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USING GRAPHIC COMMUNICATION SOLUTIONS IN ADDRESSING IMPACT OF CLIMATE CHANGE

GYANG Sunday S.
Seminar and Publications Department,
National Institute for Policy and Strategic Studies (NIPSS),
Kuru, Jos Plateau State, Nigeria
sunnydgyang@gmail.com

Introduction

The scenic landscape and the unquestionable, quintessential temperate weather of Jos, the capital of Plateau State Nigeria, has no doubt attracted a lot of people from various ethnic backgrounds and nationalities to settle in the state (Best, 2007). It is, however, worrisome to note that the once-temperate weather is gradually becoming warmer and the atmospheric moisture is changing. This has affected the environment, resulting in health, agricultural and economic challenges as observed in a study carried out by Olawepo and Enu-Iyun (2014). Could this be attributed to climate change?

Climate change occurs when there is an increase in the emission of greenhouse gases (GHGs) such as Carbon Dioxide, Nitrous Oxide, and Methane among other gases, into the earth's atmosphere. These gases contribute to the warming of the globe. Idowu, Ayoola, Opele, and Ikenweiwe, (2011) opine that the earth's temperature has risen between 0.4 and 0.8°C in the last 100 years. O'Neill (2012), observes that activities such as the use of fossil fuel in generating energy, emit Greenhouses gases (GHGs) into the atmosphere, which has consequently led to what is called global warming. This impact has negatively affected agricultural production and food security in many African countries (Babekir 2008).

The March 14 -15, 2019 cyclone Idai displaced over 3 million people in Mozambique, Madagascar, Malawi and Zimbabwe, resulting in the death of over 1000 people. Over 4.5 million people suffered starvation and over 70,000 persons (mostly women and children) died in 1993 in Sudan. Crops and livestock production, fisheries, forestry and post-harvest activities have been hampered due to alteration in the regimes and patterns of rainfall in Nigeria. Floods have devastated farmlands; increased temperature and humidity have brought about pest, disease and other natural disasters such as droughts and erosion (Chigbu, 2010). The over reliance on wood for domestic energy supply has increased the chances of deforestation, which is a contributory factor to desertification in northern Nigeria. Nigeria loses about 410,000 hectares of forest to deforestation annually (Nasiru, 2010).

The observed climate change in Jos Plateau, particularly the increase in temperature inspired this researcher to attempt to contribute in the mitigation and the adaptation of climate change and its impact, by employing the use of graphic communication solutions to address the problem. This is because Graphic Design as a discipline focuses on the application of design principles and creative thinking processes and techniques to solve visual communication problems (Ogunwole, 2018). This study, therefore, articulates some of the climate change communication gaps that are noticeable in the mitigation and adaptation approaches of the intervention of the impact, through the use of Graphics Images on billboard display to convey both negative and positive environmental activities and their consequences on humans and the environment. This will hopefully elicit environmentally friendly behaviour.

Mitigation and Adaptation of Climate Change

In its effort at intervening and combating the impact of climate change globally, the Inter-Governmental Panel on Climate Change (IPCC) has advocated two basic approaches: Mitigation, and Adaptation. While Mitigation approach is a response strategy at encouraging people to take measures that could reduce the amount of GHG emissions into the atmosphere (abatement), and also enhance the absorption capacity of GHGs (sequestration) Alawa1, Asogwa, and Ikelusi, (2014), the Adaptation approach encourages people to adjust to the unavoidable impact that past emissions have brought upon the environment.

For Mitigation and Adaptation of climate change impact intervention to be successful, there is a need for a multi-disciplinary approach in finding solutions to this elusive problem that is conceptual in nature. The use of graphic communication as a tool in the intervention becomes handy. This is because, for centuries, Graphic Images (GI) have been used in conveying important messages as well as serving as a tool for mobilization of people (Amedu, 2017). Using GI in conveying and motivating people into participating in the mitigation and adaptation of climate change impact may not be a fruitless effort after all.

Problem of the Study

Although much prominence has been given to the dissemination of the scientific information on climate change, it is noteworthy to state that effective communication of the impacts to ordinary people has been lacking (Rukevwe, 2008). Leiserowitz (2006) posit that public communication of climate change is mostly dominated by scientific, technical and other descriptions of the issue, most images also depict the scientific nature of climate change, with little or no consideration for others in the non-science disciplines, thus, affecting the effectiveness of the communication. O'Neill and Hulme (2009) believe that correct images have extensively great potentials to be used more as a means to communicate to the public. Images have also been used to stimulate the public towards the desired behaviour, more so that the world is undergoing an 'image revolution'. The ultimate aim of using GI is to engage the public with climate issues so that behaviour change can be achieved.

In respect to the use of images in climate change communication, Kevin Carter, a photo-journalist was commissioned by New York Times Magazine to cover the 1993 famine in Sudan. Famine is one among many other consequences of climate change in Africa. One of his famous shots depicting the whole scenario was published in the New York Times Magazine (1993). The shot captured by Carter showed a vulture patiently waiting for a hungry, weak and malnourished girl child to die so that it could feast on her dead body.

The photographic image created a shocking outburst globally. Kim and Kelly (2014) observed that both readers and journalists perceived Carter's photograph of the scenario as accurate documentation of an important social issue. They felt that the photographer should have done more to help the girl child and not necessarily looking at the deep causes of drought, famine and other impacts of climate change (Carter was strictly instructed not to touch any of the malnourished children for health reasons).

Even though the picture was able to attract global attention to the plight of the people, the responses that the photograph triggered in viewers may not be empathy but rather horror and disgust. These were invariably directed at the photographer and not the photograph. The image, therefore, could be said to have failed in stimulating people to participate in the mitigation and adaptation of climate change. On a live radio phone-in programme much later, Carter was asked what happened to the child. He replied that he couldn't wait to find out after taking the shot

because he had a flight to catch. The caller was reported to have replied thus: "I put it to you that there were two vultures on that day, one had a camera". Carter committed suicide by carbon monoxide poisoning in Johannesburg, two months after he was awarded his Pulitzer Prize for the photograph (Yeong, 2014).

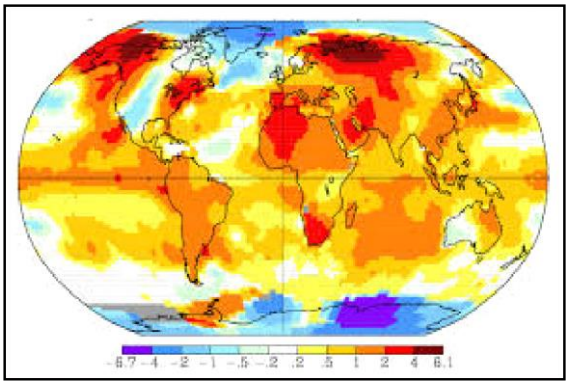

Fig. I: Malnourished child: Picture by Kevin Carter, Fig. II: Scientific image of global warming/climate (1993)
Source: https://www.pinterest.com/pinchange image, Source: blogs.discovermagazine.com

Moser (2010) opines that climate change communication should go beyond (or at least in addition to) science and policy issues, if success is to be achieved in terms of behavioural change. Communication should attempt to reach many more audiences, use more diverse forums, channels, a wider range of messengers, and a number of different framings. This will help the issues of climate change penetrate society at a deeper level.

The importance of images in communication as stated above has already been established. However, these same climate change images regarded as "expressive vehicle" could be repulsive, as, in the case of Carter's photograph, the shot seemed to have succeeded in inducing fear and disgust into the minds of people, all of which were not directed at the situation but at the photographer. Furthermore, scientific climate change images seem so complex for ordinary people to understand. These images succeed in creating a sense of helplessness, confusion, and ultimately do not empower individuals to do anything about it, as opposed to the concepts of adaptation and mitigation of climate change impacts. Consequently, Van Der Linden (2015) identifies three major reasons why such climate change public communication campaign interventions were not successful in the past:

a. Most public interventions ought to be, but are not designed in an integrative manner;

b. Current campaigns do not sufficiently target specific behaviours nor pay sufficient attention to the psychological determinants of the behaviours that they are trying to change;

c. Public campaigns often fail to make the climate change context explicit.

Van Der Linden (2015) observes that for any climate change communication campaign to be successful, it must be based on an integrated understanding of the psychological processes that motivate and influence pro-environmental behaviour. To achieve this, three conditions should be met:

a. interventions should be designed in an integrative format, that is, communication campaign messages should appeal to *cognitive-analytical type* (climate change

communication should be communicated in a simple language that is consistent with the level of understanding of the target audiences as the case may be); *affective-experiential type* (using emotional appeals such as fear and guilt in climate change communication can elicit behaviour change if carefully applied); *social-normative type* (communicating climate change issues can be persuasive, if such communications are consistent with the social and moral norms of the target audiences),

b. The context and relevance of climate change need to be made simply, explicit and easy to comprehend; and

c. Communication interventions should be very specific on the negative behaviours, and should attempt to understand the reasons why people still engage in such behaviours, thus advancing more environmentally friendly activities and the benefits.

To achieve a holistic understanding of the link between designing persuasive messages, the communication, and processing of the information, and eliciting behavioural change certainly requires the integration of insights from all relevant disciplines that deal with the subject matter. Under this circumstance, the use of Graphics Images (GI) as one of the relevant tools in graphic communication discipline comes handy in advancing the mitigation and adaptation intervention of climate change, that could elicit behaviour change. This constitutes the problem of the study.

Justification/Significance of the Study

Using graphic communication solutions in addressing Impact of Climate Change, the study is an attempt to use graphic images on billboard display as a medium of conveying climate change information in Jos Plateau, the study area, with the aim of eliciting positive climate change behaviour and also to contribute to global mitigation and adaptation of Climate Change. The importance of using this medium is essential because graphic images (GI) have the power to transcend beyond language, class, sex, education, geography, age and to reach a much larger audience (Gyang, 2015).

Aim and Objectives of the Study

The aim of this study is to effectively communicate the impact of climate change, using GI billboard display, which will elicit behavioural change towards climate change issues in Jos Plateau.

The objectives are set to help achieve the following goals:

i. Use Graphics Images (GI) to design billboard display that will communicate the impact of climate change.

ii. Investigate how GI billboard displays can help in achieving the mitigation and adaptation of Climate Change impact.

Research Questions

The following were the fundamental questions that the study attempted to answer:

i. What are some of the key factors to be considered when using GI in designing billboard displays that will effectively communicate the impact of climate change?

ii. How can GI billboard display help in achieving the mitigation and adaptation of climate change impact?

Scope and Delimitation of the Study

This study focused on two approaches of mitigation and adaptation in tackling climate change impact, using GI. The study restricted itself to the use of billboard displays. Within the Jos Plateau, which consists of six (6) Local Government Areas namely: Jos North, Jos South, Jos East, Bassa, Barkin Ladi, and Riyom Local Government Areas, this is because, billboard display has been adjudged an effective medium that has the capacity to reach out to a wide audience within a very short period and repeatedly (Yakubu, 2017).

Review of Related Literature

The aim of this literature review is to give a good understanding of published material in this field of knowledge (Toncich, 2006), in such a way that clarifies that critical decisions were made, fundamentally, giving the study a framework to build on and contribute to the existing body of knowledge in the application and use of Graphic Images in communicating the impacts of climate change.

Climate Change Communication: There is a clear missing link between the communication of climate change and the expected change from environmentally unfriendly behaviour. Thus Lorenzoni, Jones, and Turnpenny, (2007), observe that effective climate change communication should not just make information available, but should be engaging in such a way that it will elicit behaviour change, and also motivate people to be able to take positive action on climate change issues. This is because climate change is a difficult subject to perceive and understand; it does not happen within a short time frame. For that reason, clear, simple metaphors, images, and mental models, as well as captivating frames which are able to lay the foundation for a more suitable cognitive processing should be adopted in communicating climate change issues, especially for the lay audiences (Bostrom, and Lashof, 2007).

***The Use of Graphic Images in Climate Change Communication*:** Graphic communication as a discipline has conveniently employed the use of graphic images (GI) as tools in effectively conveying important and urgent information transcending linguistic and geographical barriers (Gyang, 2015). Even though textual-based messages were used prominently in previous climate change communication, such were not very effective in interpreting and framing the exact message, as images would have. It has been argued whether climate change images and text-based messages are telling the same story. Smith and Joffe (2009) state that even though they have a common narrative, images convey messages beyond linguistic and geographical barriers.

Categories of Climate Change Visual Images: For the purpose of effective communication and eliciting behaviour change, visual images of climate change have been categorized into three groups:

(a) Iconic Visual Images: these are images of politicians and prominent figures who have dominated media coverage in certain aspects of climate change;

***(b) Symbolic Visual Images*:** which has to do with any form of visual representation that can essentially construct meanings about climate change issues in the mind of people, knowing how distanced and vague it is, and

(c) Spectacular Visual Images: which are increasingly effective in promoting salient and strong emotion towards climate change, with 'before and after' photographs giving viewers baselines upon which to perform their representations (Smith and Joffe, 2009). From the categorization above, spectacular and symbolic visuals seem very effective in the mitigation and adaptation of climate

change impacts. Thus, this study used spectacular and symbolic visual images because of their effectiveness in the mitigation and adaptation of climate change impact.



Fig. III: Iconic Image Source: Fig. IV: Symbolic Image Source: Fig V: Spectacular Image Source:https://www.google.com.ng/search/al/gorehttp://www.google.com.ng/urlhttp://www.google.com.ng/url

Hindrances of Images in Climate Change Communication: Images are particularly powerful in shaping persuasive messages. However, images can function as both a hindrance and a help to climate change communication. Instead of eliciting positive behaviour change, images can create a sense of helplessness and apathy. Although images are capable of creating easily remembered multifaceted messages, they can also oversimplify climate change issues. When the images of impacts and causes of climate change were presented to the public, they created a feeling of hopelessness (O'Neill *et al.* 2013). These images typically include representations of drought, flooding, extreme weather events and animals and people in distress. While these images carry enormous impacts and the importance of climate change, they, however, employ fear-laden messages which may not necessarily be effective in motivating action.

Benefits of Combining Graphic Images and Text: In a study by Dewan (2015), she observes that taking advantage of what communication experts have discovered about the benefits of the visual medium, and including graphic elements into mostly text element driven communications, can lead to more effective communication. Apart from images being effortless to recognize and process than words, they are also easy to recall. Studies have shown that words enter long-term memory with a single code, but images, on the other hand, contain two codes: one visual and the other verbal, each stored in different places in the brain. The dual-coding nature of images allows for two independent ways of accessing visual memories, increasing the chances of remembering, unlike a text-only element. Dewan (2015) states that informative images seem to have more power of recall than images of decoration, just as individuals can recall images much more than informative text.

Billboard Display Design: The use of billboard display in advertising has many advantages. This study, therefore, used this media tool to communicate the impact of climate change. According to Yakubu (2017), Billboard display, as one of the media tools for advertisements has an effective reach because of its strategic exposure to many consumers. For this reason, therefore, billboard advertisements can be said to be the preferred tool by advertisers and marketers (Akanni, and Dakyes 2015).

According to Yakubu (2017), the Institute of Outdoor Advertising has put forward some guidelines for designing billboard layout, they include: Confine the number of your elements in the display to 3, if possible 2, or even one. Use a very big image(s); Keep your text elements (number of words) to a minimum; Ensure that the illustration (image) is in line with the text (text supportive of the illustration); Use steady typeface, in a medium or bold version, preferably San Serifs; Make sure the product is clearly identified; Ensure that the colour tones provide the right contrast.

Theoretical Framework

Theory of Graphic Communication: Visual Graphic communication theories promote the use of images much more than text for effective communication. This is because visual graphic images convey information to a larger audience who may not be familiar with the written/spoken language of the environment. Akanni and Dakyes (2017) posit that an effective image in conjunction with text messages explaining the image does arrest attention. Furthermore, colour effectively clarifies messages, ideas or concepts, highlights specific points, create appeal and decoration. Colour can also be effectively used as a tool for a successful persuasion exercise (Akanni and Dakyes, 2017).

Theory of Climate Change Communication: Van Der Linden (2015) opines that cognitive, experiential and normative influences in public climate change campaigns do not affect human behaviour independent of each other, but most behaviours are rather the result of carefully integrating the three approaches. When these three approaches interact continuously with each other on the same level, higher logical reasoning may evoke strong emotions and simple reflexes that can be triggered by higher functioning of the neocortical processes (Marx, Weber, Orlove, Leiserowitz, Krantz, Roncoli, and Philips, 2007).

Integrating cognitive, experiential and normative aspects of climate change communication is a clear indication of a more robust understanding of human behaviour in order to make communication effort more effective (Van Der Linden, 2015). While increased cognitive understanding will convey climate change information more explicitly, experiential approach would frame the apparent risk message, using emotions to elicit behaviour change. Normative approach, on the other hand, requires that the overall message should be designed in a contextualized format, clearly showing that other people are also engaging in a strong pro-environmental norm as expected, and is beneficial to all.

Research Design

The study used survey and experimental types of research. This is because survey research is an important and useful method of data collection for the purpose of describing/analysing the relationship between variables. In using the survey method, a questionnaire was designed basically to elicit views and opinions of respondents on the issues of climate change and how using GI's of climate change on billboard display can influence behaviour change.

The Study Area: This research is focused on Jos Plateau which comprises 6 local government areas in the Northern part of Plateau State, Nigeria, namely, Jos North, Jos South, Jos East, Bassa Riyom and Barkin Ladi.

Population of the Study: This study also seeks the opinion of practicing graphic designers from two major cities that are relevant to the study, (Jos and Zaria) on what is required in designing a billboard display that will effectively convey the message of climate change impact, and will also elicit behaviour change towards climate change issues. Purposive sampling of population was used in selecting 29 practicing graphic designers who gave their opinion on what is required to produce an effective billboard displays.

Billboard display (comprehensives) were used on respondents who were randomly selected using representational sampling in each of the six local government areas that consist of the study areas from a total population of 1,338327 (NPC 2006). According to Krejcie and Morgan (1970), for any given population that is greater or equal to 1,000,000 a sample size of 384 is appropriate. A

professional digital camera was used to capture images for graphic design of the billboard comprehensives.

Table 1: Population and Proportionate Sample Size

LGA	Population	Sample
Barkin Ladi	179805	52
Jos East	88301	25
Jos South	311392	89
Jos North	437217	125
Riyom	131778	38
Bassa	189834	54
Total	**1338327**	**384**

Table 1shows the population for each Local Government Area as well as the number of respondents to be sampled from each Local Government Area. The proportionate sample was used in order to establish the number to be sampled from the six LGAs as all the LGAs do not have a uniform or an equal population.

Instruments: The instruments used in the study include questionnaire; a professional digital camera for taking pictures; computer graphic software's; and billboard comprehensives. Two sets of questionnaires were used. One was for professional graphic designers to seek their opinion on what constitutes an effective billboard design, and the other was for the general respondents randomly selected in a representative method in the six local government areas that constitute the study area. The questions were designed using the Likert-Scale format to enable respondents to simply choose their views and options provided such as Strongly Agreed, Agreed, Strongly Disagreed, Disagreed and Undecided.

Table 2: Instrument (Questionnaire) used for the Study

S/N	Questionnaire Item	SA	A	D	SD	UD	Mean	Std. Dev.	Remark
1.	Billboard displays show unfriendly environmental activities								
2.	Billboard displays show friendly environmental activities								
3.	Billboard displays encourage environmentally friendly activities								
4.	Billboard displays appeal for reduction of gases into the atmosphere								
5.	Images on billboard display encourage tree planting								
6.	Images on billboard display show the dangers of cooking with firewood								
	Cumulative								

Table 2: shows the (instrument) used in the study to elicit the respondent's opinion

Instrument (Photographs) used for the Study

Fig.VI: Photograph of tree felling by Sunday Gyang 2018

Fig. VII: Photograph of tree planting by Sunday Gyang 2018

Data Collection: Data used in this research were collected from primary sources; specifically, and directly from Jos Plateau respondents through the use of questionnaires as well as secondary sources, which included published materials on climate change, professional Journals, and Internet-sourced materials. Photographs of climate change activities were also used.

Pilot Test: All the instruments used in this study were tested on a subgroup outside the study area (Zaria), corrections were affected and all observations noted have enhanced the study.

Validity and Reliability of Instruments: The designed questionnaire and attached billboard display designs were validated by professional graphic designers (practicing and academics). Adjustments and corrections were noted and implemented. To ascertain the reliability of the instrument, Cronbach's Alpha reliability test was used. The result of the reliability test of the instrument using Cronbach's alpha was found to be 0.89. According to Maduabum (2004), the reliability coefficient of 0.5 and above is good enough as it shows that the instrument is highly reliable and can be used for data collection for the study.

Data Analysis: All responses were transcribed and tabulated, using descriptive statistics of mean and standard deviation to analyse the data because it is a Likert scaled question with a benchmark mean. This method was adopted because it allowed the findings of this study to be inferred in line with the objective and reliable statements based on the data provided by the respondents and the context in which they were made. Statistical Package for Social Sciences (SPSS) computer software Version 20 was used.

Findings

Key factors to be considered when using GI in designing billboard displays: The findings show that majority of (respondents) graphic designers agreed that an effective billboard display should use good, clear images, short text messages, and contrasting colours.

Table 3: Instrument (Questionnaire) used for the Study

S/N	Questionnaire Item	SA	A	D	SD	UD	Mean	Std. Dev.	Remark
1.	Good images enhance Climate Change communication	19	8	2	0	0	4.59	0.63	Agreed
2.	Simple, clear short text messages convey Climate Change information	15	12	2	0	0	4.45	0.63	Agreed
3.	Combination of image(s) text and colour conveys messages effectively	19	9	1	0	0	4.62	0.56	Agreed
4.	The use of contrasting colours is effectively	6	21	1	0	1	4.07	0.75	Agreed
5.	Use bold text messages for effective viewing	24	5	0	0	0	4.83	0.38	Agreed
6.	Billboard display has an advantage of reaching a large audience	18	11	0	0	0	4.62	0.49	Agreed
7.	Billboard display is exposed to the audience repeatedly	13	16	0	0	0	4.45	0.51	Agreed
8.	Good, relevant and clear images have the capacity to engage people	9	16	2	1	1	4.07	0.92	Agreed
9.	Billboard display is an effective media tool in conveying important messages	15	11	3	0	0	4.41	0.68	Agreed
10.	Climate Change Billboards should be mounted in strategic places	23	6	0	0	0	4.79	0.41	Agreed
	Cumulative						**4.49**	**0.6**	

Benchmark: Mean ≥ 3.00 = Agree; Mean < 3.00 = Disagree

The cumulative mean response is 4.49 which is greater than the benchmark mean of 3.00 with the standard deviation value of 0.6. The climate change billboard displays also employed the use of fear as a motivator as advocated by Futerra (2005). Fear as a motivator theory encourages the use of fear in communication campaigns that desire to discourage negative human behaviour; this is because messages that have been embedded in fear seem to have successfully conveyed intended communication in the past by eliciting positive behavioural change.

Billboard Display Design:

The study undertook the design of billboard display comprehensives based on the responses of professional graphic designers on how to design an effective billboard display that will communicate the impact of climate change.

A: Cutting and Planting of Trees

Fig. VIII: A billboard display design by Sunday Gyang2018 (comprehensive) 48 sheets size

The bill board display design above is a (comprehensive) miniature of what is known as 48 Sheets (actual size of billboard) which is 3048mm x 6096mm or 3.048m x 6.096m or 10ft x 20ft. The billboard was designed using Corel-draw graphic software. It consists of clear images of two different activities; one depicts an individual cutting down a tree, while the other shows a man planting trees. The text element is brief, bold and simply states the need to plant two trees if one must cut down any, in contrasting colours. The colours used are Green, Red, and Yellow.

B: The use of Firewood for Cooking

Fig VIX: A billboard display design by Sunday Gyang 2018 (comprehensive) 48 sheets size

The billboard display design above is a miniature of what is known as 48 Sheets (actual size of billboard) which is 3048mm x 6096mm or 3.048m x 6.096m or 10ft x 20ft. The billboard was

designed using Corel-draw graphic software. It consists of clear images of a woman using firewood for cooking, and another image of a gas cooker and text element, all in contrasting colours. Of note in this design is the Text Element ***COOKING WITH FIREWOOD KILLS*** which has only four words, the use of the word KILLS is a "fear as a motivator" example aimed at eliciting behaviour change from such dangerous activities such as firewood burning as advocated by Futerra (2005). Billboard display is one important media tool that has been used in conveying information to a large number of people within a short time. There is a need for climate change communication campaign to exploit the advantages of billboard displays in reaching out audiences. Studies have shown that such high exposure enhances the recall of messages repeatedly (reach and frequency), especially if simple clear images, brief text messages, and the use of contrasting colours are employed.

Mitigation and Adaptation of climate change impact: The majority of respondents were of the opinion that images on billboard display showing tree planting (mitigation and adaptation) encourages participation in tree planting as an environmentally friendly activity. This finding, therefore, is of the opinion that billboard displays showing the dangers of cooking with firewood has the capacity to convey the message that such an activity is unhealthy to both humans and the environment and should be discouraged. In summary, it is the opinion of the majority of respondents that the billboard display within the study area would seem to have performed the function of communicating the impact of climate change and to a large extent, encouraged the participation in the mitigation and adaptation of climate change within the study area. The use of GI on billboard display was effective in engaging the public in the mitigation and adaptation of climate change as can be seen in the responses of respondents.

Table 4: Responses on Mitigation and Adaptation of Climate Change

S/N	Questionnaire Item	SA	A	D	SD	UD	Mean	Std. Dev.	Remark
1	Billboard displays show unfriendly environmental activities	137	187	6	32	14	4.07	1.03	Agreed
2	Billboard displays show friendly environmental activities	135	200	16	20	5	4.17	0.84	Agreed
3.	Billboard displays encourage environmentally friendly activities	160	132	37	27	20	4.02	1.14	Agreed
4	Billboard displays appeal for reduction of gases into the atmosphere	153	154	24	32	13	4.07	1.07	Agreed
5	Images on billboard display encourage tree planting	219	124	10	13	10	4.41	0.91	Agreed
6	Images on billboard display show the dangers of cooking with firewood	166	165	18	15	12	4.22	0.94	Agreed
	Cumulative						**4.16**	**0.99**	

Benchmark: Mean ≥ 3.00 = Agree; Mean < 3.00 = Disagree

The aggregate mean responses of the capacity of respondents to participate in the mitigation and adaptation of climate change is 4.16 which is greater than the benchmark mean of 3.00 with the standard deviation value of 0.99 implying that their responses were significant.

Conclusion

Billboard display is an effective media tool in reaching out to a large audience within a very short time. For billboard display to be effective in communicating the impact of climate change, simple, clear images should be employed. There is need also for the textual messages to be brief, catchy and bold, in contrasting colours.

For billboard display to effectively communicate the impact of climate change and engage people in mitigation and adaptation processes, the display must be able to frame the information in such a way that the target audience will understand at their own level, and also provide the people with an alternate behaviour that is more beneficial.

Contribution to knowledge

The study keys into the global climate change issues and it proffers the use of existing graphic communication concepts to solve or tackle the issue of its impact on the ecosystem and human life.

Recommendation

a. Climate change billboard displays should be installed in strategic places for effective climate change communication to take place.
b. Government and the private sector should invest in the provision of alternative source of energy such as cooking gas plants and solar energy at affordable rates.

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