

Children's Perception of Threat within Their Spaces of Activities Case study: Merapi Volcano Area, Indonesia

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Synopsis

In many cases, children are considered as one of the most vulnerable group of age in disasters. However, policies related to disaster management often ignore children's voices. This study aims to approach and listen to children in order to understand their world and perception as the initial step to investigate their risk communication needs. A field survey was carried out in three closest schools to Merapi ($n = 94$) in August 2008. It is found that children's perception of threat within their activity area consist not only those related to volcanic hazards, but also other threats, such as traffic accident and animal threats. As for the perception of volcanic threats, there is a significant pattern found among children who live within a similar feature of location. Based on the findings, the authors propose some recommendations for risk communication enhancement in the study area.

Keywords: children, perception, risk communication, Merapi

1. Background

Merapi volcano supports about 1.1. million inhabitants in 300 villages above 200 meters and lies approximately 30 km north from Yogyakarta city, one of the most important city in Indonesia (Thouret et al, 2000). It is located in Java Island and administratively divided into two parts, one belongs to Central Java Province, and the other one belongs to Yogyakarta Province. Thouret et al (2000) stated that the repose periods of the volcano have not exceeded 3.5 years on average since 1822, where thirteen events were large enough to cause at least 7000 deaths.

There are several typical hazards in Merapi that have been identified by experts according to the history of Merapi eruptions. The major ones are pyroclastic flows, lava flows, and lahars (Kurniawan, 2008; Newhall et al, 2000).

Children are among the dominating number of victims in many disasters. An estimated 77 million

children under 15, on average, had their lives severely disrupted and 115,000 killed by a natural disaster or an armed conflict, each year, between 1991 and 2000 (Plan UK, 2002). This age group is really unique as they are in the stage of growing up and considered to be vulnerable particularly in disaster-related matters. Some examples of those vulnerabilities are emotional distress, injury, illness, death, and failure to complete education.

However, policies related to disaster management often ignore children's voices. Although most policy makers are adults, they generally assumed that they know what children need and think. Children are often treated just as objects than subjects of policy design and implementation.

2. Objectives

The objective of this study is to identify how children in Merapi perceive threats within their spaces of activities. The outcome of this study is expected to be as the input for risk communication

which is appropriate with the needs of children in the study area

3. Methodology

A field work was conducted in July to August 2008 in order to collect primary data from children. It was carried out in three closest elementary schools to the peak of Merapi, namely: Tarakanita Tritis (n = 24), Pangukrejo (n = 29), and Srunen (n = 41) elementary schools. A set of structured activities for data collection with children, which is termed as workshop in this study, was designed in order to: (1) acquire reliable data, (2) fit time & resources constraint, (3) enable two-way communications to increase trust, understanding and to break the gaps between researcher and participants, and (4) interest and engage children actively in the whole workshop.

In each school, a two-day workshop was conducted with the 5th and 6th graders, supported by six facilitators. The workshops were followed by observation activities to each child's house. To support the analysis, some interviews with teachers and government officers were also conducted.

The workshop includes four main activities:

- a. Thematic drawing & follow up interview
The objective is to identify issues among children around Merapi and feelings about their villages. The data from this activity will not be discussed in this paper.
- b. Questionnaire
This activity aims to investigate several variables related to risk perception, disaster experience and other basic information of participants, using quantitative measure. In this paper, only the questions about basic characteristics of participants and risk perception around school will be discussed. The questionnaire sheets were distributed to all participants after the thematic drawing session finished. In each group, the facilitator guided them to fill in the questionnaires. The role of facilitator was important particularly in this session, to ensure participants understand the instructions correctly. All questionnaires were returned to facilitators in charged of each

group.

c. Mapping & follow up interview

Mapping activity aims to investigate the participant's daily activities spatially and their perception of volcanic risks within the area. In this study, thematic drawing and mapping acted as the catalyst for oral description, writing and the whole research process. These activities were always followed by an interview with children about the interpretation of their drawing or maps to decrease subjectivity when processing the data.

Facilitator explained the objective of the activity in the beginning of this session to the participants in each group, and further gave the task to make a map of area where they spend their daily activities, including home, to school, after school, or even some other important places where they go quite often. The data may explain also their social and cultural background.

The groups of variables included in the questionnaire are listed in the following table.

Table 1 Group of variables in the questionnaire and the references

Group of Variables	References
Children's attributes/ demographic characteristics	Riley, 1951; Dashiff, 2000; Ronan et al., 2008; Peek, 2008
Disaster education participation	Ronan and Johnston, 2001; Gregg et al., 2004; Finnis et al., 2004; Ronan et al., 2008
Disaster experience	Gregg et al., 2004; Finnis et al., 2004; Lindell and Perry, 2004
Hazard awareness and risk perception	Ronan & Johnston, 2001; Gregg et al., 2004; Finnis et al., 2004; Lindell and Perry, 2004
Hazard knowledge	Gregg et al., 2004

d. Story telling

The objective of this activity is to investigate children's experience of 2006 volcanic crisis. The data from this activity will not be discussed in this paper.

The observation activities were assisted voluntarily

by some children who participated in the workshop. The location coordinates of every house was recorded by using GPS (Global Positioning System) and the condition and surrounding environment of each house was observed and recorded by taking the pictures.

However, as mentioned before, to keep the focus, only the analyses based on the data from questionnaire, mapping and observation activities will be discussed in this paper.

4. Study Area and Sample Characteristics

In terms of proximity, all schools are within a similar distance to Merapi and belong to Sleman Regency of Yogyakarta province, but geographically the locations are different. Tarakanita Tritis School is the western most school (southwestern flank of Merapi) compared to the other two schools, with 6.6 km distance from the summit of Merapi. Pangukrejo School is located about 6.5 km south of Merapi's summit, while Srunen School locates at the eastern most school (southeastern flank) compared to the other schools (6.9 km from the summit).

Three rivers divide the school areas from the upstream close to the summit of Merapi to downstream. During the field work of this study, two of the rivers' conditions were full of deposits from past eruption, such as rocks and sand. They are Boyong River, which is located by Tarakanita Tritis school area, and Gendol River, which lies between Pangukrejo and Srunen school area, but closer to Srunen school area. While another river, Kuning River, which is in a very deep gorge in the western side close to Pangukrejo was filled with water flowing through the river. It is barely filled with remainders from past eruption.

The participants of the workshop in this study were those enrolled in grade 5 and 6 elementary schools. The range of age is from 9 to 15 years old (mean=10.5; standard deviation= 1.2). Other demographic characteristics of participants, with additional basic information are provided in Table 2.

As shown from Table 2, the proportion of gender is almost balance between male and female. Most children have lived in the area for more than five years, which indicates their familiarity to their environment. Most of them are living with their parents. They live mostly within 7 km distance from the summit of Merapi.

Table 2 Characteristics of all participants

Characteristics (N=94)		%
Gender	<i>Male</i>	52.1
	<i>Female</i>	47.9
Distribution of participants in each school	<i>Tarakanita Tritis School</i>	25.5
	<i>Pangukrejo School</i>	30.9
	<i>Srunen School</i>	43.6
People they are staying with	<i>Both parents</i>	90.4
	<i>Only mother</i>	7.5
	<i>Only father</i>	2.1
Length of stay in the hamlet	<i>Less than a year</i>	1.1
	<i>1 – 5 years</i>	10.6
	<i>More than 5 years</i>	88.3
House distance from the summit of Merapi	<i><5 km</i>	14.9
	<i>5 – 7 km</i>	62.8
	<i>>7 km</i>	22.3
2006 Evacuation	<i>Yes</i>	92.6
	<i>No</i>	7.4

In this study, children's spaces of activities, especially where they spend most of the time are the focus of investigation. This includes school and home. The participants of this study are living around each of the school within different ranges of distances. Their houses are distributed into several hamlets in each school area.

Children's characters of daily activities spaces could be different from one to another, except for school spaces. Children's activities and locations vary, according to the data from mapping activities, with categories as shown in the Table 3.

Table 3 Children's daily activities and locations

No	Type of activities	Location
1	Educational	School, home, friend's house
2	Religious – cultural	Mosque, school, church, community leader's house
3	Social – leisure	School, friend's house, neighbor's house, relatives' house, guarding post ground/ sport's field, forest, gorge/river, night patrol/ guarding post, plantation field, home
4	Livelihood support	Small store, gorge, forest, plantation field, home

Educational activities mainly consist of formal education at school, including extra curricular such as boyscout/ girlscout activities, which is held every week, and informal education with friends or teacher at one's home, such as study group. As for religious activities, participants from Pangukrejo and Srunen Schools have an Islamic learning for children group activities held three times in a week. As for the participants from Tarakanita Tritis School, they have Sunday school every week for some Christian children. In Pangukrejo school area, a weekly traditional musical learning is held in the house of key holder of Merapi. From those various educational, religious and cultural activities, children have chances to communicate about risks with teacher, peers, peers' family, religious leader, and cultural leader.

Social-leisure activities include playing, socializing such as visiting neighbor's houses and loitering in a guarding post, and watching (television and sport's match). Livelihood supporting activities consist of shopping (in a small store), finding things to sell (flower, sand), picking the grass, finding woods, and some house works. In the social-leisure and livelihood supporting activities, children have a chance mostly to meet peers, neighbors, relatives (e.g. uncle, grandparents), and people at home, as well as observing the surroundings. At home they have a chance to communicate with people they are living with, such as parents, siblings, some relatives. Most of the children have a regular communication with the people whom they are living with, about general matters mostly every day (76.6%) and

about Merapi hazard mostly several times in a week (42.6%), fewer children communicate about Merapi everyday (18.1%) and never (13.8%). It is assumed that the more they communicate with other people about Merapi hazard, the more they are influenced by public perception about Merapi hazard. For example, although most children were not born yet, particularly for children around Tarakanita Tritis school area, their risk perception might be influenced by perception of villagers around the area, who already experienced directly the 1994 volcanic crisis.

Although there is no information about the distance to the hazard source or past exposure to the location (see Table 3), there are several places with high risk that could be identified, such as the gorge and forest. Children usually go to the gorge to mine the sand and rocks to get extra money, or just to play around. While going to the forest usually aims to find woods for fire or house furniture, or to find grass to feed the cows. They face not only volcanic risks, but also other risks such as landslide and wild animal attack. As for the other locations, certainly all of them are within volcanic dangerous area because they are all located in hazard zone 2 and hazard zone 3 according to the Volcanological Survey of Indonesia. Children have different perceptions of which places are dangerous from volcanic hazard, and which places are safe. But many of them realize that some of their places of activities are within dangerous area from volcanic hazard.

5. Analyses

Based on the data from mapping, questionnaire and observation activities, children's perception of threat within their spaces of activities could be defined and analyzed. It appears that children perceive the existing threats in their area are not only those related to volcanic-related threats, but also other threats which at the same time could illustrate children's lives in Merapi area.

The volcanic-related threats include: (1) falling debris from Merapi, (2) volcanic ashes, (3) lahar, (4) lava, and (5) pyroclastic flow.

The non volcanic-related threats consist of: (1)

landslide (in the mountain, gorge and river), (2) traffic accident (of trucks and motorcycle), (3) kidnapping, and (4) animal threats (in the forest and fields).

From those lists, we found that children around Merapi are familiar already with the types of volcanic threats that might occur around Merapi. They even give new insights that the threats around Merapi are not just those related to volcanic activities, but also other natural and man-made threats.

Children's perception of volcanic related-threat will be explained in more detail according to the locations: at home and at school, since their home's condition could be different from the school's condition. The analyses are focused on the significant patterns which were found by the characteristics of school area and geographic locations of some groups of houses.

a. Children's perception of threat around school

This section consists of hypothesis testing of the assumption made before going to the field. In this study it was assumed that the three schools have different locations and past volcanic eruption exposure type, which provided a basis for choosing the sample schools. Chi-square test was employed to test whether those three schools are significantly different in terms of how children perceive the likelihood of injury due to volcanic threats when they are at school. The summary of basic differences of the three school areas are shown in Table 4.

Through the history from the records of Merapi eruption, the pyroclastic flow used to travel more to the western flank of Merapi than to the east. For this reason, an assumption was made that communities who live in the west are more experienced than those in the east. Tarakanita Tritis school area is located in the western most among all school areas in this study. In 1994, the pyroclastic flow traveled towards this school area, which causes some casualties of 63 died and hundreds injured particularly those from Turgo hamlet. The other two schools had never experienced that

hazard until the eruption in 2006, with no casualties, except for two outsiders whom at that time were trying to protect themselves in a bunker. The lava in 2006 flowed towards the direction of village where Pangukrejo School is located, but it did not reach the villager's houses. There were also lahar and pyroclastic flow traveled through the river nearby Srunen school area which destroyed two sabo dams.

Table 4 Characteristics of each school based on past volcanic exposure

Characteristics related to Past Volcanic Exposure	School Area		
	Tarakanita Tritis	Pangukrejo	Srunen
Location (western flank is more experienced than the eastern)	Southwestern flank	Southern flank	Southeast flank
1994	Pyroclastic flow, 63 died, hundreds injured	-	-
2006	Ashfall	Ashfall, lava directed towards here but did not reach houses of villagers, destroyed a camp site, 2 outsiders died in a bunker	Ashfall, lahar and pyroclastic flow traveled to the river nearby, destroyed two sabo dams, no casualties

Those different past volcanic eruption exposure in each school area were tested whether there is a significant correlation to the current perception about the likelihood of injury caused by the hazard occurrence. The correlation of experience and likelihood of volcanic hazard occurrence around home was not tested statistically. Children's homes are located in different places, thus the perception

about hazard around home might be influenced by the location of the home. In this section the focus is only where children would perceive on the threats of the same place, i.e. school.

As shown in Table 5, there is a significant difference between three schools, or significant relationship between the past volcanic exposure type and perception about getting injured due to the occurrence ($\chi^2 = 15.189$, $p = 0.00$). From the cross tabulation table, it is shown that most children of Tarakanita Tritis think that the likelihood of occurrence is high, followed by children of Srunen school. It is different case for children in Pangukrejo. Although Tarakanita Tritis school area experienced the exposure in 1994, which is not so recent and most children in this study were not born yet, it is likely that they receive the information from their parents or other people who experienced 1994 eruption, especially the large number of victims from the village might be the factor that made children from Tarakanita Tritis who participated in this study perceived the risk of getting injured due to volcanic threats as high.

Table 5 The result of chi-square test

		Likelihood of Injury due to Volcanic Hazard Occurrence around School			
		High	Low	Unlikely	Total
School Area	Tarakanita Tritis	16	6	2	24
	Std.	1.61	-0.43	-1.67	
	Residual				
	Pangukrejo	6	14	9	29
	Std.	-1.93	1.82	0.59	
	Residual				
Srunen	Std.	20	8	13	41
	Residual	0.39	-1.21	0.78	
	Total	42	28	24	94

($\chi^2 = 15.189$, $p = 0.00$)

The major contributor to this test is “Pangukrejo – High likelihood” (negative). This means that there

are fewer children of Pangukrejo who perceived the likelihood of getting injured due to volcanic hazard occurrence around school as high than would be expected by chance. Overall, it could be concluded that children from Pangukrejo tend to perceive volcanic risk as unlikely to occur around school and children from Srunen tend to perceive it as low. As for Tarakanita Tritis, although it is not the major contributor of the significance, but it is shown that the tendency of their perceptions is high.

Additionally, from the data of mapping activity, some reasons of participants who identified that their schools are dangerous if Merapi erupts, are provided below from each school:

(i) Participants from Tarakanita Tritis School stated that their school is dangerous if Merapi erupts, because: (1) there is no parents at school, (2) the volcanic ashes reached school (in 2006), and (3) falling debris from the roof, walls, and weak woods in each class of the school may occur (structure and quality of the school building)

(ii). Participants from Pangukrejo School stated that their school is dangerous if Merapi erupts, because the school’s roof tiles could fall and walls could crack

(iii). Participants from Srunen School stated that their school is dangerous if Merapi erupts, because (1) the volcanic ashes reached school (in 2006), (2) the school could collapse, and (3) it is close from the mountain and gorge, which could be affected by Merapi.

b. Children’s perception around home

The perception of whether the participant’s own home is dangerous or safe in case of volcanic activities and the location of houses relative to the source of hazard are discussed in this section. Participant’s perceptions about their houses were derived from daily activities mapping and the follow-up interview, where they identified dangerous locations if Merapi erupts. The locations of participants’ houses were derived from observation activities, where the research team marked the coordinates of houses by GPS and plotted them into a map by Google Earth.

Table 6 Groups of children's perception about volcanic threats at home based on house locations

Group	Characteristics	Perception about home	Reasoning
A	5.6 – 7.3 km from the summit of Merapi Belongs to Tarakanita School Area	Dangerous	(1) close to Merapi (2) close to the gorge (about 200 meters from the gorge) (3) many dangerous objects at home (4) falling debris potential
B	4.2 – 7.2 km from the summit of Merapi Belongs to Pangukrejo School Area	Safe	(1) far from Merapi (2) far from the gorge (3) the eruption has never reached this village (4) protected by trees in the forest (5) the dangerous areas are only around the mountain, the forest, the road that leads to Merapi, and Kali Adem area (from lahar and pyroclastic flow)
C	4.9 – 7 km from the summit of Merapi 600 – 700 m from the gorge	Safe	(1) far from the gorge (2) it is safer inside the home (3) being at home is safer than on the road (there was a traffic accident during evacuation) (4) they can avoid the ash fall if inside the home
D	5.2 – 8.6 km from the summit of Merapi <500 m from the gorge	Dangerous	(1) the danger of lahar (2) the danger of ash fall (3) close to the gorge (4) houses can collapse

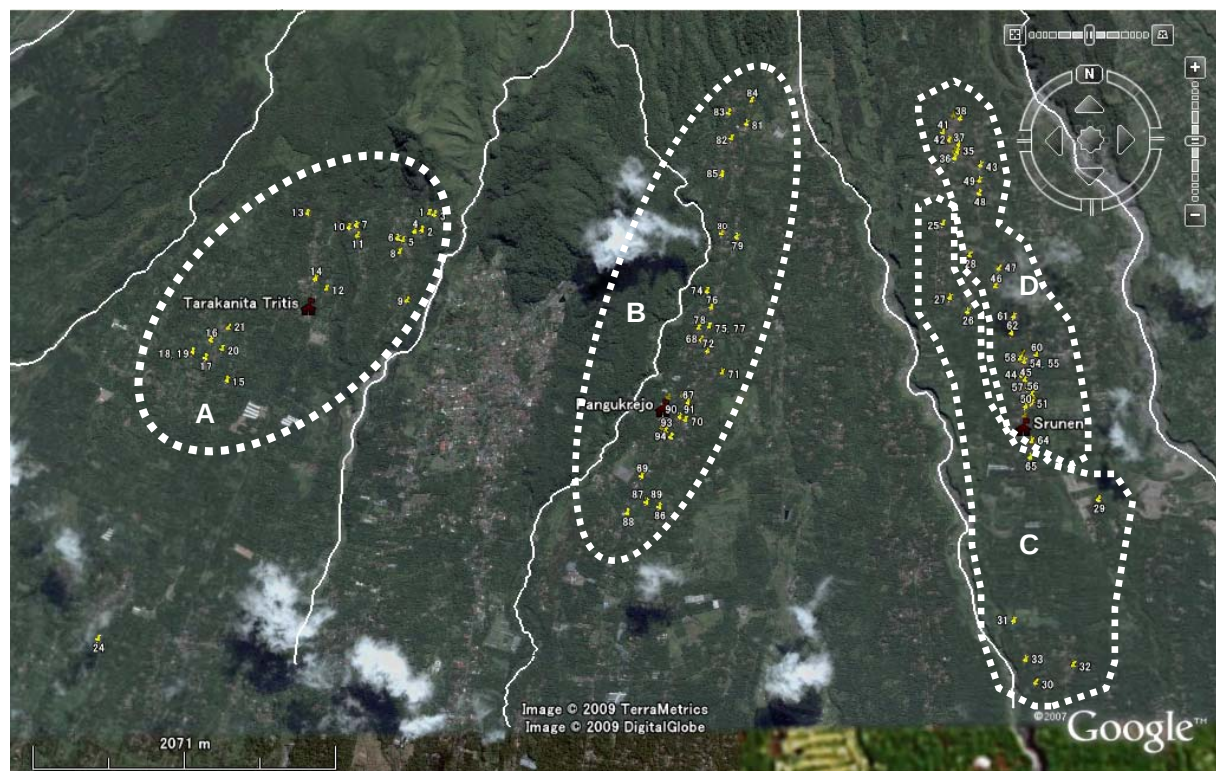


Fig 1 Groups of houses based on children's perception

The analyses were done for each school area, by first identifying the perception of each participant and his/her house location and further group them according to proximity and characters of surroundings. Additionally, the reasoning behind the perceptions will be analyzed from their own statements in the interview. The result of analysis is shown in Table 6 and Figure 1.

As shown in Figure 1, the study area is basically divided into four groups according to the distance, surroundings, and their risk perceptions. Tarakanita Tritis was formed into one group (A Group). Regardless of the distance to Merapi and gorge, most of the group members in Tarakanita Tritis perceived their homes as dangerous if Merapi erupts. This could be due to the 1994 volcanic eruption that influences their risk perceptions. The same case happened when grouping children's houses in Pangukrejo (B Group) to Tarakanita Tritis, but Pangukrejo children tend to perceive the opposite of children from Tarakanita Tritis. This is consistent with the analysis result for the experience based on school area discussed in the previous section.

As for Srunen school area, a pattern was found related with geographical position. Those who live closer to the gorge, regardless they are close or far from the summit of Merapi (C Group), perceived that the house is dangerous. Their reasons are because it is close to the gorge, it could be reached by lahar and ash fall, and their houses might collapse. In the contrary, D Group, children who live in the middle – north part of this school area perceived that their homes will be safe if Merapi erupts, with the reasons of the distance to the gorge, traffic safety during evacuation, and being inside of home to avoid the ash fall. The summary of result of this grouping is presented in Table 6.

6. Discussions

Children from Pangukrejo School tend to perceive the lowest likelihood of injury around school compared to the other two schools. Many children from this school evacuated but they found out that their school area was safe from the eruption, more over the lava traveled towards their school area but

stopped few hundreds meter before the house of key holder of Merapi who did not evacuate at all during the eruption. This could be the reason of why Pangukrejo children's perception turned negative instead of increased. Most of them also perceived that their houses are safe if volcano erupts, with the reasons that their houses are far from the hazard source, protected by trees in the forest, and the eruption has never reached their school area. Similar behavior found by Paton et al (2008) that some particular disaster experience, such as one with relatively low intensity, increases risk perception and perceived preparedness but on the contrary decreases preparedness. In this study, it was found that the disaster experience could even decrease children's perceived risks.

The fact that children learned from their experiences and just take it for granted can be seen from children in Srunen school area. The risk perception of children from this school lies in between children from Tarakanita Tritis and Pangukrejo. In general, they perceive volcanic risk as low, because of similar reason with that of children from Pangukrejo that they evacuated already but the eruption did not affect their villages in the end. However for Srunen school area, a pattern based on the location of houses was found. The 2006 pyroclastic flow traveled as far as 7 km along Gendol River. The topography of Srunen school area makes Gendol river more accessible for people, especially in the southern part of Srunen school area because the terrain in the southern is less steep than the northern part and the southern part of Srunen school area is near to the river compared to the northern and compared to Pangukrejo school area. Thus, children who live close to the river perceived that their houses are dangerous if Merapi erupts. This is not the case for children who live in the northern of Srunen school area, even though they live less than 6 km from the summit of Merapi. They mostly perceived that their houses are safe if Merapi erupts with the reason of being far located from the gorge.

The way children from Srunen School perceive volcanic hazard is limited to what they have experienced in the past, which was their first

experience, because the past Merapi volcanic eruption tend to direct towards the west than to the east. The 2006 eruption directed through the river channel, thus the knowledge is only limited to the danger is located close to the river/gorge. This is similar to the behavior found by Lavigne et al (2008), that although the communities in Merapi have a high awareness of Merapi hazard, they lack of knowledge of volcanic processes. However, the fact that some children in Srunen realized the danger of not only volcanic hazard itself, but also the danger during the evacuation, could give a new insight to improve traffic management in the study area during evacuation. They realized so because they have the accident experience during evacuation in 2006 volcanic crisis. The children who think about this accident experience perceived that being inside their homes are safer than on the street to evacuate, despite the fact that their houses are located close to the summit compared to the other houses.

From the analysis of relationship between risk perception and experience based on school area, it is found that children from Tarakanita Tritis tend to perceive the highest compared to the other schools. This is due to the past experience of volcanic crisis in 1994, which caused many casualties from the villagers in that school area. Although most of children in this study were not born yet in that year, the degree of severity from past disaster experienced by the villagers make them learn more about the risk of Merapi volcano, compared to the villagers in the other school areas. Children could realize the risk of living there from communication with their parents, neighbors, and teachers about the real disaster that ever happened in their area. However, since the 1994 eruption reached until only the northern part of this school area, a few children in the southern part of this school area, perceive that their houses are safe if Merapi erupts, because of the close distance to the designated meeting point of the villagers before going to the evacuation shelter, and because they think that their houses are far from Merapi.

It can be concluded that children tend to perceive the volcanic risk based on what happened in the

past experience (including the type of hazard happened) and the distance from where they live to the scene where past eruption reached. And recent eruption does not guarantee high perception of children, but it also determined by the impact caused by the past eruption. Thus, these children need more knowledge about the characteristics of the volcanic activities, which might change from the past, including the history of past eruption (not the recent ones), and how it might affect their areas.

7. Conclusions

Several points conclude this study analyses and discussions:

- a. There are two possible ways of children to get information about volcanic threats: communication with other people and experience of physical environment/ events.
- b. In general, children in the study area have a good awareness about Merapi threats, but still limited to the knowledge about other risks that Merapi eruption may cause to their area.
- c. They tend to perceive the volcanic risk based on what happened in the past experience only in their local area (including the type of hazard happened) and the distance from where they live to the scene where past eruption reached.
- d. More recent eruption does not guarantee high perception of children about volcanic threats, but it could be influenced more by the degree of severity of the eruption.
- e. The threats perceived by children around Merapi volcano about their spaces of activities include not only volcanic related threats, but also landslide, traffic accident, kidnapping and animal threats.

8. Recommendations

Several recommendations for policy related to the enhancement of risk communication for children who lives around a volcanic prone area are formulated as follows:

- a. Encourage risk communication in the study area through different types of children's activities: educational, religious – cultural, social – leisure, and livelihood supporting activities.
- b. Consider different scenarios for emergency

- management based on children's activities (time, locations, availability of guardians)
- c. A disaster education priority to target children who have lower risk perception. In this study, children in Pangukrejo school area should be the priority.
 - d. Emphasis on disaster education materials: (1) past volcanic eruption, (2) characteristics of volcanic hazard in eruptions, (3) the impacts which might change from time to time.
 - e. Disaster education for children around volcanic prone are which conducted during or soon after a volcanic crisis.

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子供達の生活活動空間における脅威認識に関する研究

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要 旨

多くの場合、災害時において子供達の年代が最も脆弱で影響されやすいとされている。しかし、子供達の声に耳を傾けない災害管理に関する政策が多い。この研究の狙いは、リスクコミュニケーションの際の子供達の要求を調査する第一歩として、彼らに接近し、声を聞いてやることである。この論文はメラピ山に最も近い3つの小学校で行われた3つのデータ集積方法による分析について触れている。子供達の活動空間において彼らが**脅威**と認識しているのは火山災害に関するものだけではなく、交通事故や動物から来る危害等他の**脅威**もある。火山災害の認識に関しては類似する場所に住んでいる子供達の間で独特パターンが見つけられている。発見に基づいて、筆者は調査地域内におけるリスクコミュニケーションの活性化のための提案をいくつか挙げておく。

キーワード：子供達，認識，リスクコミュニケーション，メラピ