



Awareness of local people environmental issue and young people's interest in climate change in Surakarta City, Central Java, Indonesia

NGUYEN THI HUE¹, DANG VAN MINH¹, ERNOIZ ANTRIYANDARTI^{2*}

¹ *Environmental Science and Management, Faculty International Programs Office, Thai Nguyen University of Agriculture and Forestry, Thai Nguyen, 24119, Vietnam;*

² *Agribusiness Department, Faculty of Agriculture, Sebelas Maret University, Surakarta, 57126, Indonesia;*

*Correspondence: ernoiz_a@staff.uns.ac.id

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ABSTRACT

Background: The effects of climate change in the atmosphere are starting to appear. This is clear, not only that it impacts the natural world, but also human cultures. In Indonesia, according to the IPCC estimates, these impacts are expected to increase over the coming decades. The temperature will increase, the amount of rainfall will decline and the rise in the sea level will impact a variety of coastal areas. Extreme weather conditions are also becoming more and more common, triggering problems such as flooding and droughts. Such developments present a significant challenge to human existence, economic growth, and the natural environment on which humans rely primarily for their prosperity. Moreover, these changes affect different levels and in different ways in every society. **Methods:** This research would have a general context for potential forecasts of the field of focus on climatic factors and climate change. The purpose of this study is to assess adolescents and local people on how local people appreciate and care about climate change in the city of Surakarta. The effort should also be made to examine for the area the factors that render society's essential realms susceptible to severe weather events. **Results:** The goal of this is to explain at some level the causes that increase the susceptibility of the local community when subjected to different triggers, as the effectiveness of adaptation or mitigation approaches is subject to population dynamics along with other variables.

KEYWORDS: awareness; climate change; human behavior; knowledge; local people; young people.

1. Introduction

Climate change which is a method of altering the climate environment over a lengthy period and across a large region due to natural causes or human activities has become a global concern. Normal cycles provide a limited impact on climate change, while human action is the most important factor in climate change. According to the United Nations Framework Convention on Climate Change (UNFCCC)(1992), explain that climate change is a climate transition that is specifically or implicitly due to human intervention that changes the structure of the global environment and exists in comparison to the normal climate variation found over similar periods. Climate change impacts environmental, social and economic processes. This limits the supply of healthy food and clean water and

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threatens wildlife and sustainable breathing conditions. This leads to poverty, poor health, and displacement, leaving young people especially vulnerable. Impacts of climate change involve but are not limited to, melting ice, rising sea levels and increasing the occurrence of severe weather conditions such as droughts, cyclones or heavy rainfall. The International Panel on Climate Change (IPCC)(2014) has stated that proof of a human impact on climate change is well-defined.

Climate change is related to global economic changes impacting the progress of industrialization, including greenhouse gas emissions. Greenhouse gases consist of many pollutants, one of which is carbon dioxide (CO₂), which is primarily generated through fuel-burning operations. The production of CO₂ has risen by 31 percent since 1750 (Houghton et al., 2001) which was largely attributed to deforestation, shipping operations, and the manufacturing field. Scientists have found certain indicators of climate change: Since 1861, global surface temperatures have risen by 0.6 oC and then by 0.6 ± 0.2 oC over the 20th century. Likewise, the global sea level increased from 0.1 to 0.2 meters in the 20th century. Finally, snow and ice cover reduced by around 10%. Global change is expected to impact both the climate and the human species, while human wellbeing is influenced by environmental factors.

Climate change negatively affects people, including their wellbeing, in a variety of areas. The rising global temperatures are creating issues for people with respiratory conditions such as asthma. Data recorded a rise in the occurrence of extreme asthma after a thunderstorm during the pollen season owing to allergy(D'Amato et al., 2007). Another case stated that heavy precipitation, rising temperatures, and wind affect outdoor physical activity, including young people and local people(Chan & Ryan, 2009). Physical activity is one of the determinants of wellbeing. Some health consequences of climate change are linked to vector-borne diseases. As a consequence of climate change, economic position, vector control capacity, and drug resistance (Githeko et al., 2000). According to this data, climate change and human health are interrelated.

As a broad archipelago community, Indonesia is one of the countries susceptible to climate change owing to its geographical position and subtropical environment, and also has a high population density that relies on agriculture. Higher sea levels, flooding, droughts, and landslides are several types of climate change threats that affect Indonesia. According to PEACE (2007) defined environmental change in Indonesia has been recorded since 1990 as a consequence of a temperature rise of around 0.3 oC which has happened all year round in all seasons. During precipitation, Indonesia is projected to receive about 2-3 percent more precipitation per year as a consequence of climate change. Over the past three decades, Indonesia has undergone many disasters, 80 percent of which have been related to climate change (J. Hakam, 2014). This has proven that Indonesia is a nation that is very susceptible to climate change.

The selection of the Central Java province was based on a variety of factors. Firstly, Central Java is a region vulnerable to natural hazards such as earthquakes, volcanic eruptions, flooding, landslides, droughts and declining coastlines. This is the most rugged area of Indonesia, with its fertile land and plentiful waterways (Bemmelen, 1949). Secondly, the region of 32.38 million inhabitants is the most populated (BPS Provinsi Jawa Tengah, 2014.). Thirdly, Central Java has undergone accelerated urbanization since the 1980s, with the negative consequences of strong civil turmoil (Heijmans, 2012). Surakarta is a city in Indonesia that has been faced with climate change, including its effects on safety. However, insufficient work has assessed climate change and its effects on this region. With a population of more than 550.000 people, Surakarta is a densely populated city (Indonesia Access, 2018).

Surakarta is one of the towns on the island of Java that is prone to floods. Floods that occur can be triggered by the outburst of the Bengawan Solo River or by floods due to heavy rainfall. Historically, in 1966, Surakarta suffered massive flooding in the city square of Surakarta. Furthermore, Surakarta is a metropolitan city with restricted natural wealth. Agricultural land is shrinking more and more due to the transfer of roles to cities, commerce, and manufacturing. This has an effect on the diminishing position and

commitment of the agricultural sector to sustain regional development and to the gain of agricultural products such as food crops, forestry, fisheries and livestock (Isharyanto, 2018).

Sight by youth, awareness and residents regarding the effects of climate change on wellbeing is a significant aspect of this for a variety of factors. First, it is necessary for adolescents and local people to have better adaptability, today's young people are tomorrow's representatives, decision-makers and scholars. As a consequence, this community should have a significant impact in the future, not just as lay citizens, but also in different occupational positions. A basic example: once teenagers realize that access to sunlight is detrimental to their bodies, they may take adequate preventive steps. Understanding respondents' desire for knowledge on the cause of climate change is an integral aspect of delivering accurate and reliable research. Second, teens or young adults are the ideal drivers of transformation to be the bearers of the announcement of climate change. From an ethical point of view, it is important to listen and learn from this audience, because young people would more certainly face a larger responsibility on the adverse effects of climate change than older people. A variety of experiments have effectively engaged teens as message bearers, ensuring that local people should have more awareness about climate change to find opportunities to avoid and adjust them (IPPF, 2014). From an ethical point of view, it is important to listen and learn from this audience, because young people would more certainly face a larger responsibility on the adverse effects of climate change than older people.

This study aims to assess the awareness of young people and local people about climate change, the factors affecting their awareness, health and local policies to raise awareness and make recommendations on appropriate actions to enhance the awareness and interest of young people and indigenous people about climate change.

2. Methods

2.1 Research location

This research conducted in Surakarta, Central of Java, Indonesia. With a population of more than 550.000 people. Surakarta a densely populated city (Indonesia Access, 2018). Surakarta is part of Central Java province. With a population of more than 550,000, Surakarta is a densely populated city. However, due to recent environmental changes that are taking place, it is really important that the awareness of the local people and the young people gathered between the ages of upper secondary and tertiary levels are not yet realized.

2.2 Research Design

This research is using descriptive statistics, an effective method for collecting and analyzing data. Surveys and Interview will employee including personal interaction between the researcher and participants to collect the necessary information.

2.3 Sampling Technique

The survey method was adopted as the research strategy to address the aim of the research. To conduct the study, the researcher will use a Descriptive Sampling Method. All close-ended questions will be asked to better define the characteristics of the respondents.

3. Results and Discussion

3.1 Survey analysis

According to the results of the survey, I carried out in the municipality of Surakarta city, a vast number (62%) of those participated are highly confident of ever hear about climate change before and have the knowledge (Fig. 1(a)). While a proportion of the interviewees have never heard about climate change in living take (24%) and they only have a small knowledge of climate change. Lastly, who stated unaware of the issue, account for 14%.

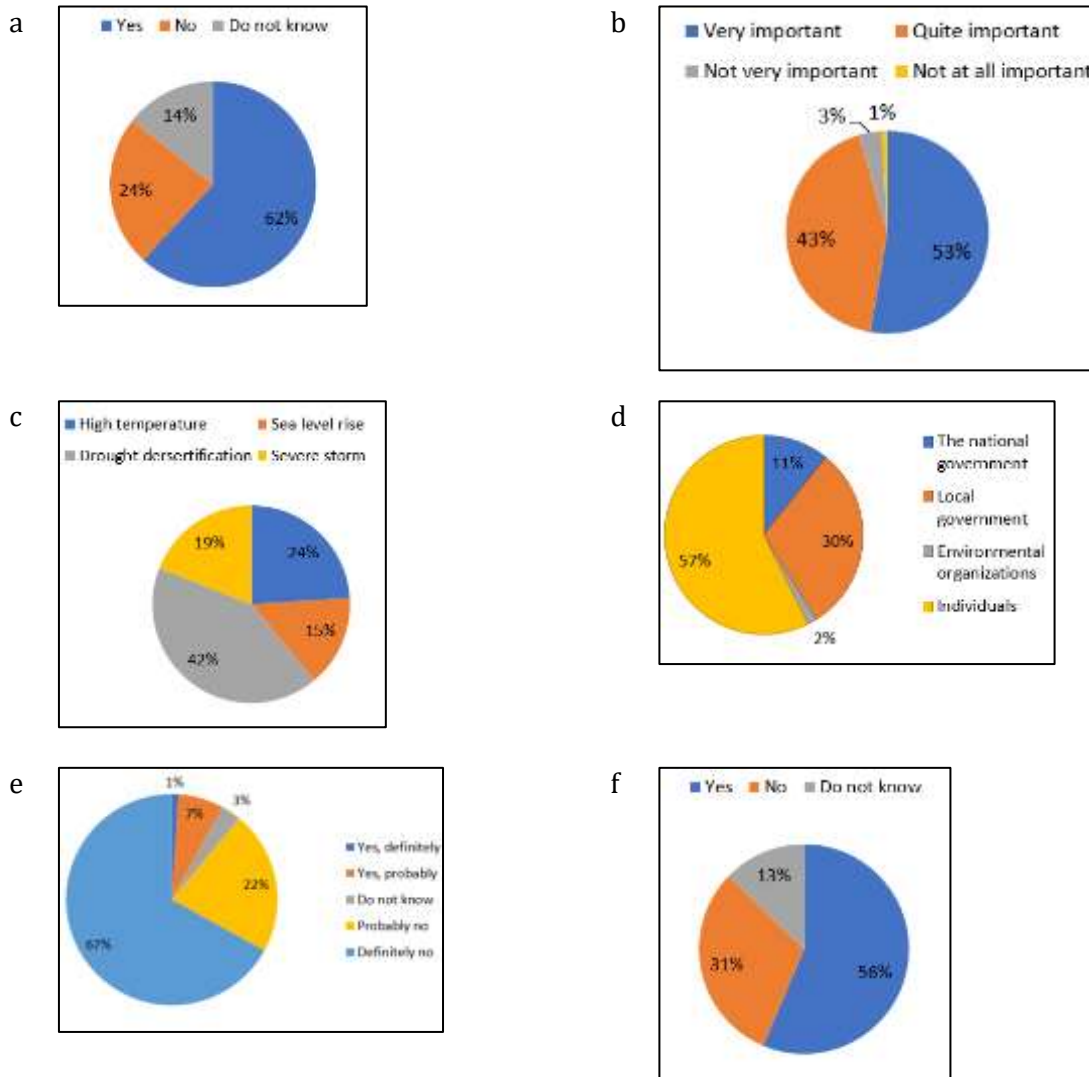


Fig. 1 (a) Results in percentages of question 1. “Have you ever heard about climate change?”; (b) Results in percentages of question 2. “How important is the issue of climate change to you personally; (c) Results in percentages of question 3: Which of these natural events affect climate change in the region?; (d) Results in percentages of question 4: “Who do you think should have the main responsibility for tackling climate change?”; (e) Results in percentages of question 5. “Do you think that the local authorities are adequately prepared to cope with the possible impacts of climate change?”; (f) Results in percentages of question 6: “Have you ever taken or do you regularly take, any action out of concern for climate change?”.

In the same manner, the majority of respondents answered with high confidence or with some reservations that climate change is a problem issue personally. More than half of them (53%) are highly confident to say that climate change is a very important issue personally (Fig. 1(b)). While smaller percentage amounts for those who are quite important (43%) therefore, there are (3%) as to whether they do not feel climate change is a problem issue for personally. Those who stated unaware of the issue, account for 1%. The results revealed that most interviewees view as the worst threat (Fig. 1 (c)) drought and desertification (42%), followed by higher temperatures (24%); severe storms (19%), and sea-level rise (15%). Survey results show that the majority of respondents (57%) consider that individuals are the main subjects responsible for climate change, followed by the local authorities where they live (30%); national government (11%); environmental organization (2%), (Fig. 1 (d)).

The next graph (Fig. 1(e)) provides information of the level of trust the inhabitants have for the local authorities coping ability, whereas a large percentage of them believe that are not adequately prepared to great extend (67%), followed by those who gave a negative response but remained skeptical. Only 1% of them were highly confident that the local authorities are prepared enough, while 7% of them gave a positive answer with some reservations. Those who stated unaware of the issue, account for 3%. More than half of the interviewees (Fig. 1(f)) (56%) have taken actions related to climate change such as planting trees, collecting rubbish on the beach, or participating in some environmental organizations. On the other hand, (31%) of their confidence consider that they had never participated in related activities to mitigate climate change. A relatively high percentage of person who had no opinion on the matter (13%).

In general, as can be seen from Figure 8, the strong combination of age groups believe in climate change for human reasons. A great percentage among the respondents (40%) in the 16-24 age group, the people who mainly participated in the survey were positive.

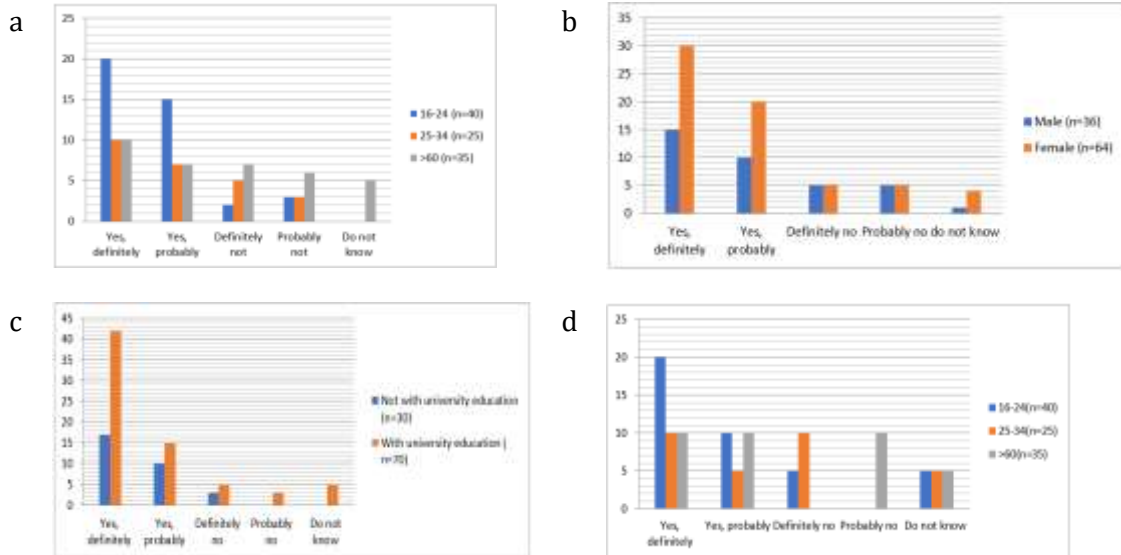


Fig. 2 (a) Correlation between age and belief in Climate Change due to human activities; (b) Correlation between gender and belief in Climate Change due to human activities; (c) Correlation between education level and belief in CC due to anthropogenic activities; (d) Correlation between age and the belief of having experienced extreme weather conditions caused by long-term global climate change.

Climate change is a significant issue in the globe. A suitable effort to mitigate the effect will then be tackled by reduction and adaptation. Inadequate understanding of climate change in a culture impacts their capacity to manage and respond. Adolescents and people

who are part of civilization are likely to confront climate change in the future. On the other side, teenagers are great drivers of transformation to send climate change messages. Knowing and finding a gap in adolescents and people's knowledge of climate change is essential to ensure proper engagement with adolescents and local people. There is a growing view that knowledge is one of the key aspects of community building adaptive capacity, so knowledge measurement is needed (Williams et al., 2015)

The correlation between gender and belief in climate change caused by human behaviors have demonstrated that both males and females are nearly comparable. They are very confident about this (Fig. 2(b)). The higher number (n) of women is mainly because they were more willing to take part in the survey than men were during the survey.

According to the survey figures (Fig. 2(c)), 70% of those questioned at the level of education believe that climate change is the consequence of human activities. Besides, 30 percent of respondents who have not gone to any university or who have reached only till elementary education such as also shared the same opinion on climate change. Furthermore, the correlation between the level of education of respondents and the belief in climate change due to artificial activities shows that the majority of respondents have high school diplomas and university degrees. Trust deeply in climate change. In the meanwhile, a significant proportion applies to some that dispute that the environment is shifting owing to human activity.

On average, the correlation between age and the belief (Fig. 2(d)) that extreme weather conditions caused by long-term global climate change have been experienced has shown that respondents in all three age groups. For the most part, strongly believe in or give in to the possibility of experiencing extreme weather conditions due to global climate change.

In this study, we measured climate change knowledge among adolescents and university residents in the Surakarta city through a structured questionnaire, we find some knowledge weaknesses and strengths among participants. One hand, most of the participants (80%) in the survey had awareness simples about climate change such as what climate change is or what is the main cause of climate change. But besides that, they also have weaknesses. Firstly, those who clearly understand the definition of climate change mainly belong to the group of educated people or young students. In the other group, almost all surveyed people do not consider climate change a serious problem or they have low awareness of climate change. Poor understanding is probably correlated with their opinion that evidence of climate change is inconclusive. Second, participants did not recognize that climate change is caused by anthropogenic factors. It can also be seen from their perception that climate change was still an unbreakable mechanism, that climate change is triggered by a natural cycle. On the other side, it is evident that humans have led significantly to the rise in greenhouse gasses that have caused global warming and climate change. Consequently, as stated by the IPCC, the global population must stop emitting greenhouse gasses to prevent the severe impact of climate change.

In this study, it has been determined that adolescents are less experienced in climate change vulnerability than older people. Besides, they also identified that some parts of the people as well as students still do not know the concept of climate change. Considering this search research, it is necessary to include scientific climate change in the curriculum in schools. Besides, the mass media need to propose more information and local authorities should also hold propaganda sessions for people about the causes of climate change and its consequences.

Participants revealed that the majority of people know about climate change is the Internet, these people are aged from 16-24. Digital, mainstream, and online media, such as the Web, radio and tv, science journals, as well as newspapers and magazines, is the next participants' choice for knowledge outlets. Television is a popular means of entertainment in the Indonesian community because of its simplicity and cheapness. This result was almost identical to study in India, where around 60 percent of respondents claimed that

television is their source of knowledge on climate change (Pandve et al., 2011). Meanwhile, utilizing smartphones or gadgets has also become a common lifestyle in Indonesia. According to the Statista survey, smartphone users in Indonesia have grown steadily since 2011 to 2017. By 2017, it is estimated that more than 60 million people in Indonesia will use smartphones nearly 24 percent of Indonesia's total population. This result was aligned with findings that indicated that new media must be taken into consideration as the key resource for promoting public safety, not only as an auxiliary tool for promoting public health.

Participants' perception of climate change and its effect on public wellbeing is somewhat inconsistent. Improving teenage awareness would be compatible with the progress of all citizens, particularly those making decisions in the area of education. There are several drawbacks to the area of research. Referring to this research, we propose that future research should develop a program to increase the knowledge and awareness of the community as a whole through an integrated program, not only training for youth and residents but also other family members and decision-makers. The curriculum should be implemented in a broader context to make a greater effect on society. Nevertheless, there is a need to concentrate on creating understanding about climate change in young people, because young people would be able to understand and pass on information to the people around them. Common channels, such as Tv, radio, and social media, may also be used to offer proof of climate change through amazing animations. Likewise, we recommend that all awareness tests be concluded with a realistic evaluation to include a detailed conclusion.

3.2 Factor analysis that affects awareness climate change in Surakarta

Regression analysis is about the reliance of one variable to one or more variables and with those variables, it is able to evaluate and/or forecast the (population) mean or average value of the former.

$$Y = A + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e \quad (\text{Eq. 1})$$

where:

- Y : Awareness of climate change
- A : Constant
- β : Regression coefficient
- X₁ : Gender
- X₂ : Education
- X₃ : Income

In this report, I used STATA software for analysis data. After conducting this study by spreading the questionnaire and survey 100 respondents, below is the table of Descriptive Statistics Data.

Table 1. Descriptive statistics data

Variable	Mean	Standard deviation	Minimum	Maximum
Gender	0.32	0.4688262	0	1
Education	13.93	2.91376	9	16
Income	1035000	752957.1	500000	3500000
Score	49.32	20.02215	20	100

Table 1 presents the minimum score awareness of climate change which is 20 and the maximum score is 100, the range age of the respondents was from 16 years old to more than 60 years old with the shortest education is 9 years and the longest is 16 years

education. Moreover, the table also showed the mean of the data and the standard deviation of the data. From the data table, this study been successful in comparing each category to find if there is positively significant data.

Table 2. Analysis of factors that affecting awareness climate change in Surakarta

Variable	Coefficient	Standard Error
Gender	5.243586	4.149525
Education	-1.617963**	0.6863409
Income	-7.27e-06***	2.63e-06
Constant	77.70177***	10.94174
F-stat	4.24***	
R-squared	0.1170	
Number of observations	100	

Note: ***Significant at 99% confidence level; Significant at ** 95% confidence level

From the Table 11, we can see that the variable of gender does not affect to awareness climate change in Surakarta. This indicates that both male and female they have same awareness of climate change this finding is in contrast with previous research that that climate change had the most significant effects on people living in the Global South. Women and girls live in rural countries are the most endangered and are 14 times more likely to suffer than men during extreme changes and disasters. Females still reflect the bulk of individuals live below the poverty line. Gender roles in the Global South are further fragmented between disadvantaged neighborhoods and households, where women perform a more conventional position, such as caring for the home and raising babies (Arora-Jonsson, 2011).

The estimated parameter of education and income are negatively significant to awareness of climate change in Surakarta. This indicates shows that the person who have higher education and low score will have knowledge and understand surely about climate change and how climate change effects to theirs life. However, for the person who have high scores and the education is low mean that they have little knowledge about climate change . The effect of education on climate change awareness and conviction is less apparent than anticipated. Neither science education nor general education has any significant predictive impact on the knowledge that carbon emissions cause climate change. When the standard of general education rises, little to no understanding of climate change continues to decline, although the association is only important at the standard of degree and 'other' qualifications. The greatest impact of the educational level on all of the 'understanding' factors is to anticipate whether climate change may affect one: as awareness rises, the potential danger of climate change is substantially more probable (up to the first-degree stage, beyond which the predictive effect decreases). However, there is not the same hierarchical association with science education. Indeed, science-based respondents are slightly less likely to see climate change as a personal danger.

For income in that table give information that, the person who have higher income with low score more understand awareness of climate change. In addition to, the person who has low income will not have any knowledge about climate change. Higher income respondents who take environmentally relevant actions more often than not out of concern for environmental protection or moral obligation. 'Very high' wage respondents are more likely to learn about climate change from the Media and publications than people with lower incomes. Those on 'small' and 'extremely poor' incomes are more optimistic regarding climate change knowledge from government and electricity providers than people on higher incomes. Significantly more respondents of higher incomes pointed of fossil fuel emissions as a source of climate change, whereas lower-income classes are more likely to say little or little about climate change and believe like they are not and should not be impacted by climate change.

4. Conclusions

The growing history of weather events appears to make the local community more responsive and aware of climate change. This also suggests, according to the results, that the large percentage of personal confidence in climate change-related to anthropogenic behavior is closely connected to the actual reality of the urban community in significant proportions. As a result, the results of the survey revealed a high level of the vulnerability of the local population, as the prefecture, appears to be one of the many regions that, to a large extent, may face more losses in a number of sectors in the future as a result of climate change, especially if no adaptation measures are taken at municipal and government level, which would otherwise allow and encourage action at the individual level. Moreover, the findings of the survey underscore the personal belief in climate change, and that the subsequent phenomena that follow are a matter of urgency for adaptation measures. The results of the survey also indicate the willingness of the respondents to take active measures to adapt to the impact of climate change.

A bottom-up approach will allow it more clear and straightforward to adopt interventions that will improve the community's resilient ability, rather than focusing exclusively on long-term prevention and adaptation strategies whose real effect needs to be seen and can not account for existing losses. In general, people are more cynical regarding climate change and prefer to assume that individual acts are of little effectiveness. Women continue to believe that climate change is alarming, that they have a social responsibility to tackle climate change, and that further effort can be done by everyone (society, community, company, government) to fix climate change. While women are more often motivated by environmental concerns to take action, men are more often motivated by financial concerns. Such results also identified major gaps in public perception of climate change within various social classes. One potential reason may be that individuals with large salaries appear to have higher rates of schooling and are more prone to societal problems such as climate change. From the multiple regression results, it can be concluded that some of the factors that influence the awareness of young people and local residents on climate change in Surakarta are education, income and gender.

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All authors fully contributed to the writing of this article

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Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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Biographies of Author(s)

NGUYEN THI HUE, Environmental Science and Management, Faculty International Programs Office, Thai Nguyen University of Agriculture and Forestry

- Email:
- ORCID:
- Web of Science ResearcherID:
- Scopus Author ID:
- Homepage:

DANG VAN MINH, Environmental Science and Management, Faculty International Programs Office, Thai Nguyen University of Agriculture and Forestry

- Email:
- ORCID: <https://orcid.org/0000-0002-2845-4405>
- Web of Science ResearcherID:
- Scopus Author ID:
- Homepage:

ERNOIZ ANTRIYANDARTI, Agribusiness Department, Faculty of Agriculture, Sebelas Maret University

- Email: ernoiz_a@staff.unc.ac.id
- ORCID: <https://orcid.org/0000-0002-0948-4000>
- Web of Science ResearcherID:
- Scopus Author ID: 57201775415
- Homepage: