Sustainable Community-Based Disaster Management (CBDM) in Wonolelo Village, Bantul Regency, Special Region of Yogyakarta, Indonesia

Widyasari Her Nugrahandika1 and Ramadhani Nuresa Putri2

12Urban and Regional Planning Study Program, Architecture and Planning Department, Engineering Faculty, Universitas Gadjah Mada, 2 Grafika Street, Sleman Regency, Special Region of Yogyakarta, Indonesia.

widyasari.hn@ugm.ac.id and ramadhanins@gmail.com

Abstract. Special Region of Yogyakarta is passed by the ring of fire and become a province which prone to disasters, especially earthquake. In 2006, Wonolelo Village was one of the villages hardest hit by the earthquake. Therefore, understanding and awareness of disaster management are important. Currently, disaster management at local is widely applied. According to Van Niekerk, et al (2017), the approach at the local level aims to change the perspective of disaster management in terms of issues, challenges and problems faced by the community. For this reason, Wonolelo Village has a disaster-aware community, the Disaster Risk Reduction Forum (FPRB). The purposes of this research are to identify the processes and factors that influence the success of sustainable CBDM in Wonolelo Village. The method used is qualitative. Based on the analysis, Wonolelo Village has three stages of the disaster management process, namely the identification, the planning and implementation stage, and the development stage. While the factors that influence the success of disaster management in Wonolelo Village are the choice of Wonolelo Village as a Pilot Project by NDMA, recurring disaster events, volunteers who have team awareness, the existence of cooperation culture in the community, and budget allocation from Wonolelo Government for CBDM.

1. Introduction
Sustainable development is the focus of development in the world today. The UN member states then formulated the Sustainable Development Goals in 2015 through a conference held by UNISDR and successfully formulated the Sendai Framework for Disaster Risk Reduction (2015-2030). The Sendai Framework (2015-2030), is an international document that contains targets to reduce the risks of global disaster and climate change. Disaster risk reduction targets are more comprehensive by adding and continuing the targets that were already in the previous document, namely community involvement in dealing with disasters at the local level. Community involvement plays an important role in reducing the number of casualties, environmental and economic losses [1].

Indonesia, which is one of the most disaster-prone countries in the world, is expected to be able to adopt and integrate the Sendai Framework into existing policies, from the central to the local level, which can ultimately build community participation. This was reinforced by Van Niekerk, et al (2017) that approaches at the local level aimed at changing the perspective of disaster management in terms of issues, challenges and problems faced by the community [2]. In 2006, an earthquake measuring 6.3 SR occurred in Bantul Regency and Wonolelo Village became one of the most affected villages. The incident killed 5,048 people and injured 27,808 people. The number of damaged houses was 240,396
units. In 2010, an eruption of Mount Merapi occurred and killed 340 people, forcing around 200,000 residents to flee [3]. Potential disasters in DIY such as the eruption of Mount Merapi and earthquakes require understanding and awareness that disaster mitigation is very important especially at the local level. This can be done through the formation of a disaster-aware community to explore community participation because the community is the direct recipient of a disaster. Currently, DIY already has a disaster-aware community, but it is necessary to know how far the community has succeeded in disaster mitigation efforts.

Based on those, this study aims to: (1) Identifying a sustainable CBDM process in Wonolelo Village; and (2) Identifying the success factors of CBDM in Wonolelo Village.

2. Literature Review

2.1 Key Elements of CBDM

UNDP (2016) divides eight key elements that play a role in CBDM activities, there are disaster management committee; community disaster risk reduction fund; community hazard, vulnerability, capacity map; community disaster risk management plan; disaster management training system; community drill system; community learning system; and community early warning system [4]. According to Kafle and Murshed (2006), there are six stages of community involvement to reduce disaster risk using the perspective of local government, namely selecting the community; rapport building and understanding; participatory disaster risk assessment; community-based disaster risk management planning; community-managed implementation; and monitoring and evaluation [5]. Moreover, Indonesia National Disaster Management Authority (NDMA) (2011) describing 4 stages of disaster management, there are preparedness; response; recovery; and mitigation [6].

**Figure 1. The Theoretical Framework**
2.2 Success Factors for CBDM
Rockat (1979), Boynton and Zmud (1984) define critical success factors as several things that must go well to ensure the success of the management of an organization [7]. Mahsun (2006) in Skripsiansyah, 2011) revealed that identification of critical success factors can be done by various factors, such as the potential of the organization, opportunities, excellence, challenges, the capacity of resources, funds, infrastructure, regulations or organizational policies, and so on. So, every stages of disaster management have an important role in determining the success of CBDM [8].

3. Methods
This research is using qualitative methods. This data collection was carried out by collecting primary data, which includes observation and interviews and secondary data collection which includes literature studies, policies of government and documents which related to CBDM in Wonolelo village. This research also uses a purposive sampling method. The participants are selected based on; local leader or community who is understands the history and process of CBDM in study area, and government officers who lead in the programs. This research involves semi structured depth interviews with local government, NDMA/BPBD officers, local leaders, NGOs and at-risk community.

The analysis technique is carried out by examining all data obtained from various sources, reducing data by only entering data which related to research objectives and discarding data that are not related to the research objectives. Then, the validity of the data was checked using triangulation techniques and made sure that the references used were sufficient.

To identify disaster management processes, three main theories are used, which are the key elements of CBDM, CBDM processes, and stages of disaster management. The three theories are then elaborated together with the data that has been obtained. To make it easier to understand and identify the disaster management process, the results are then divided into phases based on time periods. Meanwhile, to identify the factors that influence the success of a disaster, interpretation is used according to Mahsun (2006) in Skripsi, 2011) regarding the identification of Critical Success Factors (CSF) [8].

4. Result and Discussion
4.1 Identification of Sustainable CBDM Process in Wonolelo Village
Wonolelo Village is located in the south of Yogyakarta City, precisely in Pleret Sub-District which has an area of 453,4705 Ha. This area 60% are hills/mountains and 40% are plains. Wonolelo Village has characteristics that are prone to disasters, starting from its location in the Opak Fault so that it is prone to earthquake to some locations in Wonolelo Village which are slopes and hills so prone to landslides. The following are the results of observations and interviews from stakeholders in Wonolelo Village which are summarized in a scheme:

| Year | Event |
|------|-------|
| 2006 | An earthquake occurred in Yogyakarta, Wonolelo Village is one of the villages that was badly affected. |
| 2007 | Wonolelo Village got donor from UNDP and was chosen as a CBDM Pilot Project by NDMA |
| 2010 | Wonolelo Village was crowned as Tangguh Pratama Village |
| 2011 | The Resilient Village Module has been created, made in accordance with the Tangguh Village programs |
| 2013 | Wonolelo Village has been crowned by NDMA as the Tangguh Utama Village |
| 2015 | The funding allocation for Wonolelo Village was changed, and CBDM was included in the budget. |
| 2019 | As a figure who has been meritorious, Mr. Furqon was chosen as the Head of Wonolelo Village |

Figure 2. Important Years During the Process of Implementing CBDM
Based on elaboration between scheme and theoretical framework, the CBDM was obtained that shows in the scheme below.

**Figure 3.** The Stages of Disaster Management Process in Wonolelo Village

**Figure 4.** The Synchronize between Important Years and Stages of Disaster Management in Wonolelo

4.1.1. **Identification Stage.** This identification stage is the initial stage to get to know. This stage starts from the determination of the parties involved, participatory of rural appraisal (PRA), and mapping of disaster risk. Parties Involved, there are facilitator, community organizer (CO), the formation of FPRB and village stakeholders. The facilitator is tasked with directing and guiding COs around strategic issues and disaster risk reduction efforts. The facilitator and the CO then work directly down to the community to do the initial organizing. Subsequently, an FPRB was formed and the community involved will assist in disaster risk reduction activities and become a mobilizer.
Table 1. Parties Involved

| Name/ Institution | Role in Disaster Management | Role in Village Society |
|-------------------|-----------------------------|-------------------------|
| YP2SU             | Facilitator                 | Facilitator             |
| Akhmad Furqon     | Community Organizer         | Representation of Nahdatul Ulama |
| Nur Kholis Majid  | Community Organizer         | Representation of Muhamadiyah |
| Muhydin           | Village Stakeholder         | A figure of Community Empowerment (LPMD) |
| Khulil Khasanah   | Village Stakeholder         | A figure of Women Empowerment |

Participatory of Rural Appraisal (PRA), the activities carried out in the form of making community maps that contain a picture of the history of disaster and the potential that exists in the village of Wonolelo. In making community maps, components that must be drawn are important lines of villages, settlements, geographical conditions, maps of community ownership (paddy fields, fields, etc.) and disaster-prone points.

Mapping of Disaster Risk, carried out using the Wonolelo Village disaster history flow and using the season calendar. Season calendar is a tool to describe the daily activities of rural communities that can show the relationship between the community and the conditions of the season it faces. Therefore, this calendar is used to see the tendency of the time of disaster. From the results of the analysis, the Wonolelo Village disaster risk map was obtained.

4.1.2. Planning and Implementation Stage, the planning and implementation phase is the core stage. In this stage, the formulation of disaster management planning, the role of FPRB in community
empowerment, and disaster management are carried out based on regulated in Law No. 24 of 2007. Disaster management planning must be planned in various forms and systematic following the needs of each stage. The following steps are required:

| Table 2. Disaster Management Phase and Plan in Wonolelo Village |
|---------------------------------------------------------------|
| **Phase** | **Needed Plan** |
| All Phases | Disaster Management Plan (RPB), note: This RPB is made during a pre-disaster when there is no disaster. |
| Pre-Disaster Phase | Community Action Plan |
| a. Mitigation and Prevention | a. Community Action Plan |
| b. Preparedness | b. Disaster Contingency Plan |
| Emergency Response Phase | Emergency Response Operation Plan |
| Post-Disaster Phase | Rehabilitation and Reconstruction Plan |

4.1.3. Development Stage, includes recovery (in the event of a disaster) and ongoing FPRB activities. Ongoing FPRB activities in Wonolelo Village are efforts made so that Wonolelo Village is always prepared to face disasters. In the other hand, FPRB activities not only prepared to face disaster but also taking care community in many occasions like giving some village touring in term of disaster preparedness education, disaster risk reduction campaign, helping to manage traffic in holiday seasons in Bantul and surrounding, laden (helping people who have special occasions, build some house, wedding ceremony), etc

4.2. Identification of the Success Factors of Sustainable CBDM
The identification of these factors is based on Critical Success Factors (CSF) according to Mahsun (2006) in Skripsiannya (2011), namely: (1) potential; (2) opportunity; (3) excellence; (4) challenges; (5) resource capacity; (6) infrastructure; and (7) organizational regulations or policies. From the seven factors, based on the results of observations and interviews in the field, several factors can be taken into factors that influence the success of sustainable CBDM in Wonolelo Village, namely:

4.2.1. Village Potency and Excellence, has volunteers with high team awareness. Shown from the high spirit of community cooperation in the Wonolelo Village.

4.2.2. Opportunity, the choice of Wonolelo Village as a Pilot Project for Community-Based Disaster Risk Reduction by BNPB is a promising opportunity in realizing sustainable CBDM in Wonolelo Village.

4.2.3. Challenges, facing recurring disaster event, such as landslides that can be used as learning material. A disaster risk analysis can be carried out so that it can be estimated when a disaster will occur and what efforts or actions can be taken.

4.2.4. Local Government Regulation or Organizational Policy, budget allocation from Wonolelo Government was one of the success factors. This shows that in the effort to reduce the existing disaster risk, Wonolelo Village has tried its best. Besides, Wonolelo Village has also created a Wonolelo Disaster Risk Reduction Document (PRB) along with its derivative documents that contain matters regarding disaster risk reduction and the actions that must be taken when a disaster occurs.

5. Conclusion
Wonolelo is a disaster-prone village chosen as a Community-Based Disaster Risk Reduction Pilot Project by NDMA, and Wonolelo Village Disaster Risk Reduction Forum (FPRB) was formed. There
are 3 stages of the CBDM process in Wonolelo Village, namely the identification phase, the planning and implementation stage, and the development stage. Detailed disaster management efforts are listed in each stage.

Meanwhile, based on the results of the Critical Success Factors (CSF) analysis, the significant factors that influence the success of disaster management in Wonolelo Village are village potency and excellence, opportunity, challenges, and local government regulation or organizational policy.

In brief, CBDM are not necessarily applicable to be implemented in other village projects in disaster risk reduction. The use of this approach may be varied. A successful approach in Wonolelo village might not be appropriate to be implement in others village in others region. The approach depends on the characteristics of the community and environment. But, the success factors of CBDM in Wonolelo Village still can be an example for other villages.

6. Recommendation

For NDMA, before implement community-based disaster management in a village, it needs to identify the characteristics of the community and environment, such as the potency and approach the local government to support. For a village, community-based disaster management could be beneficial for disaster risk reduction if a village knows which part that become challenges and opportunities in their area.

References

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