

Knowledge, Attitudes, and Practices of Fisherfolks on Climate Change Awareness and Adaptation in Lake Sampaloc of San Pablo City, Laguna, Philippines

Asnar L. Aloro (Author)¹

¹Laguna State Polytechnic University – San Pablo City
Campus San Pablo City, Laguna, Philippines

Fatima N. Ravago (Co-Author)²

²Laguna State Polytechnic University – San Pablo City
Campus San Pablo City Laguna Philippines

Glaiza Calubiran (Co-Author)³

³Laguna State Polytechnic University – San Pablo City
Campus San Pablo City, Laguna, Philippines

Marvin Patal (Co-Author)⁴

⁴Laguna State Polytechnic University – San Pablo City
Campus San Pablo City, Laguna, Philippines

Abstract:- Community's response to climate change will vary depending on their specific location, economic status, and level of vulnerability. Given that not all communities are equally capable and there is no perfect or single response to climate change that is effective for all communities. Thus, practices at household level are an essential precursor in dealing with the said phenomena. Specifically, this study aimed to determine the respondents' socio-demographic and economic factors; identify the respondents' knowledge about and behavior towards climate change; assess the respondents' climate change adaptation strategies; and analyze selected factors influencing the respondents' level of awareness and adaptation strategies on climate change. A KAP (knowledge, attitudes, and practices) survey on climate change was constructed, validated, pre-tested, and employed to the 30 purposively selected fisherfolks residing in the five barangays around Lake Sampaloc. Descriptive statistics, Spearman's Rank Correlation and Wilcoxon-Mann-Whitney Test were used. Most of the respondents were aware of climate change, social media platform as their source of information, and perceived extreme weather events as the effect of climate change like drought. All of the respondents displayed a positive behavior on their knowledge, attitudes and practices as evident with a high level of overall mean score. High awareness level and strong positive attitude of the respondents towards climate change is a good indication that they are more likely to express willingness to act on this global problem. Awareness found to be statistically significant with knowledge and practices which proved that awareness is necessary in determining knowledge and practices among people.

Keywords:- Climate Change, Knowledge, Awareness, Practices.

I. INTRODUCTION

Climate change is an issue that is affecting every corner of the world, economically, politically, and environmentally. Recent studies have shown that natural ecosystems, water resources, and local communities are vulnerable to the effects of human-caused global warming (Cruz et al., 2006). The profound and irreversible happening now on the effects of climate change and are expected and get worsen as long as humans add more greenhouse gases to the atmosphere (National Aeronautics and Space Administration, n.d.). Since the Philippines is situated between the two biggest ocean, it is listed among the most prone countries to climate-related events and consequences such as typhoons, environmental calamities, and sudden rises of water (The World Bank, 2022; Novio, 2022).

The inland fisheries sector is claimed to be one of the primary areas to feel such effects even though they have very little contribution to the causes of environmental changes. The Philippines has many large and small lakes which cater to fisherfolks who will feel the effects of environmental change based on their experience to the disturbance, understanding, and capacity to adapt (Food and Agriculture Organization of the United Nations - Rome, 2018).

Humanity's answer to climate change varies depending on their specific location, economic status, and level of vulnerability (United Nations Framework Convention on Climate Change, n.d.). For instance, a more organized community response may involve the formation of a local sustainability organization that works to promote green energy and climate change mitigation measures in the community (International Alert, 2022). But some communities may choose to adjust to the effects of climate change, such as increasing flexibility to climate extremes.

Given that not all communities are equally capable and there is no perfect or single response to climate change that is effective for all communities, analyzing adaptation practices at household level is an essential precursor in

dealing with the said phenomena. Therefore, understanding the community level of alertness and adaptation practices on climate change at household level is important for planning proper adaptation strategies and support guidelines for addressing the expected changes for the local government agencies to address. Henceforth, it is important to conduct research which will assess the family's awareness and adaptation practices to climate change for the government to consider the results when conducting environmental and legislative planning.

In this study, the stakeholders of Lake Sampaloc, San Pablo City's largest lake, were asked regarding their knowledge, attitudes, and practices related to climate change impacts to help the local government unit of San Pablo, Laguna formulate practical and timely plans related to local climate change mitigation and adaptation. Specifically, this study aimed to determine the respondents' socio-demographic and economic factors; identify the respondents' knowledge about and behavior towards climate change; assess the respondents' climate change adaptation strategies; and analyze selected factors influencing the respondents' level of awareness and adaptation strategies on climate change.

➤ Objectives of the Study

This study aims to assess the level of knowledge, attitudes, and practices of fisherfolks on climate change awareness and adaptation in Lake Sampaloc of San Pablo City, Laguna, Philippines.

• Specifically, this Study Aims to:

- ✓ Determine respondents' socio-demographic and economic factors;

- ✓ Identify respondent's level of awareness on climate change;
- ✓ Determine respondents' climate change knowledge, attitude and practices; and
- ✓ Analyze selected factors influencing respondent's level of awareness and adaptation strategies on climate change.

II. RESEARCH METHODOLOGY

This study was conducted in Lake Sampaloc, one of the seven crater lakes of San Pablo City, Laguna. It is covered by five barangays, namely Barangay IV-A, Barangay IV-C, Barangay V-A, Barangay Concepcion, and Barangay San Lucas I. This 104-hectare recreational lake has a maximum depth of 27 meters and is known to be the most popular among the seven lakes as it is the closest to the city proper. Aquaculture of Nile tilapia (*Oreochromis niloticus*) is the major human activity and source of livelihood in the lake. Aside from tilapia, it is also blessed with *dalag*, *carpa*, *dulong*, catfish, milkfish, and various species of shrimp.

A KAP (knowledge, attitudes, and practices) survey on climate change was constructed, validated, pre-tested, and employed to the 30 purposively selected fisherfolks residing in the five barangays around Lake Sampaloc. Descriptive statistics such as mean, frequency, and percentages were used to describe the respondents' socio-demographic characteristics. Meanwhile, non-parametric tests such as Spearman's Rank Correlation and Wilcoxon-Mann-Whitney Test were used to identify associations between the study variable and identify the level of knowledge, attitudes, and practices of fisherfolks on climate change adaptation and mitigation in the lake.

III. RESULTS AND DISCUSSION

This chapter presents the data gathered which were statistically treated, presented, analyzed in table and interpreted in relation to the problem specified in the study.

Table 1.1 Age of the Respondent

	Frequency	Percent	Cumulative Percent
Single	6	20.0	20.0
Married	22	73.3	93.3
Single Parent	1	3.3	96.7
Live-in	1	3.3	100.0
Total	30	100.0	

Table 1.2 Civil Status of the Respondent

	Frequency	Percent	Cumulative Percent
below 20 years old	2	6.7	6.7
21-30 years old	2	6.7	13.3
31-40 years old	9	30.0	43.3
41-50 years old	11	36.7	80.0
51 years old and above	6	20.0	100.0
Total	30	100.0	

Table 1 results show that most (36.7%) of the respondents were within the age range of 41 to 50 years old. This finding indicates that most respondents are still in their productive stage. Majority (73.3%) of the respondents were married. This signifies that married respondents were engaged in fishing as their main source of income. As to their educational attainment, all of the

respondents' undergone formal education which implies that they understand the challenges in fishing, including the issue on climate change. Kabir et al. (2016) noted that person with higher education tend to understand impacts of climate change.

Table 2.1: Sex of the Respondents

	Frequency	Percent	Cumulative Percent
Male	27	90.0	90.0
Female	3	10.0	100.0
Total	30	100.0	

Table 2.2 Average Length of Residence of the Respondents

Years of Residence	Sex of the Respondents		N	Mean
	Male	27	26.5185	33.3
Female	3	27.3333	83.3	
OVERALL	30	26.6000	100.0	
Sex of the Respondents	N	Mean		

Table 2.3 Source of Income of the Respondent

	Frequency	Percent	Cumulative Percent
Fishing	11	36.7	36.7
Private Employee	2	6.7	43.3
Sari-sari Store	1	3.3	46.7
Poultry Owner	1	3.3	50.0
Fish Cage/Pen Operator	3	10.0	60.0
None	8	26.7	86.7
Others	4	13.3	100.0
Total	30	100.0	

Table 2, Respondents were conquered by male (90%) and female (10%). In average, respondents have lived in the area for 26 years. Respondent was dominated by fishermen. he majority of fishermen only had one main occupation, while the others had side job worked as sari-sari store owner, private employee, poultry owner and fish cage operator.

Table 3.1 Primary Income of the Respondent

	Frequency	Percent	Cumulative Percent
Below 10,000	22	73.3	73.3
20,001 - 20,000	6	20.0	93.3
20,001 - 30,000	2	6.7	100.0
Total	30	100.0	

Table 3.2 Secondary Job Income of the Respondents

	Frequency	Percent	Cumulative Percent
No Secondary Income	8	26.7	26.7
Below 10,000	19	63.3	90.0
20,001 - 20,000	2	6.7	96.7
20,001 - 30,000	1	3.3	100.0
Total	30	100.0	

Table 3, As regards to economic characteristics, majority (73.3%) of the respondents had a monthly income below Php10, 000.00. This finding shows that respondents had low income from their fishing activities as their primary source of income and lived below the poverty line, having not met the Philippine Statistics Authority or PSA's poverty threshold. According to PSA (2018), a family of five needed no less than P10, 481.00 on average, which is required to meet both basic food and non-food needs of a family in a month.

Table 4 Respondents' Awareness, Knowledge, Attitudes and Perceptions on Climate Change

Definition	30	2.3667	1.12903	Low
Sources	30	2.3333	1.09334	Low
Health Impacts	30	3.1000	1.06188	High
Environmental Impacts	30	3.0667	1.04826	High
Practical Solutions	30	2.7000	1.17884	High
Overall Awareness on Climate Change	30	2.7133	.83655	High

Legend: 1.00-1.75 = Very Low; 1.76-2.50 = Low; 2.51-3.25 = High; 3.26-4.00 = Very High

Awareness is considered as a factor that determines the implementation of effective measures for climate change adaptation (Juana et al 2013). Table 4, shows an overwhelming majority (83.3%) of the respondents were aware of climate change, while the rest were not. But when asked on how they defined climate change and its sources, data revealed a low level of awareness. But a considerably high level of awareness was noted when asked as to the health, environmental impacts and practical solutions about climate change. People and communities have this basic understanding when they heard of climate change thus, they are unaware of the details of the environmental changes they have noticed due to a lack of common understanding on climate change (United Nations Development Programme 2016)

Despite the limited access to information about climate change, respondents became knowledgeable about climate change. The study of Adebayo et al (2012) on farmers' awareness, vulnerability, and adaptation to climate change in Nigeria indicated that many of the respondents were aware of climate change. Moreover, Hassan & Nhemachena (2007) denotes that accessing information about climate change remains a vital factor in determining different adaptation strategies.

Further, respondents revealed that they usually accessed information from different sources like television and social media platforms (Youtube, Tiktok, and Facebook). In the study of Ziervogel et al (2008), it was found that farmers easily understood the information on climate change provided by the media.

Table 5 Main Entity on Combatting Climate Change

	Frequency	Percent	Cumulative Percent
National Government	15	50.0	50.0
Individuals	15	50.0	100.0
Total	30	100.0	

As to the main entity on combatting climate change (Table 5), both the national government and individuals have this shared responsibility. Respondents reiterated that municipality and fishermen must work together to develop a framework that is well-appropriate for use locally that will ensure efficient adaptation to climate change.

• *Climate Change as an Important Issue*

Although not all ecosystems and organisms are affected equally, climate change will continue to have a significant

impact on them. An overwhelming majority (76.7%) (See table 6) pointed that issue on climate change is very important in a way that it will affect everyone. Fisherfolks and fishermen who rely on fishery resources as a source of livelihood will continue to be in danger. In the study of Adeleke et al (2021) indicated that fishermen may experience a range of effects from health issues, to changes in fishing time, to changes in fish capture, to changes in fishing equipment and methods due to climate change.

Table 6 Climate Change as an Important Issue

	Frequency	Percent	Cumulative Percent
Not Important	1	3.3	3.3
Quite Important	1	3.3	6.7
Important	5	16.7	23.3
Very Important	23	76.7	100.0
Total	30	100.0	

➤ *Knowledge on Climate Change*

Table 7, shows that the respondents' knowledge on climate change revealed that they strongly agree on all the statements given. They reported that climate change is already happening and affecting every individual including children and women. Respondents reported the sudden change in temperature, breeding ground loss, and decline in fish catch, loss of species and appearance of new and invasive species and change in fish calendar. All of these signs were probed during the conduct of study where they reported all the changes. In the study conducted by Benansio et al (2022) noted that fisherfolk can act as sentinels wherein they were able to identify different changes in the environment that are significant to their livelihoods. Shrestha et al. (2021) noted that fisherfolks are more sensitive to environmental changes because they

depend on this information not just for their livelihoods but also frequently for their immediate survival. This is because fishing is a risky and occasionally life-threatening activity, and there are numerous occupational risks unique to fishers.

According to Legesse et al (2013), the frequency of occurrence of drought had already increased which corroborates to the findings of this study that they strongly agree that drought is one of the manifestations of climate change.

Though fishermen have local knowledge that can be used to deal with different environmental conditions still it should be in accordance with the global knowledge because for some reasons their local knowledge is inappropriate in uncertain conditions (Maifzar, 2018).

Table 7 Knowledge on Climate Change

	Mean	Std. Deviation	Verbal Interpretation
Climate change is a global problem.	3.8333	.59209	Strongly Agree
Climate change is happening in the Philippines.	3.6667	.60648	Strongly Agree
Drought is one of the manifestations of climate change.	3.6000	.56324	Strongly Agree
Climate change is triggered by normal processes and is also human-induced.	3.5000	.73108	Strongly Agree
Heavy rainfall can increase the risk of flooding.	3.2333	.89763	Strongly Agree
An increase in temperature and reduced rainfall may lead to water scarcities.	3.4333	.81720	Strongly Agree
Climate change is already distressing the individuals in our community.	3.5000	.86103	Strongly Agree
Climate change affects women and children the most.	3.4000	.85501	Strongly Agree
Climate is a factor that should be taken into consideration in the fishery sector.	3.5000	.82001	Strongly Agree
Climate change affects the number of harvests per season.	3.7000	.59596	Strongly Agree
Overall Knowledge on Climate Change	3.5367	.43270	Strongly Agree

Legend: 1.00-1.75 = Strongly Disagree; 1.76-2.50 =Disagree; 2.51-3.25 = Agree; 3.26-4.00 = Strongly Agree

➤ *Attitude on Climate Change*

Table 8, shows that compared to other occupations, fishing exhibits a different risk pattern (Mistiaen & Strand, 2000). Their attitudes effect the behavior through its purpose, which is a verdict to act in a specific way. Results revealed that they strongly agree on the statements given portraying a positive attitude towards climate change. Findings of this study is alike to that obtained by Mohamed Shaffril et al. (2013), who displayed a high level of adaption in small-scale fishermen's attitudes concerning climate change in the East Coast of Peninsular Malaysia.

Statement on Table 8 “Climate change will lessen the quality of life of my children and grandchildren” has the highest mean of 3.6333. This is not surprising considering the low economic status in the area thus; they are worried for the possible effect of climate change in the future. World Bank (2018) stated that the problem in the Philippines is those who are financially challenged are more susceptible to harmful shocks being exposed to more dangers for scarcity of resources without ability to cope and capacities necessary to adapt to possible hazards.

Respondents understood that environmental changes were already happening, taken into account the other factors such as government agencies’ intervention and allocation of budgets. Therefore, before the government take actions in

particular communities with their ideas and programmed intervention, they must comprehend the current status of the community thus, contextualizing the issue on climate change in the area is necessary. Thus, to ensure sustainable fishing behavior among fishermen, additional government support in the form of fishing boats and equipment as well as reliable information are important adaptation measures advised to increase information and awareness through the government’s community outreach program.

Further, it is important to note their positive attitude on the statement that every individual can do something to adapt to climate change (3.4667). Therefore, respondents display a positive attitude to naturally adapt to climate change because they think that the said phenomenon will significantly affect in food security, health & education.

Respondents strongly agree on the statement that the climate change information is difficult to understand. Thus, their disposition to acquire and receive training was very strong in the area. It underlines their eagerness to undergo training, which will be the source for their future adaptation strategies in combatting the said phenomenon. Latkin et al (2021) noted that it is not shocking that those who are more concerned about the impact of climate change are more likely to report readiness to engage in climate change actions.

Table 8 Attitude on Climate Change

	Mean	Std. Deviation	Verbal Interpretation
1) Climate change is part of environmental ordinary series; hence, I need not worry about it.	2.4667	1.19578	Strongly Agree
2) My family and I will logically adjust to climate change.	3.3333	.80230	Strongly Agree
3) Climate change is a significant in terms of crime, corruption, food security, health & education.	3.1333	.77608	Strongly Agree
4) Regular temperatures increasing by a few degrees concern me.	3.3667	.71840	Strongly Agree
5) Climate change will decrease the quality of life of my children and grandchildren.	3.6333	.55605	Strongly Agree
6) Every individual can do something to adjust to climate change.	3.4667	.81931	Strongly Agree
7) The climate change information is difficult to understand.	2.8000	1.18613	Strongly Agree
8) The government should listen to the views of societies when making strategy about climate change.	3.4333	.85836	Strongly Agree

9) The government should do more to help families to adapt to climate change.	3.0667	1.08066	Strongly Agree
10) The government should allot a budget (also allocated to education, crime, etc.) to address climate change.	3.2000	1.03057	Strongly Agree
Overall Attitude on Climate Change	3.1900	.35071	Strongly Agree

Legend: 1.00-1.75 = Strongly Disagree; 1.76-2.50 = Disagree; 2.51-3.25 = Agree; 3.26-4.00 = Strongly Agree

➤ *Practices on Climate Change*

Table 9 showed a total of 10 items that were used to measure the fishermen’s practices on climate change. Approximately, four practices recorded a high level of mean score which denotes that they always perform the said practice. Items related in buying energy-efficient things (e.g., appliances, luminaries, electronics & electrical devices) yielded the highest mean score (M=4.3). It was probed that choosing an energy efficient thing was their choice to lessen their monthly electric bill. Therefore, by investing renewable energy, switch to sustainable transport and help us our home costly changing our main energy sources to clean and renewable energy is the best way to reduce climate change. In addition, reduce how much people consume. Our transport, fashion, food and other lifestyle choices all have different impacts on the climate.

This is often by design – fashion and technology companies. But while reducing consumption of these products might be hard, it’s most certainly worth it. Reducing overall consumption in more wealthy countries can help put less strain on the planet.

According to NRDC (2022) the efficiency standards for dozens of appliances and products have kept 2.3 billion tons of carbon dioxide out of the air. That’s about the same amount as the annual carbon pollution coughed up by nearly 440 million cars. Energy efficiency is the lowest-cost way to reduce emissions. When shopping for refrigerators, washing machines, heat pump water heater, and other appliances, looks for the energy star label. It will tell you which are the most efficient.

Table 9 Practices on Climate Change

	Mean	Std. Deviation	Verbal Interpretation
1) I adopt different fishing strategies to increase catching.	3.6667	1.56102	Frequently
2) I (or the organization I belong to) plant trees.	3.3333	1.58296	Sometimes
3) I conserve and reuse water.	3.8000	1.60602	Frequently
4) I practice segregating my waste properly and refuse to burn it.	4.2667	1.17248	Always
5) I walk or cycle instead of drive.	3.7000	1.26355	Frequently
6) I recycle and reuse fishing materials like nets and hooks.	4.2333	1.35655	Always
7) I buy energy-efficient things (e.g., appliances, luminaries, electronics & electrical devices).	4.3000	.91539	Always
8) I prepare for the incidence of calamities.	3.9333	1.08066	Frequently
9) I contribute in public awareness or mitigation activities concerning climate change, such as Earth Hour.	4.0000	1.05045	Frequently
10) I discuss global climate change with family and consider household strategies to reduce impact.	3.4000	1.81184	Sometimes
Overall Practices on Climate Change	3.8633	.97255	Frequently

Legend: 1.00-1.80 = Never; 1.81-2.60 = Rarely; 2.61-3.40 = Sometimes; 3.41-4.20 = Frequently; 4.21-5.00 = Always;

Table 10 Pearson r Correlation Test Between Awareness and Knowledge, Attitudes & Practices of Firsherfolks on Climate Change

	r value	Correlation Description	p value	Interpretation
Awareness and Knowledge	0.445*	Moderate Positive Correlation	0.014	Significant Relationship
Awareness and Attitude	-0.067	Negligible Negative Correlation	0.727	No Significant Relationship
Awareness and Practices	0.439*	Moderate Positive Correlation	0.015	Significant Relationship

Table 10, revealed the result on the correlation test between awareness and knowledge, attitude and practices. The result shows that there is a significant relationship on the awareness and knowledge with (r value = 0.445), this indicates that there is a strong link between awareness and knowledge of climate change, and that engagement can change attitudes as well as have a positive impact on behaviour. Climate change awareness is often considered essential to public support for mitigation and adaptation policies. Individuals who are more exposed, knowledgeable and aware of hazards may begin to normalize risks in order

to cope psychologically with them. However, not many changes have occurred even with the different awareness approaches used. It is possible that higher awareness of climate change relates to lower risk perceptions due to the normalization of risk (Luís et al 2018).

Further, awareness and practices display a significant relationship with (r value = 0.439). This result implies that the more the farmers are aware of climate change including the effects it brings, the more they are encouraged to do practices to combat effects of climate change. This finding

corroborates with the study of Deressa et al (2009) and Hassan & Nhemachena (2008) who found out that awareness and information on climate change significantly influenced the farmers' choice of climate adaptation strategies. Further, result also in consonance with the study of Oruonye (2011) that awareness is a vital factor in determining behaviour and practices of people.

IV. CONCLUSION & RECOMMENDATION

Most (36.7%) of the respondents were within the age range of 41 to 50 years old. This finding indicates that most respondents are still in their productive stage. Majority (73.3%) of the respondents were married. All of the respondents' undergone formal education. Respondents were dominated by male (90%) and female (10%). In average, respondents have lived in the area for 26 years. Respondent was dominated by fishermen. Majority of them had only one main occupation, while the others had side job worked as sari-sari store owner, private employee, poultry owner and fish cage operator. Majority (73.3%) of the respondents had a monthly income below Php10, 000.00 thus; they lived below the poverty line.

Most were aware of climate change, with social media platform as their source of information, and perceived life-threatening climate measures as the effect of climate change like drought. As to their knowledge, attitudes and practices towards climate change all of the respondents displayed a positive behavior as evident with a high level of overall mean score. The high cognizance level and strong helpful attitude of the respondents towards issues and concerns about climate change is a good sign that they are more expected to express readiness to act on this global problem.

There is a significant relationship on the awareness and knowledge as well as awareness and practices which proved that the quality of awareness is vital in a sense that it affects behaviour, quality of response and reactions of people. In response to the result of the study, the following recommendations were drawn:

- *In support of low-income households, the Local Government Unit of San Pablo, should help and support climate change mitigation strategies and initiatives to pursue resilience at the local level.*
 - *Increase awareness and knowledge by conducting training programs, workshops, and other educational activities to provide fisherfolk with relevant information on climate change, its impacts on ecosystems, and the strategies and practices that can be adapted for sustainable fishing.*
 - *Develop communication strategies that are appropriate for fisherfolk using simplified information and illustrations to ensure that they fully understand the message on the impacts of climate change and how to mitigate it.*
 - *Encourage community-based participation in designing and implementing climate change adaptation strategies in fishing communities that ensures their active engagement and ownership.*
- *Promote sustainable fishing practices to encourage sustainable fishing practices that support the conservation of marine ecosystems and the reduction of greenhouse gas emissions, such as using environmentally-friendly fishing gear.*
 - *Provide financial and institutional support to encourage fisherfolks to implement sustainable fishing practices by providing alternative livelihoods and subsidies for environmentally-friendly and fuel-efficient fishing equipment.*

By implementing these recommendations, the knowledge, attitudes, and practices of fisherfolk regarding climate change awareness and adaptation can be improved to support sustainable fishing practices and mitigate the impact of climate change on their livelihoods.

REFERENCES

- [1]. Adeleke, L., Jerry, J. V., Ayal, D., Oluwatobi, A. J., Sunday, A. I., & Amos, A. I. (2021). Climate Variability on Fishing Activities in Inland Waters: Case of Owena River in Ondo and Osun States, Nigeria. *African Handbook of Climate Change Adaptation, 1919-1936.* doi:10.1007/978-3-030-45106-6_91
- [2]. Benansio JS, Funk SM, Lino JL, Balli JJ, Dante JO, Dendi D, Fa JE., & Luiselli L. (2022). Perceptions and attitudes towards climate change in fishing communities of the Sudd Wetlands, South Sudan. *Regional Environmental Change* 22(2), 1-15. <https://doi.org/10.1007/s10113-022-01928-w>
- [3]. Carl A. Latkin, Lauren Dayton, Da-In Lee, Grace Yi, and Mudia Uzzi 2021. Correlates of Levels of Willingness to Engage in Climate Change Actions in the United States. *Int J Environ Res Public Health*. 2021 Sep; 18(17): 9204. Published online 2021 Aug 31. doi: 10.3390/ijerph18179204
- [4]. Cruz, R.V., Harasawa, H., Lal, M., Wu, S., Anokhin, Y., Punsalmaa, B., Honda, Y., Jafari, M., Li, C. & Huu Ninh, N. (2007). In M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden & C.E. Hanson, eds. *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, pp 469–506. Cambridge, UK, Cambridge University Press. http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch10.html
- [5]. Deressa TT, Hassan RN, Ringler C, Alemu T & Yesuf M. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change* 19: 248-255 <https://doi.org/10.1016/j.gloenvcha.2009.01.002>
- [6]. Food and Agriculture Organization of the United Nations. (2018). *Impacts of climate change on fisheries and aquaculture – synthesis of current knowledge, adaptation, and mitigation options.* <https://www.fao.org/3/i9705en/i9705en.pdf>

- [7]. Hassan R and Nhemachena C. 2008. Determinants of African farmers' strategies for adapting to climate change: Multinomial choice analysis. *African Journal of Agricultural and Resource Economics* 2: 83-104 from https://www.researchgate.net/publication/46534644_Determinants_of_African_farmers'_strategies_for_adapting_to_climate_change_Multinomial_choice_analysis
- [8]. Huchim-lara, O., Salas, S., Fraga, J., Méndez domínguez, N., & Chin, W. (2016). Fishermen's perceptions and attitudes toward risk diving and management issues in small-scale fisheries. *American Journal of Human Ecology*, 5(1), 1–10.
- [9]. International Alert. (2022). Fuelling conflict? The impact of the green energy transition on peace and security, <https://www.international-alert.org/publications/fuelling-conflict-the-impact-of-the-green-energy-transition-on-peace-and-security/>
- [10]. Kabir, I., Rahman, B., Smith, W., Lusha, M., Azim, S., Milton, A.H. (2016). Knowledge and perception about climate change and human health: findings from a baseline survey among vulnerable communities in Bangladesh. *BMC Public Health*, 16 (266)
- [11]. Legesse B, Ayele Y & Bewket W. 2013. Smallholder farmers' perceptions and adaptation to climate variability and climate change in Doba district, West Hararghe, Ethiopia. *Asian Journal of Empirical Research* 3: 251–265
- [12]. Luís, S., Vauclair, C.M. and Lima, M.L., 2018. Raising awareness of climate change causes? Cross-national evidence for the normalization of societal risk perception of climate change. *Environmental Science & Policy*, 80, pp.74-81.
- [13]. Maifzar, A. "Adaptation strategies based on Fishers' local wisdom to changes in Aceh's coastal ecosystem," *Community*, vol. 4, no. 1, pp. 15–28, 2018.
- [14]. Mistiaen, J. A., & Strand, I. E. (2000). Location choice of commercial fishermen with heterogeneous risk preferences. *American Journal of Agricultural Economics*, 82(5), 1184–1190.
- [15]. Mohamed Shaffril, H. A., Abu Samah, B., D'Silva, J. L., & Md. Yassin, S. (2013a). The process of social adaptation towards climate change among Malaysian fishermen. *International Journal of Climate Change Strategies and Management*, 5(1), 38–53
- [16]. National Aeronautics and Space Administration. (n.d.). The effects of climate change. <https://climate.nasa.gov/effects/>
- [17]. Natural Resources Defense Council (2022). How you can stop global warming <https://www.nrdc.org/stories/how-you-can-stop-global-warming>
- [18]. Novio, E.B.C. (2022). Climate Change and Disasters in the Philippines. <https://th.boell.org/en/2022/01/21/climate-disasters-philippines>
- [19]. Oruonye, E. (2011). An assessment of the level of awareness of the effects of climate change among students of tertiary institutions in Jalingo Metropolis, Taraba State Nigeria, *Journal of Geography and Regional Planning*, ISSN 2070-1845, 4(9), pp. 513-517 (15) (PDF) *Awareness and Attitude Towards Climate Change of Selected Senior High Students in Cavite, Philippines*. Available from: https://www.researchgate.net/publication/334048488_Awareness_and_Attitude_Towards_Climate_Change_of_Selected_Senior_High_Students_in_Cavite_Philippines [accessed May 13 2023].
- [20]. Ramli, S. A., Abu Samah, A., & Shaffril, H. A. M. (2018). Examining factors affecting change adaptation practices among small scale fishermen in Kelantan and Pulau Pinang. *International Journal of Education and Social Science Research*, 1(5), 35-43.
- [21]. Shrestha S, Shrestha B, Bygvraa DA, Jensen OC (2021) Risk assessment in artisanal fisheries in developing countries: a systematic review. *American Journal of Preventive Medicine* S0749379721005389. <https://doi.org/10.1016/j.amepre.2021.08.031>
- [22]. The World Bank. (2022). Philippines Country Climate and Development Report. <https://www.worldbank.org/en/country/philippines/publication/philippines-country-climate-and-development-report>
- [23]. United Nations Development Programme (2016). The Knowledge Attitudes and Practice Survey (KAP) on Climate Change. Japan-Caribbean Climate Change Partnership.
- [24]. United Nations Framework Convention on Climate Change. (n.d.). Adaptation and resilience. <https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/introduction?fbclid=IwAR3fXGLmYsc9KV710qtcMsfGxHxDebzQRGWmkGf81iEfHJ0lfY-avmRO2A5U>
- [25]. World Bank (2018). *Making Growth Work for the Poor: A Poverty Assessment for the Philippines*. Washington, DC: World Bank. doi: 10.1596/29960