Assessment of Environmental Professional Awareness of Climate Change: Implication for Climate Change Education

Adekunle Olatumile[1]*

[1]Department of Arts Education, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria

*Correspondence: Dr. Adekunle Olatumile, Department of Arts Education, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. Tel: +234706504941; E-mail: kunletumile@yahoo.com

*A*bstract: Environmental professional are supposed to serve as climate change extension agents, and it is a fact that one cannot give what one does not have. The study is carried out with a view to assessing the level of environmental professional awareness of climate change and coming up with a framework for climate change education. Findings of the study showed that majority of the respondents were not exposed to programmes and activities that could get them acquainted with current issues on climate change and as such they did not believe that they could abate the effects of climate change. The level of awareness of the respondents on climate change was not all that encouraging. Age and gender did not significantly influence environmental professional's awareness of climate change. Based on these findings the paper suggested among others a framework for climate change education, based on the ideal contents, the tools and methods for such education as well as the networking that should exist among stakeholders.

Keywords: adaptation, attitudinal change, awareness, climate change, global warming, Mitigation

1. Introduction

1.1 Trend of Climate Change

The 21st century is confronted with a lingering crisis that links the present with the future. It is a keg of gun power that is gradually gaining momentum and is likely to explode in the nearest future. The crisis is climate change "It is still a preventable crisis – but only just. The world has less than a decade to change course. No issue merits more urgent attention – or more immediate action" (Human Development Report (HDR), 2007/2008).

Climate change is the significant change in weather (wind, precipitation, and temperature) over an extended period of time (http://www.globalcitizencorps.org/issues/climate-change/awareness). Climate change is now a scientifically established fact (HDR, 2007/2008). Even though causes of climate change may be natural, there is evidence that indicates that human activities have contributed to the increased frequency and intensity of natural disasters; rises in sea levels and global warning (http://www.globalcitizencorps.org /issues/climate-change/awareness).

The early warning signs are already visible for at the moment we are witnessing at first-hand what could be the onset of major human development reversal in our life time (HDR, 2007/2008). For example global warming which according to global citizen corps (http://www.globalcitizencorps. org/issues/climate-change/awareness) is the rise in the temperature of the earth's lowest atmosphere, called the troposphere, is one of the manifestations of climate change. Global warming is caused by the rapid accumulation of greenhouse gasses which are chemical compounds that

absorb the sun's infrared radiation reflected back off the earth's surface and trap it in the atmosphere. Higher accumulation causes more of the sun's heat to remain close to the earth's surface, thereby causing global warming. Nature creates greenhouse gases in order to maintain equilibrium in earth's temperature. In the same vein, humans in their day to day activities have been creating them as well, such that it exceeds the carrying capacity of the earth and hence increasing the heat in the troposphere beyond normal.

Natural greenhouse gases include water vapour, methane gas, and carbon dioxide from plants. Human induced greenhouse gases include carbon dioxide from fossil fuel burning (i.e. oil used to power aircrafts, vehicles and generators), gas from aerosols, chlorofluorocarbons used as refrigerants, and nitrous-oxide from industrial production. There have been arguments that human induced greenhouse gas emission which is the major cause of global warming, will continue till the far distant future. Yes, such argument is rife but scientific facts abound to show that that there is a drastic increase in greenhouse gases accumulation in the troposphere since the industrial revolution (McMichael *et al.*, 2003).

1.1.1   Effects of Climate Change

Climate change affects all facets of human life. These have been put in proper perspective by Global Citizen corps. (http://www.globalcitizencorps.org/issues/climate-change/awareness). It affects everyone and everything because as the earth grows warmer and the climate begins to change, life will change as well. The length of farming seasons will change, and bodies of water will decrease or disappear completely. This will instigate a decline of plant and animal life an earth. The polar ice caps will melt; ocean waters and sea levels will rise. Increased climate change induced severity and frequency of natural disasters, which will cause millions of people to abandon their houses in search of safety and consequently become environmental refugees. Climate change induced droughts and flooding will confront nations with additional problems of providing infrastructures and social services. Droughts will bring about crop failure, famine and disease outbreak will on the increase. Flooding destroys sole food sources and leads to water borne diseases. Threat to agriculture will disrupt the means of livelihoods of millions of people and poverty rate will increase. Nations that earn their income from agriculture will be unable to protect their citizens and provide basic services such as schools, hospitals and water. In view of the aforementioned problems which global warming engenders, human beings must make concerted efforts to stemming the tide of climate change and global warming. "It demands urgent action now and if the world acts now it will be possible – just possible – to keep 21st century global temperature increases within a 2^0C threshold above pre-industrial levels (HDR, 2007/2008). It is optimistic that if the world gives it the attention it deserves, this can be realized.

1.1.2   Environmental Professionals and Climate Change Education

It has been stressed that environmental professionals have a vital role to play at all stages, in meeting the urgent challenges of climate change (Institute of Environmental Management and Assessment (IEMA), 2011). They are saddled with the responsibility of educating the public on environmental issues for the purpose of creating awareness and effecting attitudinal change. United Nations Framework Convention on Climate Change stresses education, training and awareness in addressing the problem of climate change. Article 6 which centres on education, training and awareness stipulate that in carrying out their commitments; parties to the convention shall:

(a) Promote and facilitate at the national and, as appropriate, sub-regional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:

   i.   The development and implementation of educational and public awareness programmes on climate change and its effects;

ii.   Public access to information on climate change and its effects;

iii. Public participation in addressing climate change and its effects and developing adequate responses; and

iv.   Training of scientific, technical and managerial personnel.

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

i.   The development and exchange of educational and public awareness material on climate change and its effects; and

ii.   The development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries. (UNFCCC, 2012a).

The foregoing place a burden of responsibility on environmental professionals, as their primary duty is what is contained in article 6 of the United Nations Framework Convention on Climate Change.

1.2 Statement of the Problem

Global warning induced climate change is already posing a big problem World temperatures have increased by around 0.7^0C with the advent of industrial revolution. The continuous increase is alarming. The world poorest people and the most fragile ecological and economic systems are already being forced to adapt to dangerous climate change (HDR, 2007/2008). Scientific predictions have indicated that the coming years will witness more intense climate change related natural hazards such as floods, ocean surge, droughts, heat- waves, and storms. As revealed by ProAct Network (2008) more than 2.6 billion people have been affected by hazards mostly related to weather extremes from 1977 to 2006. This has caused over 1.2 million deaths and damage costing some US$800 billion. While most society is likely to be affected to some degree by the predicted changes, it is likely that the brunt of these climate related impacts will be borne by already vulnerable communities, particularly the poor and the marginalised groups who may depend largely on farming and marine resources for their livelihoods and who may live in areas already prone to recurrent disasters such as flooding or cyclones (ProAct Network, 2008). UNESCO (2010) has attached top priority to Africa because it is likely to suffer most from climate change. Climate change threatens to roll back development gains of recent years, exacerbates poverty and fuels civil strife as access to natural resources gets tighter (UNESCO, 2010). In spite of the attention climate change has attracted lately and the attendant general debate, the relevance of environmental professionals in mitigating climate change and in climate change extension remains comparatively unexplored issue especially in the realm of policy making.

1.3 Review of Related Literature

Climate change continues to be a low priority issues in relation to other social issues such as economy, terrorism, education, HIV/AIDS etc. (Upham *et al.*, 2009). Opinion on concern and perception about climate change have reduced somewhat, this is aggravated by continual increase in the number of people that are uncertain about the reality of human influence on the climate (British Broadcasting Corporation (BBC), 2010; Leiserowitz, Maibach, Roser-Renouf, & Smith, 2010; The Pew Research Center, 2009; Whitmassh, 2011; Leviston & Walker, 2011; Norton & Leaman, 2004). From their study Norton and Leaman (2004) concluded that professional groups are likely to see climate change/global warming as the most serious global threat compared with other social classes. They found that: public awareness about climate change is low. Even though most respondents heard about climate change 67%, those with detail awareness are 59%. 70% are unable to mention the gas that most contributes to global warming

Most respondents did not see climate change/global warming as the most serious threat by factor of almost 2:1 respondents see terrorism as more important threat than global warming (48% versus 25%). They also found that 1 in 5, which is 18% see global warming as serious threat to their local environment in contrast to crime and vandalism which came top at 68%.

Leviston and Walker (2011) found that 77% of the respondents think that climate change is happening, but majority attribute it to natural occurrence 45% than as something caused by humans 42%. Majority of the respondents are either 'not very' or 'somewhat' worried about climate change. On how much they think climate change will harm them personally, majority of the respondents feel 'only a little' or 'a moderate amount'

1.4 Objectives of the Study

1. To ascertain the level of awareness and the knowledge that environmental professionals have of climate change.

2. To investigate the influence of age and gender on environmental professionals' awareness of climate change.

1.4.1 *Research Question*

i. What is the extent of environmental professional's awareness of climate change?

ii. What is the influence of age and gender of environmental professionals on their awareness and knowledge of climate change?

1.4.2 *Hypothesis*

Age and gender will not significantly influence environmental professionals' awareness of climate change

2. Method

2.1 Population

The population of the study is environmental professionals in Ondo State, Nigeria. These are people who are engaged in professions that relate to environmental management and protection. They include Environmental Health officers, Forest Guards, Water and Sanitation workers and Waste Management Workers.

2.2 Sample

The sample comprised one hundred and ten environmental professionals

2.3 Sampling Procedures

2.3.1 *Sample Size and Power*

The sample was selected through multistage sampling technique. Stratified sampling technique was used to divide the sample along professional leaning (see table 1).

Table 1. Sample size and power

Sample Professionals	Sample Size
Environmental Health Officers	40
Forest Guards	30
Water and Sanitation Workers	25
Waste Management Officers	25

Proportionate sampling technique was used to determine selectable elements based on socio-demographic characteristics

Accidental random sampling technique was used to select individual sample elements that constituted the respondents.

2.3.2   *Instrument, Validity and Reliability*

The instrument used for data collection is a researcher-designed questionnaire tagged "Environmental Professionals Awareness of Climate Change Questionnaire "EPACQ".

Validity

The researcher subjected the instrument to face validity by giving it to experts in Departments of Adult Education, Guidance and Counseling and Science and Technical Education who made useful suggestions and the corrections were affected.

Reliability

The instrument was pilot tested on twenty subjects who were not part of the sample and the administered instruments were divided into two equal half. The two sets of questionnaire were correlated using Pearson Product Moment Correlation. The reliability coefficient of 0.78 was obtained.

> **Section A** comprised socio-demographic characteristics of respondents. These include gender and marital status.

> **Section B** comprised thirteen items on awareness of climate change.

2.3.3   *Research Design*

The study adopted descriptive research design.

3.   Results and Discussion

3.1   Research Question

What is the extent of environmental professional's awareness of climate change?

Table 2. Environmental professional's opinion on climate change awareness

S/N	Questions	Responses			
		Yes	%	No	%
1.	Are environmental issues like climate change of concern to you	69	62.7	41	37.3
2	Do you believe we are in a period of climate change?	100	90.9	10	9.1
3.	Do you think that the effects of global warming/climate change can be reduced by community action?	81	73.7	29	26.4
4.	Has anything you had seen heard or participated in during the last two years changed your views about climate change?	46	41.8	64	58.2
5.	Do you think you can limit the effects of climate change?	37	33.6	73	66.4
6.	Do you source for information on climate change?	62	56.4	48	43.6

From the table 2 above, majority of the environmental professionals are concerned with the issue of climate change, with 62% responding in the affirmative, 90% acknowledged that we are in a period

of climate change, These findings are in agreement with the findings of Norton and Leaman (2004), and Leviston and Walker (2011), 81% were of the opinion that the effects of global warming/climate change can be reduced by community action. This finding negates the findings of Norton and Leaman, (2004), Leviston and Walker (2011), BBC (2010), Leiserowitz *et al.* (2010), The Pew Research Center (2009), and Whitmassh (2011). The reasons for the difference in findings are not far-fetched, the fact that respondents in this study are environmental professionals goes a long way to imbue in them the fact that human actions can abate or aggravate climate change/global warming, but in relation to the finding where 33% opined that they can limit the effects of climate change whereas 66% opined otherwise, this can be attributed to the fact that most of these professionals are not current and updated with the trends in climate change as the study reveals that only 41.8% had seen, heard or participated in activities that affected their views about climate change in the last two years; while 58.2% had not, 56% of the them sourced for information on climate change. Can we say this finding is good enough if climate change professionals lack requisite knowledge of contemporary environmental issues like climate change? Apart from the impacts of climate change on their professions, that calls for sufficient knowledge of this phenomenon in order to be able to mainstream this in the course of carrying out their duties; these professionals are extension agents who are supposed to disseminate information about climate change, how to mitigate it and adapt to it as well as strategies that will be necessary to abate it. A situation whereby an environmental professional does not acknowledge the fact that he/she can limit the effects of climate change, call for urgent attention. It can be inferred from the table that most of these professionals are not current on their jobs. They are not exposed to in-service or on-the-job training or climate change related seminars and workshops that will keep them abreast of contemporary issues on climate change/global warming. It should also be noted that many of the respondents are experienced, thus they might not be taught issues that border on climate change/global warming and those who are not curious may not bother to keep abreast of current issues in their professions.

Table 3. Environmental Professionals opinion on what climate change meant to them

S/N	Questions	Frequency	Percentage
	What does the expression climate change mean to you?		
a.	The world climate is not changing	32	29.1
b.	No Comment	18	16.4
c.	In some areas storms are expected	60	54.5

The table 3 above reveals that environmental professionals were to an extent able to make meaning out of the concept of climate, even though 32% were of the opinion that the world climate is not changing and 18% declined comment. However, a situation where forty per cent of environmental professionals could not properly explain what climate change is, is quite appalling, because it is said that you cannot give what you do not have. The irony of the matter is that most of these professionals by their calling are expected to educate people on contemporary environmental issues of which climate change is almost the most discussed   in the 21st century.

3.2 Hypothesis
Age and gender will not significantly influence environmental professionals' awareness of climate change.

Table 4. Chi-square test showing the summary of influence of age and
gender on environmental professionals' awareness of climate change

	Are environmental issues like climate change concern to you?	Do you believe we are in a period of climate change?	Do you think that global warning / climate change effects can be reduced by community action?	Has anything you had seen, heard or participated in during the last two years changed your views about climate change?	Can you limit the effect of climate change?	Do you source for information on climate change?
Chi-square	7.127	73.636	24.582	2.945	11.782	1.782
Df	1	1	1	1	1	1
Level of significance	.008	.000	.000	.086	.001	.182

There is no cell which had expected frequencies less than 5. The (df) degree of freedom of (1), the x^2 value is significant, because the value under the significance column is less than 0.05. The result reveals that, there is no significant influence of age and gender on environmental professional awareness of climate change. The first column has less than 0.05, so also column 2, 3 and 4. It is pertinent to say that, people do source for information on climate change, or on what they have heard about climate change going by the figure of chi-square above. Thus the null hypothesis that says age and gender will not significantly influence environmental professionals' awareness of climate change is upheld (see table 4).

3.3 Implication for Climate Change Education

Education has a central role to play in understanding, mitigating and adapting to the changing climate (www.unesco.org/newen/natural-science-special)

Education is an essential element of the global response to climate change. It imbues people with the skills of understanding and addressing the impact of global warming, encourages changes in their attitudes and behavior and helps them to adapt to trends in climate change (www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC).

Thus it becomes imperative that education is utilized maximally if climate change problem is to be alleviated. Since climate change education according to Koichiro Matsuura, the Director General of UNESCO (2009) is about helping learners understand and address the impacts of global warming today, while at the same time encouraging the change in attitudes and behaviour needed to put our world on a more sustainable path in the future. The United Nations Framework Convention on Climate Change model on education, training and awareness in addressing the problem of climate change, may not be workable in a developing nation like Nigeria without strong recourse to lifelong education in which the non-formal mode of education is specially emphasized. This is why the role of environmental professionals in providing education on climate change cannot be over-emphasized. Effective climate change education cannot be achieved without mobilizing the concerted efforts of people who are actually saddled with the responsibility of disseminating information, ideas and innovations related to the environment and environmental issues.

The framework for climate change education for environmental professional should take into consideration the following factors suggested by UNESCO (UNFCCC, 2003)

1. Educational policies, programmes and curricular;

2. The identification of climate change education tools, materials and good practices.

3. Mobilization and engagement of networks and partnerships in support of climate change education

3.4 Educational Policies, Programmes and Curricular

For environmental professionals to be well informed and groomed on climate change issues and problems there is need to re-orient environmental and allied courses to reflect climate change/global warming. Courses like environmental health, forestry, environmental education, geography, environmental science and so on should include contents that revolve around causes and effects of climate change, mitigating climate change and adaptation and vulnerability to climate change. Besides, new programmes and courses on climate change issues should be mounted at certificate, diploma, undergraduate and post-graduate levels so that well informed and trained professionals can be trained to effectively handle climate change extension programmes. In-service and on the job training should be made available for those already working so that they will be well acquainted with the current realities of their professions. Climate change education should be consummated using multi-disciplinary approach as it may not be feasible to effectively deliver it in a single course.

3.5 Climate Change Curriculum Content and Competences for Environmental Professionals

The suggested climate change education curriculum contents draw heavily from DFID's climate and environmental advisers competency framework (Department for International Development (DFID), 2011).

3.5.1 *All Environmental Professionals must be able to Demonstrate Understanding and Experience in the Following Areas*

− Growth; climate resilient, low carbon, and environmentally sustainable;

− Development planning; integration of environment and climate priorities and the role these play in underwriting long term development effectiveness and achievement of the Millennium Development Goals;

− Political economy and governance of climate change/environment;

− Knowledge and understanding of relationship between poverty, environment, climate change, economics and social issues;

− Principles of sustainable development.

3.5.2 *Environment Professionals must be able to Demonstrate Significant Knowledge and Experience in Some of the Following Areas and Knowledge of Most of the Others*

− The inter-relationships between environmental sustainability, climate change, growth, development, social and economic issues;

− Ecosystem functions and change;

− Climate change as an environmental change phenomenon;

− The role of environmental and natural resource management in underpinning long-term development effectiveness and the achievement of the Millennium Development Goals;

− Contextual and historical understanding of sustainable development and green growth;

- Links between global, regional and local environment and development issues;

- Knowledge and understanding of tools and mechanisms for achieving sustainable development and green growth;

- Understanding of environmental management systems and tools, risk assessment and due diligence in the public and private sector;

3.5.3 A Good Understanding of Specific Environmental Issues, Including

- Natural resources and their management (e.g. biodiversity, forestry, water, land, soil, fisheries, oceans and coast);

- Environmental health: Pollution prevention, control and remediation;

- Urban and rural environment;

- Land use change and planning including rural and urban environment, agriculture and desertification;

- Industry and the environment;

- Conflict over natural resources;

- Sustainable consumption and production;

- Understanding;

- Multilateral Environmental Agreements;

- Role of international Institutions including the World Bank and United Nations in environmental management;

- Use of market based instruments for environmental management;

- Skills to anticipate possible future environmental change and identify possible development consequences;

- Analyse and evaluate complex and sometimes competing environment and development issues and integrate these into practical, balanced and sustainable solutions.

3.5.4 Basic knowledge/Understanding of

- Basic environmental economics;

- Basic environmental law;

- Environment and governance;

- Key global public good and technology issues that impact on the environment (for example developments in international trade, science and technology) and an understanding of the factors that mediate between these factors and poor people;

- Networks among environment and development policy professionals (other agencies, private sector, academics, institutions and Non-Governmental Organizations etc.).

3.5.5 Knowledge/Understanding of

- Integrating environment into government sectoral and interdepartmental planning and delivery processes;

- National and local regulatory and institutional frameworks for environmental management, as applied to developing countries;

- Role of civil society, and contribution of environmental movements;

- Environmental standards and legislation;

3.5.6 *Able to Demonstrate Understanding of*

- basic data (e.g. rainfall records) needed for assessment models and impact analysis;

- Adaptation planning tools, NAPAs and beyond;

- Vulnerability risk assessment;

- Forecasting and scenario planning;

- Spatial decision tools;

- Economic assessment of adaptation options;

- Mainstreaming adaptation;

- Climate change and rural livelihoods;

- Climate change and urban development;

- Environmental protection/enhancement;

- Biodiversity, ecosystems and resilience to climate change;

- Water resources and climate change;

- Environmental, social and economic factors for improved livelihood and effective land use;

- Understanding how to support countries to access and use adaptation funding;

- Prioritizing adaptation plans, 'Low regrets' adaptation options etc.;

- Articulating what good climate resilient development actually looks like.

3.5.7 *Low Carbon Development*

- Carbon emission reduction planning;

- Carbon sequestration (land use planning, forest management, carbon capture and storage);

- Carbon markets;

- Economics of low carbon growth;

- Renewable energy technologies;

- Energy efficiency;

- Low carbon energy policy;

- Low carbon cities or zones / eco-cities;

- 'pro-poor' options for low carbon development. Opportunities for 'win-win' solutions;

- How to facilitate access for developing countries to financing for low carbon energy development.

3.5.8 *General*

– Ability to translate scientific climate information into policy and practical guidance;

– Understanding international climate negotiation processes–UNFCCC (2012b), Kyoto, Copenhagen;

– Economics of climate change – e.g. Stern Review on costs of mitigation and adaptation;

– Skills and knowledge to build linkages between poverty reduction, Millennium Development Goals, macroeconomic policies, environment, energy, climate change and sustainable development;

– Gender and climate change;

– Monitoring Reporting and Verification – what are the requirements for developing countries and how can they develop their capacity to meet these requirements;

– Analyzing strategies employed in ones area of work to minimize risks and maximize opportunities related to climate change and climate variability;

– Traditional indigenous Knowledge and coping strategies;

– Resilient social and government structures;

– Climate change and natural resource related migration;

– Disaster Risk Reduction and climate change – conceptual and practical linkages.

3.6 Identification of Climate Change Education Tools, Materials and Best Practices

Effective climate change education requires innovative approach. The power and effectiveness of Information Communication Technology need to be adequately harnessed. The World Wide Web is a tool that environmental professionals can utilise in acquiring knowledge about climate change and skills in mitigating and adapting to it. An avalanche of materials including picture, video, projection, simulation and answers to frequently asked questions are available on the internet. The World Wide Web also provides an opportunity for collaboration with different professionals all over the world for exchange of ideas on mitigating and adapting to climate change. There is dire need for aggressive on the job training for environmental professionals on ICT application in disseminating information and creating awareness on climate change. This should include knowledge and information on causes of climate change, effects of climate change, mitigation and adaptation of climate change and responsible environmental behaviour as it affects climate change

Innovative teaching strategies like each-one-teach-one or fund the teaching of one, fear appeal approach, child-to-child method and so on should be embraced for mass education on climate change. We are in the era of globalization, yet it has been stressed that we should think globally but act locally. In this wise, it becomes imperative to look inward and utilize indigenous and traditional ways of learning in the locality and adopt these in disseminating climate change education and programmes. Proverbs, riddles, story-telling, drama, songs, oral poetry and the likes should be employed in teaching climate change issues.

Effective channels of communication will need to be used for climate change education to be meaningful. This should incorporate both formal and informal modes. The formal mode includes the use of print media such as newspapers, magazines, postal, hand-bills, flyers, mementos like t-shirt, face cap, wrist band, and head gears, with climate change issues inscribed on them. The formal mode also includes electronic media such as television, radio, computer, internet, cell phone, and multi-media projector.

The informal mode of communication which will benefit climate change education includes community power structure which entails utilizing the indigenous line of communication, for example disseminating information through king-in-council to quarter chiefs to lesser chiefs to heads of households. The use of town criers, local musicians, traditional festivals, use of signs and symbols as well as the use of taboos are also effective.

3.7 Mobilization and Engagement of Networks and Partnerships in Support of Climate Change Education

Climate change education should be delivered using the multidisciplinary approach. Aside from this, all relevant stakeholders must be mobilized for effective networking.

At the local level, all environmental professionals must work hand in hand and form formidable partnership in order to be able to effectively disseminate climate change messages and programmes, as well as effect attitudinal change in people.

Where there is need to apply law or legal dimension experts in environmental law should be consulted, when it is about changing attitudes environmental educationists and environmental psychologists should be engaged.

At the international level, there are various environmental organizations that provide free consultancy services to environmental activists. These organizations must be contacted in order to tap and benefit from their wealth of experience.

Environmental regulatory agencies of government must also be mobilized maximally and links with international regulatory bodies established in order to promote collaboration for climate change literacy and awareness.

Opportunity for in-service and on-the job training should be provided by the government.

Climate change as a problem facing humanity in perpetuity, calls for change in attitude. This can be achieved through life-long learning in which environmental professionals as climate change extension agents have invaluable roles to play. That being the case, the environmental professionals as change agent must be well grounded in the nitty-gritty of causes, effects, mitigation and adaptation of climate change as well as the skill in imparting the knowledge acquired.

Acknowledgement

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