GREENHOUSE GASES AWARENESS AMONG LOCAL COMMUNITY IN SIMPANG EMPAT VILLAGE, MUALLIM PERAK

YUSOFF, M. M.[1*] – SISUN, A.[1] – CHING, G. H[2]. – HAMZAH, T. A. A. T.[1]
– ZAINUDDIN, Z.[1] – SAINI, K. M.[1]

[1]*Department of Geography, Faculty of Art and Social Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia.*

[2]*Department of Urban & Regional Planning, Faculty of Built Environment, University of Malaya, 50603 Kuala Lumpur, Malaysia.*

**Corresponding author*
e-mail: mariney@um.edu.my

(Received 13th January 2020; accepted 15th February 2020)

Abstract. The increase of greenhouse gases in the atmosphere have been affected the Earth's climate and contributed to the global warming issues which are the cooperation and responsibility of many stakeholders such as local communities play an important role to address the issue. The study aims to examine the local community awareness against greenhouse gases in the atmosphere. Simpang Empat Village, Muallim Perak has been chosen as a study area. The objectives of the study are to identify the relationship between the general knowledge of greenhouse gases with the educations level among the local community regarding the awareness of greenhouse gases in Simpang Empat Village Maullim, Perak. The result shows that the greenhouse gas awareness has been influenced by their own experiences and the rise of local heat temperature where they live in. The study also found the awareness of the local community influenced by the level of respondent's education particularly on disease outbreak and source of pollution. Therefore, the study shows the education aspect plays an important role to increase awareness among the local community in the rural area.
Keywords: *global warming, carbon emission, climate change, social awareness*

Introduction

The climate change is a global challenge that does not respect the national border which the greenhouse gas emissions can affect people everywhere (United Nation, 2018a). This is the reason why climate change is a global issue in which the attributes of greenhouse gases are not directly from a specific location of emission but it causes by the harmful emission from around the world (Cullet, 2008). Global warming has become the center of international environmental law and policy at least since the early 1990s and become one of the critical environmental issues today that attract widespread media attention (Drake, 2014).

This is due to the greenhouse gas emission is from human activities that continuously rise through time (United Nation, 2018a). Since after 70 years of the second war end the global economy has grown rapidly more than tenfold which fossil fuel such as oil, gas, and coal as main energy for the purpose of economic growth. As a result, the concentration of greenhouse gases particularly on carbon dioxide (Co2) has risen more than 40% before the revolution industrial began (Dobbins et al., 2015). According to Drake (2014), the Earth's atmosphere temperature it has estimated increased at the range of 1.50 C to 40 C which such change can lead to a significant impact on climate change which could be led to the changes of climate weather patterns, rising sea level or

more extreme weather events occur. Therefore, it is an issue that requires solutions that need to be coordinated at the international level and it requires international cooperation to help developing countries move toward a low-carbon economy.

Most scientists believed that the global warming event is due to climate change caused by the increase of greenhouse gases such as carbon dioxide (Co2) and other gases that trapped within on Earth's atmosphere (Drake, 2014). The overwhelming scientific evidence that human activities had caused the increase of the level of greenhouse gases in the atmosphere in which the increase may affect the Earth's climate in the future and the precise future impact remain shrouded in uncertainty (Dobbins et al., 2015). The accumulation of hot temperatures (thermal radiation) due to human activities can lead to environmental disasters such as floods, droughts and the spread of diseases among others (Yusoff et al., 2018). As a result, the poorest people are the most vulnerable and being affected the most as well as a marginalized group such as women, children and the elderly (United Nation, 2018b).

The increase of carbon dioxide emission due to the industrial revolution have been responsible for vast energy consumption by burning fossil fuel that releases large carbon dioxide emission and heat, as well as the increased of human ability and technology today, may further encourage the alteration the environment where they live (Dobbins et al., 2015; Von Grebmer et al., 2016). Furthermore, the increase in human needs particularly in developed countries have led to high energy consumption (Drake, 2014). Based on the United States Department of Energy 2015, the carbon dioxide emission mostly had been contributed by China 28%, the United States 16%, EU-28 10%, Russian Federation 6%, India 6%, Japan 4% and other countries 30% (Popescu & Luca, 2017).

However, the poorest people are most affected by the changes in climate. According to Cullet (2008), the developed countries have a higher capacity to mitigate and adapt to global warming by shifting to less environmentally harmful technologies and similarly to wealthier individuals have contributed more too global warming but also have more capacity to withstand the negative impact of climate change. Therefore, climate change is global issues that should be addressed at all levels from local, state and international to safeguard the lives condition of the future generation. However, breaking the connection between greenhouse gas emission and economic growth would entail a radical change against all sector behavior of the global economy such as transportation, energy, water system, agriculture, infrastructure and building (Dobbins et al., 2015).

Therefore, there has been increasing interest in how climate change occurred including Malaysia. According to Tang (2019), most of the research on climate change in Malaysia is more related to the effects of climate change and impacts on agriculture particularly on paddy yield and rice production (Vaghefi et al., 2011). Meanwhile, oil palm as the largest agricultural yield in Malaysia has been regarded as a culprit of tropical deforestation (Fitzherbert et al., 2008). Also, according to Fredolin et al. (2012) prediction a significant temperature rise in Malaysia will happen between 30C to 50C by the ends of 21Century. Therefore, climate change is global issues that should be addressed at all levels from local, state and international to safeguard the lives condition of the future generation. Therefore, the study will focus on the awareness of greenhouse gases particularly on what extent of local community's awareness influenced the level of respondent's education in Simpang Empat Village, Muallim, Perak.

Materials and Methods

Study area

Simpang Empat Village is one of the villages that existed in Muallim District, Perak and located nearby with Tanjung Malim Town. The Simpang Empat Village approximately located at $3^0$41'08.89"North $101^0$31'52.00"East as shown in *Figure 1*. The housing area is centrally built and lined which influenced by the road development in the area. The majority race of population in Simpang Empat Village consists to Malay people following by other races such as Chinese and Indian.

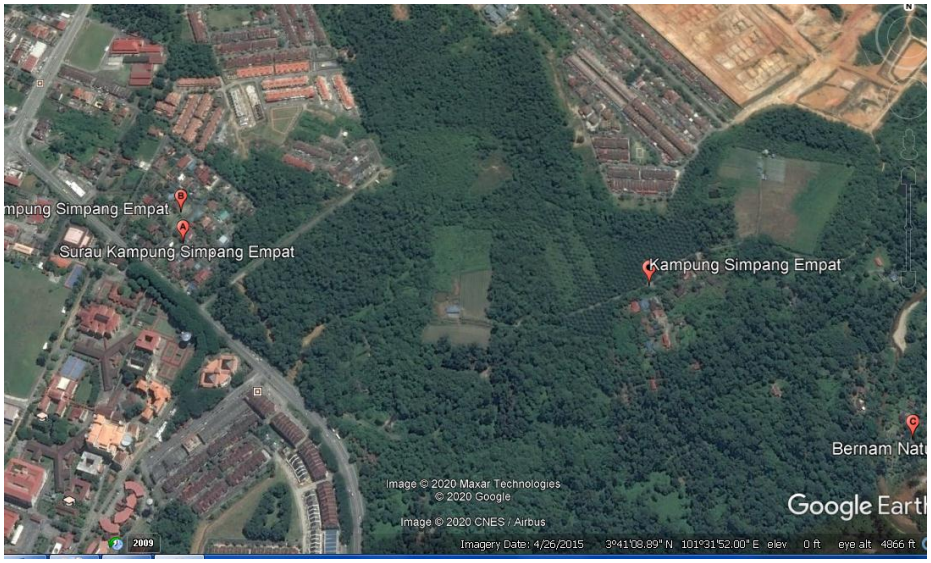

Figure 1. *Study area*

The study had employed the field study observation and questionnaire survey methods to investigate the social awareness of the village community in Muallim, Perak. Anyone that researcher came across during the study will be selected as a respondent which 67 of respondents have been selected using simple random sampling to represent 95 houses in Simpang Empat Village, Muallim, Perak. All the data that was collected keyed into IBM SPSS Statistic 23 for further analysis. The descriptive statistical analysis was used to view the frequency and percentage of respondent's demographics such as the gender, type of employment and education level. The descriptive statistical analysis was also used to identify the local community awareness based on general knowledge of greenhouse gases, the attitude of the local community towards nature preservation and the awareness of the local community towards greenhouse gas's impact on the environment and humans. The chi-square test for independent was used to view the relationship between two variable namely between the general knowledge of greenhouse gases and the level of respondent's educations which to see what extent the local community awareness under the influence of their level education or there is no relationship of their awareness with their level of education at all. The chi-square test will be based on Pearson chi-square (p) values which are if p values are more than p = 0.05 there is statistically significant (have a relationship) while if the p values are less than p = 0.05 there is no statistically

significant (no relationship). Therefore, the Simpang Empat Village, Muallim, Perak was selected as the study area.

Results and Discussion

The results of the study have been divided into four sections namely respondent's demographics, the relationship between the general knowledge of greenhouse gases with the level of respondent's education, the local community awareness of greenhouse gases based on general knowledge and the attitudes of local community towards nature's preservation as well as the awareness of local community towards greenhouse gases impact on environment and human well-being.

The demographic of respondents

There are three aspects of the respondent's demographics such as gender, type of employment and education level. Firstly, based on descriptive statistical analysis show that 73.1% of the respondents are male while 26.9% of the respondents are females. Secondly, the type of employment show that 38.8% of the respondents are not working while 25.4% of the respondent are working in private sector, 16.4% of the respondents are a pensioner and followed by freelancers and the respondents who involved in government sector which form 10.4% and 9% as shown in *Figure 2*. Meanwhile, the distribution of education levels show that most of the respondents have SPM (*Sijil Pelajaran Malaysia*) / Certificate qualification which forms 29.9%, followed by 23.9% who attain Diploma/STPM (*Sijil Tinggi Persekolah Malaysia*) while SRP/PMR holder (*Sijil Rendah Pelajaran/Pemilihan Menengah Rendah*) for lower secondary assessment and bachelor degree both form 14.9%. Meanwhile, 16.4% of the respondent do not have education as shown in *Figure 3*.

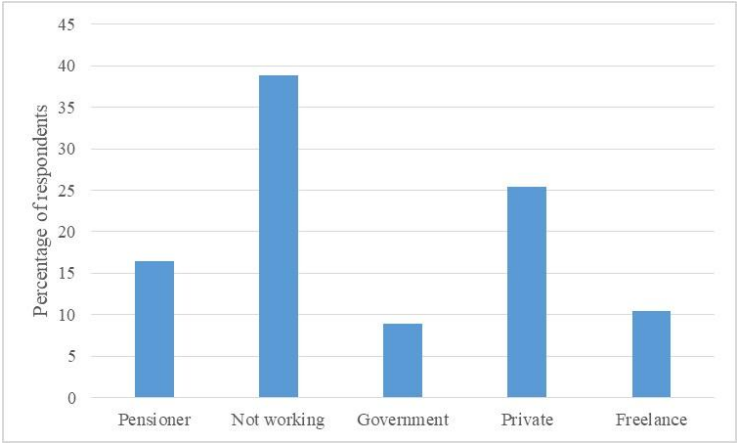

Figure 2. *The percentage of the respondent by the types of employment.*

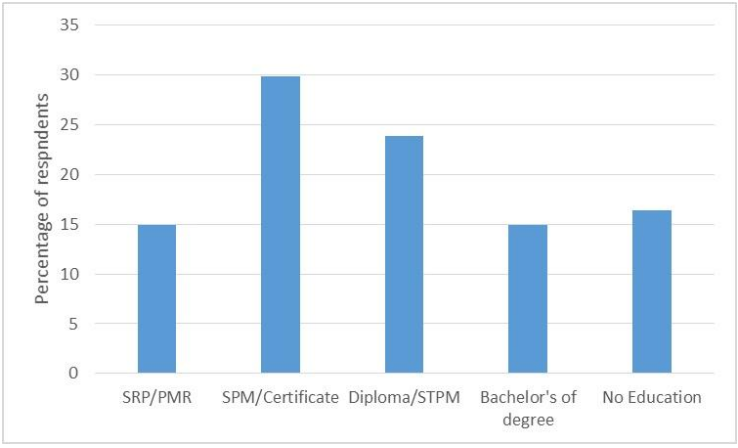

Figure 3. *The percentage of the respondents by education level.*

The relationship between the general knowledge of greenhouse gases with the level of respondent's education

To identify the relationship between the general knowledge of respondents and the level of education. Few aspects had been asked in a questionnaire survey to determine these two variables particularly on general knowledge of greenhouse gases such as greenhouses gases in the atmosphere, the source of air pollution and the impact of greenhouses gases particularly on the environment, economy and human health aspects. Firstly, based on chi-square test show there is no statistical significance between the knowledge of greenhouse gases in atmosphere with the level of respondent's education which Pearson chi-square (p) values are more than p = 0.05 namely the knowledge of respondents on the contain of various gases in atmosphere is Pearson chi-Square two (X^2) is 14.690, p = 0.065 as shown on *Table 1*. Secondly, the knowledge of respondents towards the source of air pollution in atmosphere show there is a statistical significance between the two variable which the general knowledge towards the source of pollution by the respondents X^2 is 22.205, p = 0.005 namely the p-value is less than p = 0.05 as shown on *Table 1*.

Table 1. *Chi square test between the general knowledge of greenhouse gases with level of respondent's education.*

Themes	General knowledge of greenhouse gases	Variable	X^2	P values
Greenhouse gases in atmosphere	Did you know in the air contain various gases?	Level of education	14.690	0.065
Source of pollution	Did you know the increase in global temperatures is due to high carbon dioxide emissions in the atmosphere?	Level of education	22.205	0.005
	Did you know that the increased of local temperature can cause global temperature rise?	Level of education	8.461	0.390
	Did you know the emission of carbon dioxide into the air causing air polluted?	Level of education	25.529	0.001
	Did you know the increase in global temperature can cause climate changes?	Level of education	20.559	0.008
The impacts of				

greenhouse gases on environment, economy and health	Did you know the increase of global temperatures can affects the growth of crops?	Level of education	9.852	0.276
	Do you know that the increase in global temperatures affects the amount of crop yields especially for plants that depend on climatic conditions such as tomatoes, flowers, apples, oranges and etc.	Level of education	8.240	0.410
	Did you know that the increase in global temperatures affect human health?	Level of education	1.823	0.768
	Did you know that stroke, lung disease, lung cancer, asthma, malaria and cholera outbreak occurred due to the increase of global temperature?	Level of education	26.210	0.001

X^2 = Pearson chi-Square two; p = Pearson chi-Square

Thirdly, the chi-square test between the general knowledge towards the impact of greenhouses gases against environment, economy, and health shows a different result. The chi-square test on the general knowledge of greenhouse gas impact on the environment showed that between the local temperature rise and the level of respondent's education there is no statistical significance in which X^2 is 8.461, p = 0.390, the p-value is more than p = 0.05. However, the chi-square test between the general knowledge of carbon dioxide (Co2) and the level of respondent's education as well as the general knowledge of global temperature towards climate change with the level of education showed that there is statistical significance which both of them are recorded X^2 is 25.529, p = 0.001 and X^2 is 20.559, p = 0.008 namely the p values is less than p = 0.05 as shown on *Table 1*.

The chi-square test on the general knowledge of greenhouse gases impact on economy shows there is no statistical significance between the general knowledge of growing crops and the level of education as well as the general knowledge of the global temperature impact towards the number of yield crops with the level of education which is both recorded p values is more than p = 0.05 namely X^2 is 9.852, p = 0.276 and X^2 is 8.240, p = 0.410 as shown on *Table 1*. Besides, the chi-square test particularly on greenhouse gas's impact on health show there is no statistical significance between the knowledge of global temperature effects on human health generally with the level of respondent's education which is X^2 is 1.823, p = 0.768 namely p values are more than p=0.05. However, the chi-square test on the knowledge of greenhouse gases towards disease outbreak shows there is the statistical significance in which X^2 is 26.210, p = 0.001 namely the p-value is less than p = 0.05.

The awareness of the local community towards greenhouses gases emission

To identify the local community awareness towards greenhouse gases, a few aspects were viewed such as the general knowledge of greenhouse gases and the attitudes of the local community towards nature's preservation. Therefore, the local community awareness is has been determined by the consequences of greenhouses gases emission against the atmosphere, economic and health. Based on the statistical descriptive analysis in *Table* 2 showed 49.3% of respondents are aware that the atmosphere had

various gases while 37.3% of respondents did not aware and 13.4% not sure. This is shown in many of the local people in Simpang Empat Village who do not know in the atmosphere have various gases. However, 56.7% of respondents are aware of the function of carbon dioxide toward plants while 25.4% did not know and 17.9% not sure. In addition, 55.2% of respondents are aware of carbon dioxide emission can cause air pollution, 32.8% did not know and 11.9% not sure. Besides that, 55.2% of respondents are aware the deforestation activity could affect the carbon dioxide in the atmosphere, 16.4% did not know and 31.3% not sure. This is showing some lack of the local community awareness towards the function of carbon dioxide on plants, carbon dioxide as a source of air pollution and the impact of deforestation on carbon dioxide.

Table 2. *The general knowledge of local community about greenhouses gases emission to the atmosphere.*

Knowledge	Percentage (%)		
	Yes	No	Not sure
The various gases in atmosphere (air)	49.3	37.3	13.4
The function of carbon dioxide gas to plants	56.7	25.4	17.9
The carbon dioxide into the atmosphere causes air polluted	55.2	32.8	11.9
The deforestation activity affects on carbon dioxide	55.2	16.4	31.3
The increase in global temperature is due to high carbon dioxide emissions in atmosphere	64.2	20.9	14.9
The important role of plants in controlling the Earth's temperature	98.5	0.00	1.5
The increase of local temperature lead to an increase in global temperature	88.1	10.4	1.5
The increase in global temperature cause climate change	73.1	11.9	14.9

Meanwhile, 64.2% of respondents are aware of the increase of global temperature caused by carbon dioxide emission, 20.9% of respondents did not know and 14.9% not sure. Also, 98.5% of the respondents are aware of the important role of plants in controlling Earth's temperature and 1.5% of respondents not sure. In addition, 88.1% of respondents also aware the increase of local temperature has been contributed to the increased global temperature and 10.4% of respondents did not know and 1.5% not sure. The local community aware that the increase of global temperatures can affect Earth's climate which 73.1% of respondents know while 11.9% did not know and 14.9% of respondents not sure. Therefore, the local community has awareness of the global temperature impact on climate, the importance of plants towards Earth's climate and the contribution of local temperatures against global temperature rise.

In term of the general knowledge of greenhouses gases against economic as shown on *Table 3* shows 80.6% of respondents is aware the increase of global temperature can effect on growing crops while 7.5% did not know and 11.9% not sure. Also, 68.7% of respondents are aware that the increase in global temperature could cause negative impacts on the yield of crops particularly for the crops that depend on cooler climate. This shows the local community of Simpang Empat Village has the awareness regarding the impact of temperature's rise towards economic, particularly on agriculture activities.

Table 3. *The general knowledge of greenhouses gases emission towards economics.*

Knowledge	Percentage (%)		
	Yes	No	Not sure
The increase in global temperature effects on growth of crops	80.6	7.5	11.9
The increase in global temperatures effect to the total yield of crops particularly for crops that depend on cooler climate conditions such as tomatoes, flowers, apples, lime and others	68.7	9.0	22.4

Meanwhile, with regards to the knowledge of respondents about greenhouse gas emissions impact upon human health in *Table 4*, 97.0% of respondents are aware the increase of Earth's temperatures affects human health while 3.0% of respondents not sure. Besides, 68.7% of respondents also aware the increase in global temperatures could cause disease outbreak such as stroke, lung cancer, asthma, malaria, and cholera while 19.7% of respondents did not know and 19.4% not sure. However, the local community awareness influenced by the level of their education which based on the chi-square test there is no statistical significance which is $p = 0.001$ namely less than $p = 0.05$. This shows the local community in Simpang Empat Village has awareness about the greenhouse gas impact of global temperatures on human health.

Table 4. *The general knowledge of the effect of greenhouses gases emission on human health.*

Knowledge	Percentage (%)		
	Yes	No	Not sure
The increase in global temperatures affects human health	97.0	0.00	3.0
The disease such as stroke, lung disease, lung cancer, asthma, malaria and cholera outbreaks occurred due to the increase in global temperature	62.7	17.9	19.4

Besides that, the attitudes of the local community towards nature preservation in *Table 5*, show that 83.6% of respondents applied to recycle practice while 16.4% did not apply. Meanwhile, 92.5% of respondents have to keep trees around them and 7.5% of respondents did not while 88.1% of respondents feeling worried when seeing the trees being cut down and 11.9% of respondents did not. Also, 85.1% of respondents burning their dry wood leaves and 14.1% of respondents did not apply the old practices. Therefore, the local community in Simpang Empat Village has the awareness of nature preservation except for the old practice of burning dry wood leaves because there is no better way to dispose of it and the easier way for them to clean their surrounding area.

Table 5. *The attitudes towards nature preservation by respondents.*

Attitudes	Percentage (%)	
	Yes	No
Do you practice recycling?	83.6	16.4
Do you keep the trees around you?	92.5	7.5
Do you worry about seeing the trees being cut down?	88.1	11.9
Do you burn dry wood leaves?	85.1	14.1

The awareness of the local community towards greenhouse gases impact on the environment and human well-being

Based on *Table 6*, the local community are strongly agree and agree of greenhouse gases impact on environment and human well-being namely the extinction of flora and fauna which recorded (61.2% and 35.8%), health problems (74.6% and 23.9%), and the rise of sea level and dilution of polar ice (70.1% and 23.9%) as well as the drought problems (71.6% and 25.4%). However, the statistics descriptive results have different results on the disturbance of the hydrology cycle which recorded (25.4% and 28.4%) and flood problems (23.9% and 10.4%). This due to the local community in Simpang Empat Village did not aware that the increase of greenhouse gas emission in the atmosphere also related to the disturbance of the hydrology cycle as well as the flood problems that have been contributed more by land-use activities and land surface alteration. This shows the local community has awareness of greenhouse gas impact on the extinction of flora and fauna, health problems, the rise of sea level and drought issues while they have a lack of awareness on hydrology cycle and flood problems that also related to climate changes in the atmosphere.

Table 6. *The awareness of local community towards greenhouse gases impact on environment and human.*

Greenhouse gases impacts	Percentage (%)				
	SA	A	D	SD	NS
The extinction of flora and fauna	61.2	35.8	1.5	0.0	1.5
Health problems	74.6	23.9	1.5	0.0	0.0
The rise of sea level and dilution of polar ice	70.1	23.9	1.5	1.5	3.0
The drought problems	71.6	25.4	0.0	1.5	1.5
The disturbances of hydrological cycle	25.4	28.4	17.9	16.4	11.9
Flood problems	23.9	10.4	17.9	25.4	22.4

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; NS = Not Sure

Conclusion

The study found the awareness of local community in Simpang Empat Village, Muallim, Perak particularly on the general knowledge of greenhouses gases namely on the contain of greenhouses in atmosphere, local temperature rise impact on global scale, the impact of global temperature against crops grown, the impact of greenhouses gases towards the number of yield crops and human health does not have a statistical significance based on chi-square test results which is Pearson chi-square (p) values more than P = 0.05. Based on field study observation this due to the influence of their own experiences and the rise of local temperatures where they live. This shows the awareness of local community Simpang Empat Village, Muallim Perak towards this particular knowledge not influenced by the level of respondent's education but their own experiences. Meanwhile, the general knowledge of greenhouse gases by the local communities particularly on the sources of air pollution, the sources of climate change (heat rise) and the source of diseases outbreak caused by greenhouses gases has a statistical significance with the local communities education which p-value is less than p = 0.05 as shown on *Table 1*.

Therefore, the awareness of local community towards the greenhouses gases particularly related to the impact of temperature rises in atmosphere, impact on agriculture crops and human health generally not influenced by the level of respondent's education but from their own experiences while has statistical significance between the general knowledge of the source air pollution and the diseases outbreak with the level of education. This is concluded that the level of respondent's education level also plays an important role in this type of awareness which is not learned by experiences but through the knowledge of education level by the respondent of Simpang Empat Village. Therefore, the study found that the local community awareness has been influenced by the level of education but also their awareness influenced by their own experiences and living conditions where they live.

Besides that, the study also concludes most of the local community in Simpang Empat Village does not have awareness of the contents of greenhouses gases in the atmosphere and some lack of awareness towards the function of carbon dioxide on plants, carbon dioxide as a source air pollution and the impact of deforestation on carbon dioxide. Meanwhile, the local community has awareness of the global temperature impact on climate, the importance of plants towards Earth's climate and the contribution of local temperatures against global temperature rise. Also, they have an awareness of the impact of temperature's rise towards economic, particularly on agriculture activities. Besides that, the local community has an awareness about Earth's temperatures impact on human health but influenced by their level of education. The study also concludes the local people have an awareness of nature preservation except for the old practice of burning dry wood leaves because for them the easier way to clean their surrounding area. In addition, the local community has awareness on greenhouse gas impact on the extinction of flora and fauna, health problem, the rise of sea level and drought issue while they have lack of awareness on hydrology cycle and flood problem that also related to climate changes in the atmosphere.

Acknowledgement

The authors would like to acknowledge the **Sustainability Science Research Cluster (SUSCI)**, University of Malaya that funded the related research on which this paper is based under the grant RP024-17SUS entitled "**Social Awareness of Carbon Emission towards Sustaining Quality of Life**".

REFERENCES

[1] Cullet, P. (2008): The Global Warming Regime after 2012: Towards a New Focus. – Economic and Political Weekly 43(28): 109-117.

[2] Dobbins, J., Solomon, R.H., Chase, M.S., Henry, R., Larrabee, F.S., Lempert, R.J., Shatz, H.J. (2015): Choices for America in a Turbulent World: Strategic Rethink: RAND Corporation. Retrieved from https://www.rand.org/pubs/research_reports/RR1114.html

[3] Drake, F. (2014): The Global Warming, The Science of Climate Change. – New York: Routledge 286p.

[4] Fitzherbert, E.B., Struebig, M., Morel, A., Danielsen, F., Bruhl, C., Donald, P., Phalan, B. (2008): How will oil palm expansion affect biodiversity? – Trends Ecol. Evol. 23(10): 538–545.

[5] Fredolin, T.T., Liew, J., Ester, S., E., Kwan, M.S., Loh J.L., Halimatun, M. (2012): Climate change and variability over Malaysia: gaps in science and research information. – Sains Malays. 41(11): 1355–1366.
[6] Popescu, A.L., Luca, O. (2017): Theoretical and Empirical Researches in Urban Management. – Built Environment and Climate Change 12(4): 52-56.
[7] Tang, K.H.D. (2019): Climate change in Malaysia: Trends, contributors, impacts, mitigation and adaptations. – Science of the Total Environment 650(2): 1858-1871.
[8] United Nation (2018a): Sustainable development goal. Climate action. Retrieved from https://www.un.org/sustainabledevelopment/climate-action/
[9] United Nation (2018b): Sustainable development gold. Goal 13: Take urgent action to combat climate change and its impacts. Retrieved from https://www.un.org/sustainabledevelopment/climate-change-2/
[10] Vaghefi, N., Shamsudin, M.N., Makmom, A., Bagheri, M. (2011): The economic impacts of climate change on the rice production in Malaysia. – International Journal of Agricultural Research 6(1): 67-74.
[11] Von Grebmer, K., Bernstein, J., Nabarro, D., Prasai, N., Amin, S., Yohannes, Y., Sonntag, A., Patterson, F., Towey, O. and Thompson, J. (2016): 2016 Global Hunger Index: Getting to Zero Hunger. Bonn, Washington, DC and Dublin: Welthungerhilfe. – International Food Policy Research Institute, and Concern Worldwide. Retrieved from http://dx.doi.org/10.2499/9780896292260
[12] Yusoff, M.M., Sisun, A., Ching, G.H., Hamzah, T.A.A.T., Osman, S. (2018): Social awareness of carbon emission among rural community in Taram Village Kerdau, Pahang. – International Journal of Social Science and Economic Research 3(2): 658-671.