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Building Community-Based Climate Resilience Through MASAKLIM (Climate-Conscious Students): A Survey Study

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ABSTRACT

The problem of climate change is a significant issue that is worsening. It leads to more disasters and difficulties. These challenges will keep growing in the coming years. To mitigate the impact of climate change, individuals must be conscious of environmental preservation. This study aims to analyze MASAKLIM, an initiative focused on communication, information, and education, which aims to promote sustainable waste management and support climate resilience. The research applied a quantitative approach using survey design. The study was conducted at Sebelas Maret University and involved undergraduate and postgraduate Civics students from FKIP, UNS who took Civic ecology courses during the even semester of 2023. This research showed that MASAKLIM is a legitimate initiative undertaken by students to mitigate and adapt to the effects of climate change through two key activities: a). reducing the amount of packaging waste generated by purchasing large products or avoiding the use of disposable products, and b). reducing the use of disposable plastic shopping bags in favour of reusable alternatives. The initiative promotes environmental awareness and effective management practices.

1. INTRODUCTION

Climate change is a global issue, and comprehending this phenomenon and mitigating its impacts require multidisciplinary efforts. According to the Intergovernmental Panel on Climate Change (IPCC) (2022), climate change refers to a state where the average level and/or variability of its characteristics can be determined, for example, through the use of statistical tests [1]. Where changes occur over a very long period of time, climate change must be understood from at least two perspectives: (1) as an ongoing phenomenon and (2) as the impacts it generates. In order to address climate change, we need to take two strategic steps: mitigation and adaptation [2, 3].

This study is based on existing literature, including IPCC reports and recent research on climate change. However, we have identified new areas focusing on how specific factors influence the dynamics of climate change in tropical regions. Our findings will enhance understanding of the human contribution to climate change impacts and identify knowledge gaps that need to be addressed. Therefore, this research lays a stronger foundation for further action in combating climate change in the future.

According to the Ministry of Environment and Forestry of Indonesia, climate change mitigation encompasses efforts to prevent global warming and reduce greenhouse gas emissions, while adaptation focuses on preparation and response to climate-related disasters. The issue of waste in Indonesia remains unresolved, and Asia is the largest producer of electronic waste, with a significant increase in recent years [4, 5]. Another finding also indicates that global electronic waste will continue to increase, reaching nearly 50 million tons by 2018 [6]. It is also known that in 2018, according to data from the Central Statistics Agency, Indonesia produced 65.2 million tons of waste annually. Unfortunately, the Ministry of Environment and Forestry estimates that this figure will increase even higher to reach 72 million tons per year in 2020. Regrettably, a significant portion of this waste, approximately 36% or 9 million tons, is still poorly managed. Particularly originating from households, this form of waste contributes 32.5% to the total waste generated in Indonesia, as reported by the Ministry of Environment and Forestry in 2020 [7, 8]. The island of Java, including the bustling urban area of Jabodetabek, is a particular concern as it is the largest contributor to the waste crisis in the country, producing 21.2 tons of waste annually. This amount accounts for approximately 44.5% of the total waste generated, including household waste. As responsible citizens, we have an obligation to preserve the environment, as we not only have the right to a clean and healthy habitat but also possess the knowledge to understand environmental issues and the ability to shape values, aspirations, and appropriate actions [9].

The parameters for assessing the level of civil responsibility through civil behavior can be described as follows: Firstly, having moral guidelines that evoke feelings of shame or guilt, thereby instilling a continuous readiness to apologize, rectify

mistakes made, and refrain from repeating them. Secondly, this encompasses accountability within legal boundaries, exemplified by the willingness to accept legal consequences when actions that violate regulations are discovered [10, 11]. Furthermore, this also encompasses the responsibility towards the environment, whereby each individual ensures that their actions do not cause harm to the surrounding nature, either through pollution or environmental degradation [12].

The accumulation of waste in several universities is also influenced by excessive consumption behavior and inefficient waste management systems, resulting in an increasing waste accumulation problem [9, 13]. According to some researches, the way in which students handle waste in their classrooms influences their behavior in disposing of trash [14, 15]. This is significant because there is a lot of trash in the classroom, such as in the corners of the room and in the cafeteria. When there is a buildup of trash, it indicates that students who litter may not understand the importance of maintaining environmental cleanliness.

One form of legal consciousness that refers to how society understands and interprets laws is the increasing awareness of the community towards sustainable waste management [16]. This understanding is shaped through actions and behaviors related to the law, rather than simply following regulations. One initiative to enhance legal awareness in waste management is the establishment of a student community called MASAKLIM, which serves as a platform for communication, information, and education on the value of sustainable waste management.

MASAKLIM, or Climate Conscious Students, is an initiative that focuses on addressing climate change with a number of measurable and sustainable goals, methods, and strategies. One of its main objectives is to reduce greenhouse gas emissions, enhance resilience to the impacts of climate change, and raise awareness and community participation in environmental protection. MASAKLIM also aims to tackle the effects of climate change by emphasizing waste management and implementing the 3R concept (reduce, reuse, recycle).

MASAKLIM not only concentrates on decreasing greenhouse gas emissions, but also prioritizes improving resilience to the effects of climate change that have already taken place. This involves creating early warning systems for natural disasters, tree planting programs, ecosystem restoration, and advocating for sustainable agricultural practices [17]. Furthermore, a robust communication strategy is employed to spread awareness about environmental protection and rally support for more stringent environmental policies [18]. Through educational campaigns, financial incentives, and collaborations with the public and private sectors, MASAKLIM also promotes the adoption of renewable energy sources like solar and wind power, while diminishing reliance on fossil fuels that add to carbon emissions.

With the growing debate on climate change adaptation and mitigation, the concept of resilience is proposed as a transformative adaptation solution to various disruptions (disasters) caused by climate change, providing a new perspective by prioritizing sustainable development [16, 19]. The term climate resilience has been developed to promote the development of urban and rural areas that are more resilient and sustainable [20].

The impact of the MASAKLIM initiative is very significant. In addition to reducing greenhouse gas emissions and increasing resilience to the impacts of climate change, this program also helps create new jobs in the renewable energy sector, reduces air pollution and improves the overall quality of life [21]. In addition, by increasing public awareness and participation in environmental protection efforts, MASAKLIM forms a strong foundation for long-term sustainability in facing the challenges of global climate change.

In addition to the right to a clean and healthy environment, citizens also have an obligation to preserve the environment. This approach is based on the society's knowledge of environmental issues and their ability to determine their own values, goals, and actions. Values, goals, and actions are manifestations of moral consciousness, which is the condition of human existence, reflecting an individual's moral perception and subsequently manifested in the form of actions, movements, and deeds [12, 22]. The key to achieving a resilient city lies in collective action at the grassroots level, namely the community, to seek solutions to various disruptions and generate social innovation and creativity [21].

This study aims to identify college students' perceptions of climate change and measure their level of legal awareness related to this topic. Initially, we will investigate students' understanding of climate change, including their awareness of related environmental issues. Therefore, this research will provide a better understanding of the extent to which students comprehend climate change issues and how aware they are of its connection to existing legal frameworks. The results of this study are expected to offer a clearer insight into students' readiness to take action regarding climate change and the relevance of legal education in preparing them to contribute effectively to addressing this issue.

2. LITERATURE OVERVIEW

From the perspective of socio-ecological systems thinking and psychology, community resilience to climate change goes beyond simply responding to disasters and involves the goal of influencing ecological and social change processes, as well as conscious actions [23]. In this case, socio-ecological resilience is employed as an approach to foster the transition towards a more sustainable and socially just society, which can be articulated through grassroots climate adaptation initiatives [24]. In previous literature, it has been discovered that relevant characteristics of a community are necessary to build community resilience that enables transformation [21]. For instance, two primary requirements to collectively take action towards climate adaptation and transformation are the individual and collective ability to act (i.e., active institutions) and the capacity to self-organize and function as a group [15]. On the other hand, independent agency and organization rely on other features that support the community. These include community infrastructure and resources, leadership, local knowledge, social networks, social learning, sense of place and identity, values and beliefs (such as acceptance of change), and equality in access and distribution of these resources [2, 25].

As a result of the unavoidable emissions of greenhouse gases (GHGs) for over two centuries from the burning of fossil fuels in energy generation, industry, transportation, deforestation, as well as intensive agriculture, climate change has now become an inevitable and rapidly damaging problem for the Earth [15, 26]. Climate change has significant and concerning impacts on ecological, physical, and social systems and communities [17, 27]. This affects humans in many ways,

most of which are complex, indirect, and sometimes unclear. As a result, there are often challenges when someone conducts scientific exploration into the overall dynamics.

Climate change has become a common phenomenon on Earth through climate variability and extreme conditions. However, the current impacts of global climate change are different for two reasons. Firstly, it is caused by human actions, and secondly, it is occurring at a faster rate than ever before in the past fifty million years [28]. Climate change is the result of the increasing concentration of greenhouse gases in the atmosphere due to factors such as traffic, industry, urban waste accumulation, livestock farming, agriculture, land use changes, and deforestation. Greenhouse gases include carbon dioxide (CO_2), carbon monoxide (CO), water vapor (H_2O), nitrogen (N_2), hydrogen (H_2), hydroxyl (OH), nitric oxide (NO), hydrogen (H), oxygen (O), carbon (C), and methane (CH_4) [8]. One of the greenhouse gases that contributes to climate change is methane gas (CH_4), which is produced at landfill sites [29]. As the unprocessed waste pile continues to accumulate at the final disposal site, methane emissions also increase. The rise in CH_4 emissions has a significant impact on climate change. This is because methane gas is 20 to 30 times more damaging than CO_2 [20]. Climate change is being addressed in three main dimensions: climate change is significant, complex, uncertain, and creates a highly challenging environment [30]. Certainly, this poses a significant global issue that will have a profound impact on the entire human population in a remarkably short period of time, affecting various population segments across different regions with all their complexities.

The assessment of climate risk and community capacity to address it can be evaluated through two crucial approaches: social vulnerability and resilience [21]. The vulnerability of a system, particularly from an ecological perspective, comprises three components: (1) Exposure to disturbances - the extent to which the system is affected by these disturbances. (2) Sensitivity to disturbances - the degree to which a system is influenced by disturbances. (3) Adaptability - the ability of a system to adapt to external disturbances [6, 15]. Various complex economic, political, social, and physical factors are combined to determine the vulnerability of an individual or community. Scholars have distinguished between human and non-human components, as well as differentiating between human, social, and physical vulnerability [15, 31].

Vulnerability is a measure of a system's susceptibility to environmental threats and other hazards. Only resilient communities (further discussed in the following section) are able to cope with pressures such as climate change more effectively. Resilience is the long-term ability of a system to adapt to and thrive amidst change [29]. The resilience of society to climate change can be defined as a combination of resilience to frequent and severe disruptions, the ability to recover and self-regulate, and the capacity to adapt to new conditions. Recently, social scientists have been investigating the relationship between vulnerability and resilience of systems or communities to environmental and social disruptions [32, 33]. In addition, there are three other components required to achieve climate resilience: urban systems, social actors, and urban institutions. (1) Urban systems refer to the infrastructure, ecosystems, institutions, and knowledge that can be intervened as part of climate change mitigation. (2) Social actors are defined as individuals (urban residents), households, and public organizations and private institutions involved in urban sector mitigation and management [17, 34].

Critical analysis of literature highlights the knowledge gap that needs to be addressed by this research. There is a need for a deeper understanding of how initiatives like MASAKLIM influence students' perceptions of climate change and the extent to which their legal awareness relates to the environment. Additionally, factors such as socio-economic background and education also need to be explored to understand their influence on students' perceptions and actions towards climate change. By addressing these gaps, this research is expected to provide a more profound and relevant insight into students' perspectives and their awareness to be part of the community called MASAKLIM.

3. METHODOLOGY

This study falls under the category of quantitative research [35], specifically utilizing the survey method. A survey is a technique employed to gather information regarding the attitudes, opinions, or behaviors of a representative sample or all participants [36]. Furthermore, surveys offer valuable insights into the characteristics of the subjects [37]. The most commonly utilized form of survey is the cross-sectional survey, which collects data from samples selected based on specific demographic characteristics [38].

The respondents in this study were fourth-semester students of the Civic Education Program, Faculty of Education and Teacher Training, Sebelas Maret University, who were taking the course on citizenship ecology. A total of 38 respondents were selected using cluster sampling, which involved selecting samples based on classes or clusters that were considered to meet the criteria of representing the target population adequately [39]. This approach ensured that the selected sample would provide a diverse representation of students enrolled in the course across different classes, thus enhancing the generalizability of the findings to the broader student population [40]. In terms of data collection techniques, this study employed a questionnaire to gather validated data by consulting with experts regarding the questionnaire instrument [41]. The instruments utilized aim to extract information regarding the opinions of students regarding their understanding of climate change, mitigation, and adaptive behavior towards climate change, as well as their attitudes towards environmental cleanliness in relation to waste and its management [12, 14, 16].

The data analysis technique employed in this study is quantitative descriptive analysis, utilizing percentages to determine the frequency of respondents' answers and the phenomena occurring in the area in relation to their understanding of the investigated points in the questionnaire [42]. This step is also taken to determine the size and proportion of each answer to the question, so that the resulting data can be easily analyzed and interpreted in the form of charts or graphs.

In this study, the survey design utilized involved the development of a customized questionnaire to measure students' perceptions of legal awareness regarding the environment and climate change issues. The questionnaire was designed to assess students' understanding of environmental laws and climate change issues, as well as their attitudes and behaviors towards the environment. The questionnaire's questions encompassed aspects such as knowledge of relevant

legal frameworks, their views on the importance of environmental protection, and their attitudes towards environmentally friendly practices. Therefore, through the analysis of survey results, we can evaluate the extent to which MASAKLIM has succeeded in enhancing legal awareness and pro-environmental attitudes among students, with the aim of optimizing this community's role in climate change.

4. RESEARCH RESULTS

The university has become one of the sources of waste production that is related to urban waste management systems. The waste problem in the university is due to the high consumption activities in the higher education environment, such as at Universitas Sebelas Maret. The negative impact of unmanaged waste accumulation will contribute to emissions that drive climate change. As residents of the university, it is important for students to have knowledge about climate change. Based on research results regarding students' knowledge of climate change, the following findings were obtained.

Based on Figure 1, it is evident that all students possess knowledge about climate change and its impact on life. Therefore, they have sufficient awareness about the importance of preserving the Earth's sustainability. In addressing climate change, mitigation and adaptation practices are key to reducing the problems caused by erratic weather conditions. It is essential to possess knowledge about climate change mitigation and adaptation. It is also evident that approximately 89.5% of students understand the efforts of mitigation and adaptation in addressing the impacts of climate change. Individuals who possess knowledge of climate change mitigation and adaptation are able to recognize the risks of climate-related disasters and plan accordingly for their mitigation. Climate change leads to various catastrophic events, including hurricanes, tropical cyclones, floods, endemic diseases, droughts, El Nino, famines, tsunamis, and other incidents that diminish ecosystem functionality and cause ecological disasters. Human actions, often environmentally unfriendly, contribute to many of these climate-related disasters.

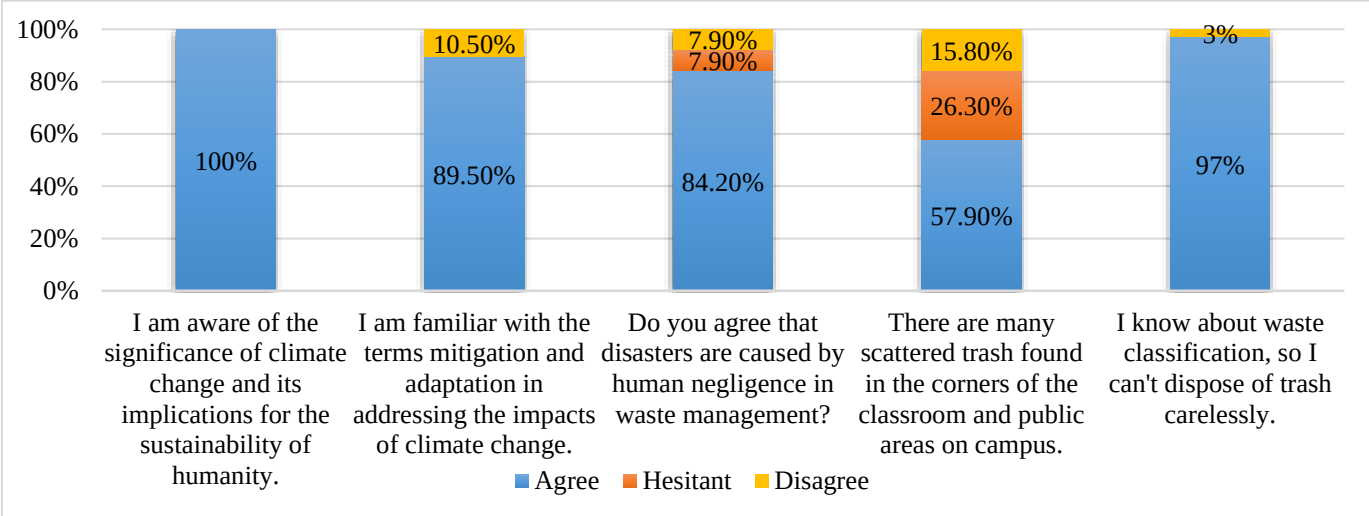

Figure 1. Students' understanding of climate change and waste

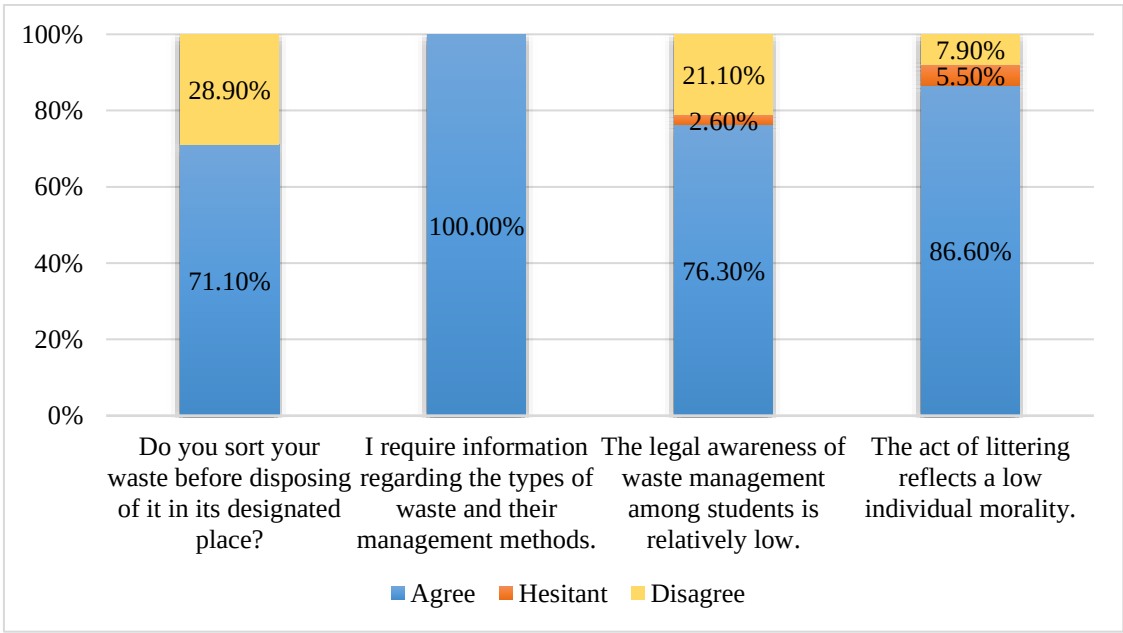

Figure 2. The legal awareness response of students in disposing of waste

The survey results indicate that the majority of students, approximately 84.2%, agree that human behavior that neglects waste management can cause disasters, while 7.9% are unsure. This reaffirms the consensus among many students that human activities contribute to climate change disasters. Waste is identified as one of the main factors exacerbating this situation, with the majority, namely 57.9%, experiencing the prevalence of litter in campus areas, such as corners of classrooms and other places. However, the majority of students, around 97.4%, have a good understanding of the types of waste, demonstrating a strong awareness of this issue. This knowledge is expected to shape habits and behaviors that are more responsible for waste management on campus.

Based on Figure 2, it can be observed that 71.1% of students carefully sort their waste before disposing of it in waste disposal areas. This undeniable fact serves as evidence of the existing awareness among many students regarding sustainable waste management practices. However, it is clear that there is a need to further enhance students' understanding in this field, particularly by providing them with comprehensive information on various types of waste and appropriate management techniques.

Furthermore, the graph also demonstrates that 100% of respondents state that achieving sustainable waste management requires information on waste types and waste management methods on campus. In line with this, respondents also indicate that 76.3% of them believe that students' legal awareness of waste management is very low. This is further supported by the graph below. Research data shows that all students seem to agree that littering is a reflection of a lack of awareness about waste management. This is evidenced by the response of 86.8% of students who agree that littering is an expression of low morality.

The findings of this study align closely with its objectives. The research reveals that college students express significant interest in achieving sustainable waste management practices on campus and recognize the importance of understanding waste types and management methods. Additionally, the results indicate a notable gap in students' legal awareness regarding waste management, which correlates with the initial aim of measuring their level of legal awareness related to environmental issues. Furthermore, the data highlights a strong consensus among students that littering reflects a lack of awareness about waste management, underscoring the need for enhanced education and awareness initiatives. Thus, the results provide valuable insights into students' perceptions of climate change and the relevance of legal education in addressing environmental challenges effectively.

5. DISCUSSION

Resilience typically refers to the ability of an individual, community, organization, business, or system to overcome disruptions. There are two types of disruptions: "shocks," which tend to occur infrequently but can have significant impacts (losses/damages), and "stressors/pressures," which tend to occur more frequently but have smaller impacts. Climate resilience refers to the ability of a system to function despite being disrupted by climate change. The concept of resilience in terms of climate resilience is closely related to the approach of adapting to climate change [21].

In holistic theory, resilience is defined as a cycle consisting of four stages: conservation stage (1), release stage (2), reorganization stage (3), and growth stage (4) [15]. Technical and socio-ecological resilience are two general categories [33]. The ability of a system to return to a balanced or steady state after experiencing a disturbance (single equilibrium) and the ability of a system to achieve alternative states of balance and stability (multi-equilibrium) are known as technical resilience [43]. To achieve the highest level of resilience, an engineering resilience approach must be combined with a socio-ecological resilience approach. There are four common characteristics of resilience: 1) Based on time (short-term, medium-term, or long-term); 2) Based on concentration (single or multiple balances); 3) Based on response (reactive or proactive). Reactive actions are usually taken immediately after a disturbance occurs, while proactive actions involve taking anticipatory measures without waiting for disruption; and 4) Resilience is determined by the type of effort, whether it is focused on maintaining business as usual (BAU) or achieving breakthroughs through innovative thinking. From a social resilience perspective, which views communities as providers of resources, community participation through social capital ownership is necessary. Social capital refers to the resources inherent in a community or society in the form of norms or values that promote cooperation through positive and harmonious networks of interaction and communication [44-46].

In various social contexts, social capital provides strength or power and is considered important for resilience across all layers of society. This highlights the significance of social capital as a component of community resilience, acting as an agent in shaping environmental resilience systems to enhance climate resilience [31]. The ability of a group to cope with and overcome external pressures and disruptions caused by social, economic, political, and environmental factors is known as community resilience [17, 47]. The resilience of a community depends on its ability to withstand disturbances and its capacity to recover after a crisis and potential future disruptions, which arise as challenges become more likely [13, 45].

The resilience of society can be seen as the key factor in achieving climate resilience at the meso and macro scales, ranging from cities, villages, to other geographical units [34]. Resilience is achieved through a series of actions where communities learn from past experiences, make decisions, and implement them with the hope of a better future [48]. As part of the ongoing learning process, 'bottom-up resilience' is interpreted as an effort to build resilience at the smallest level (micro), thus driving more sustainable changes at the meso and macro levels [17]. The resilience of a developing society emerges when there are similar economic conditions and strong interactions between the community and the environment [28]. Next, there are seven resilience factors driven by organizations: leadership, scientific and technical skills and learning, values of trust, inter-organizational relationships, social interactions, positive or optimistic outlook, and availability of public infrastructure. These strengths are achieved through self-action and collective influence through organizations. Therefore, the main characteristic of community resilience is self-organization and the presence of institutional processes that enable the community to develop an integrative concept of community resilience [21, 49].

Regarding climate change, there are at least 10 main capacities that need to be considered to build community resilience, which can be done through coordination between

the community and organizations in the surrounding area [46]. These capabilities can be described in the following ways: 1) The skill to maintain and enhance adaptable and flexible abilities to optimize the use of resources efficiently. 2) The skill to assess the extent of disruption; unexpected events (like sudden floods) and pressures (such as food insecurity). 3) The skill to integrate different horizontal interests (like diverse social groups/political sectors) to devise comprehensive solutions. 4) The skill to strengthen vertical relationships across different levels of society (individuals, families, communities, government institutions) to collectively and collaboratively implement various interventions. 5) The skill to take proactive actions, actively reducing climate risks. Alongside adaptation efforts, optimizing climate change mitigation is one of the ways to not only minimize the impacts of climate change but also limit the prolongation of its effects. 6) The skill to utilize positive climate narratives to instill hope and inspire measures for climate change mitigation and adaptation. Encouraging climate change-related campaigns is crucial to educating people from diverse groups. 7) The ability to foster creativity and imagination to envision alternative futures that guide human behavior towards a better path. 8) The ability to address climate change-induced injustices (climate justice) by reducing inequality. 9) The ability to develop processes that promote participation, learning, and empowerment. 10) The skill to bring about transformative changes, rather than solely adapting to current conditions [45, 48]

According to some findings, there are various ways to enhance community participation: 1) Educating the community about the risks and dangers of climate change through socialization and education. 2) Providing the community with accurate information about the current situation. 3) Involving the local community in identifying local issues, determining their urgency, setting goals and objectives, and presenting the outcomes of community discussions to the government for monitoring through dialogue and public debate. Community involvement in addressing climate change impacts can be promoted through. 4) Daily community programs and activities that raise awareness and sensitivity to climate change phenomena. 5) Encouraging local actors and activists to mobilize community resources for change, such as promoting environmentally conscious behavior or introducing climate change programs. 6) Utilizing information and engaging in discussion activities and focused group discussions to drive community efforts. And 7) Strengthening community efforts with support from stakeholders, where the government responds to the needs of the local community in addressing climate change. This requires coordination, collaboration, and cooperation from all relevant parties [12, 46].

The obtained data indicates that the understanding of climate change among students is quite good, and they are aware of the positive aspects in order to prevent and mitigate the impacts of climate change. The survey results also identify MASAKLIM as one of the movements that can reduce the negative impacts of climate change and increase awareness of environmental cleanliness by managing daily waste properly instead of disposing it haphazardly. Besides, the behavior of disposing of waste is an action that arises from how an individual treats the waste they have produced, whether by littering or by storing it and then placing it in the trash. This is related to an individual's knowledge or conception of waste because having knowledge about waste, from its benefits and uses to the impacts it can have, can influence an individual's behavior and prompt them to take action regarding waste [1].

In a recent study, research findings have highlighted the deficiencies in students' knowledge and understanding regarding two crucial issues: climate change and waste management. Despite various efforts to raise awareness about these problems, there still appears to be a gap in students' understanding. The majority of students tend to have limited knowledge about the impacts of climate change and the importance of effective waste management. This lack of understanding is a primary cause for the low participation in environmental problem-solving efforts [29]. The primary focus of this research is the tendency of students to disregard climate change. Despite the availability of campaigns and information, many students still show a lack of concern or even indifference towards climate change. Factors such as a lack of awareness of the direct impact on their daily lives and needs, as well as a lack of knowledge about the actions they can take, contribute to this apathetic attitude [13, 20]. However, there are also some students who are beginning to realize the importance of climate change issues and feel compelled to contribute to addressing them. This attitude is reflected in their participation in activities aimed at reducing carbon footprint, supporting sustainable environmental policies, and taking concrete actions to reduce resource wastage [7, 10]. This conscious attitude demonstrates the potential to broaden students' understanding and involvement in the fight against climate change [50].

When examining the outcomes of this study, it is crucial to stress the correlation between the findings and previous research. While discovering that students who perceive waste as unwanted tend to dispose of it selectively, it is essential to highlight that our study has identified notable differences from prior research. Our study underscores the inadequacies in considering socio-economic factors and educational levels concerning environmental issues that could impact students' perceptions of waste. As a result, the research calls for a deeper exploration of these factors and an understanding of the effects of educational approaches and environmental awareness on waste management behaviors among students.

Knowledge is one of the important factors in shaping a person's behavior. Students who view waste as something no longer useful usually select the waste they truly need to dispose of in its proper place. They will only consider something as waste if it can no longer be used, but if it can still be used, albeit not for its original purpose, it is not considered waste [51]. On the other hand, students who view waste as something no longer useful tend to consider things they do not need at a particular time as waste and dispose of them immediately. Many students still lack knowledge about proper waste disposal because there are still students who litter. However, on the other hand, there are still students who are aware of and care about their surrounding environment, so they pay more attention to how they choose materials and limit the possibility of waste accumulation.

The findings of this research provide a crucial foundation for formulating policies that enhance legal awareness of the environment and instill environmental values on campus. By emphasizing that students' perception of waste influences waste management behavior, concrete steps can be taken. Campuses can integrate environmental law aspects into the curriculum while encouraging student participation in environmental activities such as reforestation and waste management. This will not only enhance students' legal

awareness but also strengthen their environmental values. However, this study is limited in uncovering factors such as socio-economic background or educational level of students in terms of environmental issues.

6. CONCLUSIONS AND RECOMMENDATION

The research findings indicate that understanding plays a crucial role in influencing individual behavior. In terms of waste, students hold two perspectives: waste is defined as an object that can no longer be used or an unwanted object. Unusable items are those that cannot be used or repaired anymore and have lost their usefulness, while unnecessary items may still have value or usefulness but are currently not needed. The societal perception and handling of waste can significantly influence their actions. Students exhibit varying levels of knowledge about waste. In order to encourage students to manage waste effectively, it is necessary for them to understand the nature of waste and disposal methods, as well as its various categories. Although our research indicates that students who perceive waste as unwanted tend to dispose of it selectively, this study has limitations in exploring factors such as socio-economic background or their level of education on environmental issues. For future research, it is recommended to further consider these factors and the effects of educational approaches and environmental awareness on students' waste management behavior.

REFERENCES

[1] Albitar, K., Al-Shaer, H., Liu, Y. S. (2023). Corporate commitment to climate change: The effect of eco-innovation and climate governance. Research Policy, 52(2): 104697. https://doi.org/10.1016/j.respol.2022.104697

[2] Kemp, L., Xu, C., Depledge, J., Ebi, K.L., Gibbins, G., Kohler, T.A., Rockström, J., Scheffer, M., Schellnhuber, H.J., Steffen, W., Lenton, T.M. (2022). Climate endgame: Exploring catastrophic climate change scenarios. Proceedings of the National Academy of Sciences, 119(34): e2108146119. https://doi.org/10.1073/pnas.2108146119

[3] Mikulewicz, M., Caretta, M.A., Sultana, F., Crawford, N.J.W. (2023). Intersectionality & climate justice: A call for synergy in climate change scholarship. Environmental Politics, 32(7): 1275-1286. https://doi.org/10.1080/09644016.2023.2172869

[4] Ardi, R., Tobing, D.H., Agustina, G.N., Iswahyudi, A.F., Budiarti, D. (2021). Religious schema and tolerance towards alienated groups in Indonesia. Heliyon, 7(7): e07603. https://doi.org/10.1016/j.heliyon.2021.e07603

[5] Prasmoro, A.V., Supratman, J., Sitorus, H., Spalanzani, W. (2022). Penyuluhan kesadaran masyarakat berwawasan lingkungan di desa sukatenang kecamatan sukawangi kabupaten bekasi. Jurnal Sains Teknologi Dalam Pemberdayaan Masyarakat, 3(1): 63-70. https://doi.org/10.31599/jstpm.v3i1.1195

[6] Susilowardhani, A. (2014). The potential of strategic environmental assessment to address the challenges of climate change to reduce the risks of disasters: A case study from Semarang, Indonesia. Procedia - Social and Behavioral Sciences, 135: 3-9. https://doi.org/10.1016/j.sbspro.2014.07.317

[7] Perdinan, P., Atmaja, T., Adi, R.F., Estiningtyas, W. (2019). Adaptasi perubahan iklim dan ketahanan pangan: Telaah inisiatif dan kebijakan. Jurnal Hukum Lingkungan Indonesia, 5(1): 60-87. https://doi.org/10.38011/jhli.v5i1.75

[8] Hasnawi, M., Asyrafinafilah, H., Adib, H. (2021). Sinergi dalam pertanian Indonesia untuk mitigasi dan adaptasi perubahan iklim. Jurnal Inovasi Penelitian, 1(10): 2085-2094. https://doi.org/10.47492/jip.v1i10.424

[9] Dewi, H.K., Sunarharum, T.M. (2022). Peningkatan ketahanan iklim di kabupaten magelang: Telaah kerangka kebijakan smart environment. Jurnal Sinar Manajemen, 9(2): 183-191. https://doi.org/10.56338/jsm.v9i2.2463

[10] Whitmarsh, L., Player, L., Jiongco, A., James, M., Williams, M., Marks, E., Kennedy-Williams, P. (2022). Climate anxiety: What predicts it and how is it related to climate action? Journal of Environmental Psychology, 83: 101866. https://doi.org/10.1016/j.jenvp.2022.101866

[11] Crespi, A., Renner, K., Zebisch, M., Schauser, I., Leps, N., Walter, A. (2023). Analysing spatial patterns of climate change: Climate clusters, hotspots and analogues to support climate risk assessment and communication in Germany. Climatic Change Services, 30: 100373. https://doi.org/10.1016/j.cliser.2023.100373

[12] Schwarzwald, K., Lenssen, N. (2022). The importance of internal climate variability in climate impact projections. Proceedings of the National Academy of Sciences of the United States of America, 119(42): e2208095119. https://doi.org/10.1073/pnas.2208095119

[13] Abdillah, A., Buchari, R.A., Widianingsih, I., Nurasa, H. (2023). Climate change governance for urban resilience for Indonesia: A systematic literature review. Cogent Social Sciences, 9(1): 2235170. https://doi.org/10.1080/23311886.2023.2235170

[14] Greenwood, N., Warren, P. (2022). Climate risk disclosure and climate risk management in UK asset managers. International Journal of Climate Change Strategies and Management, 14(3): 272-292. https://doi.org/10.1108/IJCCSM-09-2020-0104

[15] Lai, C.H., Liao, P.C., Chen, S.H., Wang, Y.C., Cheng, C., Wu, C.F. (2021). Risk perception and adaptation of climate change: An assessment of community resilience in rural Taiwan. Sustainability, 13(7): 3651. https://doi.org/10.3390/su13073651

[16] Wijayanti, W.P. (2013). Peluang pengelolaan sampah sebagai strategi mitigasi dalam mewujudkan ketahanan iklim kota Semarang. Jurnal Pembangunan Wilayah dan Kota, 9(2): 152. https://doi.org/10.14710/pwk.v9i2.6531

[17] Huiskamp, U., ten Brinke, B., Kramer, G.J. (2022). The climate resilience cycle: Using scenario analysis to inform climate-resilient business strategies. Business Strategy and the Environment, 31(4): 1763-1775. https://doi.org/10.1002/bse.2982

[18] Ray Biswas, R., Rahman, A. (2023). Adaptation to climate change: A study on regional climate change adaptation policy and practice framework. Journal of Environmental Management, 336: 117666. https://doi.org/10.1016/j.jenvman.2023.117666

[19] Sigit, D.V., Azrai, E.P., Suryanda, A., Ichsan, I.Z., Cahapay, M.B., Rahman, M.M., Gomes, P.W.P., Susanti, R. (2022). Needs analysis of students' pro-environmental

behavior for climate change books. Journal of People, Plants, and Environment, 25(5): 513-520. https://doi.org/10.11628/ksppe.2022.25.5.513
[20] Novita, A.A. (2021). Environmental Governance and climate change adaptation in Indonesia. Jurnal Ilmiah Administrasi Publik, 7(1): 46-55. https://doi.org/10.21776/ub.jiap.2021.007.01.6
[21] Ruiz-Mallén, I., Satorras, M., March, H., Baró, F. (2022). Community climate resilience and environmental education: Opportunities and challenges for transformative learning. Environmental Education Research, 28(7): 1088-1107. https://doi.org/10.1080/13504622.2022.2070602
[22] Islam, M.M. (2022). Distributive justice in global climate finance–recipients' climate vulnerability and the allocation of climate funds. Global Environmental Change, 73: 102475. https://doi.org/10.1016/j.gloenvcha.2022.102475
[23] Comim, F., Hirai, T. (2022). Sustainability and human development indicators: A poset analysis. Ecological Economics, 198: 107470. https://doi.org/10.1016/j.ecolecon.2022.107470
[24] Eriksen, T.H. (2022). The sustainability of an anthropology of the anthropocene. Sustainability, 14(6): 3674. https://doi.org/10.3390/su14063674
[25] Wang, Y., Wang, R., Li, Y., Man, Z. (2020). Natural vegetation distribution and climate ecology prediction based on geographic information system. Environmental Engineering and Management Journal, 19(9): 1623-1630. https://doi.org/10.30638/eemj.2020.152
[26] Jansson, J.K., Wu, R. (2023). Soil viral diversity, ecology and climate change. Nature Reviews Microbiology, 21(5): 296-311. https://doi.org/10.1038/s41579-022-00811-z
[27] Suroto, D.A. Nugroho, Amelia Rafiah, R. (2021). Penguatan partisipasi warga banua melalui prinsip ecological citizenship pada program kampung iklim untuk mewujudkan ketahanan lingkungan lahan basah berkelanjutan. PINUS: Jurnal Penelitian Inovasi Pembelajaran, 7(1): 59-70. https://doi.org/10.29407/pn.v7i1.16393
[28] Aquilina, M.C., Sheate, W.R. (2022). A critical analysis of the role of the urban climate resilience nexus in London. European Planning Studies, 30(7): 1355-1377. https://doi.org/10.1080/09654313.2021.1958758
[29] Setyowati, A.B. (2020). Mitigating energy poverty: Mobilizing climate finance to manage the energy trilemma in Indonesia. Sustainability, 12(4): 1603. https://doi.org/10.3390/su12041603
[30] Pihkala, P. (2022). Toward a taxonomy of climate emotions. Frontiers in Climate, 3: 738154. https://doi.org/10.3389/fclim.2021.738154
[31] Thompson, W.J., Blaser-Hart, W.J., Joerin, J. et al. (2022). Can sustainability certification enhance the climate resilience of smallholder farmers? The case of Ghanaian cocoa. Journal of Land Use Science, 17(1): 407-428. https://doi.org/10.1080/1747423X.2022.2097455
[32] Carayannis, E.G., Campbell, D.F. (2021). Democracy of climate and climate for democracy: The evolution of quadruple and quintuple helix innovation systems. Journal of the Knowledge Economy, 12(4): 2050-2082. https://doi.org/10.1007/s13132-021-00778-x
[33] Chandra, A., McNamara, K.E., Dargusch, P. (2017). The relevance of political ecology perspectives for smallholder climate-smart agriculture: A review. Journal of Political Ecology, 24(1): 821-842. https://doi.org/10.2458/v24i1.20969
[34] da Silva, M.S.R., Correia, J. (2022). A political ecology of jurisdictional REDD+: Investigating social-environmentalism, climate change mitigation, and environmental (in) justice in the Brazilian Amazon. Journal of Political Ecology, 29(1): 123-142. https://doi.org/10.2458/JPE.4713
[35] Daniel, B. (2022). The role of research methodology in enhancing postgraduate students research experience. Electronic Journal of Business Research Methods, 20(1): 34-48. https://doi.org/10.34190/ejbrm.20.1.2253
[36] Creswell, J.W., Plano-Clark, V.L., Gutmann, M.L., Hanson, W.E. (2003). Advanced mixed methods research designs. In Handbook of Mixed Methods in Social and Behavioral Research. Sage.
[37] Patel, M., Patel, N. (2019). Exploring research methodology. International Journal of Research and Review, 6(3): 48-55.
[38] Puri, V. (2019). Modern trends in research methodology. International Journal of Research Methodology, 2(1).
[39] Oducado, R.M. (2021). Survey instrument validation rating scale. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3789575
[40] Al-Ababneh, M.M. (2020). Linking ontology, epistemology, and research methodology. Science and Philosophy, 8(1): 75-91. https://doi.org/10.23756/sp.v8i1.500
[41] Silalahi, U. (2015). Metode penelitian sosial kuantitatif. Journal of Visual Language and Computing, 11(3).
[42] Mutluer, Ö., Altun, S. (2021). Instructional design in teaching the gifteds. Milli Eğitim, 50(231): 407-426. https://doi.org/10.37669/milliegitim.711802
[43] Bryan, A. (2022). Pedagogy of the implicated: Advancing a social ecology of responsibility framework to promote deeper understanding of the climate crisis. Pedagogy, Culture & Society, 30(3): 329-348. https://doi.org/10.1080/14681366.2021.1977979
[44] Erdianto, A., Rofiqo Irwan, S.N., Kastono, D. (2019). Fungsi ekologis vegetasi taman denggung sleman sebagai pengendali iklim mikro dan peredam kebisingan. Vegetalika, 8(3): 139. https://doi.org/10.22146/veg.41374
[45] Carmen, E., Fazey, I., Ross, H., et al. (2022). Building community resilience in a context of climate change: The role of social capital. Ambio, 51(6): 1371-1387. https://doi.org/10.1007/s13280-021-01678-9
[46] Kais, S.M., Islam, M.S. (2016). Community capitals as community resilience to climate change: Conceptual connections. International Journal of Environmental Research and Public Health, 13(12): 1211. https://doi.org/10.3390/ijerph13121211
[47] Harvian, K.A., Yuhan, R.J. (2021). Kajian perubahan iklim terhadap ketahanan pangan. Seminar Nasional Official Statistics, 2020(1): 1052-1061. https://doi.org/10.34123/semnasoffstat.v2020i1.593
[48] Barzaman, S., Shamsipour, A., Lakes, T., Faraji, A. (2022). Indicators of urban climate resilience (Case study: Varamin, Iran). Natural Hazards, 112(1): 119-143. https://doi.org/10.1007/s11069-021-05174-x

[49] Daryanti, D., Charnade, R.S.V. (2022). Corruption potential of environmental funds in overcoming climate change in Indonesia. Corruptio, 3(2): 113-122. https://doi.org/10.25041/corruptio.v3i2.2737
[50] Prihatin, R.B. (2018). Masyarakat sadar bencana: Pembelajaran dari Karo, Banjarnegara, dan Jepang. Aspirasi: Journal of Masalah Sosial, 9(2): 221-239. https://doi.org/10.46807/aspirasi.v9i2.1106
[51] Estok, S.C. (2023). Climate change and migration. Neohelicon, 50(1): 239-251. https://doi.org/10.1007/s11059-023-00686-w