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Research Article

Knowledge, Attitudes, Practices, and Action on Climate Change and Environmental Awareness of the Twenty-two Villages along the River Banks in Cagayan de Oro City, Philippines: PART II

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Abstract

People are significant actors in the careful management of river ecosystems since their social and economic activities impact on the river. This study assessed the knowledge, attitudes, practices, and action of the settlers of the twenty-two villages along the River Banks in Cagayan de Oro City, Mindanao, Philippines on climate change and environmental awareness. This study used the quantitative and qualitative approach with field observation and questionnaires method for data collection. Results of this study indicated that the settlers' knowledge, attitudes, practices, and action on climate change was on a moderate level, with attitudes as the main domain, followed by knowledge, practices, and action. Their environmental awareness did not translate into involvement in river conservation, protection, and sustainability. The study concludes that the settlers' knowledge, attitudes, practices, and action need intervention to improve their awareness to feel, think, and act in a responsible manner in such a way that protects both public health and the environment.

Keywords: Knowledge, Attitudes, Practices and Action; Climate Change; Settlers; Oro River Banks

Introduction

The Climate Change Synthesis Report [1] spelled out that climate change refers to any significant change in measures of climate, such as temperature, precipitation, wind, and other weather patterns. The world's climate is showing signs of shifting, which is evident from observation of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. Potential effects of this phenomenon include more variable weather, stronger and longer heat waves, more frequent intense precipitation events, and extreme weather events, such as flooding.

In reality, climate change is a product of human-made activities. For instance, human activities such as burning fuels to produce energy, have released large amounts of carbon dioxide and other gases into the atmosphere. These gases trap energy in the atmosphere and cause it to warm. These conditions are changing the climate which consequently leads to dangerous effects on human health, public wellness, and ecosystem [2]. In the Philippines, deforestation and improper land use planning have also aggravated these environmental hazards.

The Philippines, home to almost 90 million people, is one of the most vulnerable countries to climate change. Due to its geographical setting, the Philippines is naturally vulnerable to hydrometeorological hazards such as tropical cyclones, flooding, droughts, and rain-induced landslides. Furthermore, climate change represents a serious threat to the Philippines which is heavily reliant on agriculture for food security and economic growth. The livelihood of millions is threatened by the potential effects of climate change as current agricultural practices are adapted primarily to the prevailing climate [3].

The city of Cagayan de Oro is one of the largest cities in the Philippines. It is located on a flat plain on the northern coast of Mindanao, the large southern island of the country, and is the capital city of the province of Misamis Oriental. The city has an area of 412 square kilometers 26, about one-third of which is used for agriculture, and six major rivers flow through the city and into the ocean at the city's northern coast. The largest of these-the Cagayan River-is fed by a mountainous, 1500-square-kilometer watershed located in Bukidnon, a province adjacent to the city 27. Land in Bukidnon is used largely for mining, forestry, and family-scale

and plantation-scale agriculture 28. Even though the watersheds of Bukidnon drain through Cagayan de Oro, the city does not have political jurisdiction over the province.

In recent years, Cagayan de Oro has experienced the damaging impacts of flooding. Cagayan de Oro City, which serves as the major gateway to various destinations in Mindanao, has experienced deadly and costly flooding. In January 2009, a tropical depression caused the flooding of major business districts and highways. Then in December 2011, rains brought by Tropical Storm Sendong (Washi) made two of the city's river systems rose to unprecedented levels, it became one of the most devastating and deadly events in the country's recent history. Sendong claimed 1,259 lives, 6,071 injured, 182 missing and caused Php 1.7 billion cost of damages [4].

The Caribbean Institute of Media and Communication [5], on its report on climate change, recommended that although there are some people who are aware of climate change, more public education about climate change and its impact to the settlers and river communities. Fontenard [6] reported that since respondents generally do not go out of their way to search for information on climate change, measures to reach such persons through their alternative preferred information sources should be insured.

A successful communication campaign is therefore crucial since it will motivate learning, hence the desired change among the people on climate change and environmental awareness. As the knowledge and experience of the respondents are incorporated into the learning process, then applying the action to knowledge will follow [7]. KAIRI Consultants Limited [8] endorsed that there should be a component of the public education programme which targets persons working in sectors that would be hard hit by climate change. At present, there seemed to be the perception that climate change is an environmental issue. However, it is critical for the population to understand the far-reaching potential of climate change to impact societies.

Mc Michael., *et al*. [9,10] argued that while climate change affects multiple aspects of people's lives, the impact on health is significant. The most important health impacts are those determined by the basic requirements for health - clean air, safe drinking water, sufficient food, and secure shelter - and are also reflected in more frequent injuries and increases in social inequisites. Climate risks can also damage health infrastructure, undermining the provision of health services.

The World Food Programme [11] reported that climate-related disasters already affect more than 200 million people every year. This implies that climate shocks can trigger powerful downward spirals in human development. Economically disadvantaged people have no alternatives but to reduce consumption, cut nutrition, take children out of school or sell the productive assets on which their recovery depends. These are choices that limit human capabilities and reinforce inequalities. They are avoidable low human development traps. Basically, climate change could act as a significant hunger risk multiplier.

Moreover, the disastrous impact of climate change on public health is significant research-based agendum. The UN Environment Programme [12,13] disclosed that climate-related disasters could damage the very service-delivery infrastructures that help secure public health and well-being, such as health services, utilities, and municipalities, energy and communication systems among others. The increasing extreme events may also overburden social protection system, and public safety nets, social security coverage, existing policies, and social protection systems are often inadequate to enhance resilience and mitigating the negative climate change impact.

According to Guzman., *et al.* [14], climate change impacts depend heavily on where people are living and the assets and resources they bring. The world is increasingly urbanized. More than half of the population lives in urban areas, and by 2050 it could be as high as two thirds [15]. Nearly all urban growth will happen in cities in the developing world. Highly vulnerable locations, poor housing materials, limited access to infrastructure and lack of secure tenure make people in urban areas among those most likely to experience several climate impacts. This is exacerbated by the fact that several of the worlds urban population currently lives in cities located in low elevation coastal zones, many in the developing worlds, which are highly exposed to impacts of sea level rise and extreme weather conditions. These cities are also experiencing rapid growth, as people move to them for economic opportunities, and at the same time expose themselves to greater risk of climate impacts.

Cardwell [16] stated that the effects of human activities are evident in noticeable changes to the functioning of ecosystems, earth's oceans, atmosphere, freshwater systems, and land surfaces. The potential disastrous events, negative consequences, and negative public health impact of climate change necessitate the people's awareness of the natural and human-made disasters. It is, therefore, imperative that people have to possess knowledge, attitude, practices, awareness, and actions on climate change as a research-based scenario for policies as an intervention program. Hence, this study was conducted to determine the knowledge, attitudes, practices, and action on climate change and environmental awareness of the twenty-two villages along the river banks in Cagayan de Oro City, Philippines. Specifically, the study aimed to determine the: de-

mographic profile of the respondents in terms of age, gender, religion, ethnicity, educational attainment, occupation, and monthly family income; level of knowledge of the respondents about climate change in terms of its causes and possible consequences; respondents' awareness of the possible effects of climate change; respondents' attitude and practices towards climate change; and respondents' action taken to adapt climate change.

Methodology

The descriptive research design with a combination of qualitative and quantitative techniques was used in this study and was conducted in the twenty-two villages along the river banks of Cagayan de Oro City.

The respondents were composed of 1,208 residents taken from the twenty-two villages. Stratified purposeful sampling technique was used, with the following criteria of selection: a) household located along the 22 river villages; b) at least 2 respondents per household either head of the family or a family member; c) at least 5 years of stay in the city; and d) are willing to give their informed consent as respondents. Patton (2001) describes these as samples within samples and suggests that purposeful samples can be stratified or nested by selecting particular units or cases that vary according to a key dimension.

A modified set of Climate Change Questionnaire from the study of Lubos*., et al*. [17] was used in the study. Part I gathered data on the demographic profile of the respondents in terms of age, gender, religion, ethnicity, educational attainment, occupation, and family monthly income. Part II dealt with the respondents' level of knowledge on the causes and possible consequences of climate. Part III gathered data on the attitude and practices on climate change. Part IV gathered data on the awareness of climate change and Part V gathered data on the action taken to adapt to Climate Change. The questionnaire was subjected to a reliability test to 30 respondents.

Research protocol was strictly observed in the study. Written informed consent was also obtained from the respondents.

The data were presented, analyzed and integrated through the frequency counts, percentages, and weighted mean.

Results and Discussion

The residents of Cagayan de Oro City are no stranger to natural calamities thought to be brought about by extreme changes in weather or to climate change. Several super typhoons have hit the city in 2011 and 2012. Tropical storm Washi, for example, resulted in severe flooding which swept away thousands of poor communities living along the Cagayan River and about 2000 people dead or missing [18].

In this cross-sectional study, samples were taken from all twenty-two villages along the river banks in the city. Data were gathered in relation to their demographic profile, knowledge on the cause and possible effects of climate change, their attitude, and practices; action is taken to adapt and mitigate climate change.

Objective 1

To determine the demographic profile of the respondents regarding age, gender, religion, ethnicity, educational attainment, occupation, and monthly family income.

A total of 1,208 respondents from 22 villages of Cagayan de Oro City participated in the study. Table 1 shows the frequency distribution of the study participants.

Name of Barangays	Number of Households	Number of Household Respondents
1. Tignapoloan	899	18
2. Dansolihon	991	20
3. Mambuaya	533	11
4. Bayanga	623	12
5. Lumbia	3,044	60
6. Balulang	7,868	158
7. Carmen	15,360	308
8. Kauswagan	7,598	152
9. Bonbon	2,093	42
10. Macasandig	5,203	104
11. Nazareth	2,526	50
12. Barangay 1 (Pob.)	115	2
13. Barangay 2 (Pob.)	21	2
14. Barangay 6 (Pob.)	38	2
15. Barangay 7 (Pob.)	131	2
16. Barangay 10(Pob.)	139	3
17. Barangay 13(Pob.)	542	11
18. Barangay 15(Pob.)	760	15
19. Barangay 17(Pob.)	554	11
20. Consolacion	2,435	49
21. Macabalan	4,470	89
22. Puntod	4,366	87
TOTAL	60,309	1,208

Table 1: Frequency distribution of the household respondents according to their area of residence.

Table 2 shows the frequency and percentage distribution of the respondents' profile. It can be seen from the data collected that 32 percent of the respondents are young people between the ages of 20 - 24 years old, followed by 25 - 29-year-olds. The rest is be-

tween the ages of 30 and above. This means that majority of the respondents are young and middle adults who composed most of the working populace.

Gender	Frequency	Percentage
Male	558	46.19
Female	650	53.81
Total	1208	100
Age		
20-24 years old	380	31.46
25-29 years old	257	21.27
30-34 years old	193	15.98
35-39 years old	132	10.93
40 years old and above	246	20.36
Total	1208	100
Religion		
Roman Catholic	979	81.04
Islam	46	3.81
Protestant	85	7.04
Others	98	8.11
Total	1208	100
Ethnicity		
Cebuano	874	72.11
Ilonggo	100	8.28
Ilocano	62	5.13
Waray	59	4.88
Manobo	73	6.04
Higaunon	13	1.08
Others	30	2.48
Total	1208	100
Education		
Elementary Level	21	1.74
Elementary Graduate	71	5.88
High School Level	162	13.37
High School Graduate	305	25.15
College Level	317	26.41
College Graduate	222	18.38
Masteral Level	38	3.15
Masteral Graduate	32	2.65
Doctorate Level	33	2.73
Doctorate Graduate	7	0.54
Total	1208	100
Main Occupation		
Farming, fishing, livestock raising	148	12.25
Work in an office - employee	255	21.11
Teaching, training, facilitating	89	7.37
non-farm family business (owner)	137	11.34
Property owner (house rental, boarders/lodgers)	109	9.02
Laborer	143	11.84
Driver	110	9.11
Self Employed	162	13.41
Others	55	4.55
Total	1208	100
Monthly Income		
9,001.00 and above	185	15.30
8,001.00-9,000.00	38	3.15
7,001.00-8,000.00	13	1.08
6,001.00-7,000.00	100	8.28
5,001.00-6,000.00	42	3.48
4,001.00-5,000.00	70	5.79
3,001.00-4,000.00	158	13.08
2,001.00-3,000.00	278	23.01
1,001.00-2,000.00	294	24.34
1,000.00 and below	30	2.49
Total	1208	100

Table 2: Frequency and percentage distribution of the respondents' profile.

Although there are more females among the respondents, there's not much difference in terms of the percentage (only 8%). This means that both genders are well represented in the study.

The majority is Roman Catholics, and the rest of the 19 percent belonged to Islam, Protestants, Iglesia ni Cristo and other "Born Again" religious groups.

Almost 72 percent of the respondents claimed to be Cebuanos, while the rest said they come from the following ethnicity: Ilonggos, Ilocanos, Waray, Manobo, Higaunon, and others.

In terms of educational attainment, more than half of the respondents reached the college level, followed by about a third who reached or completed the high school level. Only a few (about 5.88%) reached or completed only the elementary level, and only about 9% took further education (Masters and Doctorate level).

As to the respondents' occupation, most of them (about 21.11%) are rank and file employees of private and public institutions or establishments, followed by those who claimed to be self-employed (13.41%), then by farmers and fishermen (12.25%), laborers (11.84%), non-farm family business owners (11.31%), drivers (9.11%), those jobs which involved teaching, training and facilitating of some sort (7.37%), property owners (9.02%), and about 4.55 percent having odd irregular jobs.

From the kind of income, most of the respondents' monthly family incomes are PhP 4,000 below (about 66%). There are those with a family income of more than PhP 9,000 (about 15.30%), but the rest have salaries ranging between PhP 1,001 to PhP 9,000. Basing from the Philippines' minimum monthly wage of PhP 6,000, about 72 percent of the respondents are receiving less than the minimum.

In summary, most of the respondents in this study can be described as young and middle Roman Catholic adults of Cebuano origin and who was able to get a college education but are only rank and file employees in both private and public institutions receiving below minimum wages.

Objective 2

To determine the level of knowledge of the respondents about climate change in terms of its causes and possible consequences.

As mentioned earlier, most people in Cagayan de Oro City can relate to climate change through personal experiences. When the respondents were asked on how much they know about climate change, more than half (52%) replied that they know at least a fair amount on the phenomenon. About 27 percent claimed that they do not know much and 21 percent said they hardly know anything about it. This data can be gleaned from table 3. From their own perceptions, they have admitted that they only know a thing or two about climate change.

How much do you know about climate change?	Frequency	Percentage
At least a fair amount	628	51.99
Not much	325	26.90
Hardly anything	255	21.11
Total	1,208	100.00

Table 3: Level of knowledge on climate change as perceived by the respondents.

Table 4 presents the collected data on the respondent's knowledge in terms of the causes of climate change. Almost 70 percent agreed that climate change is caused by various factors led by sea level rise (74.34%), followed by coral bleaching about 73.76 percent, poor agricultural practices (e.g. Pesticide misuse) (72.60%), burning fossils such as coal, oil, natural gas (71.77%), electricity generation improper garbage disposable such as burning garbage (71.27%), transportation, such as driving car, bus or boat (vehicle emissions) (70.53%), land clearing (e.g., Deforestations) (62.91%), and poor industrial practices (e.g., Factory emissions, improper waste disposal) (54.72%). Most of these 8 causes are man-made, called "anthropogenic" factors. About 14.82 percent are still not sure that the mentioned factors are actual causes of climate change, while around 16.20 percent believed that these do not cause climate change. This means that majority of the respondents know the causes of climate change, but a third is still not yet convince or do not know these causes.

Do you think any of the following causes climate change?	YES		NOT SURE		NO	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Poor industrial practices (eg. Factory emissions, improper waste disposal)	661	54.72	157	13.00	390	32.28
Land clearing (eg. Deforestations)	760	62.91	163	13.49	285	23.59
Transportation, such as driving car, bus or boat (vehicle emissions)	852	70.53	160	13.25	196	16.23
Burning fossils such as coal, oil, natural gas	867	71.77	151	12.50	190	15.73
Electricity generation Improper garbage disposable such as burning garbage	861	71.27	165	13.66	182	15.07
Poor agricultural practices (eg. Pesticide misuse)	877	72.60	223	18.46	108	8.94
Sea level rise	898	74.34	215	17.80	95	7.86
Coral bleaching	891	73.76	197	16.31	120	9.93
AVERAGE	833	68.98	179	14.82	196	16.20

Table 4: Frequency and percentage distribution of the respondents' knowledge in terms of the causes of climate change.

These findings are supported by the studies of Wachholz, Artz and Chene [19], Eggers, Kayser, and Isselstein [20] and Lorenzoni and Pidgeon [21]. Wachholz., *et al.* [19] found out that the majority of the American college students believed that climate change is real and is caused by human-induced factors. The study of Eggers., *et al.* [20] and Lorenzoni and Pidgeon [21] also confirmed that the grassland farmers themselves had experienced the effects of climate change and thus, they are no longer skeptical about it.

Table 5 contains the data on the respondents' knowledge of the possible consequences of climate change. The majority (51%) of the respondents' agreed that most extreme environmental events are effects of climate change. Most of these environmental events associated with climate change are global warming, typhoons, floods, El Nino/La Nina, and variations in climate. Other environmental occurrences highly associated with climate change according to the respondents are depletion of ozone layer, earthquakes, intense storm surges, sea level rise, and fish kill, among others. Still, about a third of the respondents are not sure that these events are real consequences of climate change and almost 16 percent do not believe that these events are associated with climate change at all.

Do you associate any of the following with climate change?	YES		NOT SURE		NO	
	F	P	F	P	F	P
Global warming	609	50.41	415	34.35	184	15.23
Typhoon	595	49.25	411	34.02	202	16.72
Floods	601	49.75	425	35.18	182	15.07
El Nino/La Nina	589	48.76	437	36.18	182	15.07
Climate variability	605	50.08	384	31.79	182	15.07
Ozone layer depletion	626	51.82	403	33.36	179	14.82
Earthquakes	635	52.57	384	31.79	189	15.65
More intense storm surges	599	49.59	400	33.11	209	17.30
Sea level rise	635	52.57	384	31.79	189	15.65
Fish kill	599	49.59	400	33.11	209	17.30
Landslide	635	52.57	384	31.79	189	15.65
Increased greenhouse gases	599	49.59	400	33.11	209	17.30
Droughts	643	53.23	364	30.13	201	16.64
Health epidemics	593	49.09	388	32.12	227	18.79
Coral reef bleaching	643	53.23	364	30.13	201	16.64
Volcanic eruptions	593	49.09	388	32.12	227	18.79
AVERAGE	612	50.76	397	32.82	199	16.42

Table 5: Frequency and percentage distribution of the respondents' knowledge in terms of its possible consequences.

A similar study among American citizens in 2010 revealed that majority of the respondents knew the causes of climate change. However, they do not know why these factors caused changes in the climate [22].

Objective 3

To determine the respondents' awareness of the possible effects of climate change.

The respondents were also asked whether certain environmental events have occurred in their communities. Table 6 illustrates the frequency and distribution of the respondents' experiences or observations on the possible effects of climate change in their area of residence. About half of the respondents claimed that they have experienced or have observed increased flooding and severity of tropical storms. They have also noticed river flooding, land slippage, as well as decreased productivity of fisheries. On the other hand, almost 32 percent of the respondents said that they are not sure they have observed the deterioration of river ecosystem, salt water intrusion into aquifers and loss of freshwater, riverbank erosion, and decreased agricultural productivity.

Do the following occur in your community?	YES		NOT SURE		NO	
	F	P	F	P	F	P
1. Increased flooding	612	50.66	415	34.35	181	14.98
2. Increased severity of tropical storms	639	52.90	367	30.38	202	16.72
3. River flooding	560	46.36	409	33.86	239	19.78
4. Land slippage	639	52.90	367	30.38	202	16.72
5. Decreased productivity of fisheries	560	46.36	409	33.86	239	19.78
6. Deterioration of river ecosystem	639	52.90	367	30.38	202	16.72
7. Salt water intrusion into the river	560	46.36	409	33.86	239	19.78
8. riverbank erosion	626	51.82	366	30.30	216	17.88
9. Decreased agricultural productivity	581	48.10	389	32.20	238	19.70
AVERAGE	602	49.82	389	32.17	217	18.01

Table 6: Frequency and percentage distribution of the respondents' awareness of the possible effects of climate change.

According to the 2015 Global Climate Risk Index, the Philippines is one of the most affected by climate change due to its geography [23]. This country is surrounded by the western Pacific Ocean, which brings about warm water temperature. Being an archipelago, the Philippines lacks natural barriers between its seas and land areas, thus increasing the risk of tropical storms. On the average, 20 cyclones enter the Philippine waters each year, with 8 or 9 of these cyclones making landfall. The responses of the study participants confirmed that many of them have felt the environmental changes brought about by frequent variability of the weather and extreme changes in the climate.

When the respondents were asked about their perceptions regarding the extent of environmental changes related to climate change, approximately 48 percent have consistently replied that they had noticed the changes "always". This is presented in table 7 on the frequency and percentage distribution of the respondents' perception of the extent of environmental changes related to climate change. Because the Philippines have only 2 seasons, the wet and dry, the study participants may have experienced these changes once a year but for a longer period (between 2 - 4 months in duration).

Have you noticed any of the following changes in your community?	Always		Sometimes		Never	
	F	P	F	P	F	P
Increase in river erosion	527	43.63	378	31.29	303	25.08
More drought	616	50.99	353	29.22	239	19.78
Decrease in fish supplies	538	44.54	371	30.71	299	24.75
Increase in insect pest	616	50.99	353	29.22	239	19.78
Vegetation changes	538	44.54	371	30.71	299	24.75
More intense tropical storms/ typhoons	538	44.54	371	30.71	299	24.75
More landslide	610	50.50	370	30.63	228	18.87
Increase in rainfall	545	45.12	371	30.71	292	24.17
Rising river water	610	50.50	370	30.63	228	18.87
More flooding	545	45.12	371	30.71	292	24.17
Temperature fluctuation	610	50.50	370	30.63	228	18.87
Differences in seasonality of crops	626	51.82	366	30.30	216	17.88
AVERAGE	**576**	**47.73**	**368**	**30.46**	**264**	**21.81**

Table 7: Frequency and percentage distribution of the respondents' perception of the extent of environmental awareness changes related to climate change.

Objective 4

To determine the respondents' attitude and practices towards climate change.

The fourth variable of the study is the attitude of the study participants toward climate change mitigation. The data on attitude were presented in table 8. On average, the respondents were "moderately concerned" with the importance of the mentioned mitigating strategies to prevent or solve the problems associated with climate change. The highest mean was on the reduction in consumption of electricity. Followed by improved pest management strategies, and the implementation of energy efficient measures in the industrial and commercial sectors.

Do you think any of the following can be important in helping your community deal with climate change?	Mean	Standard Deviation	Verbal Description
Public education on health-related impacts of climate change	4.00	1.020	Moderately concerned
Disaster management plans	3.89	1.004	Moderately concerned
Improved water storage	3.97	1.022	Moderately concerned
Flood warning systems	3.72	1.122	Moderately concerned
Increased public awareness of climate change issues	3.63	1.210	Moderately concerned
Early warning systems for health-related impacts (such as dengue)	3.77	1.180	Moderately concerned
Improved crop cultivation in the agricultural sector	3.90	1.119	Moderately concerned
Improved pest management strategies	4.13	0.832	Moderately concerned
Increased and better surveillance systems	3.98	0.889	Moderately concerned
Increased research and development of renewable energy technologies	4.11	0.828	Moderately concerned
Reduction in fossil fuel (coal, oil, natural gas) use	4.07	0.869	Moderately concerned
Observing building code	4.04	0.882	Moderately concerned
Reduction in consumption of electricity	4.18	0.811	Moderately concerned
Implementation of energy efficient measures in the industrial and commercial sectors	4.10	0.831	Moderately concerned
Total	**3.96**	**0.973**	Moderately concerned

Table 8: The weighted mean of the respondents' attitude towards climate change mitigation.

Legend:

4.50 – 5.00	-	Very concerned
3.50 – 4.49	-	Moderately concerned
2.50 – 3.49	-	Concerned
1.50 – 2.49	-	A little bit concerned
1.00 – 1.49	-	Not concern at all

These responses were confirmed with the open-ended answers collected as qualitative data. When the respondents were asked what they will do within themselves to adapt or mitigate the effects of climate change, the following were the 10 most common responses:

"Think self as steward of God to protect Mother Earth".

"Strive to learn or be aware of the causes and effects of climate change".

"Be a role model to others".

"Be disciplined in actions, for example in garbage disposal and segregation".

"Follow rules related to keeping the environment clean and in preserving natural resources".

"Do the 3Rs: reduce, reuse, recycle".

"Conserving water and energy".

"No to cutting trees".

"No burning of wastes, plastic, or rubber".

"Use of eco-transportation such as bicycle and walking".

When the respondents were asked what they can do as a community to mitigate climate change, most of them verbalized the following:

"Being concern for climate change issues and thus, cooperate with climate change mitigating activities within the community".

"Help disseminate information or conduct education campaign related to climate change causes, effects and mitigating actions".

"Support the surveillance program within the community, such as flood warning systems, among others".

"Participate in keeping the community clean".

"Be involved in greening projects of the barangay, such as planting trees, mangroves, etc".

"Support local policies related to saving the environment and preventing climate change".

"No to the establishment of coal factories or any factories causing pollution".

"Provision of proper drainage in the community".

"Supporting the ban of using plastic or rubber".

"Disseminating the use of eco-friendly products".

With regard to the respondents' practices towards climate change mitigation, the overall mean revealed that the respondents just "moderately" practice these. For them, this means that they have accepted that they are not really practicing climate change mitigation strategies at all times. This data are presented in table 9.

Objective 5

To determine the respondents' action taken to adapt to climate change.

To what extent do you practice the following?	Mean	Standard Deviation	Verbal Description
Use environmentally safe products	3.26	0.834	Moderate
Proper waste segregation	3.26	0.834	Moderate
Conserve energy	3.15	0.903	Moderate
Maintenance of safe household drains	3.22	0.838	Moderate
Avoid burning of solid waste	3.23	0.795	Moderate
Practice soil conservation	3.29	0.722	Moderate
Participate in reforestation/tree planting	3.43	0.699	Moderate
Maintaining a compost pit	3.22	0.790	Moderate
Reduction in harmful emission	3.43	0.699	Moderate
Conduct impact assessment studies on climate change	3.22	0.790	Moderate
Total	3.27	0.790	Moderate

Table 9: Weighted mean of the respondents' practices towards climate change mitigation.

Legend:

3.50 – 4.00	-	High
2.50 – 3.49	-	Moderate
1.50 – 2.49	-	Low
1.00 – 1.49	-	Not at all

Table 10 shows that 46 percent of the general respondents stated they adapted practices in one or more ways to climate change. This means that the respondents have taken actions and developed a sustainable climate change awareness strategy.

The qualitative data on the respondents' behavior towards climate change mitigation centered on 6 themes, namely: practices related to garbage or waste management, preservation of trees, conservation of other natural resources, pollution control, programs and laws related to climate change, and personal commitment to this problem.

For the first theme in relation to garbage or waste management, most of the respondents mentioned the following practices:

The second theme is related to preservation of trees. The following practices were verbalized by the respondents:

The third theme is about the conservation of other natural resources, including the coral reefs, fishes in the sea, land, water and energy resources.

Have you taken the following actions already to adapt to climate change?	YES		NO		NOT SURE	
	F	%	F	%	F	%
1. Planted trees	582	48.18	347	28.73	279	23.10
2. Planted plants in the house yard	440	36.42	405	33.53	363	30.05
3. Stopped cutting trees	597	49.42	342	28.31	269	22.27
4. Maintained vegetation	449	37.17	395	32.70	364	30.13
5. Built/fixed dikes	597	49.42	342	28.31	269	22.27
6. Built well sand other water resources	534	44.21	368	30.46	306	25.33
7. Cleaned or helped to maintain public drainage systems from waste	617	51.08	350	28.97	241	19.95
8. Turned off lights when not in use (energy efficiency)	544	45.03	364	30.13	300	24.83
9. Turned off water when not in use	617	51.08	350	28.97	241	19.95
10. Built or helped to build green spaces, such as parks or gardens	544	45.03	364	30.13	300	24.83
11. Stopped/reduced time taking car or bus and walked or cycled	544	45.03	364	30.13	300	24.83
12. Not litter even when bins are not available	616	50.99	359	29.72	233	19.29
Average	557	46.10	363	30.00	289	23.90

Table 10: Showing Action was taken to adapt to Climate Change.

"Proper disposal and waste segregation".
"Practicing the 3 Rs (reduce, reuse, recycle)".
"Making compost pit in the backyard".
"No open burning".
"Providing adequate garbage cans or regular collection of garbage".
"Turning waste into fertilizers".
"Cleaning the environment regularly".
"Cleaning drainages regularly and having the proper drainage".
"Less use of plastic or recycle plastic".
"No burning of plastics".
"No burning of rubbers".
"Putting signages as reminders related to proper waste segregation".

Table a

"Conducting tree planting or reforestation"
"Stopping illegal logging or cutting of trees"
"Preserving the forest land"
"Stopping the practice of kaingin"
"Helping farmers who are very poor"

Table b

"Preserving coral reefs or fish sanctuaries"
"Stopping illegal fishing"
"Saying no to mining activities"
"Avoiding the use of pesticides in agriculture"
"Developing agriculture using organic fertilizers"
"Conserving water"
"Conserving electricity or energy"

Table c

The fourth theme identified was on pollution coming from various sources such as from factories, coal power plants, cars, air conditioners and even from cigarette smoking. The respondents suggested such mitigating actions as:

"Stopping pollution from cars"
"Stopping pollution from factories and other industries"
"Saying no to coal power plants operation"
"Banning cigarette smoking"
"Limiting the use of products with CFC/GHG (aircon, etc.)"
"Encouraging use of renewable energy (solar power, etc.)"
"Proper implementation of the Clean Air Act"
"Stopping traffic particularly in highly urbanized communities"

Table d

The fifth theme is related to all the laws, policies, regulations and programs related to environmental protection and prevention of climate change. The most common mitigating actions identified by the respondents were:

Finally, the last theme identified from the responses of the study participants is related to personal commitment to act on the problem of climate change. The respondents highlighted the following as significant personal contribution to climate change mitigation:

From the ideas shared by the respondents on certain actions which they think will help mitigate climate change, it can be deduced that they have a fair amount of knowledge about climate change; that they are also moderately concerned about the occurring changes in the environment and are moderately practicing some mitigating actions toward curbing the consequences brought about by this phenomenon.

"Prioritizing climate change related issues or problems"
"Creating programs or projects to prevent effects of climate change"
"Provision of appropriate budget to climate change related projects/programs"
"Implementing properly climate change related projects/programs"
"Creation of laws which prevent the effects of climate change"
"Implementing laws related to climate change prevention"
"Strict penalty for offenders of climate change related laws"
"Improving flooding mitigation system"
"Stopping corruption in the government"
"Awareness/Education campaign on climate change"
"Promoting the use of eco-friendly appliances/ materials"
"Promoting the use of eco-transportation (bike, etc.)"
"Construction of conservation parks"
"Conducting research about climate change adaptation and mitigation"

Table e

"Having the discipline or commitment to do what is right for the environment".
"Becoming stewards of God's creation". *"Becoming role models to others".*
"Developing teamwork or cooperation within their own communities".
"Having faith in God".
"Organizing peoples' organizations and NGOs focused on climate change issues".
"For leaders to have the strong political will to lead the people".

Table f

Similar findings were noted among American citizens in the study of Leiserowitz., *et al.* in 2010 [22]. Buys, Miller and van Megen [24] further documented that public engagement and support is very important to ensure adaptation to climate change. Likewise, William, Terry, Hardison, and Preston [25] found out that having traditional knowledge on climate change will form the public's culture about climate change adaptation, in following the laws related to it, in accepting the risks related to it and even will affect governance [26-59].

Conclusion and Recommendations

Based on the findings of the study, it can be concluded that the respondents are equally represented regarding gender, belonged to the working group, had enough education yet are not having jobs with the proper pay and so have low socioeconomic status. They perceived that they only have moderate knowledge about climate change causes and the possible negative effects on people and the environment. Thus, they have accepted that they lack full knowledge about climate change. Regarding attitude and practices towards climate change mitigation, they are only moderately concerned about the issue and are moderately practicing mitigating actions. The general population saw the need for more information about climate change.

The authors recommend that the public education program should have a component that targets persons working in sectors who would be hard hit by climate change. There is a need to introduce persons to a wider range of actions which can be implemented in addressing climate change issues. Across all the surveys, there was the suggestion by the respondents that there is a need for more awareness and public education activities in the community. The local community should be involved in formulating communication materials to increase knowledge and awareness. Moreover, the vulnerable sector should be involved in formulating climate change action plan in the local government unit.

Bibliography

1. IPCC: "Climate Change Synthesis Report". Geneva Switzerland (2007).

2. Ramin B and Syoboda T. "Health of the Homeless and Climate Change". *Journal of Urban Health: Bulletin of the New York Academy of Medicine* 86 (2009): 654-664.

3. Tolentino., *et al*. "Projected Impact of Climate Change on Hydrological Regimes in the Philippines". *PLOS One* (2016).

4. Lo DS., *et al*. "Flood inundation mapping along the proposed dike system of the cagayan de oro river: the sendong scale flood". *International Journal of Sustainable Development and Planning* 12.1 (2017): 165-175.

5. Caribbean Institute of Media and Communication (CARIMAC): "Report On Climate Change Knowledge, Attitude And Behavioural Practice Survey". The University of the West Indies, Mona Campus, Kingston 7 Jamaica (2012).

6. Fontenard T. "Knowledge, attitudes and practices (KAP) Survey Report. UNDP-JCCCP In-Country Specific Campaign for Grenada". Castries, Saint Lucia (2016).

7. Hope S. "Knowledge, attitudes & practices study on climate change adaptation and mitigation in Guyana". Japan caribbean climate change partnership. Caribbean (2016).

8. Kairi Consultants Limited. "Climate change awareness, attitudes and behavioural practices in the OECS: a KAP survey of six member states". OECS Survey Report Volume 1 - Main Survey Report. Castries, Saint Lucia (2013).

9. Mc Michael AJ. "Comparative Quantification of Health Risks: Global and Regional Burden of Disease Due to Selected Major Risk Factors". Geneva, World Health Organization (2004).

10. Mc Michael AJ. "Climate Change and Human Health-Risks and Responses". Geneva, World Health Organization (2003).

11. World Food Programme. "Climate Change and Hunger: Towards a WFP Policy on Climate Change". Rome, WFP (2011).

12. United Nations Environment Programme. "Green Jobs: Towards Decent Work in a Sustainable Low-Carbon World". Nairobi (2008).

13. United Nations Environment Programme. "Climate Changes Its Consequences on Employment and Trade Union Action". A Training manual for Workers and Trade Unions Nairobi (2008).

14. Guzman JM. "Population Dynamics and Climate Change". New York and London, United Nations Population Fund and International Institute for Environment and Development (2009).

15. State of World Population. "Unleashing the Potential of Urban Growth". New York, UN Population Fund (2007).

16. Cardwell FB. "Knowledge, Attitudes and Practices of Global Environmental Change and Health: Toward Sustainable Behaviour Change?" *McMaster University* (2011).

17. Lubos LC., *et al*. "Knowledge, attitude, and behaviors related to climate change in Cagayan de Oro City: Implications on public health policies and practices" (2015).

18. Sealza IS and Sealza LP. "Recovering from the Effects of Natural Disaster: The Case of Urban Cagayan de Oro, Philippines". *European Journal of Sustainable Development* 3 (2014): 103-110.

19. Wachholz S., *et al*. "Warming to the idea: University students' knowledge and attitudes about climate change". *International Journal of Sustainability in Higher Education* 15 (2014): 128-141.

20. Eggers M., *et al*. "Grassland farmers' attitudes toward climate change in the north german plain". *Regional Environmental Change* 15 (2015): 607-617.

21. Lorenzoni I and Pidgeon NF. "Public views on climate change: European and USA perspectives". *Climatic Change* 77 (2006): 73-95.

22. Leiserowitz A., *et al*. "Americans' Knowledge of Climate Change". Yale Uniiversity. New Haven, CT: Yale Project on Climate Change Communication (2010).

23. Kreft S., *et al*. "Global Climate Risk Index 2015: Who Suffers Most from Extreme Weather Events? Weather-related Loss Events in 2013 and 1994 to 2013 (2015).

24. Buys., *et al*. "Conceptualising climate change in rural australia: Community perceptions, attitudes and (in)actions". *Regional Environmental Change* 12 (2012): 237-248.

25. Williams T and Hardison P. "Culture, law, risk and governance: Contexts of traditional knowledge in climate change adaptation". *Climatic Change* 120 (2013): 531-544.

26. Akerlof K. "Public Perceptions of Climate Change as a Human Health Risk: Survey of the United States, Canada, and Malta". *International Journal of Environmental Research and Public Health* 7 (2010): 255-2606.

27. Akompab DA., *et al*. "Heat waves and climate change: Applying the health belief model to identify predictors of risk perception and adaptive behaviours in adelaide, Australia". *International Journal of Environmental Research and Public Health* 10 (2013): 2164-2184.

28. Blackdot Media. "Report on climate change knowledge, attitude and behavioural practice survey for the climate change secretariat". *Lusaka, Zambia* (2016).

29. Beggs PJ. "Impacts of Climate and Climate Change on Medications and Human Health". *Australian and New Zealand Journal of Public Health* 24 (2000): 835-842.

30. Bell A. "Climate of Opinion: Public and Media Discourse on the Global Environment". *Discourse and Society* 51 (1994): 33-64.

31. Bulto PL. "Assessment of Human Health Vulnerability to Climate Variability and Change in Cuba". *Environmental Health Perspectives* 12 (2006): 114.

32. Clark C. "Internal and External Influences on Pro-environmental Behaviour: Participation in a Green Electricity Program". *Journal of Environmental Psychology* 23 (2003): 237-246.

33. Collins AE. "Cyclone Disaster Vulnerability and Response Experiences in Coastal Bangladesh Disaster". 34 (2010): 931-954.

34. Crona B., *et al*. "Perceptions of climate change: Linking local and global perceptions through a cultural knowledge approach". *Climatic Change* 119.2 (2013): 519-531.

35. Ebi KL. "An Approach for Assessing Human Health Vulnerability and Public Health Interventions to Adapt to Climate Change". *Environmental Health Perspectives* 12 (2006): 114.

36. Haque. "Households' Perception of Climate Change and Human Health Risks: A Community Perspective" (2012).

37. Hennessay KJ and Pittock AB. "Greenhouse Warming and Household Temperature Events in Victoria, Australia". *Journal of Climate* 15.6 (1995): 591-613.

38. Kearney A and De Young R. "A Knowledge-Based Intervention for Promoting Carpooling". *Environmental Behaviour* 27 (1995): 650-678.

39. Kempton R. "Environmental Values". *Annual Review of Environment and Resources* (2005): 335-372.

40. Kittipongvises S and Mino T. "Do environmental norms and climate change perceptions influence mitigation behaviour?: Thailand as a case study". *International Journal of Environmental Science and Development* 4.3 (2013): 251.

41. Kovats RS. "Climate Change and Human Health". *British Medical Journal* 318 (1999): 7199.

42. Kucheik M. "Regional Differentiation of Heat Waves in Poland and Their Impact on Mortality". In 17th International Congress of Biometeorology 41 (2005): 417-418.

43. Leiserowitz L. "American Opinions on Global Warming" (2003).

44. Lyons-Eubanks K. "Climate Change and Public Health Preparation Plan" (2010).

45. Macnaghten P and Jacobs M. "Public Identification with Sustainable Development". *Global Environmental Change* 7 (1997): 5-24.

46. Masud MM., *et al*. "Pro-environmental behavior and public understanding of climate change". *Mitigation and Adaptation Strategies for Global Change* 20.4 (2015): 591-600.

47. Mccright AM. "The effects of gender on climate change knowledge and concern in the american public". *Population and Environment* 32 (2010): 66-87.

48. Md Iqbal Kabir B., *et al*. "Knowledge and perception about climate change and human health: Findings from a baseline survey among vulnerable communities in Bangladesh". *BMC Public Health* 16 (2016).

49. Neri DLE. "Education for Sustainable Development as Strategy for Climate Change Adaptation and Mitigation: A Literature Review". *International Journal of Multidisciplinary Research* 15 (2012).

50. Njagi AN. "Knowledge, Attitude, and Practice of Healthcare Waste Management and Associated Health Risks in the Two Teaching and Referral Hospitals in Kenya". *Journal Community Health* 17 (2012): 1172-1177.

51. O'Connor R. "Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change". *Risk Analysis* 19 (1999): 461-471.

52. Patchen M. "Public Attitudes and Behaviour About Climate Change" (2006).

53. Picotz JA and San Kovatz R. "Hotspots in Climate Change and Human Health" (2002).

54. Piotrowicz K. "The Occurrence of Unfavourable Thermal Conditions on Human Health in Central Europe and Potential Climate Change Impacts". *Environmental Management* 44 (2009): 766-775.

55. Regassa N and Stoecker BJ. "Research Article: Attitude and risk perceptions about climate change in farming communities in southern Ethiopia". *Environmental Practice* 16 (2014): 29-36.

56. Sevilla CG. "Introduction to Research Methods". Manila: Rex Book Store Co. (2007).

57. Stephenson J. "Population, Development and Climate Change: Links and Effects on Human Health". (2013).

58. Stevenson KT., *et al*. "Overcoming skepticism with education: Interacting influences of worldview and climate change knowledge on perceived climate change risk among adolescents". *Climatic Change* 126 (2014): 293-304.

59. European Opinion Research Group (EORG), "The Attitudes of Europeans Toward the Environment". Brussels (2002).

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