Participatory Mapping Implementation in Capacity Building of Urban Fire Risk

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ABSTRACT— *Ampel is a socio-cultural strategic area of Surabaya with its dense population characteristic. Therefore, it is also has a high urban fire risk. Risk is contrary toward community capacity in disaster term, so urban fire risk level can be decreased by increasing the community capacity. Capacity building requires synergistic cooperation of community, so that participatory mapping is the right approach because it involves the community to solve the problem themselves actively. The goal of this article is to describe the increasing of community capacity who lived in the high level fire risk area with its case study in Ampel area, Surabaya. The analytical process is using questionnaire and focus group discussion with participatory mapping method. The result shows the increase of community capacity by identifying indicators, there are understanding, awareness, and preparedness. Understanding indicator is assessed by calculating questionnaire with result of increasing understanding score from 60 to 85 between the period three months knowledge transfer process. Awareness and preparedness were assessed through an observation of community behavior. Awareness indicator emerges from community participation in participatory mapping activity. Preparedness generates urban fire mitigation strategies and community preparedness.*

Keywords— Ampel, capacity building, urban fire, community, participatory mapping

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1. INTRODUCTION

Disaster is an event or series of events that potentially threaten and discrupt people's lives (Harjadi et all., 2007; Carter, 1991; Priambodo, 2009). Itwas a natural occurrence, people made, or combination of both which have negative impact. Mentioned by BNPB (2008), disaster presented in several variables that are risk, hazard, vulnerability, and capacity. Law of The Republic Indonesia Number 24 of 2007 concerning Disaster Management defines risk as potential loss caused by the disaster. Hazard is a threat caused by people or nature that potentially cause damage (Vanasponge, 2007). Vulnerability is defined by Miladan (2009) as a tendency for the disaster affected region. Capacity is the skill and knowledge to provide feedback and make preparations against a risk of disasters (Pamungkas, 2004). Disaster riskis proportional to the hazard and vulnerability, but inversely proportional to the capacity (BNPB, 2008).

Ampel area has a high risk of fire in Surabaya (Surabaya Spatial Plan 2014-2034). This is caused by the high vulnerability of the environment and the low capacity of the community. High vulnerability can be identified from the density of buildings more than 50 units/Ha, where belong to a high density, and the existence of industrial activities which potentially cause a fire. Meanwhile, Ampel community have a low knowledge and preparedness in response to a fire (Surabaya Long-term Development Plan 2010-2015). Ampel area according to Regional Regulation of Surabaya Number 12 of 2014 about Surabaya Spatial Plan has also been designated as a strategic area of socio-cultural.This area is a valuable asset for Surabaya and it must be protected including from the risk of fire.

Urban fire risk reduction in Ampel area can be done with vulnerability reduction and capacity building. Vulnerability reduction through building regulation is difficult to do because the direction of Regional Direction of Surabaya No. 5 of 2005 to preserve the cultural heritage. Capacity building as a community development approach can be done effectively to improve their skill and ability (UNDP, 2006).Capacity building is done through the improvement of the human resources quality, encouraging the community, and creating a well-functioning environmental condition to solve their own problems.

Sutoyo (2012) explained that capacity building can be done through coaching, both lectures and field practice. According to module of Community Empowerment National Program (PNPM) Mandiri, capacity building can be done

through training, study tours, seminars and workshops. Pamungkas (2004) explained that capacity building requires the synergic cooperation between decision makers and community, one of which can be done through participatory mapping technique. Conventional methods such as lectures, training, study tours, seminars and workshops do not involve the community actively to solve their problems. Urban fire requires handling by the community independently. Participatory mapping is selected because it puts the community not only as objects but also as the subject of sustainability. Problems of concern in this social project is "how does the implementation of participatory mapping can create capacity building of Ampel's community in reducing the urban fire risk?" This project aims to identify the increase of community capacity to reduce the urban fire risk.

2. METHODS

Participatory mapping is a mapping with the community to solve the problems of society itself and accompanied by a facilitator. Implementation of participatory mapping consist of identifying issues, brainstorming and participatory mapping, selecting the alternative solutions, also implementation and policy formulation with community.This article's discussion will be in a qualitative process through stakeholders perspective. Focus group discussion (FGD) and questionnaires is chosen as the best alternative in this context as a process identified. The assessment of the community capacity is in term of researchers and stakeholders perception. In conducting the assessment, researchers complied an indication of increased capacity with indicator of understanding, awareness and preparedness. Questionnaire is conducted to determine the perception of stakeholders on the handling of fire risk in the Ampel area. Questionnaire is a well-established tool for acquiring information from participants on their social characteristics, present and past behaviors, standards of behavior or attitudes, their beliefs and reasons for action with respect to the topic under investigation (Bulmer, 2004).This community perception will be equipped with the perception of government as policy actors who have an important role in effort to reduce urban fire risk. FGD process will make consensus in determining effective urban fire mitigation strategies. Focus groups are better for exploring exactly how those opinions are constructed (Robinson, 1999).Questionnaire and FGD process are also supported by spatially participatory map.

Table 1. Stakeholders Type and Required Information

Stakeholders Type	Information Type
Local community (age between 17-50 years; race of Java, Maduranese and Arabian; local activist)	• Understanding about the high risk of fire in their environment; • Awareness about the importance of the heritage in Ampel area for Surabaya, so the fire risk should be minimized; • Preparedness in urban fires; • Community preference against government policies on urban risk reduction; • Opinion and community development plans in order to community resilient to fire.
Government: - Fire Department of Surabaya - Head of Ampel area	• Government perception about the high risk of fire on the heritage area of Ampel. • Government policies on urban fire risk reduction based on community. • Opinion and community development plan in order to community resilient to fire

3. RESULT AND DISCUSSIONS

3.1 Implementation of Participatory Mapping in Capacity Building

The result of capacity building in the reduction of urban fire risk in Ampel area is measured by some indicators. The application of participatory mapping, an indication of the understanding, awareness and preparedness can be achieved in the following stages:

1. Build the trust, implemented through visit weekly and engage with community of Ampel area. After build the trust, the community began to open mind their environment problem. The community also became interested in learning more about the handling of urban fire.

2. Brainstorming, implemented by telling problems, then community will expressing their opinions or leaving a comments so that the problems has been explored. This activities are also a form of education and finding issues.

3. Fire risk mapping with the community, is done by dividing the community into two groups and mapping locations that are at risk of fire. Risk mapping was based on variables of vulnerability, hazards, and the capacity which is formulated by the community in brainstorming session. That are risk of fire points, things cause of the fire, and locations that has a high fire risk. The outcomes of these activities is a fire risk map. This event was attended local community that consist of local activist, Local Community Resilience Organization, and Family Welfare Guidance activist. In addition, the community have also understood about the potential area which can be used in mitigation, such as the distribution of water resources, fire infrastructures, and potential evacuation area. The result of participatory mapping has been analyzed with overlay technique using Geographic Information System

(GIS) software and resulted amount 38.25 Ha area classified as moderate fire risk and 14.64 Ha area classified as low risk of fire. These results have been presented to the community about zooning fire risk through participatory mapping.

Figure 1: Participatory Mapping Assistance: (a) Mapping Directly; (b) Discussing the Problems; (c) Explaining the Potential Area; (d) re-Asking to Equate Perception

4. Formulation of participatory mitigation plans conducted by FGD. When the problems have identified through participatory mapping, the community should also be able to find the solution based on the potential. This FGD process was attended by Fire Department of Surabaya and Head of Ampel Area to compare their perception in order to formulate urban risk mitigation based on the community.

Figure 2: Situation when the community giving opinion in FGD: (a) by the community; (b) by Fire Department of Surabaya

5. Organizing the community, should have done to ensure the sustainability of the mitigation program. As the subject of sustainability, this community will be reviewing, analyzing, and implementing the fire mitigation program in their area.

The assessment of the researchers to identify the increase community capacity in Ampel area before and after the project can be described as follows:

Table 2: Measurement of Capacity Building through Participatory Mapping Implementation

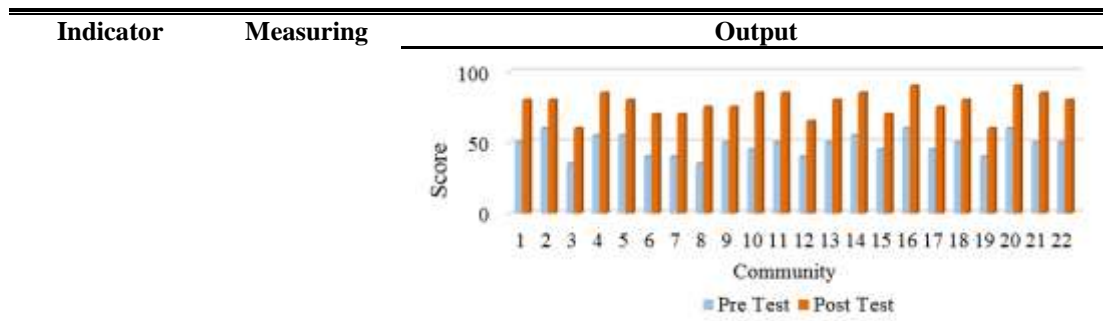| Indicator	Measuring Tool	Output	
		Before	**After**
Understanding	Questionnaire	Using scale between 0-100 to know the community knowledge about fire risk and the mitigation strategy that achieved the score of 60.	Using scale between 0-100 to know the community knowledge about fire risk and the mitigation strategy that has increased to 85.

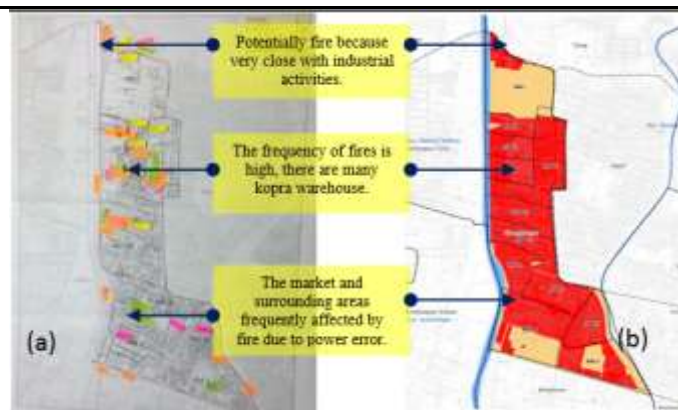| Indicator	Measuring	Output	
		Figure 3: The result of community understanding measurement	
Awareness	Risk Map resulted from participatory mapping	There are no community efforts to respond to the high risk of fire in their area. *(Source: Interviewed, 2015)*	The community is open minded to discuss and formulate of problem and potential and also mapping area at risk of fire.
		Figure 4: (a) Fire Risk Map by the Community; and (b) Spatial Analysis Overlay Result with ArcGIS Software	
Preparedness	The Community's Behavior in Focus Group Discussion	There are no preparedness of the community to reduce the risk of fire in their environment. *(Source: Interviewed, 2015)*	1. The community did fire fighting simulation using simple methods, such as using a wet sack and using CO_2 gas and small fire extinguisher. 2. There are some preparedness formulation based on the community, such as: a. Initiation of fire emergency telephone number stickers affixed to the community house; b. Electrical installation repair of household scale; c. Procurement efforts largefire extinguisher in every local area; and d. The proposal of fire pump facilities.
		There are no community of people in fire mitigation.	The establishment of fire disaster preparedness based on community.

3.2 Stakeholder's Perception of Urban Fire Risk

Implementation of participatory mapping involved stakeholders, including the community represented by local activist, Local Community Resilience Organization, and Family Welfare Guidance activist. While the government are made up of head of Ampel Area and Fire Department of Surabaya. This FGD process is able to build interaction and harmonization among stakeholders to make consensus. The assessment of increasing capacity by researcher will be validated using triangulation between perception of stakeholders, including the community and the government.

Table 3: Transcript and Discussion Perception of Stakeholders during FGD Process

Information	Transcript		
	Community	**Fire Department of Surabaya**	**Head of Ampel Area**
Perception about the high risk of fire in the heritage of Ampel area	- *"this area is densely populated, with daily activities using liquated petroleum gas. There was cultural heritage house made of wood so flammable"*–Mr. Sodikin, local activist - *"This area often in fire, because the environment is very dense and already an old building"* – Mrs. Fitri, Family Welfare Guidance activist	*"from the physical observation, this area is definitely fire-prone areas. The densely building and narrow street s will make it more difficult attend upon the process of extinguishing the fire. At least the people here should be equipped with the basic knowledge in order to facilitate the performance of the personnel later"*	*"here is a fire-prone area. Sometimes ago a fire occurred in an oil warehouse. Considering this area is not only just a regular residential, but also a cultural heritage asset that needs to be protected then fire management should be a priority."*
	Discussion: consensus about the high risk of fire in Ampel area and the need for immediate treatment considering the area is the asset of Surabaya as a heritage area.		
Government policy and/or community preferences of government policy in order to reduce the risk of fire	- *"I've ever heard about similar training programs but only attended by few people and after the training was completed, there is no other news anymore."* – Mr. Ahmad, local resident RW IX - *"I've never heard about training activity in our environment. PMK officers who come here duty to extinguish the fire"* – Mrs. Siti, local resident RW III - *"this kind of socialization must be held in Ampel area"* – Mrs.Fitri,activist PKK	*"Surabaya is indeed fire frequently. So the major of Surabaya is now more intensively doing socialization. The government also made coaching to Unit Volunteer Fire (Satlakar) at the district level. They are representative district were trained to become volunteer fire on the environment."* *"Training and support fire infrastructure will be provided if there was a request from the public. Please submit as needed! "* *"This area make fire-fighting more difficult because of the huddled houses."*	*"there are already fire program from the government based on management training. But it is representative of the target district. And the weaknesses of this training is not delivered by people who are trained to the public generally so as not developing."* *"…fire infrastructure also not currently as a priority yet, because it is basically limited submission in Musrenbang, not all necessarily be approved."*
	Discussion: there is already government policy and efforts of Surabaya Government in reduction of the risk of fire, especially in the fire-fighting efforts by Firefighters. But its implementation are still not optimal due to the efforts of fire management that tend to be done after the incident and has not actively involve the community as side of risk of fire. The community has already not participated in preventive and responsive efforts related to the potential for fire disaster in the environment.		
Opinion and community development plans in order to create community resilience to fire	- *"training activities provided very useful, so I know how to put the corret LPG."* –Mrs. Romlah, local resident RW V - *"by understanding the fire response efforts, at least in the future we don't have to be panic and be able to anticipate*	*"They had already knowledge of training activities. The next to do is a follow-up the community. The important thing is the motivation to the community."* *"if the community is active, the government will be better.*	*"people need to be encouraged to actively participate and independent in disaster preparedness and mitigation of fire."* *"Yes, after this event, later in the future I can*

Information	Transcript		
	Community	**Fire Department of Surabaya**	**Head of Ampel Area**
	early." – Mr.Dikin, head of RW I - *"We try not to blame the fire officers, but the fire officers should arrive not too long."* – Mr. Sholeh, local resident RW X	*We support. This community care will also bring good cooperation between the community and the fire officers so the impact of disasters can be minimized."*	*help community to be followed-up and assist in Musrenbang."*
	Discussion: Required mentoring, organizing, and technical mitigation plan formulation in the form of a fire contingency plan. It requires regular assistance and build a network of information with the government agencies in urban fire mitigation efforts. To improve the preparedness of the community, it is necessary to formulate an urban fire disaster contingency plans that integrate with local knowledge of community, also the experience of PMK in dealing fire disasters.		

3.3 Capacity Building to Reduce Urban Fire Risk

Capacity building through the implementation of participatory mapping in Ampel area added spatial analysis phase using supported software. Spatial overlay analysis using GIS would help the community assessed fire risk problems in their environment more accurately. GIS is a tool that is able to do the overlay, ie the integration of data from layers of different maps to produce a map of the new information on the analysis (Handayani et al., 2005). Through participatory mapping, the obtained information is the basic information on land use, population density, building density, building sites with materials burned, the distribution of water resources, and the scene of fire over the last five years in Ampel area. The information should be analyzed using a spatial overlay analysis to be able to explain the risk zonation of fire in Ampel area. Therefore the community will be convinced that their region at risk of fire, so giving early initiation of awareness in the form of proposed mitigation plans.

The active participation of the community was also able to increase the community capacity in accordance with the need of the community itself. The community was established to ensure the mitigation of fire that had been formulated by the community, so fire mitigation policies that take not only top-down but also bottom-up. Top-down approach is the approach by one participation from top to bottom. In the process of implementation, the role of government is very large, so the assumption that occurred is decision-makers is a key factor in the successful implementation. However, problems often arise in a top-down policy is a mismatch between the program made by the government to local condition and need of community, because local people were not given the opportunity to be involved in the planning for their future. The community being to feel no interest in development activities of their environment ultimately it could result problems for the government.

The bottom-up approach is coming from below (the public). The assumption of this approach is that implementation taken place in community environment and should be able to accommodate the need of the community. In efforts to reduce the risk of fire in the residential area, the most suitable approach is participatory approach where the policies made by the government can respond well by the community. This is confirmed by Nugroho (2011), that there are "five right" basically that need to be fulfilled in terms of the effectiveness of policy implementation, there are accuracy of policy, accuracy of execution, the precision of the target implementation, accuracy of the implementation, and accuracy of the process.

Capacity building will continue to flourish and sustainably through cooperation between the various parties. By connecting together relevant stakeholders, community, the local headmen (Lurah), Fire Department of Surabaya, and the academics as a facilitator through FGD. Perception among stakeholders as well as the exploration of the needs and opinions in an effort to mitigate the fire, it can be determined the policy direction that is appropriate to the need of society. The key point in the participatory method is community, so it is needed the assistance activities regularly, in the form of planning a fire contingency plan based on community. Fire contingency plan integrating local knowledge community, as well as the experience of the technical personnel competent in handling fire disaster.

4. CONCLUSIONS

The implementation of participatory mapping is effective to build community capacity of Ampel area through increasing the understanding, awareness, and preparedness. This implementation has been carried out through several stages and developed with adding spatial overlay analysis based on the information map by the community. The output of this project are fire risk map, participatory mitigation plans, and consensus perception among stakeholders as the foundation. There are useful ways to formulate contingency fire plan by integrate local knowledge community, also the experience of the technical personnel competent in handling the fire. This method is expected to be developed on the completion with other similar problems, certainly with the support of various other involved parties.

5. ACKNOWLEDGEMENT

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