Financing Disaster Risk Reduction: The Perspective of Budget Allocation for Awareness Programs in The Merapi Volcano Community

Yosi S. Mutiarini¹*, Hitoshi Nakamura², Yasmin Bhattacharya²

¹Doctoral Student, Graduate School of Engineering and Science, Shibaura Institute of Technology, Japan, ²Department of Planning, Architecture and Environmental Systems, Shibaura Institute of Technology, Japan,

na19505@shibaura-it.ac.jp

Abstract. The increasing number of disasters and high costs of damage highlight that financing is an essential part of managing community disaster response. As the most significant spending related to a disaster occurs after the disaster strikes, it can be challenging to know how much this spending could be reduced through preparedness in disaster management. This paper discusses the budget allocation of ex-ante programs on disaster risk reduction, focusing on education, knowledge awareness, capacity building, and risk communication. Special attention is paid to budget management programs in the Merapi Volcano area. A literature review is carried out to create a profile of the budget allocation for awareness programs in the whole disaster management cycle. It is found that the budget allocation for such programs is 7% of the total budget of the rehabilitation and reconstruction project and 20%–30% of the annual budget of the Local Disaster Management Agency. The findings demonstrate a need for alternative budgeting for ex-ante programs on disaster risk reduction to accelerate the targeted outcomes.

1. Introduction

Financing disaster risk reduction (DRR) is essential, especially the large number of disaster occurrences that have occurred in the last 20 years [1–4]. With the growth rate of the population and their livelihood assets, security and relief funds needed to safeguard against various levels of disaster risk. As part of reducing the disaster risk and vulnerability of this population, education and awareness building are indispensable. However, financing DRR programs is a complex process due to the nature of the uncertainty of disaster occurrences [5]. The expenditure related to a disaster mostly takes place after the disaster strikes, as part of the emergency response, rehabilitation, and reconstruction, and only around 13% of the budget goes to ex-ante DRR programs [3]. Similar to other nations, Indonesia allocates around 10% of its total DRR budget for ex-ante programs, based on High-Level Dialogue on Disaster Risk Financing and Insurance Indonesia [6].

Moreover, the World Bank [7,8] estimates that the annual economic impact of disaster (e.g., earthquake, floods, cyclone) in Indonesia is around 0.3% of Gross Domestic Product (GDP), and that cost of a major disaster could potentially exceed 3% of the GDP (about USD 30bn). Then, DRR has not been fully implemented in the government structures, including budgeting, especially on the local level [9]. Meanwhile, it is not clear how much budget allocation can be reduced from ex-post programs to assist ex-ante programs. Further, it argued that there is a limited budget portion for ex-ante programs [10]. For these reasons, this research examines the budgeting portion of ex-ante DRR programs and
determines the reliability for preparing the uncertain future with disaster risk. This discussion has focused on discussing the programs related to improving the awareness of vulnerable community members and capacity building of stakeholders. Then, it points out the needs for alternatives funding for accelerating ex-ante programs that could contribute to reducing loss after a disaster occurrence.

2. Methods
Using an evaluative and prescriptive approach, this research explains the portion of budget allocation from disaster management used for education for DRR programs (ex-ante) such as risk communication, disaster drill prevention, and institutional development related to disaster awareness. The data are from secondary sources such as reports from the local government (i.e., annual government performance report [11–20]), project reports (i.e., Community-Based Settlement Rehabilitation and Reconstruction Project for Central and West Java and Yogyakarta Special Region which describes the project of rehabilitation and reconstruction of several locations on Java Island following an earthquake and tsunami, and volcanic eruption [2,7,21]), and relevant academic literature. The data were processed and discussed in a descriptive model focused on the budget allocation for ex-ante DRR programs, knowledge and capacity building, and risk communication. This research has some limitations in that the public access data are discussed on the level of the Sleman Regency where the Merapi Volcano is located, and the impact of the 2010 eruption is the most salient.

3. Analysis and Results

3.1. Disaster Risk Reduction Awareness Programs
The disaster governance system in Indonesia requires that disaster management related programs at the regional level include, at minimum, the following three components: (a) risk communication to the public; (b) mitigation and preparedness; and (c) disaster response and evacuation [22,23]. Within these areas, some of the activities that directly relate to the process of DRR education and improving public awareness are (a) risk communication and education activities, (b) disaster mitigation and preparedness training for the communities, officers, and related stakeholders, (c) disaster prevention drills (desk or field simulations). Indicators for the evaluating the success of ex-ante DRR programs primarily concerning education and building awareness are the number of Safe School Learning (SSL), number of Disaster Resilience Village (DRV), number of people who have participated in disaster trainings and drills, and risk communication through media.

SSL is a collaborative concept in which the school aims to protect children’s rights, security, and survival, including their right to obtain quality and sustainable education. Then, DRV is defined as a village that can independently adapt and respond to disaster risks and can recover from the disaster loss and damage [9,24]. In a DRV, the community, with assistance from the government, is expected to build its disaster-resilient capacity using local resources. A comparison of the targeted number and actual implementation of SSL and DRVs in Sleman (Fig. 1) [15–18] shows that for most years, the number of implementations exceeded the targets. Figure 2 shows that the number of participants have taken part in training, simulation and disaster prevention drills has increased [15–17]. In 2019, there were slight changes in the indicators of these programs, which caused the number of participants to decrease from the previous year (3,840 participants) [18]. However, the activities have a more complex and integrated approach, such as field disaster drills and simulations for the community and school, community training on the management of evacuation areas, public kitchens and logistic support, simple handyman training processes for providing support with the emergency, mitigation trainings for community-based early warning system management, trauma healing, emergency response teams, and, disaster volunteers [18].

Another indicator of disaster risk awareness programs is risk communication through digital media such as providing risk maps of various hazards, the regulations of the disaster relief fund, and information on evacuation route and sign. The government has developed and written various news and contents on the disaster agency website [25] and community websites hosted by disaster volunteers [26]. In 2019, these websites were accessed by a sum total of 138,344 visitors.
In addition, the local government also built an application called ‘Lapor Bencana Sleman – Sleman Disaster Report’ in which community members can voluntarily report to the command center and access various materials about a disaster occurrence and preparation. For example, one feature of the application called ‘Jarak aku dan Merapi (“The distance between Merapi and me”’), provides information about Merapi includes safe distance, Merapi activities, and status updates. In 2019, this application was downloaded by 603 persons. The local government also used the social media platform to disseminate information to the public. Overall, these programs for risk communication and the number of people utilizing them indicate that the public accesses risk communication contents, reflecting the success of awareness-raising.

### 3.2. Budget Allocation of Awareness Programs for Disaster Risk Reduction

Indonesia’s budgeting system has several levels, from the national to the provincial, regency, sub-district, and village levels. Financial support for DRR often comes from this budgeting system with additional support by private organizations as community social responsibility, and donations from programs participants. In this research, the budget allocation is discussed from the perspective of provincial and regency levels. Budget reports from Yogyakarta province and Sleman Regency where Merapi is located are analyzed to understand the allocation for education-related and ex-ante DRR programs. Several local bureaus and agencies at the provincial and regency levels manage the budget based on their programs and activities. Those include the disaster management local bureau, social agency, development planning agency, spatial planning agency, and education bureau.

Budget planning, especially for DRR, should not focus solely on the availability of total annual funds but also take into account characteristics of the potential hazards, including the risks they pose and different levels of severity [27]. For example, in Sleman, Yogyakarta, several potential hazards could occur, both natural and human-made. These include tropical cyclone, landslides, volcano eruptions, floods, droughts, cyclones, fires, and epidemics [11–14,19,20]. In 2017 and 2018, Sleman and Yogyakarta were hit by strong winds caused by Tropical Cyclone Cempaka, and this affected the subsequent budget planning for disaster response and management. As there were more cyclones in 2017 and 2018 compared to the previous year, the budget planning should allocate more resources to prepare for cyclone versus other types of disasters that occur less frequently.
The budget allocation for response and preparedness activities in Sleman Regency constitutes over than 80% of the total budget for the local disaster management agency (DMA) (Fig. 3). However, only 20% to 30% of this allocation is used for capacity building and DRR education (including simulation costs and community disaster drills and training). The rest is reserved for a response to a disaster, rehabilitation and physical reconstruction (not specifically for loss or damage caused by Merapi Volcano). Similar to the budget allocation managed by Sleman Regency, the disaster budget at the upper level of government is allocated to ward structural mitigation such as the construction of the Early Warning System and Fast Response Team (TRC) supporting systems, command center, and physical mitigations like dams or dykes [19,20].

Furthermore, given the evaluation indicators for DRR programs such as the number of SSL programs and DRVs, it is advisable to obtain additional funding from another budget category in addition to the budget allocation from the Local DMA. For example, in DRV related programs, the DRR can be supported by other types of budgets such as the Village Fund (Dana Desa) which offers grants from the national government to each village in Indonesia in addition to the standard budget allocation [24]. This fund can be used for disaster response, including capacity building under the concept of the DRV.

Aside from this, especially in Yogyakarta, there is another budget provided by the national budget allocation called Dana Keistimewaan (Privilege Fund) [28]. This fund allows disaster-related programs to acquire additional funds [28,29], as DRR matters fall into the five categories that can be funded with this privilege fund: (a) governance system of the governor and vice governor, (b) institutional affairs, (c) culture, (d) land, and (e) spatial affairs [28,30].

From the Merapi Volcano rehabilitation and reconstruction project itself which reports as the part of Community-based Settlement Rehabilitation and Reconstruction Project for Central and West Java and
Yogyakarta, it can be seen that most of the funds go to physical resources such as housing reconstruction and infrastructure investment [21]. Then, around 7% of the funds go to the education part of the project.

Among a total of 860 formal schools (primary, junior high, and high school) in Sleman [31], only 68 schools have SSL status (7.64%), excluding 48 higher education institutions that had 192,943 students in 2016 [32,33]. Among 86 villages in Sleman [31], only 61.63% of them have standards as DRVs. The current budget allocation from the local government can only sustain 9 SSL programs on average per year and 10 villages a year with various levels of DRV standards. This points to the need for an alternative financing system and a collaborative policy so that all the formal schools and villages can achieve the standardization for SSL or DRV, respectively. From this description, it can be concluded that there is a need to fund programs that can accelerate the outcomes of DRR. Similarly, Djalante et al. [9], Fahlevi et al. [27], and Oktari et al. [10] said that Indonesia needs a more collaborative and accommodating policy system, with formal, informal and non-formal for ex-ante programs. That is, ex-ante DRR programs can improve the community response to disaster occurrences, and thereby reduce the high ex-post disaster budget.

4. Conclusion
This research points out that the budget allocation for ex-ante DRR programs only 7% of the total budget for rehabilitation and reconstruction projects, and 20% – 30% of the annual budget of the Local DMA. Thus, in comparison with Indonesia’s national budget of disaster education, which is 10% of the total budget [6], the local budget for disaster education has greater allocation. In the budget profiles and programs in Sleman, Yogyakarta, and Indonesia as a whole, more disaster funding has been allocated for physical mitigation, rehabilitation, and reconstruction. The most important reason for this is that funding has been urgently needed for affected disaster communities undergoing the recovery process [1,8]. Moreover, because of the increasing number of disasters, victims and exposed communities are at a moderate to high level of risk, and therefore need larger emergency relief and recovery. Overall, non-physical awareness and preparedness are often less prioritized because of the limitations in budget allocation.

With this budget profile, there is a need to consider other types of financing for ex-post and ex-ante DRR programs. The current ex-post budgeting emphasizes physical matters. This research suggests that it will be helpful to develop an alternative financing model and collaborative system that to assist in the preparation for possible disaster occurrence. For example, some communities have community social insurance, including securing of their the livestock and tangible assets [1].

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