

Capacity Analysis in Disaster Risk Reduction Case Study Wukirsari Village at Imogiri, Yogyakarta

Alfiati Zahrah A R

Graduate Student awardees BPKLN at Magister of Civil Engineering,
Islamic University of Indonesia

E-mail: ad_alphi@yahoo.com

Disaster risk reduction is an important thing in disaster risk reduction which now has been collaborated with development program. Natural hazard, vulnerability, exposure, capacity, and risk analysis are the scope of disaster risk reduction. Capacity analysis is a combination of all strength and resources available within a community or organization that can bear/reduce level of risk as affected by a disaster which consist of individual, institutional and enabling capacity. From the experience of disasters which had happened in Yogyakarta such as earthquake in 2006 and Merapi eruption in 2010, Wukirsari villages which has been proposed as a *Kampung Siaga Bencana* by the Ministry of Social Affairs, has more capacity in disaster risk reduction efforts. Capacity analysis is needed to determine the resilience of Wukirsari village to face the disaster in the future with better preparation in increasing capacity.

Keywords: disaster risk reduction, capacity analysis



Introduction

Indonesia is located in one of the most active in disaster areas where some types of disasters such as earthquakes, tsunamis, volcanic eruptions, floods, landslides, droughts and forest fires often occur. According to the Global Assessment Report for Disaster Risk Reduction 2009, Indonesia is one of the top 35 countries that have a high risk of death from a variety of hazards to the population risk of about 40 percent. For a country that has more than 230 million people, this percentage gives a huge number of more than 90 million people potentially at risk. Data from the United Nations International Strategy for Disaster Reduction (UNISDR) showed that based on the data of residents in disaster-prone regions, Indonesia has a very high risk, where to earthquakes, Indonesia is ranked third among the 153 countries with 11,056,806 people affected .

The earthquake that occurred on May 27, 2006 in Yogyakarta and its surroundings has claimed many victims both property and lives. Based on data from the damage caused by the 2006 earthquake on BAKORNAS, in the Province of Yogyakarta there are 96 730 homes damaged, 117 075 homes were damaged and 156 971 homes with minor damage. While the number of casualties, according to Bappenas some 4,659 dead and 19,401 wounded.

On October 26, 2010, Mount Merapi, which is one of the most active volcano in Indonesia erupted with repetition period between 2-5 years, has shown activity of a large eruption with pyroclastic blast range as far as 3-4 km. Eruption occurred again at 4-5 November 2010 with a blast of hot clouds as far as 15-17 km which cause casualties and destroying homes and infrastructure of the area around Merapi settlement. According to data from Rekompak, in the province of DIY Merapi eruption death toll reached 198 people, hospitalized 288 people and refugees numbered 158,367 people. With the amount of damage to homes reaching 2682 homes spread over several areas in the district of Sleman.

With the number of people affected and the material damage is so great, and the location of Indonesia especially in Yogyakarta province that has great potential disasters it is necessary disaster relief efforts which the government and the local government to be in charge. One of the responsibilities and authority of the Government in the implementation of disaster management is the integration of

disaster risk reduction and disaster risk reduction into development programs as well as the creation of development plans that incorporate elements of disaster management policy.

Sustainable development is a process of development (land, cities, business, communities, etc.) that principled "meet present needs without compromising the needs of future generations" (Brundtland Report of the United Nations, 1987). Where one of the factors that must be overcome to achieve sustainable development is how to improve the environmental destruction without compromising the needs of economic development and social justice. In the process, sustainable development must incorporate elements of disaster risk reduction, especially community-based sustainable development. As it says on 5 pillars of HFA Priority Disaster Risk Reduction the roomates first is making the disaster risk reduction as a priority. HFA is an agreement of more than 160 countries to mainstream disaster risk reduction into development. Indonesia as one of the countries that agreed HFA, HFA is ratified in the National Disaster Management System. Some form of this is HFA ratification of Law No. 24 Year 2007 on Disaster Management, National Disaster Management Plan, the National Action Plan for Disaster Risk Reduction and others.

Natural hazard, vulnerability, exposure, capacity, and risk analysis are the elements of disaster risk reduction. Capacity is a combination of all strength and resources available within a community or organization that can bear/reduce level of risk as affected by a disaster.Reducing risk means increasing capacity which can make hazard, vulnerability and exposure getting low.

Wukirsari village is designated as a Kampung Siaga Bencana (KSB) by the Ministry of Social Affairs to provide protection to the public from the threat and disaster risk prevention activities by organizing and community-based disaster management through the utilization of natural and human resources that exist on the local environment. To assess how much capacity is owned by the village well Wukirsari individual capacity, as well as enabling institutional capacity in disaster management operations required an analysis. From the analysis of the capacity is expected to increase the capacity of the village attempted to focus on the priorities measurable improvements, targeted and thorough and can also set the policy direction of capacity building for disaster risk reduction in the rural Wukirsari.

Disaster Risk Reduction Concept

Disaster Risk Reduction is the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risk throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development. Hazard is a potentially damaging physical event, phenomenon and /or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Vulnerability is the condition determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Positive factors, which increase the ability of people and the society they live in, to cope effectively with hazards and can reduce their susceptibility, are often designated as capacities.

Between all three (hazard, vulnerability, and capacity) are related to each other in a disaster risk. Furthermore, the risk of disaster is the product or directly influenced by the external threat (hazard, vulnerability (vulnerability) and the ability (capability). Resilience is a combination of vulnerability and capacity. Relationships among the 3 elements can be expressed in the following formula (De Leon, in Widodo (2012)),

$$Risk = Hazard \times \frac{Vulnerability \times Exposure}{Capacity}$$

Based on the above relationships, the risk would be greater if the hazard, vulnerability and exposure value is great, while the capacity is small. In the social risk analysis, these elements were weighted / specific contribution which the weight capacity contrary to the weight of the other elements. Furthermore each of these elements is divided into sub-sub elements, each of which is also given a certain weight. On the other hand the high vulnerability of humans can be caused by many things such as poverty, underdevelopment, increasingly limited natural resources, lack of skills and so on. While the ability of people (capacity) low dalam disaster will add to the risk. This is for example the lack of a systematic disaster management system, there is no coordination, no experience, no money, no equipment, and so on.

Capacity of Society

Wisner (2011) says capacities refer to the resources and assets people possess to resist, cope with and recover from disaster shocks they experience. Capacities are not the opposite end of vulnerability on a single, linear spectrum. Most people, including marginalised and vulnerable people, have capacities. These capacities fall within the same typology of resources used for assessing livelihoods and vulnerability, i.e. natural, physical, human, economic, social and political, as shown in Figure 1.

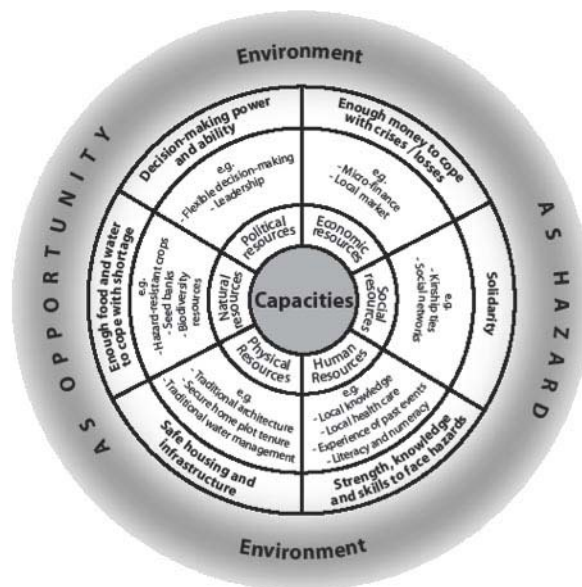


Figure 1

The Circle of Capacity

Source : Wisner (2011)

People employ these in order to prevent, resist, cope with, and recover from challenges wrought by natural hazards. No one is a helpless victim, nor should they be labelled only as such Figure 1 emphasises the fact that capacities are often, yet not exclusively, rooted in resources which are endogenous to the community facing hazards. Enhancing capacities encompasses activities, often at the household or

community levels, which strengthen people's strategies to face the occurrence of natural hazards, such as agreeing on warning signals, infrastructure and livestock protection, meeting points, planning evacuation routes, vehicles and shelters, and preparing resources to cope with the disruption of daily life. It is therefore often easier to enhance capacities than to reduce vulnerability. Capacities must therefore be recognized and used.

By Anonymous (in Widodo, 2012), capacity (capacity) that exist in the community also can occur in any type of vulnerability, such as the social aspects, physically, economically and environmentally. Capacity to deal with disasters in general there are three large-groups, namely: 1) individual capacity, 2) institutional capacity, and 3) enabling capacity (policy, strategy, etc.). Most of the elements that exist on Disaster Management is both capacities. Therefore, to increase the capacity of the main is to increase the institutional capacity (hardware: organization, program, all the resources, cooperation, coordination), the function of government officials (software: policy, strategy, planning, mechanisms, procedures, etc.). In order to reduce risk, the element of capacity should be increased.

Furthermore, it is said that the capacity of communities to cope with disasters include 3 main things that 1) Human Resource Development (HRD) is an individual self-development or leadership group includes local (community leader), social capital / local wisdom, the knowledge, understanding, skills ineffectively or access to information in order to cope with disasters. A lot of effort needs to be done by the start of the Disaster Management Agency invitation to the community to work together to face the disaster, provision of information, awareness, training, coaching, mentoring and developing cooperation network. 2) Organizational Development, ranging from the establishment of the organization, charging that organisasi organ program planning, provision of all resources (human resources, facilities, equipment, finance, technology) to implement the program, which passed the evaluation, monitoring and feedback. Included in the development of the organization also gave birth to coordinate with institutions both inside and outside. 3) Enabling Capacity Development, is the preparation of all kinds of devices rules, laws & regulations, rules, sanctions, conventions and the like are necessary in order to deal with the disaster. Besides, it is also the policy, strategy, mechanisms, procedures etc.. Many

things must be done as efforts to increase the ability of communities to cope with disasters. In the development and utilization of the capacity of local wisdom approach (local wisdom) is very important.

Then to realize the disaster management activities primarily to find out how the capacity of a region in the face of disaster, one with the enactment of National Agency for Disaster Penanggulangan on Guidelines for Assessment Capacity in Disaster Relief. Assessment guidelines are intended to monitor, develop and implement, monitor and develop local capacity in disaster management operations in each region in Indonesia.

Semi Empirical Method in Assessing Capacity

In assessing capacity, we can use such things like parameter, indicator, and weighting factor which can describe capacity in semi qualitative. Parameter is any factor that defines a system and determines (or limits) its performance, or anything that contributes causally to a result in capacity. Parameter in capacity as shown on Table 1.

Table 1. Parameter of Capacity

No.	Parameter
1.	<i>Equipment Testing (EW)</i>
2.	<i>Disaster Monitoring (EW)</i>
3	<i>Disaster Prediction (EW)</i>
4.	<i>Service ass. readiness (EW)</i>
5.	<i>Preparedness Plan./Contingency Plann(Prep)</i>
6.	<i>Disaster need assessment (Prep)</i>
7.	<i>Improving Coordination (Prep)</i>
8.	<i>Legislation framework (Mit)</i>
9.	<i>Pendalaman RPB (Mit)</i>
10.	<i>Leadership and Coordination (Mit)</i>
11.	<i>Resources Plann & Mobilization (Mit)</i>
12.	<i>Designing Disaster Mitigation Procedures (Mit)</i>
13.	<i>Land used Plan & Environment Identification (Prev)</i>
14.	<i>Resettlement (Prev)</i>
15.	<i>DRR Program (Prev)</i>
16.	<i>Research and Studies (Prev)</i>

Source : Compilation from many sources

While Indicator score is a value which represents a state with a certain level which is used in the assessment of this capacity is very high, high, moderate, low and very low and as in table 2.

Table 2. Scoring *Indicator*

<i>Indicator</i>	<i>Ind. Score</i>
<i>Very High</i>	10
<i>High</i>	7
<i>Moderate</i>	5
<i>Low</i>	2
<i>Very Low</i>	1

Source : Compilation from many sources

Weighting factors are estimated values indicating the relative importance or impact of each item as compared to the other items in the group of parameter capacity. The purpose of assigning weighting factors is straightforward which can help us establish work priorities. Weighting factor may vary from one researcher to another, depend on the perspective of the researcher. From the parameters of capacity we can determine which factor is the most important thing in assessing capacity. The most important thing gets the highest score and the lower thing gets the lower score. In this case we can determine weighting factor for capacity as shown in table 3.

Table 3. Weighting Factor in Capacity

No.	Parameter	WF
1.	<i>Equipment Testing (EW)</i>	3
2.	<i>Disaster Monitoring (EW)</i>	4
3.	<i>Disaster Prediction (EW)</i>	8
4.	<i>Service ass. readiness (EW)</i>	5
5.	<i>Prep. Plan./Contingency Plann (Prep)</i>	7
6.	<i>Disaster need assessment (Prep)</i>	6
7.	<i>Improving Coordination (Prep)</i>	7
8.	<i>Legislation framework (Mit)</i>	5
9.	<i>Pendalaman RPB (Mit)</i>	6
10.	<i>Leadership and Coordination (Mit)</i>	5
11.	<i>Resources Plann & Mobilization (Mit)</i>	6
12.	<i>Designing Disaster Mitigation Procedures (Mit)</i>	5
13.	<i>Land used Plan & Environment Identification (Prev)</i>	7
14.	<i>Resettlement (Prev)</i>	5
15.	<i>DRR Program (Prev)</i>	8
16.	<i>Research and Studies (Prev)</i>	5

Source : Researcher Analysis (2013)

Method of Investigation

The research was conducted in July and August 2013 at the study site chosen was Wukirsari village because the village is one of the villages that are designated as KampungSiagaBencana (KSB) by the Ministry of Social Affairs in 2010. KampungSiagaBencana (KSB) is a community-based disaster management container is used as the region / place for disaster management program to provide an understanding and awareness of hazards and disaster risks, strengthen the social interaction of community members, trained community organizing disaster preparedness and optimize potential and resources for disaster management.

Administratively Wukirsari village located in the district of BantulImogiri Special Region of Yogyakarta (DIY) with a distance of 17 km from the city of Yogyakarta as the capital of Yogyakarta Province. Geographically, Wukirsari village located at $07^{\circ} 53'30''$ - $07^{\circ} 56'00''$ latitude and $110^{\circ} 22'30''$ - $110^{\circ} 26'30''$ longitude. Wukirsari village administrative boundaries that limited the Northern District of Jetis and Pleret, south of the village is restricted Imogiri, Girirejo village and district. Dlingo, west of restricted Jetis District, and the East District bounded Dlingo as shown in Figure 2. The total area is 15.385 km² Wukirsari Village consists of 16 hamlets namely Tilaman, Karangkulon, Giriloyo, Kedungbuweng, Nogosari I, II Nogosari, Cengkehan, Jatirejo, Pundung, Sindet, Singosaren, Bendo, gig, Dengkeng, Karangtalun, and Karangasem.



Figure 2

Village Administrative Map of Wukirsari

source : www.google.com

In the village monograph, Wukirsari population in 2013 reached 16 505 inhabitants with a density of 1,000 jiwa/km². In the event of an earthquake that struck Yogyakarta on May 27, 2006, Wukirsari is one of the affected villages. Based on the results of a study of Geology Engineering UGM cooperation with JICA and ASEAN, Wukirsari rural areas included in the zone with a very high level of vulnerability as a land zone with the most powerful earthquakes in response to vibration. This zone covers an area of Bantul east, especially along the river Opak as shown in Appendix 1.

The data was collected through field surveys, literature studies, administration of questionnaires and interviews with village officials, KSB officials and residents who live in the village Wukirsari. While the analysis using a semi-empirical method to determine the parameters, indicators, and weighting factors which may further note the value of the contribution in the village Wukirsari capacity in disaster risk reduction.

RESULT AND DISCUSSION

Some capacity building efforts undertaken in the village, among others, with the stipulation Wukirsari Regulation No. Wukirsari village. 06/PD/WKS/2009 on Disaster Management, the existence of which there are RPJMDes Map Village Disaster Prone Wukirsari as shown in Appendix 2, the socialization of disaster are held from early childhood through high school levels, dissemination to the public through a puppet show held every alternate year each hamlet, the Forum for Disaster Risk Reduction (FPRB), the Social Sentry is equipped with the Standard Operating Procedure of local disaster management system that is integrated with local and national disaster, area Map describing the condition or level of vulnerability, and the vulnerability of communities to disasters or risks disaster and Social barn for storage and inventory items disaster preparedness as shown in Figure 4. In addition Wukirsari village also has 72 Radio Transmit (HT) and 1 Community Radio broadcasts every day. Presence of 140 young men and women in Wukirsari village who are willing to become a blood donor when needed is also a capacity-building efforts in this village.



Figure 4

Social Barn and Social Sentry in Wukirsari Village

source : private documentation (2013)

To analyze the capacity of the village Wukirsari, can be done by determining the parameters related to the capacity of both individual capacity, organizational capacity, and enabling capacity. As set out in Table 4.

Table4. Parameter and Indikator of Capacity in Wukirsari

No.	Parameter	WF	Indicator's	Keterangan
1.	<i>Equipment Testing (EW)</i>	3	2	<i>Low</i>
2.	<i>Disaster Monitoring (EW)</i>	4	5	<i>Moderate</i>
3.	<i>Disaster Prediction (EW)</i>	8	5	<i>Moderate</i>
4.	<i>Servise ass. readiness (EW)</i>	5	5	<i>Moderate</i>
5.	<i>Prep.Plan./Contingency Plann(Prep)</i>	7	5	<i>Moderate</i>
6.	<i>Disaster need assessment (Prep)</i>	6	5	<i>Moderate</i>
7.	<i>Improving Coordination (Prep)</i>	7	7	<i>High</i>
8.	<i>Legislation framework (Mit)</i>	5	7	<i>High</i>
9.	<i>Pendalaman RPB (Mit)</i>	6	5	<i>Moderate</i>
10.	<i>Leadership and Coordination (Mit)</i>	5	7	<i>High</i>
11.	<i>Resources Plann & Mobilization (Mit)</i>	6	7	<i>High</i>
12.	<i>Designing Disaster Mitigation</i>	5	5	<i>Moderate</i>
13.	<i>Land used Plan & Environment</i>	7	5	<i>Moderate</i>
14.	<i>Resettlement (Prev)</i>	5	5	<i>Moderate</i>
15.	<i>DRR Program (Prev)</i>	8	7	<i>High</i>
16.	<i>Research and Studies (Prev)</i>	5	7	<i>High</i>

Source : Field Study (August 2013)

From the data parameters and indicators of existing capacity, it can be calculated Score Capacity Index (SCI) through the steps 1) Determine the parameter (b), weighting factor / WF (c), 2) Determine the indicator score (d) based on survey data , 3) Calculating the score (e) which is the result of the multiplication WF and indicator score, 4) Calculate the maximum value of WF, through multiplication with

a maximum value of WF, which is 10, 5) Calculating normalization WF, by dividing the total number of WF, 6) Calculated the normalized score by dividing score with the value of WF maximum, 7) Calculated the value of the participation contribution by dividing WF normalized value with score normalization value.

The maximum value of the participation contribution is 1 which means that when the result of analysis gets 1, the area of study has good capacity. But when the value of participation contribution is lower than 1 means the capacity getting lower as well.

From the analysis of the results obtained by the end of the participation contribution in village Wukirsari capacity is 0.5469 as shown in Table 5.

Table5. Score Capacity Index (SCI) Wukirsari Village

No.	Parameter	WF	Indicator score	Score	Max. WF	Norm WF	Norm. score	Participation Contribution
(a)	(b)	(c)	(d)	(e)=(c)x(d)	(f)=(c)x10	(g)=(c)/ΣWF	(h)=(e)/(f)	(i)=((g)/(h))
1	<i>Equipment Testing (EW)</i>	3	2	6	30	0.0313	0.2	0.0063
2	<i>Disaster Monitoring (EW)</i>	4	5	20	40	0.0417	0.5	0.0208
3	<i>Disaster Prediction (EW)</i>	8	5	40	80	0.0833	0.5	0.0417
4	<i>Service Ass. Readiness (EW)</i>	5	5	25	50	0.0521	0.5	0.0260
5	<i>Prep.Plan./Contingency Plann (Prep)</i>	7	5	35	70	0.0729	0.5	0.0365
6	<i>Disaster Need Assessment (Prep)</i>	6	5	30	60	0.0625	0.5	0.0313
7	<i>Improving Coordination(Prep)</i>	7	7	49	70	0.0729	0.7	0.0510
8	<i>Legislation Framework (Mit)</i>	5	7	35	50	0.0521	0.7	0.0365
9	<i>Deepening DRR (Mit)</i>	6	5	30	60	0.0625	0.5	0.0313
10	<i>Leadership and Coordination (Mit)</i>	9	7	63	90	0.0938	0.7	0.0656
11	<i>Resources Plann. & Mobilization (Mit)</i>	6	7	42	60	0.0625	0.7	0.0438
12	<i>DRR Procedure (Mit)</i>	5	5	25	50	0.0521	0.5	0.0260
13	<i>Land used Plan. &Environment Identification (Prev)</i>	7	5	35	70	0.0729	0.5	0.0365

14	<i>Resettlement (Prev)</i>	5	5	25	50	0.0521	0.5	0.0260
15	<i>Dis. Risk Red Prog (DRR), Prev.</i>	8	5	40	80	0.0833	0.5	0.0417
16	<i>Research and Studies (Prev)</i>	5	5	25	50	0.0521	0.5	0.0260
		96		525	960	1.0000		0.5469

Source : Researcher Analysis (2013)

CONCLUSION

The data of field study shown that Wukirsari got the variety of values from the capacity parameter from low to high. But more than 60% of the capacity parameters is in the moderate value.

From the analysis of the results obtained by the end of the value contribution of participation in village Wukirsari capacity is 0.5469 which means that the Wukirsari village has a Moderate value of participation contribution. To further enhance the value of the capacity, it is necessary to improve the quality and quantity of each of the parameters that have been there that still have low or moderate value.

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Appendix 1

