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Submission date: 05-Feb-2023 12:53PM (UTC+0700)

Submission ID: 2006493046

File name: 6870-Article_Text-27701-1-2-20221227.doc (296.5K)

Word count: 3368

Character count: 19284

COMMUNITY CONCEPTIONS AND PERCEPTIONS OF CLIMATE CHANGE MITIGATION AND ADAPTATION IN TERNATE

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Abstract

This article examines the conception and perception of the people in Ternate City about the impact of climate change. This study is important because geographically the city is located on the path prone to volcanic eruptions. Communities in Ternate have the right and obligation to be involved in climate change issues that threaten their islands, as well as find solutions to current environmental problems. This study used a community-based participatory research method involving 30 people consisting of community members, teachers, lecturers, and students. Focus group discussions (FGD) and photovoices were conducted to obtain data on causes, impacts and solutions to climate change problems in the city of Ternate. The research results confirmed that the people in the city of Ternate feel the negative impacts of climate change in the city, such as reduced water sources, loss of plant vegetation (for example: mangroves, sago and sea grass), reduced marine habitats, floods and landslides at several points, increased sea level. The main causes of climate change in the city of Ternate are the establishments of non-environmentally friendly development policies, the lack of public knowledge and awareness of climate change adaptation, the lack of regional regulations at the city to village levels related to environmental issues. The solutions offered by the community are very diverse but according to the community, the government and young people need to conduct education, mitigation, and adaptation to climate changes in the city of Ternate.

Keywords: *Climate Change, Mitigation, Adaptation Community Perception*

Introduction

Climate change is a major problem for countries around the world including Indonesia. Climate change not only has an impact on ecological conditions, but on the entire structure of human life. Research into climate change continues to be conducted around the world using remote sensing technology and satellite imaging. The results show that the impact of climate change on environmental damage continues to increase (IPCC, 2018, 2020, Gabrys 2016). This increase is due to increased emissions of greenhouse gases such as carbon dioxide (CO₂), methane (CH₄) and nitrogen oxides (N₂O) that have been produced since the pre-industrial era to the present day. In addition, environmentally negligent development increases the temperature of the earth. IPCC data suggests that the average temperature of the earth periodically increases by 1 °C due to the emission of greenhouse gases (IPCC, 2018, 2020).

The increase in the earth's temperature has a negative impact on climate change. Based on the 2019 UNCCS report, climate change has resulted in droughts, floods, hurricanes, storms, heat waves, forest fires, landslides and so on. Based on a research report by the Center for Research on the Epidemiology of Disasters (CRED), every year cases of natural disasters in the world increase significantly. In 2018, 315 cases of natural disasters resulting from climate change were reported, including 16 cases of drought, 26 cases of extreme temperatures, 127 cases of floods, 13 landslides, 95 cases of storms and 10 cases of forest fires. The number of people affected by natural disasters in 2018 was

68.5 million, with floods, storms, and droughts accounting for 94% of the total people affected.

In Indonesia, climate change has led to the occurrence of natural disasters such as landslides, floods, flash floods, earthquakes, tsunamis, tidal waves, tornadoes, volcanic eruptions, forest fires to drought (BPS, 2018). The impact of climate change is also experienced by people in North Maluku. The results of Indonesia's disaster risk index analysis in 2020 indicate that North Maluku is in the category of "prone" to disasters such as earthquakes, volcanic eruptions, tsunamis, floods, landslides, forest fires, drought, extreme waves, abrasion, and extreme weather. North Maluku's disaster-prone index (IRBI) in 2020 reached 144.81, which is categorized as high (IRBI, 2020). Of the nine districts/cities in North Maluku, six have a high IRBI, and four have a moderate IRBI, including the City of Ternate.

Ternate is included in the disaster-prone area because of its hilly and sloping topography. Ternate also has many active volcanoes. In addition, the limited land area has resulted in development centered on urban coasts. This land conversion has an impact on climate change in Ternate City. Some of the impacts that have been experienced by the people in the city include lava floods, flash floods, high sea waves, land abrasion and coastal abrasion.

Abrasion and landslides are among the significant problems threatening coastal areas in subdistricts on Ternate Island. These natural disasters can occur due to the nature of the island's territory, which tends to be sloping, hilly and mountainous. The topography of such an area increases the potential for landslides. The effects of the Ternate landslides have been exacerbated by beach reclamation on Ternate Island, which has been carried out from 2006 to the present. Beach reclamation has resulted in sea level rise, soil erosion and beach abrasion.

Coastal abrasion also damages plants on the coast of Ternate Island. Beach abrasion can

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Received:
Revised:
Accepted:

even damage homes on the beach. Therefore, young people need to undertake mitigation and adaptation to climate change in Ternate City.

The increase in disaster risks due to climate change at global, national, and local levels has led to social and economic problems, as climate change is estimated to have the most severe impacts on human populations, especially children in disaster-prone areas (as with very poor ecological conditions) (Landman PJ, Stegeman JJ, Fleming LE, et al, 2020; Crate and Nuttall 2009). Cultural issues related to climate change have also become popular among the public and have been disseminated through various information, digital and social media (Scott Allan Orr, Jenny Richards & Sandra Fatorić, 2021, Lowe et al. 2006; Stokol et al. 2009).

The climate change issues are important to discuss. Research related to public conceptions and perceptions of climate change is needed to increase and encourage public involvement in solving climate change problems.

Research Methodology

This qualitative research employed a community-based participatory approach to explore and describe people's conceptions and perceptions of problems, impacts and solutions for climate change mitigation and adaptation in Ternate City. This method was used to facilitate the collection and presentation of data or information sourced from the local community. This study involved 30 people from different backgrounds.

Research Location

The current study was conducted in a village named Rua on the Ternate Island, Ternate

Tools and Materials

The study's data were obtained through focus group discussion (FGD) and photovoice.

Data analysis is carried out inductively starting from data exploration, data reduction, data classification to data construction.

The FGD technique was chosen because data and information can be obtained quickly together by discussing specific questions about the causes, effects and consequences of climate change and their solutions. The FGD activities were carried out with the support of a facilitator who acted both as a facilitator and as a motivator for the participants. The moderator was supported by the log, whose task was to collect and record all data. FGD was used as a practical approach to identify and analyze problems, causes and strategies for climate change mitigation and adaptation. The objectives of conducting the FGD are 1) to identify and rank the main climate change issues in Ternate City based on community perceptions; 2) identify and understand the main causes and drivers of climate change; 3) identify and understand several potential climate change mitigation and adaptation strategies.

Results and Discussion

The findings reveal that all participants in this study are aware of the concept of climate change and their perceptions of the impact of climate change on their region. The majority of participants believed that climate change was happening in their region, with dire consequences. On average, their arguments were similar, but in some ways, their perspectives differed, allowing them to complement each other.

Climate change was made a major issue for communities with the agreement that environmental degradation has impacted climate change. In the FGD sessions, the community members described their deteriorating environmental conditions such as erratic weather patterns, flooding, and local environmental problems that affected the way people lived in the city. Of the many opinions

put forward by the community, four main issues that were often found in discussions about climate change in Ternate City are: 1) erratic weather changes; 2) reduced water sources; 3) contamination of groundwater and seawater; and 4) sea level rise leading to abrasion in coastal areas. Reduced water sources was one of the four issues that received the most attention during the FGDs. The following are excerpts from the presentation of the DW-1 FGD.

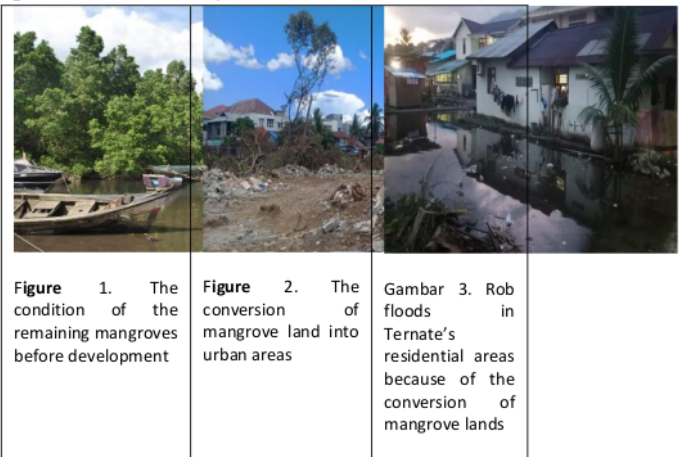
“The environmental conditions in the city of Ternate have undergone changes, including frequent abrasion of the coastal environment, conversion of forest land as a source of water to become community settlements and service industries. These changes caused the extinction of mangroves and seagrass beds, which have high carbon absorption. These environmental changes occurred at several points in the City of Ternate, such as in the Kota Baru Sub-District and the Kastela Sub-District. I will show you some photos of changes in the topography of the mangrove forest and the impact felt by the community”

The opinion of DW-1 is in line with that of MM-1 who stated that: *“Ternate is a very small island whose water source comes from the hills. When it rains, the water settles in the lowland areas with mangrove forests, forming swampy areas that serve as a water source for the people of Ternate city, such as akegaale water in Sangaji Village which is the center of the regional drinking water company in Ternate. However, the non-environmentally friendly development impacts on the conversion lands for mangrove, sago or nipa. This activity has a major influence on the water shortage in the city of Ternate. We are already feeling the impact, I don’t know how it will affect us in the future.”*

The discussion then developed and shifted to the factors that affect the reduction of water sources in the city of Ternate. The

participants mentioned that reduced water sources in the city of Ternate could be caused by the loss of mangrove, nipa and seagrass vegetation at several points, as happened in Akegaale in the Sangaji Village, the coastal areas in the Jambula and Kastela sub-districts, the Ngade Lake area and the Talaga Ici lake area in Takome sub-district, the coastal areas in Gambesi and Sasa sub-districts, Toboko and Kota Baru areas (MC-1).

The vegetation loss is the result of land conversion into residential areas, urban development areas, offices, tourist areas, schools, and steam power plants. The FGD participants presented their arguments using photos taken directly at their observation sites.



The photos above prove that mangrove vegetation changes have occurred in Mangga Dua Village, Central Ternate District. The remaining mangrove forests (Figure 1) have been converted into residential areas and roads and ports have been upgraded (Figure 2). The effects of this land conversion are now being felt by residents, namely the appearance of Rob flooding in coastal areas in Manga Dua Village (MC-2).

Through photovoice, MC-3, who is also an environmental activist, said that one of

the factors causing environmental damage in the city of Ternate is the spatial planning of the city of Ternate, which does not endorse nature reserves (meaning that the development planning in the city of Ternate has not yet no preference shown for the environment). In addition, the lack of public knowledge and awareness about the function of natural vegetation also leads to environmental damage (UP-1).

All community members recognized that maintaining mangrove vegetation and protecting their environment from damage was very important for their survival in the present and for the survival of future generations. Several community members explained in detail how the recent weather events had impacted their lives, most of whom are residents of the coastal area of Ternate. They directly experienced floods, rising sea levels, reduced water sources, reduced marine habitats such as fish (MM-2). They then decided that the problem of climate change was a joint responsibility of the government, society, community, educators and all members of society. Mitigation and adaptation strategies then became the theme of FGD's second session.

In the second session, the community members suggested that the best way to mitigate and adapt to climate change was to develop an environmentally sensitive mindset in society (IN-1). According to them, education was important to build public awareness. Through education, the community will have knowledge about how to use renewable energy and at the same time have an awareness that is reflected in their attitudes and behavior on a daily basis towards the environment. In addition, several community members suggested that there was a need for favorable policies related to climate change issues, from the top level to the sub-village or neighborhood association level (UPI-

2). Household waste management and organic farming systems were also proposed as climate change mitigation and adaptation (IN-1). These community member's suggestions are in line with the opinion of Wardekker (2021), which states that environmental conditions can be maintained by building community resilience, educating the community to be disaster resilient and developing a resilient community.

This empirical research provides unique insights into how people conceptualize and discuss climate change and its impact on their communities. Most of the FGD participants in this study had no background in the environmental field, but they were environmentalists. The FGDs conducted in this study focused on public opinion about the causes, impacts, and strategies for mitigating climate change. There were common and different perspectives on how climate change was conceptualized, levels of concern, and mitigation and adaptation measures.

The results of the current study show that climate change is happening and, if not addressed quickly, will continue to hamper national policy responses to global problems. These results indicate how society conceptualizes climate change. The results of this study are expected to help guide policy development as well as the development of effective community engagement. The results of this study are also expected to contribute to risk communication and awareness strategies in the community. This study supports the findings of Buys et al. (2012) and Wardekker (2021) who argue that public participation and support is crucial to ensure adaptation to climate change. In line with this, Fislis et al (2022) propose that translating people's knowledge and perceptions of climate change may enable the development of resilience strategies. Such actions can help governments and stakeholders develop relevant joint policies and enhance institutional

understanding of local physical processes and climate change impacts.

Conclusion

The people in the city of Ternate feel the negative impacts of climate change in the city, such as reduced water sources, loss of plant vegetation (for example: mangroves, sago and sea grass), reduced marine habitats, floods and landslides at several points, increased sea level. The main causes of climate change in the city of Ternate are the establishments of non-environmentally friendly development policies, the lack of public knowledge and awareness of climate change adaptation, the lack of regional regulations at the city to village levels related to environmental issues.

Acknowledgment

The completion of this article was made possible by funding from the Ternate State Islamic Institute (IAIN Ternate). Thus, we are grateful to the Rector of IAIN Ternate and the Chair of the LPPM IAIN Ternate for allowing us to conduct and publish this research.

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