</sup> Neil Evans, “Discourses of Urban Community and Community Planning: a Comparison between Britain and Japan”, *Sheffield Online Papers in Social Research* 3, April, 2003 Available at [www.shef.ac.uk/socst/Shop/evans.pdf](http://www.shef.ac.uk/socst/Shop/evans.pdf)
- <sup>vii</sup> Yamada Masaki, “A Philosophy for Community Building”, *Aichi Voice* 14, pp.3-7, 2001
- <sup>viii</sup> Yoshimura Teruhiko, “Machi-zukuri: New Challenge in Japanese Urban Planning”, *Thirtieth International Course in Regional Development Planning*, May 16-June 26, 2002, Nagoya: United Nations Centre for Regional Development
- <sup>ix</sup> Questionnaire survey conducted by OYO corporation, 2005