Sustainable Development Goals for settlement around Lapindo mudflow

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Abstract. The Lapindo mudflow in the Porong area, Sidoarjo Regency has been 14 years old since it first occurred on May 29, 2006. The biggest loss from the Lapindo mudflow is the damage to infrastructure and residents' homes which has an impact on the slowing down of Sidoarjo's economy. One of the efforts made by the government is to establish a National Action Plan (RAN) for disaster risk reduction (PRB) as an effort to achieve the Sustainable Development Goals (SDGs). Considering that the Lapindo mudflow is still active and the expiration time cannot be estimated, a long-term management strategy is needed in settlements around the location that are adaptive to the existence of the disaster. The research was carried out using qualitative-descriptive methods. Data collection techniques are carried out by interview, observation and documentation study. The data obtained is then matched with the indicators for assessing the Sustainable Development Goals (SDGs). The results of the research will provide insights in the form of settlement strategies carried out by local governments and communities as part of sustainable development in accordance with the conditions of their respective regions.

Keywords: Lapindo mudflow, adaptive, action plans, coping strategies, sustainable development

1. Introduction

Environmental damage has become a problem for today's global community. The decreasing quality of life has threatened human life in it, one of the causes is a disaster that occurs in an area. One of the disasters that can still be felt today is the Lapindo mud disaster.

Lapindo has been 14 years old since it first occurred on May 29, 2006 in the Porong area, Sidoarjo Regency (Novenanto, 2016). Lapindo mud is a hot mudflow from gas drilling in the Banjarpanji well, Porong (Prasenja, Bengen, & T, 2018). According to the Agency for the Assessment and Application of Technology (BPPT), in 2006-2009 the Lapindo mudflow reached 50,000 meters of peel and increased to 100,000 cubic meters per day in 2015. Until now, the Lapindo mud has drowned 1,071 hectares of land covering 14 villages in 3 sub-districts namely Porong, Tanggulangin and Jabon sub-districts (Kamil & Kusumaningrum, 2019).

Lapindo mud did not claim any lives, but based on the results of KLH and LPPM IPB (2008) it was explained that Lapindo had lowered the city's macro economy. Sidoarjo Regency experienced an economic decline from 5.71% in 2005 to 5.38% in 2006. (IPB, 2008). The economic decline can be seen clearly in the 3 affected sub-districts, namely Porong, Jabon and Tanggulangin. Losses due to the Lapindo mud disaster are estimated at Rp. 758,887,089,001, - originating from damage to natural
resources (SDA) and Rp. 4,022,071,056,737, - which comes from damage to human resources (HR) (Hidayat, Bahtiar, Hudiyasturi, & Safitri, 2010).

The role of the government in overcoming the problems of economic reconstruction and environmental improvement is manifested in the concept of sustainable development (Kamil & Kusumaningrum, 2019). One of the challenges in sustainable development is the problem of disaster in a country or region (Rahadian, 2016). In Indonesia, sustainable development is regulated in Presidential Regulation (Perpres) number 59 of 2017 concerning the implementation of the achievement of the Sustainable Development Goals (SDGs) embodied in the National Action Plan for Disaster Risk Reduction (RAN PRB) where disaster problems are set on the goal number 11 point 3 which discusses the development of green cities and climate and disaster resilience (Nasional/Bappenas, 2017).

The TPB / SDG have been compiled and integrated into the National Medium Term Development Plan (RPJMN). TPB / SDG is a global and national commitment that seeks to improve the welfare of society which is manifested in 17 Goals and 169 Targets. TPB / SDG related to the development of green cities and resilience to climate and disasters are manifested in goal 11 point III (Nasional/Bappenas, 2017).

This research only focuses on TPB - 11 point III, namely the development of green cities and climate and disaster resilience carried out by the government and communities around the Lapindo mud area as an effort to achieve Post-disaster Sustainable Development (TPB), where these efforts are a strategy used in community settlements around the Lapindo mud disaster area, especially Kalitengah Village. This study aims to answer the existing problems, namely: what is the form of strategy in the settlement of Kalitengah Village after the Lapindo mud disaster as an effort to achieve Sustainable Development Goals (SDG).

2. Research Methods Research
On settlement strategies after the Lapindo mud disaster was carried out to answer the existing problems, namely: what is the form of the settlement strategy in Kalitengah village after the Lapindo mud disaster. So that the appropriate method is to use a qualitative-descriptive method. Data collection method is done by collecting data from the internet and interviews with key-person. In addition, it is equipped with the results of previous observations.

The choice of research location was in Kalitengah Village. Kalitengah village is a settlement that was rebuilt in a former disaster location. In addition, the location of Kalitengah Village is in danger zone 1, where the village location is ± 500 from the outer embankment and ± 1.5 km from the center of the Lapindo mudflow.

In this study, researchers dig up information from previous studies as additional information, given that there is no research similar to the research that will be conducted. Journal of Mochammad Abram Wahyu Nurdiansyah, student of the Sepuluh Nopember Institute of Technology (ITS) Surabaya. The research entitled "Post Disaster Housing Based on Victims Behavior and Approach of Architectural Flexibility" conducted in 2013 which discusses changes in the function and physical changes of buildings in Renokenongo Village provided by the government, where the building does not see the behavior of the victims in it, and only focuses on the problem technical. So that it causes people to tend to renovate houses resulting from relocation (Nurdiansyah, Faqih, & Purnomo, 2013).

The data obtained were then analyzed with their assessment indicators Sustainable Development Goals (SDGs) to produce a conclusion on post-disaster settlement management.

3. Results and discussion
Government disaster management in the Sustainable Development Goals (SDG) in Porong Sidoarjo were also manifested in the form of relocation of settlements, especially Kalitengah Village. Kalitengah village is divided into 2 areas, namely, former overflow area (old settlement) and new area (new settlement).
3.1 Conditions of Old Settlements in Kalitengah Village

Old Settlements are used by disaster victims who have not completely lost their homes, where their houses have only been damaged and can still be used again (Daulay, 2019). This was due to economic factors and attachment to the location that made these people choose to repair and re-occupy their houses in the same location using compensation money from Pt. Lapindo Brantas Inc. and the government as much as 15-25 million rupiah (Kamil & Kusumaningrum, 2019). The old settlement is in the area closest to the Lapindo mud embankment. The distance between the old settlement and the embankment is only limited by empty land with a width of ± 500 meters. Based on the condition of the settlement location which is directly opposite the Lapindo mud embankment, the government wanted to evict this area, but this decision was opposed by the community.

The physical condition of the buildings in the old settlements is still far from proper, where many buildings still use old and weathered materials due to disasters. The condition of the house yard is lush due to overgrowth of weeds and there are also lots of land subsidence filled with mud around it. The road conditions use paving material, but in some locations it is still dirt and sand. The availability of clean water is very minimal where residents’ wells have been contaminated with Lapindo waste, so that people are forced to use PDAM water. In old settlements, garbage dumps were also found in almost every front of the house, where residents dumped garbage in their yard and then burned it. The economic condition of the community still depends on the surrounding agricultural sector, where most of the residents in the old settlements still work as rice and pond farmers with an income of around 1.5 million to 2 million per month.
3.2 Condition of New Settlement in Kalitengah Village

The new settlement resulting from Government Relocation is named Perumahan griya asri. Rumah Griya Asri is a relocation program carried out by the government for disaster victims who come from Kalitengah and Gempolsari Villages. The residential area of the beautiful home was originally a pond and rice field area belonging to the residents of Kalitengah Village which was later purchased by Pt. Lapindo Brantas Inc. in collaboration with Real Estate Indonesia (REI) East Java, Bank Jatim and the Governor of East Java and the District Government (Pemkab) Sidoarjo (Prasenja, Bengen, & T, 2018). The number of relocation victims is around 2,000 people, which are divided into 16 groups. The number of ready-to-live houses provided is 200 units with type 36 on a land of about 10 hectares (Sukmana, 2016).

![Figure 3. Physical condition of the settlement (new) in Desa Kalitengah](image)

**Figure 3. Physical condition of the settlement (new) in Desa Kalitengah**

Sumber. Personal documentation

The physical condition of the buildings in the new settlement can be said to be feasible, where the buildings are made with materials that are responsive to disasters. The road condition uses paving material with a width of 4 meters. The availability of clean water no longer uses wells but uses PDAM water. The disposal of garbage in the old settlement has been well organized, where the garbage is collected in front of the house which is then disposed of at the nearest TPS. The economic conditions of the people in the new settlements are quite diverse, where most of the residents work in the industrial sector with an income of around 2 million to 3.5 million.

3.3 Objectives Sustainable Development (TPB) or the Sustainable Development Goals (SDGs) to 11 points III

Interest Sustainable Development (TPB) or the Sustainable Development Goals (SDGs) related disaster embodied in the National Action Plan for Reduction of disaster (RAN PRB) involving the role of government and local community. Sidoarjo is one of the areas that has the potential for disaster in the form of the Lapindo Mud disaster, where the impact is still being felt by the people around the location. Assessment indicators used to achieve post-disaster Sustainable Development (TPB) are to reduce the number of deaths, the number of people affected, and substantially reduce the economic losses relative to global GDP caused by disasters, with a focus on protecting the poor and people in vulnerable situations. The following are indicators of assessment in achieving the Sustainable Development Goals (SDGs).

| Table 1. indicator of sustainable development goals to 11 points III |
|---------------------------------------------------------------|
| **Target** | **No** | **Indicator** | **Description** |
| 11.5 By 2030, significantly reduce the number of deaths and the number of people affected, and | 11.5.1 * | Number of victims died, missing and affected by disasters per 100,000 people. | National indicators that are in accordance with global indicators (not in the attachment to the Perpres). |
| 11.5.1. (A) | Indonesian Disaster Risk Index (IRBI). | | |
| Target | No          | Indicator                                         | Description                                                                 |
|--------|-------------|---------------------------------------------------|-----------------------------------------------------------------------------|
|        | 11.5.1. (B) | Number of disaster resilient cities formed.       | Substantially reduce economic losses relative to global GDP caused by disasters, with a focus on protecting the poor and people in vulnerable situations. |
|        | 11.5.1. (C) | Number of weather and climate and disaster early warning systems. |                                                                                     |
|        | 11.5.2      | Direct economic losses due to disasters to GDP, including catastrophic damage to critical infrastructure and disruption to basic services |                                                                                     |
|        | 11.5.2. (A) | Total direct economic losses due to disasters.    |                                                                                     |

The indicators above are used as a reference in achieving the Sustainable Development Goals (SDGs) that the government embodies in the National Action Plan for Disaster Risk Reduction (RAN PRB). These indicators provide an overview of the activities that the government and society must undertake for the surrounding environment.

The settlement strategy that was deemed capable of handling the problems of Kalitengah Village was relocation, especially for people in old settlements. The relocation of the old settlement was carried out because the location was in a danger zone, so it was not suitable for use as a settlement. Relocation to a safer location can minimize the impact of a subsequent disaster from the Lapindo mud disaster. Relocation can be accepted if the new location is not far from community sources of income.

Table 2. Implementation of sustainable development goals to 11 points III

| Target | Indicator | Form | Description |
|--------|-----------|------|-------------|
| 11.5   | By 2030, significantly reduce the number of deaths and the number of people affected, and substantially reduce economic losses relative to global GDP caused by disasters, with a focus on protecting the poor and people in vulnerable situations. | The number of victims killed, missing and affected by the disaster per 100,000 people. for the Indonesian Disaster Risk Index (IRBI). | Relocation of old settlements to new, safer locations |
|        |           |      | Settlements in new locations that are responsive to subsequent disasters from Lapindo access to a safe, affordable, accessible and sustainable transportation system porong river estuary reforestation |
|        |           |      | Number of disaster resilient cities formed. |
|        |           |      | Settled on terms retrofitting |
|        |           |      | Settled on terms retrofitting |
|        | Number of weather and climate early warning systems and disasters. | Settled on terms retrofitting | Relocation of old settlements to new locations close to the economic point of the community |
| Target | Indicator | Form |
|--------|-----------|------|
| Amount of direct economic loss due to disaster. | | national and regional development planning |

4. Conclusion
The Sustainable Development Goals (SDGs) which are embodied in the National Action Plan for Disaster Risk Reduction (RAN PRB) are a strategy used for disaster management in an area. The Sustainable Development Goals (SDGs) themselves are carried out to ensure the survival of the community in them. The National Action Plan for Disaster Risk Reduction (RAN PRB) has been implemented in Sidoarjo, especially in the vicinity of the Lapindo mud disaster site, which involves the government and the surrounding community.

The National Action Plan for Disaster Risk Reduction (RAN PRB) can be realized in the relocation of old settlements to safer and more affordable locations from the economic point of the community. The relocation program is carried out on the basis of village locations that are in the danger zone and not suitable for use as residential locations. The relocation program must involve the role of the community in it, so that the right agreement is obtained between the government and the community who will use it. The relocation program is expected to guarantee the safety and welfare of the people of Central Kalimantan.

References
[1] Augustia, MS (2010). Utilization of Image Data. Surabaya: Geomatics Engineering-ITS.
[2] Bappenas, KP (nd). The Sustainable Development Goals (TPB) / Sustainable Development (SDGs). Retrieved August 2020, 08, from http://sdgsindonesia.or.id/
[3] BPS. (2015). Central Bureau of Statistics of Sidoarjo Regency. Retrieved 08 12, 2020, from https://sidoarjokab.bps.go.id/
[4] Daulay, P. (2019). Forced Migration of Disaster Victims Communities: Tracing Portraits of the Survival of Lapindo Mud Victims in the Village of Kedungsolo Porong, Sidoarjo. TALENTA Conference Series: Local Wisdom, Social, and Arts, Volume 2 (Issue 3).
[5] Elahi, KM, Ahmed, KS, & Mafizuddin, M. (1991). Riverbank Erosion, Flood and Population Displacement in Bangladesh. Bangladesh: Dhaka: REIS-IU.
[6] Hariandja, R. (2020). MONGABAY-environmental news website. Retrieved 09 01, 2020, from https://www.mongabay.co.id/2020/05/29/kehidup-warga-korban-lumpur-lapindo/
[7] Hidayat, A., Bahtiar, R., Hudyasturi, S., & Safitri, MD (2010). economic analysis of the impact of the hot mudflow in Sidoarjo. Environmental Journal of Economics, Vol 14 No.2.
[8] ICCTF. (2020). ICCTF Indonesia Climate Change Trust Fund. Retrieved August 2020, 08, from https://www.icctf.or.id/sdgs/
[9] IPB, L. (2008). LPPM IPB. Retrieved July 04, 2020, from http://lppm.ipb.ac.id/
[10] JPNN.com. (2018). JPNN.com. Retrieved August 2020, 12, from https://www.jpnn.com/news/kajian-selesai-15-w Wilayah-terdampak-lumpur-bakal-digabung
[11] Kaluarachchi, Y. (2017). Building Community Resilience in the Re-settlement of Displaced Communities. Procedia Engineering.
[12] Kamil, M., & Kusumaningrum, DN (2019). DEALING WITH SDG'S COMMITMENT ON SUSTAINABLE CITY DEVELOPMENT: THE PROBLEMS OF MUNICIPAL WASTE OF SIDOARJO. journal.unmuhjember.ac.id, Page 338-350.
[13] Moreu, F. (2019). Strategies for Prioritizing Needs for Accelerated Construction after Hazard Event. Tran-SET.
[14] National / Bappenas, KP (2017). Guidelines for the Preparation of a National Action Plan for Sustainable Development Goals (SDGs). Jakarta: Ministry of National Development Planning / Bappenas.
[15] NASIONAL / BAPPENAS, KP (2017). SUMMARY OF METADATA INDICATORS ON THE GOAL OF SUSTAINABLE DEVELOPMENT (TPB) / SUSTAINABLE DEVELOPMENT GOALS (SGDs) INDONESIA.

[16] Novenanto, A. (2016, April). Critical review of the role of the state in the Lapindo case. COMMUNITY: Sociology journal: LabSosio. Center for Sociology Studies, FISIP-UI, 20 (2), 159-192. Retrieved from Critical review of the role of the state in the Lapindo case

[17] Prasenja, Y., Bengen, DG, & T, AA (2018). Land-use analysis of eco fishery tourism using a low-cost drone, the case of Lumpur Lapindo island, Sidoarjo district.

[18] Rahadian, AH (2016). SUSTAINABLE DEVELOPMENT STRATEGY. STIAMI Seminar Proceedings, Volume III, No. 01.

[19] Sarmiento, JP, Sandoval, V., & Jerath, M. (2020). The influence of land tenure and dwelling occupancy on disaster risk reduction. The case of eight informal settlement in six Latin American and Caribbean countries. Progress in Disaster Science.

[20] Sukmana, O. (2016). Post-Disaster Recovery Process. PKS Journal, Vol 15 No 4, 307-316.

[21] Wahyuningsih, D., Taufik, M., & S., CN (2011). ZONATION OF IMPACTED AREA DUE TO THE DISTRIBUTION OF BUBBLE OUTSIDE THE BORDER OF LAPINDO MUD WITH A GEOGRAPHIC INFORMATION SYSTEM (GIS). GEOID, Vol 07 (No 01).