

Environmental Biology for Community Sustainability in Nigeria

S. J. Ado^{a*} and R. P. Chris^b

^aBasic and Preliminary Studies Department (Biology Unit), Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria

^bScience Laboratory Technology Department (Biology Unit), Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria

Corresponding author: adosamuel1962@gmail.com

ARTICLE INFO

Received: December, 2019

Accepted: April, 2020

Published: April, 2020

Keywords:

Environmental biology

Sustainability

Community Sustainability

Environment

ABSTRACT

The unceasing speedy technological development of the world with its Socio economic and industrial improvement is crucial for this present-day, but its associated penalties need knowledge, awareness of environmental biology, environmental behaviour, expansion of sustainable policies and steady community action to enhance human and ecological sustainability. Also, natural catastrophes such as earthquakes, torrents, Coronavirus and landslides occur unpredictably in different parts of the world even in Nigeria. Hence, the Sustainable Organization of all environmental facts in a community which will require the understanding of environmental biology to manage resources available to it and sometimes the community's preparedness. Therefore, these make sustainable environmental biology very crucial for every society. This research work resolved to analyse the importance of sustainable environmental biology for community's sustainability and development in Nigeria. It also examines the tasks of the environment in Nigeria linking them to the requirement of bearable ecological sustainability and communal sustainability as a whole. The paper recommends the followings among others; Communities that observed landslides and torrents in recent past should be given due consideration and attention with an opinion to stopping future incidence. The government of Nigeria will need to be active in the enactment of sustainable environmental strategies and be firm in the application of sustainable environmental laws and statutes, through which knowledge and awareness of environmental issues in the societies can be boosted.

1. INTRODUCTION

Environmental biology for justifiable expansion is indispensable for human and ecological sustainability in this contemporary era. It's also vital to the sustenance of the incessant rapid science and technological development across the globe, and may be central in reducing and extenuating the negative result of globalization, development, and socio-industrial change. Hence, the declaration of United Nation (UN) of the year 2005 to 2014 as "Decades of Education for Sustainable Development" (UNESCO, 2005). This UN declaration may be indispensable in this century to encourage the increase in knowledge of environmental biology, information and learning that will support the conservation of the world from adverse implications

of growing advancements in Science and Technology and quicken the sustenance and satisfaction of the benefits of growing development by man (Damerell *et al.*, 2013).

Environmental science is a multifaceted academic endeavour which comprises of physical, biological and information sciences to the study of the environment and the panacea of environmental challenges. Currently, it consolidates, quantitative and interdisciplinary method to the study of ecological classifications. The knowledge of environmental biology enhances human beings to utilise their environment in a justifiable pattern for their sustainability, this support the trend of advanced education which tries to increase human knowledge and consequently their activities in their surroundings (Chawla and Cushing, 2007). It also enables individuals to study their environmental challenges and provide solutions that will cut-tail problems, and impede further negative effect to the environment (USEPA, 2007).

One of the main focus of environmental biology is man's active participation in acknowledging more about living and non-living things and the remedy for environmental problems which is multidimensional (Chawla and Cushing, 2007). Therefore, environmental biology is indispensable in the development of positive attitude to the sustainable management of the environment.

Environmental Biology

By definition environmental biology is that study that concentrates on the scientific training of the origins, interactions, relationships, functions and natural antiquity of living populations, communities, ecosystem and species in relation to active ecological processes. While a community is an interrelating group of several species in a common location, e.g. a forest of trees and vegetation, colonised by animals and deep-rooted in soil encompassing bacteria and fungi, all these constitutes a biological community. It also has the potential of granting knowledge that will provide actions that will encourage sustainable interferences to the location, e.g. afforestation.

It underwrites the disaster risk reduction (DRR) approach, thus making people understand the nature of hazards in their environment and how to relieve from it and occasionally manage with them (Howe, 2009). Hence environmental biology is anticipated to reassure ecological preservation and bearable development though, experiential training relating to the costs and benefits of various methods of education in the areas of environmental conservation and sustainable expansion is limited for now. There is need for proper assessment of measures geared toward the preservation of the environment to moderate policies that will enhance environmental biologists. In light of this, this research work assesses the level of environmental biology in Nigeria 'vis-a-vis' the current environmental challenges common in the country today.

The military has knowingly or unknowingly adopted various defence mechanisms from biological animals. For example, the tortoises and anthropoids have hard protective armour, which can be compared with the military model of human experience. Some animals develop lethal organs of offence such as spines, horns, claws, and teeth, while poison glands are often used as protective lethal. Organs are found in snakes, centipedes and scorpions' cephalopods (Aquatic molluscs) which have developed a method of ejecting a black substance into water to provide a screen while they escape parallel to the use of smokescreen (from smoke granite) in military operations. It further examines the evolution of environmental biology relating it to Nigeria's governmental policies on environmental sustainability. To this end, it expounds the roles of environmental biology as a driver of environmental attitudinal change that will support durable community sustainability.

All living things reside in one environment or the other, especially the military that use biological weapons for the protection of lives, properties and national defence against foreign and internal enemies. Biological

weapons are essentially biological organism, usually microorganisms, bacteria, viruses, Fungi, toxins manufactured to cause diseases in man, plants and animals. Biological Weapons are also interchangeably called Biological War (B.W.) agents (Odia, 2016). Toxins are poisonous substances produced by living organisms. They are non-living and can be synthesised artificially in the laboratory. Hence, they are grouped with Chemical Weapons. Biological weapons are used in military tactics to produce casualties, destroy or disable equipment and disrupt the enemy's operations. The biological and toxins weapon convention was held and many countries agreed to ban biological weapon permanently (Biological Weapon Convention, 1972). Microorganisms such as bacteria and viruses qualify as biological weapons mainly because they are capable of reproducing themselves in large numbers within fractions of a second.

METHODOLOGY

This research work reviews the works on environmental biology and education on the basis of collaborating the relevance of biology to the environment where we live. It added a link between the military and biology and tried to analysing matters and application of the situation in Nigeria and relates them to the requirement of sustainable ecological education that will enhance justifiable community through careful training, conservation and management of the environment we are living now (ourselves) and the future generations.

ENVIRONMENTAL BIOLOGY AS A CATALYST OF INFORMATION

Education is vital for science and technological development all over the world and socio-economic growth of the people. It is also indispensable for the development of community's strategies in the management of negative vices common with every aspect of progress. The fears mostly created by the technological development, natural resource misuse and untenable organisation of nature given resources in different levels of lives at approximate time yield negative penalties that are globally common to man and his surroundings such as environmental insecurity and climate change (Damerell *et al.*, 2013).

Since the negative penalties from technological developments, people need knowledge of the stages of growth in their environment in order to produce actions that will inspire environmental sustainability though, there are essential challenges in demonstrating a fundamental relationship rather than an association between receiving environmental biology and guaranteeing changes in attitude, knowledge, levels or behaviour (Roy, 2013).

However, the eventual objective of environmental biology everywhere in the world is to increase knowledge that will inspire actions and foster a better environment, avoiding reparations and enhance human livelihood and communal sustenance. Nevertheless; research work world over has not been able to agree on the style and real way of training ecological education that will yield anticipated results and attitude that will enhance environmental actions for justifiable societies (Damerell *et al.*, 2013).

All over the world, environmental biology and education has continuously been appraised for good, and that raised the need to inculcate this knowledge to children, because children are the future of tomorrow and once an attitude is imparted in them, it may not be simply erased (Damerell *et al.*, 2013). Also, there are no definite evidence that the child-orientated environmental education may impact adult knowledge and eventually the behaviour of the household. (Damerell *et al.*, 2013). Therefore, we may not overrule the relevant understanding of the parents' attitude swaying the children ecological attitude though intergenerational spread of past history of environmental attitude may be limited (Lappanen *et al.*, 2012). In a related research study on the valuation of environmental information, attitude and behaviour of learners in Teacher Training Colleges in Israel found a noteworthy constructive relationship between the level of the students and mothers' education in association to the ecological familiarity and ecological attitude of

students (Peér *et al.*, 2007). In another research study published by Damerell *et al.* (2013), children on wetlands lessons were compared to the one, not on the lessons recommended that education is foremost to underpinning ecological knowledge for children. The research work further understood that parents having children that had gone through wetlands lessons had pointedly higher information on wetlands without observing it than the parents whose children were not on wetlands lessons (Peér *et al.*, 2007; Damerell *et al.*, 2013).

Other forms of education which may not be official training or lessons might create an understanding which could always sustain environmental attitudes and actions. Since human beings' idea of its environment may be informed through this training which may inspire the understanding of the need for ecological safeguarding, in order to support the common values for now and the future. For example, sticker videos, theoretical preservation, posters and workshops were used in a study in the combination of the Comoros to reveal services provided by the critically scarce fruit bats in which the study revealed an increase in the knowledge of the bats in their seed distribution roles which led to among others advancement of policy and legislation and progressive conservation (Dillon, 2003).

Also, informal education may be outside formal settings or classrooms setting such as investigation in museums, botanical gardens and field centres are prime to building up attitudes and equivalent environmental activities. This helps learners to see the necessity, proofs and effects of environmental dilapidation and negligence thereby exploring and developing their own environmental knowledge, skills, attitudes, consciousness, opinions and actions (Dillon, 2003; Ballantyne and Packer, 2005). Hence, the essence for environmental knowledge cannot be exaggerated for introducing and nurturing of conservation attitudes expected to boost environmental safety and sustainable societies through practicable and supportive environmental activities that will be created and generated by the understanding of our immediate environment.

In another study in Florida Peninsula published in 2002, on informal training with the intention of conserving of *Manatees (Trichechus)* in the water of the Tampa Bay Florida Peninsula where boat accidents with *Manatees* were accounting for about one-quarter of the death of Manatees yearly expresses a relationship between attitudes and environmental knowledge (Aipanjiguly *et al.*, 2003). The study found the boaters indicating support for environmental knowledge than strict policy such as speed limits, increased patrol and no access areas because the boaters have attained knowledge of conservation, thereby becoming more careful and supportive to environmental safety (Aipanjiguly *et al.*, 2003).

The researchers further affirmed that people cannot display environmental responsibility behaviour without satisfactory understanding and information about their environment and that the first step in reducing the influence of humans on the environment is to make available satisfactory information of the same though knowledge may not promise proper environmental behaviour (Kuhari *et al.*, 2013).

EVOLUTION OF ENVIRONMENTAL EDUCATION IN NIGERIA IN BRIEF

The National policy on Education stipulates a 6-3-3-4 structure in Nigeria which include six years Primary, three years Junior Secondary, three years Senior Secondary and four years of higher education. The Primary and Junior Secondary education creates basic education that is free and obligatory. Within the formal system in Nigeria, ecological knowledge is taught as part of the syllabus. A significant deal of effort has been devoted by the Nigeria Educational Research Development to bring about a sustainable environment for all.

The yearning and obligation of government to tackle environmental education matters in Nigeria pointed to the necessity to develop in baseline survey, the Nigeria Living Standard Survey 2003/2004 for monitoring and assessment of the numerous government programmes like Tree Planting Campaign, sustainable environmental management and others. Over the last twenty years, an awareness of the subject environmental education has grown at formal and non-formal levels in Nigeria. Within the formal system in Nigeria, environmental education is taught as part of other school subjects such as Integrated Science and Social Studies. A significant deal of determination has been capitalized by the Nigeria Educational Research Development Council (NERDC) to permeate the environmental education concept into many subjects in the Junior and Senior Secondary Schools Syllabi. The Science Teachers' Association of Nigeria (STAN) on its own part is pursuing a regimen of training for environmental education for the school system through its annual workshop. The study is an evaluation of the teachers' knowledge of environmental issues and examination of the delivery of environmental education in schools.

ENVIRONMENTAL EDUCATION AS A BOOSTER OF AWARENESS

Environmental education is projected to increase learners' consciousness in order to make them sensitive towards the environment and its resources thereby driving them to take the equivalent actions towards environmental conservation in their communities. This study agrees with Blumstein and Saylan that there has not been adequate data on the level of public responsiveness and knowledge of environmental matters relating to conservation of the environment (Blumstein and Saylan, 2007). Improved legislation, projections and plans are available to reduce increasing environmental degradation in different parts of the world. Nevertheless, some of the studies conducted world over on the effect of environmental education on learners' attitudes and practices have shown progressive and hopeful stake towards reasonable environmental attitudinal change which always yield well-disposed actions that will encourage conservation of the environment. For instance, in New Zealand where a national research project examined the consequences of implementation of syllabus innovation on environmental education by way of guidelines document rather than obligatory curriculum statement. The study identifies the students results which were 91 percent of the 235 respondents were the attainment of understanding, knowledge and awareness about the environment were achieved (Ladan, 2015).

Environmental education and responsiveness are crucial to sensitizing residents of every community to accept a justifiable environmental policy that is expected to bring about manageable sustainable community. In India, on a willingness to pay for better waste management in Silchar municipal Area in Cachar District, Assam, India, it was recommended by the researchers that willingness to pay by the family heads has a well-disposed relationship to the level of formal education of the family head (Maskey, B and Singh, n.d.)(Roy, 2013). This was based on the consideration that the level of formal education of the societies determine the level of the knowledge and awareness of the society's environmental problems and consequences and the requirements to remedy them.

In accord with the investigation study carried out in Goroka municipality in Nepal, it was understood that the family head was statistically at 5 percent level having a positive coefficient with environmental responsiveness variable of a positive coefficient with statistical importance at 1 percent which portrays that the family heads support a readiness to pay for enhanced waste collection service because of his/her responsiveness of the adverse consequences of waste on the environment (Maskey and Singh, 2017).

ENVIRONMENTAL ISSUES IN NIGERIA

Nigeria has its own environmental challenges that will always require sustainable management so as to preserve the future for ourselves and generations yet unborn. The management of this challenges demands awareness, attitudes, skills, Knowledge and participation which are the basis of maintainable environmental education that is necessary for community's sustainability. Most of the trials we face today are due to lack of understanding, attitudes to environmental facts of life required for sustainable processes(Odia, 2016). This makes the need for ecological education and consciousness to be requisite to the community and societal sustainability and growth. Some of these challenges may need proactive environmental education that will create citizenry's knowledge, attitude and awareness. These include the understanding of the processes of sustainable solid waste management, the implications for water insecurity, issues of deforestation, the need for preservation of biodiversity and the understanding of dangers associated with natural tragedies and its organization. Few amongst the environmental issues in Nigeria are: landslides, heavy rainfall, erosion, poor roads, poor building and lay outs, blockage of water of sewage etc. We must all stand to defend, and protect our heritage for continuity of our race and better sustainability for all. (Imam *et al* 2008).

Most of the forests in Nigeria has continuously reduced due to urbanisation, rapid development and constant use of forest cover mostly due to demand for fuel, charcoal, and timber without justifiable process of afforestation and growth. The perpendicular biomass of most of Nigeria ecosystems has been declining with the exception of the bigger protected forest which is mostly forest reserves and national parks (Pomeroy *et al.*, 2012; Ladan, 2015). Hard waste management has been a problem in many developing countries particularly in Nigeria in urban and semi urban societies. This is a common scenario in urban centres in Nigeria.

KNOWLEDGE AND ADMINISTRATION OF HUMAN MADE CHALLENGES IN NIGERIA SOCIETIES

Nigeria still practices mixed waste collection and discarding. Categorisation and practice of separating waste minimises effort in recycling waste such as source reduction, and reprocessing are still not yet acceptable to most of the people in Nigeria particularly the privileged. There has been a non-stop growth in waste and sewage generation in many urban centres in many state capitals in Nigeria and the development of slums and informal settlement. (Imam *et al.*, 2008; Ladan, 2015). However, the hard waste generated in most of the urban centres such as Kaduna, Lagos and Abuja cities overpower the capacity for its collection and discarding (Ladan, 2015).

The instrument to sort and handle possibly dangerous waste from the mixed waste has been lacking in the waste management instruments. (Imam *et al.*, 2008). The dangerous waste in the waste stream getting to discarding site may be toxic to underground water in case of leaching. Hence, urban citizenry knowledge and responsiveness of the necessity to sort waste from the source and waste minimization instrument will be contributory to the effective management of hard waste in urban centres in Nigeria.

4. CONCLUSION AND RECOMMENDATION

This research work aligns itself with the view that ecological biology and education are vital to the development of environmental activities. Thus, it confirms that every nation, including Nigeria will need to encourage sustainable conservation knowledge through sustainable guidelines, formal and informal knowledge that will build methods, inspire environmental behaviour that may help the achievements of community sustainability. Therefore, the formal education syllabus in all schools may need to be improved with more local content. That is, with more of the issues that are common to the community and the nation at large. Formal environmental knowledge is important in building knowledge and consciousness. Also,

informal technique of education needs to focus on the nation and its communities, environmental challenge and act very fast in solving such challenges.

The researchers recommend the following among others:

- The government of Nigeria should take the lead in creating the community's knowledge, responsiveness and readiness in disaster risk decrease through campaigns, handbills, billboards, formal education etc.
- Previous seismic happenings and nature of our soils makes it susceptible to earthquakes. Hence, efforts should be geared towards minimizing them as in Kwoi in southern Kaduna and Lagos state in Nigeria.
- Communities that observed landslides and torrents in recent past should be given due consideration and attention with an opinion to stopping future incidence.
- The disaster risk decrease in education and methods should also be supported by the non – governmental organisation and the international non-government organisation, (INGO).
- The government of Nigeria will need to be active in the enactment of sustainable environmental strategies and be firm in the application of sustainable environmental laws and statutes, through which knowledge and awareness of environmental issues in the societies can be boosted.
- Our people should be aware of their physiological body functions and know when and where to defecate appropriately and dispose same without contamination.
- Water channels should not be blocked at any point in time mainly to allow free flow especially in the rainy season.
- The work of the town planners should be encouraged and checked by sincere minded people for proper implementation of policies and surveillance on land use

References

- Aipanjiguly, S., Jacobson, S. and Flamm, R. (2003). Conserving manatees: Knowledge, attitudes and intentions of boaters in Tampa Bay, Florida. *Conservation Biology*, 17(4): 1098–1105. <https://doi.org/https://doi.org/10.1046/j.1523-1739.2003.01452.x>
- Ballantyne, R. and Packer, J. (2005). Promoting environmentally sustainable attitudes and behaviour through free-choice learning experiences: what is the state of the game? *Environmental Education Research*, 11(3): 281–295. <https://doi.org/https://doi.org/10.1080/13504620500081145>
- Blumstein, D. and Saylan, C. (2007). The failure of environmental education (and how we can fix it). *Biology*, 5(5): 120. <https://doi.org/https://doi.org/10.1371/journal.pbio.0050120>
- Chawla, L. and Cushing, D. F. (2007). Education for strategic environmental behaviour. Education for strategic environmental behaviour. *Environmental Education Research*, 13(4): 437–452. <https://doi.org/https://doi.org/10.1080/13504620701581539>
- Damerell, P., Howe, C. and Milner-Gullard, E. J. (2013). Child-orientated environmental education influences adult knowledge and household behaviour. *Environmental Research Letters*, 8: 015016 (7pp). <https://doi.org/doi:10.1088/1748-9326/8/1/015016>
- Dillon, J. (2003). learners and learning in environmental education: missing theories, ignored communities. *Environmental Education Research*, 9(2): 215–226. <https://doi.org/https://doi.org/10.1080/13504620303480>
- Howe, C. (2009). The Role of Education as a Tool for Environmental Conservation and Sustainable Development. *A Dissertation Submitted for the Degree of Doctor Philosophy at Imperial College London*. <https://doi.org/https://doi.org/10.25560/5377>
- Ladan, S. . (2015). Forest and forest Reserves as security threats in Nigeria. *European Journal of Scientific Research*, 10(35): 1857–7881.
- Leppanen J. M, Haala A. E, Lensu, A. M. and K. M. T. (2012). Parent-Child Similarity in Environmental

- Attitudes: A Pairwise Comparison. *The Journal of Environmental Education*, 43(3): 162–176.
- Maskey, B and Singh, M. (n.d.). Households' Willingness to pay for improved waste collection service in Gorkha Municipality of Nepal. *Environment*, 4(4): 77.
- Odia, A. . (2016). Environmental Education for Human Survival: The case of Nigeria. *Review of Public Administration and Management*, 5(9): 164–179.
- Roy, A. . (2013). Households Willingness to Pay for Improved Waste Management In Silchar Municipal Area: A Case Study In Cachar District, Assam. *IOSR Journal of Humanities and Social Science*, 6(5): 21–31. <https://doi.org/DOI: 10.9790/0837-0652131>
- Ministry of Water and Environment. Joint sector Review Report (2010).
- United Nations Educational, Science and Cultural Organization (UNESCO). <https://www.google.com/search?client=firefox-b-United+Nations+Educational%2C+Science+and+Cultural+Organization+%28UNESCO%29>.
- United States Environmental Protection Agency. (2017). What is Environmental Education? Available online:<https://www.epa.gov/education/what-environmental-education>.