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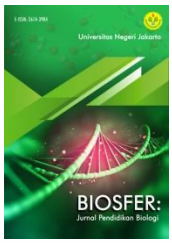

# The evidence from coastal area in the correlation between climate change literacy and pro-environmental behaviour of student

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**ABSTRACT**

Climate change literacy and pro-environmental behaviour have been proven to be one of the solutions to address climate change in the student's perspective from several countries. Therefore, it is crucial to gain a comprehensive understanding of the relation between these two variables for the impact on climate change in Indonesia. The objective of this research was to analyse the relationship between climate change literacy and pro-environmental behaviour among senior high school students in Indonesia. A correlation study was conducted using a survey method. The samples were students from the X, XI, and XII grades of senior high school, collected using proportionate stratified random sampling. A total of 386 students from three schools participated in this survey. The test comprised a climate change awareness instrument to examine climate change literacy. Furthermore, a questionnaire was used to measure pro-environmental behaviour among high school students. Additionally, interviews were conducted to obtain comprehensive data. The results demonstrated a positive and highly significant relationship between climate change literacy and pro-environmental behaviour among senior high school students. This research highlighted that awareness of climate change causes and government policies related to climate change influenced pro-environmental behaviour.

## INTRODUCTION

Indonesia, with the longest coastline in the world, is highly vulnerable to the phenomenon of sea level rise due to global warming (Nadya & Salim, 2023). Consequently, those who live on the coast will experience the adverse effects. This is exemplified by the coastal area of Demak. For years, the community has experienced prolonged tidal flooding and the threat of crop failure due to rising sea water that makes the soil salty (Haloho & Purnaweni, 2020). Furthermore, ports, industrial and trade areas, and educational facilities are always inundated by tidal water (Asrofi, Hardoyo, & Sri Hadmoko, 2017). Tidal floods inundate residential structures, resulting in cracking, tilting, rotting, and sinking (Kusuma, Liesnoor, & Suhandini, 2016).

A considerable number of researchers have highlighted the significance of education as a pivotal strategy in climate change mitigation (Azevedo & Marques, 2017; Busch, Henderson, & Stevenson, 2019; Lehnert, Fiedor, Frajer, Hercik, & Jurek, 2020). This is particularly relevant for the current generation of youth, who are among the most vulnerable demographic groups, as they will be the first generation to experience the full impact of climate change (Han & Ahn, 2020). Moreover, the economic and social consequences of climate change will also be the responsibility of the current generation (Eskenazi et al., 2020; Sanson, Van Hoorn, & Burke, 2019). Therefore, climate change literacy was published to educate young people about the impacts of global warming and encourage behavioural changes to adapt to climate change (The US Global Change Research Program, 2009).

Climate change literacy is based on the scientific concept of climate change, which encompasses awareness of the climate change causes, awareness of the climate change risks, awareness of government policies, and awareness of consumption behaviour (Singh & Mathur, 2019). Climate change literacy aims to promote, stimulate, and foster pro-environmental behaviour (Powdthavee, 2020). Pro-environmental behaviour refers to behaviours undertaken to protect the environment and preserve the environment. This encompasses the reduction of negative environmental impacts, including greenhouse gas emissions, the wastage of natural resources, and so forth (Kurisu, 2015).

Previous research indicates that an individual's willingness to engage in pro-environmental behaviour is believed to be influenced by their awareness of the phenomena and impacts of climate change (Kolenatý, Kroufek, & Činčera, 2022). Climate change literacy has been demonstrated to increase the probability that an individual will utilise environmentally friendly products when travelling, reduce the use of disposable items, recycle, reduce energy consumption, purchase environmentally labelled products and local goods, and reduce the reliance on private vehicles (Chankrajang & Muttarak, 2017; Meyer, 2015). Nevertheless, previous research indicated that the pro-environmental behaviour exhibited by high school students of Surabaya was moderate at 64% (Nabilah & Hariyono, 2021). This suggests that further improvement is necessary, given the significant challenges posed by climate change that the Indonesian generation will undoubtedly face.

Previous researches have predominantly examined the relationship between climate change literacy and pro-environmental behaviour on a global scale (Kolenatý et al., 2022; Yu & Yu, 2017). Furthermore, previous researches have highlighted the relationship between pro-environmental behaviour and subjective well-being in global contexts (Capstick et al., 2022; Kaida & Kaida, 2016; Zawadzki, Steg, & Bouman, 2020). However, there is a paucity of research that examines the relationship between climate change literacy and pro-environmental behaviour from student's perspective, specifically in Indonesia.

The relationship between climate change literacy and pro-environmental behaviour has been the subject of only limited amount of research. One study that highlighted the study was conducted by Srivastava (2024), which focused on middle and high school students in India. In the meantime, no research has been identified that examines the relationship between climate change literacy and pro-environmental behaviour in Indonesia. Previous study has only analysed the level of climate change literacy among Indonesian students (Nabilah & Hariyono, 2021). Therefore, this study aims to analyse the relationship between climate change literacy and pro-environmental behaviour among senior high school students in Indonesia.

This research will provide new insights and evidences on how climate change literacy are related to pro-environmental behaviour in senior high school students in Indonesia, which has never been studied, especially in coastal area. Therefore, the school community, especially educators, can enhance students' climate change literacy and pro-environmental behaviour, equipping them with essential skills to address climate change issues.

## METHODS

### Research Design

This study employed a quantitative correlational approach utilising the survey method. Quantitative correlation was conducted to analyse the relationship between climate change literacy skills and pro-environmental behaviour of high school students (Fraenkel, Wallen, & Hyun, 2012). The subjects of this research were senior high school student of 10th, 11th and 12th grade from three schools.

The survey method was utilised to gather data on the variables of climate change literacy and pro-environmental behaviour in high school students. The population of survey research was extensive, enabling the results of the study to be generalised (Arifin, 2014). The quantitative data was derived from the collection of respondents' data through climate change literacy test instruments and pro-environmental behaviour questionnaires.

### Population and Samples

A sample of 20% of the total student population would be selected because the population exceeds 100 students (Arikunto, 2017). Samples were obtained from the student population of 3 schools in Demak, Central Java, Indonesia using the proportionate stratified random sampling technique. This was necessary due to the size of the population and the need to consider the strata present within it. The sample was then selected at random through a lottery process, ensuring that all classes had an equal opportunity to be sampled.

**Table 1**
Demographic Data of The Research Population

| | **Subdistrict Sayung (36.27%)** | **Subdistrict Wonosalam (63.73%)** |
|---|---|---|
| 10th Grade | 53.00 | 79.00 |
| 11th Grade | 49.00 | 86.00 |
| 12th Grade | 38.00 | 81.00 |
| Total | 140.00 | 246.00 |

Table 1 showed the demographic data of research population that used in this research. A total of 386 students participated in this study from 2 different subdistricts. Subdistrict Sayung consisted of School B and School C. Subdistrict Wonosalam consisted of School A. The students were divided into three groups: 53 students from 10th grade Subdistrict Sayung and 79 students from 10th grade Subdistrict Wonosalam, 49 students from 11th grade Subdistrict Sayung and 86 students from 11th grade Subdistrict Wonosalam, 38 students from 12th grade Subdistrict Sayung and 81 students from 12th grade Subdistrict Wonosalam.

Subdistrict Sayung was chosen because the area is always inundated by tidal floods. The two schools selected are schools that are affected by tidal flooding (Thanjaya, 2021). Meanwhile, the school in Wonosalam Subdistrict was chosen as a point of comparison for the other schools for a comprehensive analysis.

### Instrument

The research instruments employed tests related to climate change literacy, as well as questionnaire on pro-environmental behaviour. The indicators used in the climate change literacy test instrument were modified from Singh & Mathur (2019). Furthermore, the pro-environmental behaviour questionnaire was modified from Kaiser & Wilson (2004). The interview instrument was employed to elicit more detailed responses from students.

Four indicators of climate change literacy are employed: 1) Awareness of the causes of climate change, 2) Awareness of the risks associated with climate change, 3) Awareness of government policies related to climate change, 4) Awareness of the importance of addressing consumption behaviour. In parallel, six indicators are employed to assess pro-environmental behaviour: 1) Encompassing saving and utilisation efficiency to conserve energy from natural resources, 2) Behaviour to use pro-environmental mobility and transportation, 3) Behaviour to reduce waste, 4) Behaviour to consume

environmentally friendly products, 5) Behaviour to recycle waste and 6) Behaviour of active engagement with social issues pertaining to the environment.

The instruments were validated by expert in the field of climate change literacy and pro-environmental behaviour. Moreover, the validated items were evaluated in a field test involving students to assess the instrument's validity and reliability. The results of the validity test for the climate change literacy instrument yielded an average of 0.007 with a reliability coefficient of 0.842, indicating a high degree of reliability. Meanwhile, the results of the validity test of the pro-environmental behaviour instrument averaged 0.012 with an instrument reliability test result of 0.902 (very high).

**Procedure**

The research was conducted in several stages: 1) Pre-research to measure student's climate change literacy and pro-environmental behaviour. 2) Mapping schools that would be used for the research. 3) Coordination with the teacher was carried out on the class that would be used as a sample. 4) Data collection was carried out through surveys to students with the tested instruments. 5) Data processing by conducting normality test, linearity test, and correlation test. 6) Interview were conducted with the students to obtain more comprehensive answers. 7) Data presentation and data description.

**Data Analysis Techniques**

The data analysis technique in question was descriptive quantitative, derived from student response scores in the climate change literacy test and pro-environmental behaviour questionnaire. The converted data was then subjected to the Kolmogorov-Smirnov normality test in order to determine the normal distribution of the data with a significance level of 5%. Furthermore, a linearity test was conducted with a 5% significance level. The Spearman Rank Correlation nonparametric test was conducted as an alternative to the correlation test because the data was not normally distributed.

**RESULTS AND DISCUSSION**

The result of Spearman Rank Correlation test from combined data can be seen in Table 2.

**Table 2**
The Result of Spearman Rank Correlation Test from Combined Data

| | | | PEB | Correlation Category |
|---|---|---|---|---|
| Spearman's rho | CCL | Correlation Coefficient | .969** | Very Strong |
| | | Sig. (2-tailed) | .000 | |
| | | N | 386 | |

Table 2 showed a positive and very strong correlation between climate change literacy (CCL) and pro-environmental behaviour (PEB) from combined data with correlation coefficient 0.969. The data analysis in Table 2 indicated that the Spearman Rank Correlation value between climate change literacy and pro-environmental behaviour was 0.969, exceeding the 0.05 threshold. This suggested a positive and very strong relationship. Furthermore, the percentage contribution of climate change literacy skill to pro-environmental behaviour was 93.8%. This could be observed from the results of the Spearman correlation in Table 2, after which the coefficient of determination was sought. Therefore, it could be concluded that if climate change literacy skill was high, the value of pro-environmental behaviour would also be high.

The findings of this study could reinforce previous findings that there was a positive and significant relationship between climate change literacy and pro-environmental behaviour ((Chankrajang & Muttarak, 2017; Hoffmann & Muttarak, 2020). Individuals who have gained awareness about climate change, such as the causes of climate change, were more likely to adopt pro-environmental behaviour because they were more aware of the causes of climate change.

All students who participated in this study were enrolled in a biology course and learned about ecosystem and climate change. The results of the interviews indicated that students had received knowledge on climate change and had engaged in hands-on learning activities. Students have understood the basic principles of climate change and its causes. The knowledge of climate change possessed by an individual can influence their self-perception regarding climate change mitigation.

Consequently, an individual might engage in pro-environmental behaviors (Hoffmann & Muttarak, 2020).

Education is a significant factor in an individual's awareness of climate change, accounting for up to a quarter of this awareness (Hoffmann & Muttarak, 2020). Education plays an important role in the level of awareness that positively influences decision-making for environmental behaviour. It revealed an important role in understanding the causes and effects of climate change, thereby triggering pro-environmental behaviour. The acquisition of cognitive skills through the process of schooling could influence the level of sensitivity to risk management and decision-making, which were important elements of pro-environmental behaviour (Rosi, Bruine de Bruin, Del Missier, Cavallini, & Russo, 2019).

**The Analysis of Correlation Between Climate Change Literacy and Pro-Environmental Behaviour from Each School in Demak**

This research also analysed the data from 3 schools. The result of Spearman Rank Correlation test from each school data could be seen in Table 3.

**Table 3**
The Result of Spearman Rank Correlation Test from Each School

| School | Sig. | Coeficient of Correlation | Category |
|---|---|---|---|
| School A | 0.000 | 0.960 | Very Strong |
| School B | 0.000 | 0.979 | Very Strong |
| School C | 0.000 | 0.971 | Very Strong |

Table 3 showed a positive and very strong correlation between climate change literacy and pro-environmental behaviour from each school. School A gained the coefficient of correlation 0.960 (very strong). School B received the coefficient of correlation 0.979 (very strong), also School C with coefficient correlation 0.971 (very strong).

The research data also revealed a positive and very strong relationship between climate change literacy and pro-environmental behaviour from each school (Table 3). Data from three schools indicated that climate change literacy skills was at a moderate level, with a percentage of 63.8% (School A), 61.8% (School B), and 53.3% (School C). Additionally, students' pro-environmental behaviour was also in the medium category, with a percentage of 68.7% (School A), 66.4% (School B), and 66.7% (School C). This might be one of the reasons for the very strong correlation between climate change literacy and pro-environmental behaviour.

School A and School B possessed a high score in indicator of awareness the climate change causes (climate change literacy) and showed a high score in indicator of encompassing saving and utilisation efficiency to conserve energy from natural resources (pro-environmental behaviour). These findings provided a strong indication that School A has a positive and very strong relationship with climate change literacy and pro-environmental behaviour. This finding was also consistent with the result of previous research, which indicated that individuals who were aware of the causes of climate change might be more likely to use resources efficiently (Halady & Rao, 2010).

High scores in indicator awareness of government policies related to climate change (climate change literacy) and high scores from indicator of behaviour of active engagement with social issues pertaining to the environment (pro-environmental behaviour) were possessed by School C. This indicated that students' awareness of government policies about climate change was related to the behaviour of active engagement with social issues pertaining to the environment. The result of interview showed that students from School C has a good understanding of the government policy in Demak, such as mangrove reforestation program toward coastal area protection. In addition, students have also conducted mangrove planting activities alongside residents from the coastal area. This reflected that students who were aware of government policy could engage the local community to protect the environment. Previous research also stated that individuals who were aware of the government policies about climate change mitigation could move to engage with the local community regarding activities that led to environmental protection (Hügel & Davies, 2020).

**The Analysis of Correlation Between Climate Change Literacy and Pro-Environmental Behaviour from Each Grade in 3 Schools in Demak**

This study also examined the relationship between climate change literacy and pro-environmental behaviour at the level of grade differences from high school student. The result of Spearman Rank Correlation test from each grade data could be seen in Table 4.

**Table 4**
The Result of Spearman Rank Correlation Test from Each Grade in 3 Schools

| School | Grade | Sig. | Coeficient of Correlation | Category |
|---|---|---|---|---|
| School A | 10th | 0.000 | 0.959 | Very Strong |
| | 11th | 0.000 | 0.942 | Very Strong |
| | 12th | 0.000 | 0.963 | Very Strong |
| School B | 10th | 0.000 | 0.974 | Very Strong |
| | 11th | 0.000 | 0.983 | Very Strong |
| | 12th | 0.000 | 0.975 | Very Strong |
| School C | 10th | 0.000 | 0.947 | Very Strong |
| | 11th | 0.000 | 0.976 | Very Strong |
| | 12th | 0.731 | 0.160 | No Correlation |

Table 4 showed a positive and very strong correlation between climate change literacy and pro-environmental behaviour at School A and School B in all grades. In the meantime, School C revealed a positive and very strong correlation, except in 12th grade with the coefficient correlation 0.160. It shows that there's no correlation between climate change literacy and pro-environmental behaviour.

Upon closer examination of the data from each grade, School A showed a positive and very strong correlation between climate change literacy and pro-environmental behaviour. It became evident that all grade levels 10th, 11th, and 12th at School A exhibited the highest scores in climate change literacy, as indicated by their responses to questions about awareness of climate change causes. This was particularly evident in their responses to statements about behaviour of efficiency and utilisation of natural resources, which gauges their pro-environmental behaviour. This indicated that students who were aware of climate change, particularly of the climate change causes, were more likely to adopt energy-saving behaviours. Research by Abbasi and Nawaz (2020) suggested that awareness of the causes of climate change could influence behaviour because of the desire to have a good environment.

The students of School B in grades 10th, 11th, and 12th achieved the highest scores on questions about awareness of climate change causes on climate change literacy. Conversely, the pro-environmental behaviour of School B students obtained different highest scores. The highest scores were achieved by students in 10th grade on statement 7 (behavioural indicators of waste reduction), 11th grade on statement 1 (behavioural indicators of saving and efficient use to conserve energy from natural resources), and 12th grade on statements 7 and 16 (behavioural indicators of waste reduction and active behaviour towards social problems in society).

The level of climate change literacy among students at School B was significantly correlated with their engagement with climate change-related behaviours on multiple fronts. Primarily, an understanding of the underlying causes of climate change could motivate students to reduce their waste production. This was purported to be influenced by the tendency of 10th grade students at School B to frequently bring their lunches from home, as evidenced by student interviews. This practice was believed to contribute to a reduction in the accumulation of waste at the school.

Secondly, climate change literacy in relation to the indicator of awareness of the causes of climate change can motivate students to conserve energy. It was evident that students were more inclined to turn off the tap when washing their face rather than leaving it on without turning it off. This finding indicated that individuals who were aware of the causes of climate change tend to choose to save energy because they were aware of the impact of climate change on environmental sustainability (Niamir & Filatova, 2016).

Climate change literacy also encouraged students to engage in active socialisation towards environmental issues in the community. This was evidenced by students such as those who reminded family members to dispose of garbage in the appropriate receptacle. Adolescents who were aware of

climate change were more likely to choose to disseminate information and educate others about the importance of positive behaviour towards the environment (Narksompong & Limjirakan, 2015).

The 10th grade students of School C achieved the same score on questions in indicators of awareness the causes of climate change and indicators of awareness of government policies related to climate change. Pro-environmental behaviour was evidenced by a high score on indicators of pro-environmental mobility and transportation, waste reduction behaviour, waste recycling behaviour. This indicated that students who were aware of climate change were more likely to engage in pro-environmental behaviours, such as utilising public transportation (bus, angkot). Research conducted by Sekhokoane et al. (2017) demonstrated that students who possessed a high level of awareness of climate change were more inclined to adopt environmentally sustainable behaviours, such as opting for environmentally friendly modes of transportation when they travelled.

The 11th grade students demonstrated the highest level of climate change literacy skills on question awareness of government policies related to climate change. Conversely, the students exhibited the highest level of pro-environmental behaviour on statement saving behaviour and efficient use of natural resources to conserve energy. The government's policies to tackle climate change, such as the construction of flood barriers, could effectively activate students' awareness of the need to adopt pro-environmental behaviour through small, everyday actions, such as turning off the tap when brushed their teeth. This could be evidenced by the fact that awareness of climate change could prompt individuals to engage in small-scale environmental protection measures. Government policies on climate change could demonstrate that climate change could be addressed through specific environmental treatments (Ünal et al., 2019; Bouman et al., 2020).

The results of the analysis conducted in 12th grade of School C indicated that there was no correlation between climate change literacy and pro-environmental behaviour (Table 4). It was well documented that two climate change literacy questions elicit low scores: a question about an indicator of awareness of the risks of climate change and a question about an indicator of awareness of government policies related to climate change. Meanwhile, students' pro-environmental behaviour scores were observed to be relatively high. The indicator with a low score was behaviour of consuming environmentally friendly products.

The results indicated that students who exhibited low awareness of the risks of climate change also exhibited low pro-environmental behaviour with regard to the consumption of environmentally friendly products. Previous research has demonstrated that low awareness of the risks of climate change could impede an individual's capacity to assist in the reduction of the negative impacts of climate change (Xie et al., 2019; Wang et al., 2021). Consequently, it was challenging to implement actions that could mitigate the adverse effects of climate change, such as low pro-environmental behaviour towards the consumption of environmentally friendly products. The analysis of the discussion yielded no evidence of differences in climate change literacy skill and pro-environmental behaviour among students from different grades. Nearly all classes from the three schools achieved the highest score on several indicators of the two variables, indicating the need for more specific measurements to identify potential differences.

## CONCLUSION

The findings of this study indicated a significant and positive correlation between climate change literacy skills and students' pro-environmental behaviour. This was evidenced by the correlation value of 0.969. This was also observed in the data from each school and the data from each grade. However, one data set did not demonstrate a correlation, namely the data from grade 12 from one of school. The study revealed that indicators of climate change literacy, specifically awareness of climate change causes and government policies related to climate change, were playing a pivotal role in influencing pro-environmental behaviour. This research is a cross-sectional study. Consequently, the study was only capable of deriving broad conclusions. It is important to note that the study is limited in its ability to elucidate the relationship between variables over time. Therefore, experimental and longitudinal studies must be conducted to elucidate the temporal dynamics of the relationships under investigation. To further explore the research, experimental and longitudinal studies are necessary.

## REFERENCES

Abbasi, Z. A. K., & Nawaz, A. (2020). Impact of Climate Change Awareness on Climate Change Adaptions

and Climate Change Adaptation Issues. *Pakistan Journal of Agricultural Research*, *33*(3), 619–636. https://doi.org/10.17582/journal.pjar/2020/33.3.619.636
Arifin, Z. (2014). *Penelitian Pendidikan: Metode dan Paradigma Baru*. Bandung: PT Remaja Rosdakarya.
Arikunto, S. (2017). *Pengembangan Instrumen Penelitian dan Penilaian Program*.Yogyakarta: Pustaka Pelajar.
Asrofi, A., Hardoyo, S. R., & Sri Hadmoko, D. (2017). Strategi Adaptasi Masyarakat Pesisir Dalam Penanganan Bencana Banjir Rob Dan Implikasinya Terhadap Ketahanan Wilayah (Studi Di Desa Bedono Kecamatan Sayung Kabupaten Demak Jawa Tengah). *Jurnal Ketahanan Nasional*, *23*(2), 1. https://doi.org/10.22146/jkn.26257
Azevedo, J., & Marques, M. (2017). Climate literacy: A systematic review and model integration. *International Journal of Global Warming*. Inderscience Enterprises Ltd. https://doi.org/10.1504/IJGW.2017.084789
Bouman, T., Verschoor, M., Albers, C. J., Böhm, G., Fisher, S. D., Poortinga, W., … Steg, L. (2020). When worry about climate change leads to climate action: How values, worry and personal responsibility relate to various climate actions. *Global Environmental Change*, *62*. https://doi.org/10.1016/j.gloenvcha.2020.102061
Busch, K. C., Henderson, J. A., & Stevenson, K. T. (2019). Broadening epistemologies and methodologies in climate change education research. *Environmental Education Research*. Routledge. https://doi.org/10.1080/13504622.2018.1514588
Capstick, S., Nash, N., Whitmarsh, L., Poortinga, W., Haggar, P., & Brügger, A. (2022). The connection between subjective wellbeing and pro-environmental behaviour: Individual and cross-national characteristics in a seven-country study. *Environmental Science and Policy*, *133*, 63–73. https://doi.org/10.1016/j.envsci.2022.02.025
Chankrajang, T., & Muttarak, R. (2017). Green Returns to Education: Does Schooling Contribute to Pro-Environmental Behaviours? Evidence from Thailand. *Ecological Economics*, *131*, 434–448. https://doi.org/10.1016/j.ecolecon.2016.09.015
Eskenazi, B., Etzel, R. A., Sripada, K., Cairns, M. R., Hertz-Picciotto, I., Kordas, K., … Zlatnik, M. G. (2020). The international society for children's health and the environment commits to reduce its carbon footprint to safeguard children's health. *Environmental Health Perspectives*, *128*(1). https://doi.org/10.1289/EHP6578
Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to Design and Evaluate Research in Education* (8th ed.). New York: Mc Graw Hill.
Halady, I. R., & Rao, P. H. (2010). Does awareness to climate change lead to behavioral change? *International Journal of Climate Change Strategies and Management*, *2*(1), 6–22. https://doi.org/10.1108/17568691011020229
Haloho, E. H., & Purnaweni, H. (2020). *Adaptasi Masyarakat Desa Bedono Terhadap Banjir Rob Di Kecamatan Sayung, Kabupaten Demak, Jawa Tengah Oleh*.
Han, H., & Ahn, S. W. (2020). Youth mobilization to stop global climate change: Narratives and impact. *Sustainability (Switzerland)*, *12*(10). https://doi.org/10.3390/su12104127
Hoffmann, R., & Muttarak, R. (2020). Greening through schooling: Understanding the link between education and pro-environmental behavior in the Philippines. *Environmental Research Letters*, *15*(1). https://doi.org/10.1088/1748-9326/ab5ea0
Hügel, S., & Davies, A. R. (2020). Public participation, engagement, and climate change adaptation: A review of the research literature. *Wiley Interdisciplinary Reviews: Climate Change*, *11*(4). https://doi.org/10.1002/wcc.645
Kaida, N., & Kaida, K. (2016). Pro-environmental behavior correlates with present and future subjective well-being. *Environment, Development and Sustainability*, *18*(1), 111–127. https://doi.org/10.1007/s10668-015-9629-y
Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behavior: The specific composition of a general performance. *Personality and Individual Differences*, *36*(7), 1531–1544. https://doi.org/10.1016/j.paid.2003.06.003
Kolenatý, M., Kroufek, R., & Činčera, J. (2022). What Triggers Climate Action: The Impact of a Climate Change Education Program on Students' Climate Literacy and Their Willingness to Act. *Sustainability (Switzerland)*, *14*(16). https://doi.org/10.3390/su141610365
Kurisu, K. (2015). *Pro-Environmental Behaviors*. Japan: Springers Tokyo Heidelbers.

Kusuma, M. A., Liesnoor, D. S., & Suhandini, P. (2016). *Dampak Rob terhadap Perubahan Sosial Masyarakat di Kawasan Rob Desa Bedono Kecamatan Sayung Kabupaten Demak*. http://journal.unnes.ac.id/sju/index.php/jess

Lehnert, M., Fiedor, D., Frajer, J., Hercik, J., & Jurek, M. (2020). Czech students and mitigation of global warming: beliefs and willingness to take action. *Environmental Education Research*, *26*(6), 864–889. https://doi.org/10.1080/13504622.2019.1694140

Meyer, A. (2015). Does education increase pro-environmental behavior? Evidence from Europe. *Ecological Economics*, *116*, 108–121. https://doi.org/10.1016/j.ecolecon.2015.04.018

Nabilah, H., & Hariyono, E. (2021). Analysis on Climate Literacy Capacity of Level XI High School Students in Surabaya. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *9*(1), 28. https://doi.org/10.33394/j-ps.v9i1.3816

Nadya, N., & Salim, A. (2023). Pengaruh Sea Level Rise di Wilayah Perkotaan Indonesia. *SENSISTEK*, *6*(1), 52–55. https://doi.org/10.62012/sensistek.v6i1.24248

Narksompong, J., & Limjirakan, S. (2015, July 1). Youth Participation in Climate Change for Sustainable Engagement. *Review of European, Comparative and International Environmental Law*. Blackwell Publishing Ltd. https://doi.org/10.1111/reel.12121

Niamir, L., & Filatova, T. (2016). *From Climate Change Awareness to Energy Efficient Behaviour*. http://www.iemss.org/society/index.php/iemss-2016-proceedings

P. Singh, K. D., & Mathur, A. (2019). Climate Literacy and Individual Consumption Behavior: An Evaluation of the Indian Experience. *European Journal of Sustainable Development*, *8*(5), 187. https://doi.org/10.14207/ejsd.2019.v8n5p187

Powdthavee, N. (2020). *The Causal Effect of Education on Climate Literacy and Pro-Environmental Behaviours: Evidence from a Nationwide Natural Experiment*.

Rosi, A., Bruine de Bruin, W., Del Missier, F., Cavallini, E., & Russo, R. (2019). Decision-making competence in younger and older adults: which cognitive abilities contribute to the application of decision rules? *Aging, Neuropsychology, and Cognition*, *26*(2), 174–189. https://doi.org/10.1080/13825585.2017.1418283

Sanson, A. V., Van Hoorn, J., & Burke, S. E. L. (2019). Responding to the Impacts of the Climate Crisis on Children and Youth. *Child Development Perspectives*, *13*(4), 201–207. https://doi.org/10.1111/cdep.12342

Sekhokoane, L., Qie, N., Rau, PL.P. (2017). Do Consumption Values and Environmental Awareness Impact on Green Consumption in China? *Lecture Notes in Computer Science*, 10281. Springer, Cham. https://doi.org/10.1007/978-3-319-57931-3_58

Srivastava, V. (2024). Study of climate literacy and pro-environmental behavior amongst students. *Citizenship, Social and Economics Education, 23*(1), 31-46. https://doi.org/10.1177/14788047241246806

Thanjaya, R. D. C. (2021). *Analisis Risiko Sosial Bencana Banjir Rob di Pesisir Kabupaten Demak*. Universitas Muhammadiyah Surakarta.

Ünal, A. B., Steg, L., & Granskaya, J. (2019). "To support or not to support, that is the question". Testing the VBN theory in predicting support for car use reduction policies in Russia. *Transportation Research Part A: Policy and Practice*, *119*, 73–81. https://doi.org/10.1016/j.tra.2018.10.042

Wang, C., Geng, L., & Rodríguez-Casallas, J. D. (2021). How and when higher climate change risk perception promotes less climate change inaction. *Journal of Cleaner Production*, *321*. https://doi.org/10.1016/j.jclepro.2021.128952

Xie, B., Brewer, M. B., Hayes, B. K., McDonald, R. I., & Newell, B. R. (2019). Predicting climate change risk perception and willingness to act. *Journal of Environmental Psychology*, *65*. https://doi.org/10.1016/j.jenvp.2019.101331

Yu, T. Y., & Yu, T. K. (2017). The moderating effects of students' personality traits on pro-environmental behavioral intentions in response to climate change. *International Journal of Environmental Research and Public Health*, *14*(12). https://doi.org/10.3390/ijerph14121472

Zawadzki, S. J., Steg, L., & Bouman, T. (2020). Meta-analytic evidence for a robust and positive association between individuals' pro-environmental behaviors and their subjective wellbeing. *Environmental Research Letters*. IOP Publishing Ltd. https://doi.org/10.1088/1748-9326/abc4ae