

Empowering and Engaging Communities: Citizen Science on Climate Change Awareness

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ABSTRACT

Climate change is considered by many to be the most daunting issue that has confronted the human race. For the more than 20,000 families hardly hit and devastated by tropical storm Washi in 2011, this disastrous influence of climate change destroyed victims' physical life, and worse intensified their sufferings due to loss of loved ones, the threat to life, loss of property and valuable resources. This study is part of the University's Climate Change Project aimed to empower the typhoon survivors using the Climate Change Module as its initial vehicle for community organizing. It used Citizen Science as an approach and a discipline, believing that most citizen science projects have underlying, testable assumptions that engaging the public in the process of research has scientific, educational, attitudinal, and behavioral outcomes. Thus this study aimed to increase the survivors' climate change awareness to ease the victims' level of anxiety about climate change and to enhance their emotional coping capacities by increasing their knowledge, developing positive attitude and behavior on climate change. Results show that there were significant increases in their knowledge, attitude and potential behaviors regarding climate change.

Keywords: Climate Change, Citizen Science, Empowerment, Engagement

INTRODUCTION

Climate change is the most serious and most pervasive threat facing humanity today. Many regard climate change as perhaps the most profound challenge confronting human social, political, and economic systems (Dryzek, Norgaard, & Schlosberg, 2011). These are most especially and clearly seen and felt during the aftermath of unseasonal and extreme weather events such as typhoons and or hurricanes causing natural disasters all over the globe. All countries at high risk from climate change find it increasingly hard to create sustainable development (Munasinghe & Swart, 2005).

The Philippines is not spared as the country has been severely suffering from natural disasters for the last decade, and many of those displaced by these calamities have yet to return to their homes or relocated. “What’s worse is that there is hardly any room to breathe, and the cycle repeats when the next super-typhoon crashes onto our shores” (Mendoza, 2016). The most recent was in November 2013, wrought by typhoon Yolanda (Haiyan), killing thousands and leaving millions homeless and devastated (NDRRMC Report, 2012).

In Cagayan de Oro City, for the more than 20,000 families hardly hit and devastated by tropical storm Washi in 2011, this tragic effect of climate change did not only destroy the victims’ physical life but also intensified their suffering emotionally due to the loss of loved ones, threat to life, and loss of property and valuable resources. The city government’s response on shelter brought the victims and their families to the present three (3) relocation communities. Families were relocated by the city government in an attempt to stabilize their immediate needs of food, clothing, and shelter. Among the relocation cites is Talungan, where Liceo de Cagayan University found it more appropriate to extend services seeing its capability to deliver services considering the strength of its social, health, and environmental academic programs. Service-learning characterized the community extension program in that it emphasized both student learning while addressing the real needs in the community.

A recent study of the University assessed the typhoon victims’ coping strategies and activities in dealing with the loss of property, life, and livelihood in the relocation communities (Daan, 2015). It revealed that victims were able to cope with food, clothing, shelter, and other basic survival needs, but many were found to be still in the different stages of emotional distraught. Although some of the flood victims’ emotional distress may have been generated by their living conditions, it is believed that elevated levels of emotional anxiety may be due

to the precipitous traumatic effects of the disaster itself. Many studies claimed that adults and children who experienced floods and other man-made or natural disasters are always left in high levels of anxiety. It would be of great advantage that they become familiar with the source of stressors such as climate change (Norris & Murrell, 1988; Coelho, 2000). In many instances, climate change causes most people to feel small and unproductive (Peterson & Zimmerman, 2004).

Thus, this study documented the first phase of the Climate Change Project of the University in its attempt not only to ease the victims' level of anxiety about climate change but also to enhance their emotional coping capacities by enhancing their knowledge, attitude, and behavior on climate change. The project used citizen science as an approach and a discipline in itself to empower and engage community members on climate change.

Thus, this study documented the first phase of the Climate Change Project of the University in its attempt to ease the victims' level of anxiety about climate change by enhancing their emotional coping capacities, their knowledge, attitude, and behavior on climate change.

FRAMEWORK

In the conduct of this study, a major hovering assumption is that humans should address climate change. Climate change is something to which humans should be responding, believing that individual action will make an impact and empowerment focus on individual-level (Heuscher, 2012; Ahmad & Abu Talib, 2015).

Climate change is strongly associated with unseasonal weather and extreme weather situations. Some scientists, however, continue to claim that it may not be plausible to directly attribute these extreme weather events to climate change (Heuscher, 2012; Emanuel, 2013). Nevertheless, there is always one big and pervading question that usually arises during discussions in the aftermath of a disaster: "Will this extreme weather event be considered the "new normal" and therefore attributable to climate change?" This was the question posed by Kerry Emanuel (2013), a Hurricane Researcher of the Massachusetts Institute of Technology in Cambridge. On the other hand, Mima Mendoza (2016), a Research Associate of Climate Change and Environment Cluster at the Ateneo School of Government, Ateneo de Manila University, decried the grim reality that indeed this is "becoming the new normal and that climate change is a reality,

and countries like the Philippines are living in its deadly clutches.”

Thus, another assumption of this study recognizes that extreme weather events are defining the “new normal.” Thus, it becomes paramount for the University to facilitate projects that could help the typhoon victims in the community who are yet emotionally distressed and that it had become more difficult for them to move on, to be more prepared for this continuous onslaught of extreme weather events. It is worthwhile to quote Sun Tzu, an ancient Chinese philosopher, general and military strategist who said, “if you know the enemy and know yourself, you need not fear the result of a hundred battles.” Acquainting the typhoon victims on the dynamics of climate change can better prepare them not only physically but socio-emotionally.

The Climate Change Project. This ongoing project is a partnership of the University Student Body Organization with one of the Research Centers of the University, the Liceo de Cagayan University Center for Biodiversity and Conservation (LIMCEBCON), an education and training center for communities to increase awareness and build capacity for conservation and environmental protection and management. The center initiates partnership with environmental organizations and communities to strengthen the application of science and public policy by conducting community-based researches. Social science and natural science faculty members and students conduct studies that are in turn used by the University to make more meaningful engagement in various extension services in the adopted communities. Students and faculty members who undergo training with LIMCEBCON are called Green Advocates. They are commissioned to be actively involved in the different community projects in coordination with the Liceo Center for Community Development (LCCD). One of these is the Climate Change Project, an ongoing three-year project. This endeavor intends to empower target beneficiaries through a series of teachings and workshops to heighten their awareness of climate change. Thus, the target beneficiaries include the faculty, students, administrators, and members of adopted communities of the University. In this particular study, the target beneficiaries to be empowered are the typhoon victims in the adapted community. It uses Citizen Science as a means of empowering and engaging the communities.

Citizen science research. This mode of research is presently gaining utilization in environmental research. It has emerged as a distinct field of inquiry covering not only citizen science projects but the discipline of citizen science itself (Crall et al., 2015). Citizen Science is defined by the European Commission Green Paper as “general public engagement in scientific research activities where citizens

actively contribute to science either with their intellectual effort, or surrounding knowledge, or their tools and resources” (2013). This means partnering scientists with members of the community and engaging them to become scientists themselves (Toomey & Domroese, 2013). In this study, the partners of citizen scientists are the faculty researchers.

In a meta-analysis of a number of publications (n=1,935), Kullenberg and Kasperowski (2016) indicated three main categories of Citizen Science. The largest group was composed of research on biology, conservation, and ecology, and uses Citizen Science as mainly as a methodology of collecting and classifying data. A second feature of research was on geographic information research, where citizens participate in collecting geographic data. The third was “a line of research relating to the social sciences and epidemiology, which studies and facilitates public participation in relation to environmental issues and health. This present endeavor falls under a mix of ecology and social science.

Another classification for specific Citizen Science projects has been suggested by Wiggins and Crowston (2011) that is based on the goals of the study. Among these is an action project initiated by volunteers designed to encourage intervention in local concerns such as improving water quality in their local stream. This present Climate Change Project is also considered an action project because it was designed to increase awareness on environmental concerns and used Citizen Science as the means of engaging the community members as they take an active part in organizing the trainings and workshops and in the data gathering relative to the immediate and long term effect of the climate change awareness intervention (Wiggins & Crowston, 2011).

Utilizing Citizen Science with the targeted typhoon victims, this Climate Change Project aims to increase knowledge, attitude, and behavior toward climate change and effect lasting changes among the target beneficiaries, such as sustaining activities that support actual preservation and conservation of the environment. The researchers believe that with an issue like climate change which causes people to feel small and unproductive, processes of empowering and engaging them on the causes and possible consequences of climate change may help them cope with their anxieties and emotional distress because of the typhoon experience (Heuscher, 2012). Supported by the wisdom of Sun Tzu, in his famous quote on “the need to know the enemy and know yourself, you need not fear the result of a hundred battles” (Mair, V.H. Translation, 2007), acquainting the typhoon victims on the dynamics of climate change considered as the ‘enemy’ can better prepare them not only physically but socio emotionally.

Shirk et al. (2012), however, are doubtful on the significant effect of Citizen Science project on attitude and behavior change. Nevertheless, this current study hopes to disprove Shirk et al.'s claim since the pitfalls of citizen science using past studies in climate change were seriously considered in the project planning.

Citizen Science is becoming popular owing to its potential of increasing environmental stewardship by environmentally motivated citizens due to their substantial and active participation in research and consequent informal (i.e., non-classroom-based) science education. Most citizen science projects have an underlying, testable assumption that engagement of the public in the process of research has scientific, educational, attitudinal, and behavioral outcomes (Georgakakis et al., 2007 as cited by Toomey et al., 2013). Follet and Strezov (2015) likewise reinforced the nature of engagement of public and or community members as citizen scientists. Engagement, therefore, in this study mainly took the form of the activities undertaken by the citizen scientists.

Empowerment. Empowerment is crucial to any effort of researchers, community practitioners, or policymakers in bringing about meaningful social change related to marginalized individuals and groups (Aber et al., 2010). The typhoon victims in this present study are not only economically disadvantaged but also psychosocially marginalized. In studying empowerment, Heuscher (2012) cites the significance of developing a deep understanding of empowerment if this is to be achieved collectively. In her study, she emphasized the significance of education as a means of empowerment but cautioned that education as a sole basis maybe difficult to empower the target community, although it could be the first level. She further recommended the organization of clear and actionable projects to bring together a common task. In this study, the Climate Change Project does not rely alone on training the community members who were organized around a common issue which was climate change. There are activities programmed by the Project to collectively empower the community members. It is important to look at the critical link between individual empowerment, and community organization processes which require implementers to regard the "process of empowerment as participatory and developmental which means occurring over time, involving active and sustained engagement, and resulting in growth in awareness and capacity" (Maton, 2008). This study recognizes the developmental nature of empowerment through a collective effort of the community members. Therefore, empowerment, as far as this paper is concerned, refers to the first level of community empowerment (OMIT: empowering the community) using education as its vehicle. Phase Three of the Climate Change Project is planned to

gradually develop into collective efforts of community organizing as a continuing basis for community empowerment.

OBJECTIVES OF THE STUDY

This study aimed to increase climate change awareness among the Typhoon Sendong (Washi) to ease the victims' level of anxiety about climate change and to enhance their emotional coping capacities by increasing their knowledge, attitude, and behavior on climate change vis-à-vis, empowering them on climate change. Thus, this study documented the first phase of the Climate Change Project of the University in its attempt to ease the victims' level of anxiety about climate change by enhancing their emotional coping capacities, knowledge, attitude, and behavior on climate change.

METHODS

The study is descriptive in nature, using Citizen Science as an approach where it partnered with professional researchers to further the purpose of the study. Citizen science was used both as an approach and discipline. It was not only a vehicle of data gathering; it was also a vehicle for engaging community members. The study was conducted in Talungan District, Canitoan Village, Cagayan de Oro City, one of the three (3) relocation communities for Typhoon Sendong (Washi) survivors in 2011. There were 132 resident-participants from the 40 households of the district who were purposively chosen using the following criteria: a) at least high school graduate; b) with at least four years of stay in the village; and c) willing to give their informed consent as participants.

A modified set of Climate Change Questionnaire from the study of Lubos et al. (2015) previously used in a study in collaboration with the Department of Health Region 10 entitled 'Knowledge, Attitude and Behaviors related to Climate Change in Cagayan de Oro City: Implications on Public Health Policies and Practices' elicited quantitative and qualitative information pertaining to level of and summarized in a table. Furthermore, an indication of how often a response was given as general, typical, or variant. It is considered general if one half to almost all of the participants indicated the response. Typical were those responses that were stated at least by a fourth to almost half of the participants. Variant when these were mentioned by only one up to less than ten of the respondents.

The second batch of citizen scientists will be thoroughly chosen from the

knowledge on the causes and possible consequences of climate change. It also gathered data on the attitude and behavior of the participants on climate change. This instrument was translated into the vernacular to minimize communication barriers. A training module on Climate Change Education was used as the material for the seminar-workshops. Focus group discussions were also initiated among the participants to verify deeper into their awareness of climate change.

This study documented Phase One of the Climate Change Project, which consisted of two stages, namely, Stage 1: the training of the first batch of citizen scientists and Stage 2: the training of the community members to become potential citizen scientists.

Stage 1, Phase One of the project involved the three-day training of the fifteen (15) student leaders as citizen scientists using the Climate Change Module to empower them for community involvement. However, only ten (10) sustained the training and eventually became the first batch of citizen scientists. Even with fewer citizen scientists, it was important to pursue Phase One of the project. The observed spirit of service and volunteerism with a commitment that prevailed among the student leaders were very encouraging and also very important elements in conducting partnerships in Citizen Science (Follet & Strezov, 2015; Kullenberg & Kasperowski, 2016). Voluntary actions could very well sustain the citizen scientists' interest in learning about the context of the research and in pursuing the collection of accurate information.

Stage 2, Phase One, on the other hand, consisted of the actual deployment of the first batch of citizen scientists into the community, where they conducted the same Climate Change Module with the 132 typhoon survivors. This was only after ensuring that they were already equipped for their immersion in the community to serve as trainers of community volunteers as citizen scientists. The community volunteers underwent the same training as that of the first batch of student-citizen scientists. Before the three-day training, a pretest using the Climate Change Questionnaire was administered as a benchmark. A post-test of the same instrument was also administered after the three-day training to determine the increase/change in knowledge, attitude, and potential behavior on climate change. The data were organized and analyzed through descriptive statistics as well as t-test to determine the increase in knowledge after the three-day training workshops on climate change.

Qualitative data were organized using the classification adopted from the guidelines of Heppner and Heppner (2004), where categories that emerged from the analysis of the data were separated into three types (general, typical, variant)

and summarized in a table. Furthermore, an indication of how often a response was given as general, typical, or variant. It is considered general if one-half to almost all of the participants indicated the response. Typical were those responses that were stated at least by a fourth to almost half of the participants-variant when these were mentioned by only one up to less than ten of the respondents.

The second batch of citizen scientists will be thoroughly chosen from the 132 training participants and will be identified as community volunteers in Citizen Science. This is Phase Two of the Climate Change Project and is being hope to materialize by the end of July. Being survivors themselves, they are potential citizen scientists and can be effective in educating other communities from the lessons and common experiences they learned about climate change.

To determine whether the training module was effective, Kirkpatrick's Model of Training Evaluation was used. It observed the four levels, namely: 1) Reaction; 2) Learning; 3) Behavior; and 4) Result. Thus, the instrument for this study was designed to capture the first two levels with suggestive questions that may lead to potential behavior change. The last level is part of the ongoing community organizing activities of this project which is spearheaded by the Office of the LCCD Director.

RESULTS AND DISCUSSION

Out of the 132 participants, only 117 actively took part in the answering the questionnaire.

Table 1

General knowledge on climate change as perceived by the respondents

How much do you know about climate change?	Before		After	
	Frequency	Percentage	Frequency	Percentage
as least a fair amount	58	43.94	91	68.94
not much	57	43.18	8	6.06
hardly anything	2	1.52	18	13.64
no response	15	11.36	15	11.36
Total	132	100.00	132	100.00

Table 1 shows data before and after the training. It is noted that there is an increase in their general knowledge about climate change. There were increases

in the responses of “at least a fair amount” from almost 44% to almost 69% after the training; a decrease in “not much” from more than 43% to almost 7% was also noted. It is surprising to note that there was an increase of “hardly anything after the intervention.” Trainers noted that these were the ones who were late or partially attended the whole span of training.

Table 2

Frequency Distribution on the ‘Yes’ Responses Before and After the Training (n=132)

Relate to this event listed as to the frequency of its occurrence near your community.	Before		After	
	Yes		Yes	
	F	%	F	%
Increase in rainfall	73	55.30	116	87.88
More drought	51	38.64	114	86.36
More intense tropical storms / typhoons	59	44.70	115	87.12
Temperature increase / decrease	68	51.52	112	84.84
More landslide	43	32.58	114	86.36
More flooding	48	36.36	114	86.36
Differences in seasonality of crops	54	40.90	115	87.12
Vegetation changes	53	40.15	115	87.12
Increases in insect pest	58	43.94	114	86.36
No Response	15	11.36	15	11.36

Likewise, Table 2 shows their knowledge of the effects of climate change in terms of the frequency of events that occur near their community before and after the training workshop. The data revealed considerable increases in the knowledge of the community members on the effects of climate change, especially in terms of increase in rainfall, among all others. There were 15 participants who chose not to answer the questions.

Table 3

Distribution of Responses on Association of Events to Climate Change (n=132)

Do you associate any of the following with climate change	Before Yes		After Yes	
	F	%	F	%
Earthquakes	72	54.55	117	88.64
Typhoon	87	65.91	117	88.64
Increased greenhouse gases	56	42.42	116	87.88
Landslide	75	56.82	117	88.64
Volcanic eruptions	53	40.15	116	87.88
Floods	81	61.36	117	88.64
Sea level rise	73	55.30	116	87.88
More intense storm surges	80	60.61	117	88.64
Health epidemics	61	46.21	117	88.64
Global warming	86	65.15	117	88.64
Coral reef bleaching	38	28.79	116	87.88
Droughts	57	43.18	117	88.64
Climate variability	81	61.36	117	88.64
Fish kill	53	40.15	117	88.64
Ozone hole problem (ozone depletion)	74	56.06	117	88.64
El nino / la nina	71	53.79	117	88.64
No specific association	30	22.73	117	88.64
No response	15	11.36	117	88.64

The participants were also asked if they could associate certain events with climate change. Table 3 presents responses of the community member-participants on how they associate certain events with climate change before and after the training.

Using video clips, movies, and workshops, the intervention for three days discussed intensively on the different climate change topics to include major events such as those that were listed above. The participants were intently focused on the visuals. It was easier to increase their knowledge with the prepared visuals. Results show that the visuals especially the video clips and movies, helped a lot in changing their opinions in associating typhoons, earthquakes, and the like with climate change. The same visual materials presented instructional segments that discussed causes of climate change.

Table 4

Distribution of Responses on the Causes of Climate Change Before and After the Training (n=132)

Probable Causes of Climate Change	Before		After	
	F	%	F	%
Burning fossils such as coal, oil, natural gas	53	40.15	117	88.64
Coral bleaching	45	34.09	116	87.88
Transportation, such as driving car, bus or boat (vehicle emissions)	71	53.79	115	87.12
Land clearing (eg. Deforestations, slash and burn/kaingin practices)	94	71.21	115	87.12
Poor agricultural practices (eg. Pesticide misuse)	60	45.45	116	87.88
Poor industrial practices (eg. Factory emissions, improper waste disposal)	92	69.70	117	88.64
Improper garbage disposable such as burning garbage	47	35.61	116	87.88
Sea level rise	60	45.45	115	87.12

Table 4 shows the opinions of the community members on the causes of climate change. Thus, the before-and-after responses to the question: “Do you think any of the following cause climate change?” indicated positive changes in the manner they regarded the sources of climate change. Almost all of them answered that these practices cause and or contribute to climate change.

The above data just presented show the increase in knowledge on events associated with and probable causes of climate change among the community members who have undergone the three-day training. Part of the tool used for data gathering required qualitative responses. When asked what would probably cause climate change, the most common among the qualitative responses of the participants could be captured in the following answers:

- “ilegal na pag mina ug illegal nga pag putol sa kahoy” (Illegal mining and illegal logging)
- “Mga aso sa sakyanan, pagamit sa ref ug aircon” (Smoke coming from the vehicles and use of refrigerator)
- “Pagkaingin” (Swidden farming/slash and burn)
- “tungod rapod sa tawo” (Brought/caused by the people themselves)
- “Sa bukid nga gakaupaw” (Denudations of the mountains)
- “Mga hugaw gikan sa factory” (Factory waste)

Table 5

Comparison of Means to Establish the Change of Attitude Before and After the Training

Attitude: Do you think any of the following can be important in helping your community deal with climate change?	Before		After		T-Value
	Mean	Description	Mean	Description	
Reduction in fossil fuel (coal, oil, natural gas) use	4.15	Mod. Con.	4.96	Ext. Con.	7.59*
Reduction in consumption of electricity	3.81	Mod. Con.	4.97	Ext. Con.	10.61*
Energy efficient measures in the industrial & commercial sectors	3.92	Mod. Con.	4.98	Ext. Con.	9.52*
Increased research & development of renewable energy technologies	4.14	Mod. Con.	4.96	Ext. Con.	7.59*
Improved crop cultivation in the agricultural sector	4.28	Mod. Con.	4.99	Ext. Con.	6.69*
Increased public awareness of climate change issues	4.19	Mod. Con.	4.99	Ext. Con.	6.96*
Improved pest management strategies	3.88	Mod. Con.	4.97	Ext. Con.	9.68*
Increased and better surveillance systems	4.02	Mod. Con.	4.97	Ext. Con.	8.48*
Early warning systems for health-related impacts (such as dengue)	4.02	Mod. Con.	4.99	Ext. Con.	8.58*
Public education on health-related impacts of climate change	4.21	Mod. Con.	5.00	Ext. Con.	7.33*
Improved water storage	4.24	Mod. Con.	4.97	Ext. Con.	6.64*
Flood warning systems	4.09	Mod. Con.	4.99	Ext. Con.	7.74*
Disaster management plans	4.16	Mod. Con.	4.99	Ext. Con.	7.39*

*Legend: Mod. Con-Moderately concerned; Ext. Con. - Extremely Concerned; *Significant at 0.001 (two-tailed test)*

Knowledge of these events definitely has also affected their outlooks. By asking the question: “Do you think any of the following can be important in helping your community deal with climate change?”, Table 5 reveals the shift in the attitude of the respondents regarding climate change using t-test to establish significant difference in their responses before and after the training.

Data in Table 5 disclosed the change of the participants’ attitude towards practices that are deemed important in helping the community deal with climate change.

Table 6

Comparison of Means to Indicate Change of Opinion Before and After the Training (n=132)

Climate Change Mitigation	Before		After		T- Value
	Mean	Description	Mean	Description	
1. Use environmentally safe products	3.13	Moderate	3.97	High	9.18
2. Reduction in Harmful Emission	2.91	Moderate	3.95	High	11.44
3. Participate in Reforestation/Tree Planting	3.33	Moderate	3.93	High	7.13
4. Conduct impact assessment studies	3.03	Moderate	3.97	High	11.09
5. Maintenance of safe household drains	3.32	Moderate	3.97	High	8.71
6. Proper waste segregation	3.16	Moderate	3.97	High	9.67
7. Practice Soil Conservation	3.10	Moderate	3.95	High	9.93
8. Avoid Burning of Solid Waste	3.16	Moderate	3.95	High	9.18
9. Maintaining a compost pit	2.86	Moderate	3.95	High	10.63
10. Conserve energy	2.95	Moderate	3.94	High	10.62

Table 6 also supports the data on attitude considering the indication of significant change in the opinion of the participants on climate change mitigation. These responses were also reinforced with interview data from the series of focus group discussions with the community members. The table shows the data that disclosed the change in opinion of the participants regarding climate change mitigation after the training. On a scale of 1 to 4, their stand about the possible actions/behavior that can be done or that they were presently doing was found to be 'high' from the general response of 'moderate'. The qualitative data on the respondents' behavior towards climate change mitigation reinforced the previous opinions of the participants. There were six (6) themes in the respondents' answers, 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. The following were the most common commitment of the participants in terms of behavior relating to climate change challenge:

1. Garbage or waste management:

- "Pag praktis sa 3Rs" (Practicing the 3 Rs (reduce, reuse, recycle).
- "Magbuhat ug compost pit sa nataran sa likod" (To make compost pit in the backyard)
- "Dili mi magsunog sa basura" (No open burning)
- "Pag-andam ug sakto nga butanganan sa basura" (Provide adequate garbage cans for garbage collection)

- “Kanunay mi ga limpyo sa among tungod” (Cleaning the surrounding regularly)
 - “Kanunay nga pag hinlo sa mga kanal ug pagbuhat sa saktong mga kanal”(Cleaning drainages regularly)
 - “Talagsa na lang mi mogamit ug plastic,ang uban kay amo gina recycle”(Less use of plastic or recycle plastic)
2. Preservation of trees:
- “Magtanom ug mga punuan” (Tree planting or reforestation)
 - “Ipaundang ang mga illegal na pag putol sa kahoy” (Stopping illegal logging or cutting of trees)
 - “Ipaundang ang mga pag sunog sa bukid” (Stop the slash and burn farming practice/ kaingin)
3. Conservation of other natural resources
- “Pagtipig sa mga basura ug puy anan sa mga isda” (Preserving coral reefs or fish sanctuaries)
 - “Ipa-undang ang mga illegal nga pagpangisda” (Stopping illegal fishing)
 - “Pagdumili sa pagmina”(Saying no to mining activities)
 - “Pag daginot sa tubig” (Conserving water)
 - “Pagdaginot sa elektrisidad ug enerhiya” (Conserving electricity or energy)
4. Pollution Control
- “Pag papaundang sa polusyon gikan sa mga sakyanan” (Stopping pollution from cars & motorized vehicles)
 - “Pagpaundang sa polusyon gikan sa mga paktorya ug planta” (Stop pollution from factories & other industries)
 - “Ibawal ang pag-panigarilyo” (Banning cigarette smoking)
 - “Sakto nga pagpatuman sa mga balaod sa “Clean Air Act” (Proper implementation of the Clean Air Act)
5. Laws, policies, regulations, and programs related to environmental protection and prevention of climate change.
- “Unahon pg atiman sa mga isyu or problema mahitungod sa pagbag-o sa klima” (Prioritizing climate change related issues or problems)
 - Pagpatuman ug sakto sa mga programa bahin sa pagbag-o sa klima” (Implementing properly climate change related projects/programs)
 - “Istriktong pagpatuman sa pagsilot sa mga dili motuman sa mga balaod bahin sa pagbag-o sa klima”(Strict penalty for offenders of climate change related laws)

- “Pag-usbaw sa mga sistema sa pagpugong sa mga pagbaha” (Improving flooding mitigation system)
 - “Pagbuhat ug kampanya ug pag edukar sa katawhan bahin sa pagbag-o sa klima” (Awareness/Education campaign on climate change)
6. Personal commitment to act on the problem of climate change.
- “Adunay disiplina ug pasalig sa pagbuhat ug saktong para sa kinaiyahan” (Having the discipline or commitment to do what is right for the environment)
 - “Mahimo nga tig-amping sa kinaiyahan gikan sa Ginoo” (Becoming stewards of God’s creation)
 - “Pagpalambo sa kooperasyon sa mga katawhan sa kada komunidad” (Developing teamwork or cooperation in our community)
 - “Ang mga lider dapat madasigon sa pagdumala sa katawhan” (For leaders to have strong political will to lead the people)

The primary aim of this study was to increase the climate change awareness among the Typhoon Sendong (Washi) survivors as means of easing the victims’ level of anxiety about climate change and to enhance their emotional coping capacities by increasing their knowledge, attitude, and behavior on climate change vis-à-vis empowering them on climate change. The data from both quantitative and qualitative sources show the extent to which the objective of this study was attained. Tables 1 to 6 quantitatively disclosed evidences of the increase in their knowledge, attitude, and behavior. On the other hand, the result of the series of focus group discussions supported the quantitative findings and revealed the depth of the participants’ responses on the climate change issue, and reinforced the answers to the structured question of “To what extent can you practice or are you practicing these activities?” which implied potential positive behavior for climate change. Their responses especially were impressive in that they tried to look into bigger things other than their own.

The findings may not have direct evidences of easing their level of anxiety. However, during the data organization and analysis, the faculty researchers engaged the student- citizen scientists in discussions where they also talked of their sense of fulfillment during the training and in the data gathering. This fulfillment, they said, came from their experience when they observed most of the participants to have gained positive dispositions about climate change. There may not be explicit evidences of ease in their anxiety on climate change, but their responses gave significant implications of their readiness to move on as they willingly participated in the workshops and in the data gathering.

CONCLUSIONS

This paper intended to determine the effectiveness of empowering the typhoon survivors by raising their awareness on climate change in order to alleviate to a certain extent their emotional distress about the experience of loss which they continue to cope with. Considering that issues like climate change which causes people to feel small and unproductive, empowering and engaging them on causes and possible consequences of climate change had helped them overcome their anxieties and emotional distress. Earlier assumption stated that educating the typhoon victims on the dynamics of climate change can better prepare them not only physically but socio-emotionally. It can be further concluded that the training has empowered them and gave them the head start information to be more familiar with the 'enemy' (Sun Tzu, undated) and to be more prepared on issues of climate change. Empowering and engaging them on causes and possible consequences of climate change had helped them overcome their anxieties which cause them extreme emotional distress.

In fine, widening people's understanding and awareness on climate change can influence attitude and behavior which in turn can lead to a more stable emotional state. Shirk et al. (2012), were doubtful on the significant effect of Citizen Science project on attitude and behavior change. Results of this study show however, that it is possible to initially change opinion, attitude and behavior with Citizen Science on climate change.

Considering the robust data gathered by the students, this study also confirms the practical worth of partnering with citizen scientists who have also become empowered and engaged in the campaign of the University on climate change awareness. Citizen Science was not only a beneficial tool in this study; it has advanced its practicality as a discipline.

The proponents believe that attitude and behavior towards climate change could become more stable when the Climate Change Project goes into the completion of the Phase Two and Phase Three where collective efforts of community members will be dealt with more intensively. This study therefore recognized that sustaining attitude and behavior need collective support of the community members themselves. It also implied that while the emotional distraught may not be totally healed, their initial responses and or commitments to help mitigate climate change can be spring board for them to move on where they can positively face climate change issues in the future given the continuing community support.

This study recognized that sustaining attitude and behavior need collective support of the community members themselves. It also implied that while the emotional distraught may not be totally healed, their initial responses and or commitments to help mitigate climate change can be spring board for them to move on where they can positively face climate change issues in the future given the continuing community support. Hence, the proponents believe that attitude and behavior towards climate change could become more stable when the Climate Change Project goes into the completion of the Phase Two and Phase Three where collective efforts of community members will be dealt with more intensively.

RECOMMENDATIONS

This study recommends the implementation of the next Phases of the Project as programmed. These researchers are optimistic that engaging the typhoon victims to plan for their own climate change mitigation activities and sustaining them is possible given the University's and their community's collective support. Working towards the project's sustainability will not only prepare the typhoon victims physically and socio-emotionally, it will also cultivate in them resilience to climate change.

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