

Culture and Environment: Diponegoro University's Experience in dealing with climate change

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Abstract. The city of Semarang is located on the northern coast of Java. According to a data on June 12, 2020, this city's area is 373.7 Km². Problems routinely faced by settlers living by the coast, in which coastal areas are prone to abrasion, flooding due to tidal waves, while the land surface is threatened by subsidence. Society is also experiencing the effects of global warming and other climate-induced problems. Various studies and actions have been carried out to overcome these problems. However, the actions taken by Semarang City Government become insignificant with little to no support from the large communities. Diponegoro University is a public university located in Semarang City. This state university supports the achievement of resilient city development goals through disaster-prevention programs in response to climate-change. The communities that have received this support have benefited from it.

1 Introduction

Climate change was the 13th objective out of 17 indicators of the Sustainable Development Goals (SDGs) proposed by 193 intergovernmental countries under the United Nations (UNs). The SDGs were expressed in UNs Resolution dated 21 October 2015. The program was carried out from 2015 to 2030. There were 17 Indicators of SDGs as follows:

- Goal 1. End Poverty in all its forms.
- Goal 2. End hunger, achieve food security and improved.
- Goal 3. Ensure healthy lives and promote well being for all at all ages.
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities.
- Goal 5. Achieve gender equality and empower all women and girls.
- Goal 6. Ensure availability and sustainable management of water and sanitation for all.
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all.

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- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- Goal 10. Reduce inequality within and among countries.
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.
- Goal 12. Ensure sustainable consumption and production patterns.
- Goal 13. Take urgent action to combat climate change and its impacts.
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Indonesia was one of the countries that agreed on the SDGs application. The Indonesian Government was committed to making SDGs agenda succeed in Indonesia. Various strategic measures were arranged and implemented from the central to regional levels. Some principles agreed on by SDGs were also adopted by Indonesia, as follows:

Principle 1: *universality*, that was to drive SDGs application in all countries, both developed and developing.

Principle 2: *integration*, that SDGs was implemented in an integrated manner and interrelated in all social, economic and environmental dimensions.

Principle 3: “*No One Left Behind*”, that was to guarantee that SDGs implementation should benefit all people.

The principles were implemented in Indonesia as follows:

Principle 1: SDGs would be implemented in Indonesia’s whole territory.

Principle 2: it was taken as the basis for arranging action plan, especially related to program, activity, and budget planning.

Principle 3: it guarantees SDGs implementation (especially susceptible agenda of which implementation involved all stakeholders) benefits all parties.

The principles of SDGs Application in Indonesia followed the national mid-term development plan set forth in Presidential Regulation of the Republic of Indonesia Number 59 Year 2017 on Implementation of Achieving Sustainable Development’s Goals. The details of global target, national target for the national mid-term development plan from 2015 to 2019, and the executing institutions for each indicator were expressed in the Appendix to that regulation. SDGs’ targets and goals were divided into four pillars: Social Development Pillar, Economic Development Pillar, Environmental Development Pillar, and Law Development and Governance Pillar.

SDGs implementation in Indonesia was coordinated by the National Coordination Team with assistance of Indonesian SDGs Secretariat. SDGs agenda executor was set forth in Appendix to Presidential Regulation of the Republic of Indonesia Number 59 Year 2017 on Implementation of Achieving Sustainable Development’s Goals. Meanwhile, the Central Statistics Body gave its support in the form of issuance of book containing the data of Indonesia’s sustainable development position in 2016. The data were needed as the basis for SDGs team to observe the progress of SDGs future implementation. The World Organization of United Cities and Local Governments (UCLG) as the biggest local and regional governmental organization in the world also gave its support to SDGs agenda in Indonesia by issuing guidance in the form of a book entitled “*YANG PERLU DIKETAHUI*”

OLEH PEMERINTAH DAERAH [WHAT LOCAL GOVERNMENT NEEDS TO KNOW]” [1]. Heads of Regions, especially in Indonesia, were expected to immediately understand the aims and goals of SDGs agenda. This way, the goals of SDGs regional implementation would run in line with achieved development implementation.

The SDGs implementation period as set forth in 2015 was from 2015-2030. Indonesia had greatly contributed to various international forums in formulating SDGs. In line with SDGs program implementation at global level, the Indonesian Government also arranged the National Mid-Term Development Plan for 2015-2019. When the period passed, the Indonesian Government arranged the National Mid-Term Development Plan for 2020-2024. With regard to SDGs implementation, the Central Statistics Body issued a publication entitled “Indonesia’s Sustainable Development Goals 2020”. The publication contained data related to 17 indicators needed by SDGs executors, as reference in development planning in their respective working area. The National Development Planning Agency (Bappenas) as the coordinator of SDGs executors in Indonesia together with stakeholders’ representatives also arranged Guidelines on Action Plan Drafting of SDGs that applied for drafting National Action Plan (RAN) and Local Action Plan (RAD) for them to be in harmony with the substance of the National Mid-Term Development Plan for the period 2020-2024 [2].

This paper discussed Diponegoro University’s involvement in the effort to face climate change in Semarang City. Climate change was part of Diponegoro University’s Indicators, one of the best universities in Indonesia. This university was known receiving various awards for various activities in support of SDGs achievement by Semarang City Government.

2 Method

This research is qualitative. The data were collected through observation and secondary sources. The observation was carried out on the implementation of policies supporting prevention of adverse impacts due to climate change performed both in and off Undip’s Tembalang campus environment, Semarang. In addition, the data were also collected through secondary sources, covering research journals related to campus society’s efforts of Diponegoro University to prevent any adverse impacts due to climate change, Indonesian Government’s policies, Indonesian Government’s publications, electronic books, campus news, online news, and online newspapers [3]. Upon data collection, criticism was carried out on the secondary sources for data conformity to observation results. Reconstruction was then performed for an article entitled “Culture and Environment: Diponegoro University’s Experience in dealing with climate change”.

3 Results and Discussion

3.1 Cultural, Environmental, Climate Change Concepts

3.1.1 Cultural Concept

Culture is an entire system of values, norms, beliefs, knowledge, and behavioral patterns that are possessed and passed down by a group of people from generation to generation. Culture shapes the way individuals think, act, and interact within a community, thus serving as the foundation for determining social identity and the direction of social development. Culture is also dynamic. It is dynamic because it can change over time due to internal influences, such as the development of science and technology. Meanwhile, cultural changes caused by external factors include intercultural interactions and globalization. Therefore, culture not only reflects the legacy of the past but also serves as a guide in facing social.

The cultural concept in this paper was individual's or community group's attitudes or behaviors that are consistent from time to time. Suparlan said that cultural values were individual's needs to be capable of distinguishing between good or bad attitudes or behaviors. Culture that an individual or community group has may change from generation to generation. Such change occurred because of changes in the values prevailing in a generation [4]. From the opinion, we may conclude that an individual or community group has values inherent in themselves. Whether they will behave well or poorly depends on how strong their mentality in their heart or how well they can control it. Such attitudes or behaviors will not be crushed by any changes if their mentality in their heart is firm. In the context of this paper, it means the power of individual or community group's attitudes or behaviors against the effort or prevent adverse effects of climate change. They are capable of keeping attitudes or behaviors consistently and continuously, thus the attitudes or behaviors become their culture.

3.1.2 *Environmental Concept*

People generally understand the environment as everything that exists around them. Thus, the concept of the environment includes both living and non-living things. They interact with and influence each other, affecting the lives of humans and other living beings. The environment surrounding humans can be natural or artificial. Natural environments include soil, water, air, plants, and animals, while artificial environments include buildings and infrastructure.

In scientific studies, the environment is not only understood as a place to live but also as a dynamic ecological system. A dynamic ecological system requires a balance between humans and nature to ensure the sustainability of life. Therefore, human awareness and responsibility in maintaining environmental preservation are essential factors in preventing environmental degradation and supporting sustainable development.

Dini Ratnasari and Siti Chodijah used Otto Soemarwoto's writing to define environment. According to Otto Soemarwoto, environment is all existing items and conditions in the space that we occupy. Meanwhile, environment in practical or analytical needs context means earth, water, atmosphere where living bodies exist. However, in the papers' discussion, they use Islamic teaching approach. According to Islamic teaching, humans are God's creation given with the power to manage the nature. When humans do not treat the nature well, at some point the nature will respond to them with natural degradation that the humans have done [5].

Diana Ayu Gabriella and Agus Sugiarto in their paper entitled "*Kesadaran dan Perilaku Ramah Lingkungan Mahasiswa di Kampus* [Students' Environmentally Friendly Awareness and Attitude at Campus]" do not specifically mention the definition of environment. However, according to their explanation, the concept of environment is the space in the sky, on earth surface, under earth surface, above sea surface, and under sea surface, and that humans are the ones causing natural degradation. Environmental awareness is needed for humans to avoid destroying the nature. There are four factors influencing environmental awareness, as follows: (1) unawareness, (2) poverty, (3) humanity, and (4) lifestyle. Environmental unawareness factor may cause humans destroy the environment. Poverty factor causes humans to wholeheartedly only think about how to fulfill their life needs. They do not have the chance to think about environmental issues. The humanity factor in Diana and Agus's paper is related to humans as a creature created by God with reasoning. With reasoning, humans should be able to distinguish what are good and what are bad. The concept shows that humans as intelligent creature should be aware of keeping the environment preserved compared to God's other creatures. Meanwhile, lifestyle factor also influences human's awareness of keeping the environment preserved. The reason is that if humans have green lifestyle, they will keep the environment preserved and green [6].Based on the

explanations from all the papers presented in the previous paragraphs, we can conclude that, in principle, climate change is a natural degradation caused by human negligence. This negligence arises from environmental unfriendly technological innovations, as well as unsustainable processing and management of natural resources

3.1.3 Climate Change Concept

Climate change is an extreme reaction of weather phenomenon that causes negative impacts on agricultural resources, water resources, human health, ozone layer depletion, vegetation and soil, and other forms of life. Changes in the Earth's weather, temperature, and wind are also part of climate change.

Vivi Triana in her paper entitled "*Pemanasan Global* [Global Warming]" states that global warming occurs due to increase in average temperature of the atmosphere, sea and earth land. Global warming, according to the research by the Center for International Forestry Research (CIFOR) occurs because of sun's long wave radiation (hot or infrared wave) that is trapped and radiated to the earth by greenhouse gases. Diana, Yeni and Marga state that there are six greenhouse gases: Carbon dioxide (CO), Methane (CH₄), Nitrous oxide (N₂O), Hydroperfluorocarbons (HFCs), Perfluorocarbon (CFCs), and Sulfur Hexafluoride (SF₆). All of the gases exist naturally in the air (atmosphere). The greenhouse effect is the term used for heat that is trapped in the earth's atmosphere and cannot be dispersed. In addition, the increase in earth's temperature is also caused by depletion of the ozone layer [7]. The depletion of the ozone layer occurs because of the "use of Carbon Fluoro Oxide (CFC) gas, Freon, Foem, and Methanol as the consequence of use of AC, foam stuffs and plastics". The rapid increase in earth's temperature causes glacier on both North and South Poles melt massively. Consequently, sealevel will rise anytime. When sea level rises, many towns on coastal areas or on low land will sink in a few decades [8].

Based on the results of all the research on climate change, it could be concluded that, in principle, climate change is a natural degradation caused by human negligence. This negligence occurs due to environmentally unfriendly technological innovations, as well as unsustainable processing and management of natural resources.

3.2 Climate Change and Impact on the People and Semarang City

Nur Miladan in 2009 stood for his Magister Thesis of Regional and City Development Engineering Master Program of Postgraduate Program, Diponegoro University. Through a research entitled "*Kajian Kerentanan Wilayah Pesisir Kota Semarang terhadap Perubahan Iklim* [A Study of Susceptibility of Coastal Area of Semarang City Against Climate Change]", Nur Miladan concluded that people living on the coastal area of Semarang City had their life disturbed because of rise of sea level. The people were susceptible physically, social-economically, social-demographically, and regional-economically. The low, medium and high levels of susceptibility of people living on the coastal area of Semarang City for the variables are not always equal between sub-districts. In the context of this paper, the research results minimally prove that the people living on the coastal area of Semarang City are affected by climate change that the sea level rises in the form of rob or flood [9]. On the other hand, Yadi Suryadi, Denny Nugroho Sugianto, and Hadiyanto conducted a research through 2 stations of climatology/meteorology in Semarang City. The research results show that the projection of average temperature in the period of 2017-2048 significantly increases.

compared to the baseline period of 1985-2016. Meanwhile, for the rainfall, there is no significant change compared to the baseline period of 1985-2016 [10]. Based on the explanation, it is understood that the flooding problem in Semarang occurs due to extreme weather, spatial planning policies, and climate change.

Rukuh Setiadi proposed for the Semarang City government on climate change governance in Semarang City. In his paper entitled “*Tata Kelola Perubahan Iklim di Kota Semarang: Dulu, Sekarang, dan ke Depan* [Climate Change Governance in Semarang City: In the Past, Now and Future]” issued in 2016, he proposed that the Semarang City Government followed up the results of climate change governance practice given by the Asian Cities Climate Change Resilience Network (ACCCRN). The governance was expected to facilitate the Semarang City Government in the effort to build a city resistant to climate change [11]. The Rukuh Setiadi’s paper seemed to be responded by the Regional Research and Development Planning Agency of Semarang City through its official website Semarang City successfully gained the predicate as a Most Caring City for Climate Change. The Predicate was acquired after a research by the Smart Innovation and Community Center of the Bandung Institute of Technology publicized by various online mass media on 3 February 2022. The assessment category was specifically determined to face the climate change issue that led to earth surface’s warming as the result of increased level of CO₂. The research indicators were: use of renewable energy, minimizing vehicle, and environmental management [12].

News coverage from various digital media in 2020, 2021, 2022, 2023, and 2024 reveals that Semarang City was hit by flooding disasters as a result of climate change. Below is the most notable data for those years. The Mijen sub-district, specifically Cangkiran Village and Jatisari Village, was flooded by inundation (rob) with water levels reaching 30-50 cm on 19 November 2020. The tidal flood peaked at 60 cm in Tanjung Mas Village, on 29 May 2021, affecting 11.128 people and flooding 33.590 houses. Extreme tidal flooding inundated Bandarharjo Village and Tanjung Mas Village, impacting approximately 8.000 households. Tidal flood remains a potential threat in the northern coastal areas of Semarang City. The inundation level in the affected area of Semarang was estimated to reach 1,1 meters in 2023. Meanwhile, tidal flooding in Tambak Lorok in 2024 forced local residents to raise their house floors every two years, at a cost of around one hundred million rupiahs .

3.3 Diponegoro University, Climate Change and Achievement

Diponegoro University is one of the best universities in Indonesia. This state university has taken a strategic role as an academic partner and local catalyst in effort to mitigate and adapt to climate change in Semarang City. This role is carried out through a research center called the Center for Urban and Regional Resilience (CURE) Undip. The research center operates under the Department of Urban and Regional Planning, Faculty of Engineering, Undip. This state university has been actively involved in climate adaptation and disaster mitigation program over the years, including collaborations with initiatives such as the Asia Cities Climate Change Resilience Network (ACCCRN) to formulate strategies for strengthening urban resilience to climate change. The activities conducted by CURE are published through its official website at <https://pwk.ft.undip.ac.id/en/cure-2/>.

Undip also facilitates policy development through scientific studies such as vulnerability mapping and recovery modeling for the coastal areas of Semarang. This mapping serves as the basis for recommendation to the Semarang City Government in formulating integrated adaptation and mitigation actions. [13] Undip has implemented various activities that directly engage coastal communities and the urban environment. Several initiatives include the development of a slum upgrading model for coastal settlements based on climate change vulnerability levels in Mangkang Wetan and Tirtomulyo Districts, Semarang, involving

assessments of human, social, physical, and community capital assets to enhance resilience against tidal flooding and seawater intrusion.[14] In addition, Undip organizes community education programs such as summer course on climate change response in coastal areas, initiated by Faculty of Public Health. This activity was held in July 2023 under the name “Community Participation in Public Health: Public Health Coping and adaption Response to Climate Change in Coastal Area”. This activity was published on Diponegoro University. This activity was published on Diponegoro University’s official website. The university has also initiated Climate-Sensitive Urban Design projects in the historic areas of Semarang City, aiming to minimize urban heat stress, increase green open spaces, and support the recovery of vulnerable area.[15]

The benefits gained by the people of Semarang City from Undip’s involvement are quite tangible. One example of the benefits felt by the community is the development of a slum upgrading model facilitated by Undip. This program has provided better access for affected residents of Semarang City to infrastructure facilities, strengthened community social capital, and enhanced local adaptive capacity in facing tidal flooding and inundation. The results of the study indicate that improvements in human quality and social relationships within the community have a positive impact on local resilience. This study was published by Khristiana Dwi Astuti et.al. Community education and training programs conducted by Undip have not only increased awareness of climate change but also strengthened the adaptive capacity of coastal residents to respond to climate-related extrem events. Thus, Undip contributes to achieving the goal of resilient city, where the community is not merely the object of protection but becomes an active actor in managing climate risks in Semarang City. In this change, the writer would like to say thanks to the Dean of Faculty of Humanities, Diponegoro University, who has provided funding for this research.

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