

DEVELOPING COGNITION OF ENVIRONMENTAL SUSTAINABILITY THROUGH EDUCATION: ISSUES AND CHALLENGES

Beatrice N. Manyasi

Maasai Mara University, School of Education,
P.O. Box, 861- 20500 Narok, Kenya

ABSTRACT

Environmental sustainability focuses on protecting environmental resources such as water, land, forests and biodiversity, among others. The relationship between human beings and nature is essential. Human beings need a healthy productive life without undermining the environmental needs of present and future generations. Social communities ought to develop their economy making intellectual decisions pertaining to the management of their natural resources so as not to compromise the needs of future generations. The study sought to establish the effectiveness of the approach used in teaching environmental education in secondary schools in Kenya by investigating the cognition of first year university students about environmental concerns and their effects. Qualitative research methodology was used. The techniques used to generate data were interviews and audio-recording. Findings revealed that respondents lacked cognition about how human beings negatively affect the environment and the challenges experienced by them as a result of the negative effects. The approach used in teaching environmental education in secondary schools in Kenya is not effective. It goes against the principle of using the preventive approach to protect the environment through education. It is essential to develop appropriate policies and reform the curriculum in basic education to enable learners to move from nature appreciation and awareness to education for an ecologically sustainable future. Environmental Education can be used as a context of integration for learning with other subjects including English Language Teaching.

Key words: Curriculum Reform, Education, English Language Teaching, Environmental, Sustainability

INTRODUCTION

Environmental Concerns in this paper means the negative effects of human activities on the environment, while challenges refer to the impact of the negative effects on human beings, animals and plants. Globally, there are a lot of environmental concerns or problems that seem to be escalating, causing a number of challenges. The environmental problems such as global warming, acid rain, air pollution, urban sprawl, waste disposal, ozone layer depletion, water pollution and climate change are alarming. The exploitation of our planet and degradation of our environment has gone up at an alarming rate, causing natural disasters

striking us more often in the form of floods, tsunamis, cyclones, drought and diseases among others. This has led to many deaths and other devastating effects on the ecosystem.

Global warming worldwide will affect the ecosystems and agriculture. There have been regional trends in floods and droughts. Water bodies such as oceans are absorbing about a quarter of the carbon dioxide emitted to the atmosphere annually and are becoming more acidic as a result, leading to concerns about increasing impacts on marine ecosystems (Walsh et.al 2014). In Kenya, it has not been any different. There are more deaths caused by environment related issues such as: floods, prolonged droughts, pollution and diseases among others. The destruction of Mau forest in Kenya due to human settlement and other human activities is hurting the Maasai Mara Game Reserve. The Mara River is drying up due to the same reason yet the issue is highly politicized. In 2016 to 2017, Kenya experienced the worst drought ever in history in the northern region. Many animals and human beings have lost their lives for lack of water and food. This is as a result of climate change due to environmental Concerns. Deforestation in western Kenya due to sugar cane growth and overpopulation has left the region with adverse climate change. (Pooley and O'Connor, 2000).

Education is a tool for social transformation (Kenya Vision 2030 Research team 2007). It furnishes the general public with understanding and knowledge that enables them to make informed decisions about their lives and problems facing the society. It is expected to provide skills and attitudes that will steer Kenyans to the economic and social goals of vision 2030. The Kenya government's vision for education is; *'Quality Education and Training for Development.'* Focus is on positive behaviour change to be a productive member of the society (Sessional paper No. 1 of 2005). The mission of education is to: *promote and coordinate quality life- long education, training and research for Kenya's sustainable development and responsible citizenry* (MOES&T, 2005). Environment being important is captured in the goals of education in Kenya. The goal states that:

"Education and training must empower our people to conserve, sustain and exploit our environment for sustainable development." (MOES&T, 2005).

To achieve the stated goal, there is need to use education as a vehicle for empowering learners with knowledge, skills and positive attitude to conserve, sustain and utilize the environment for sustainable development.

Purpose of the Study

The study sought to establish the effectiveness of the approach used in teaching environmental education in secondary schools in Kenya by investigating the cognition of first year university students about environmental concerns and their effects.

Research Questions

The following research questions guided the study.

- ✚ How do human beings negatively affect the environment?
- ✚ What challenges are experienced by human beings as a result of the negative effects?

LITERATURE REVIEW

Environmental Concerns and Challenges

The universe is currently facing a lot of environmental concerns. The environmental problems like global warming, acid rain, air pollution, urban sprawl, waste disposal, ozone layer depletion, water pollution, climate change and many more affect all living things and nature. Different environmental groups around the world play their role in educating people about how their small actions when combined together can play a big role in protecting the earth. Air, water and soil contamination take enormous number of years to recover. Industry and engine vehicle fumes are other toxins that affect the environment. Substantial metals, nitrates and plastics are poisons in charge of pollution (Walsh et.al 2014). While water contamination is brought about by oil leaks, acid rain, and urban sprawl; air contamination is created by different gasses and poisons discharged by manufacturing plants and burning of fossil fills as illustrated in Figure 1.



Figure 1: Motor Vehicle Exhaust and Industry Pollution

Source: (Walsh et.al 2014)

Air, water and soil Pollution cause several diseases as summarized in Figure 2.

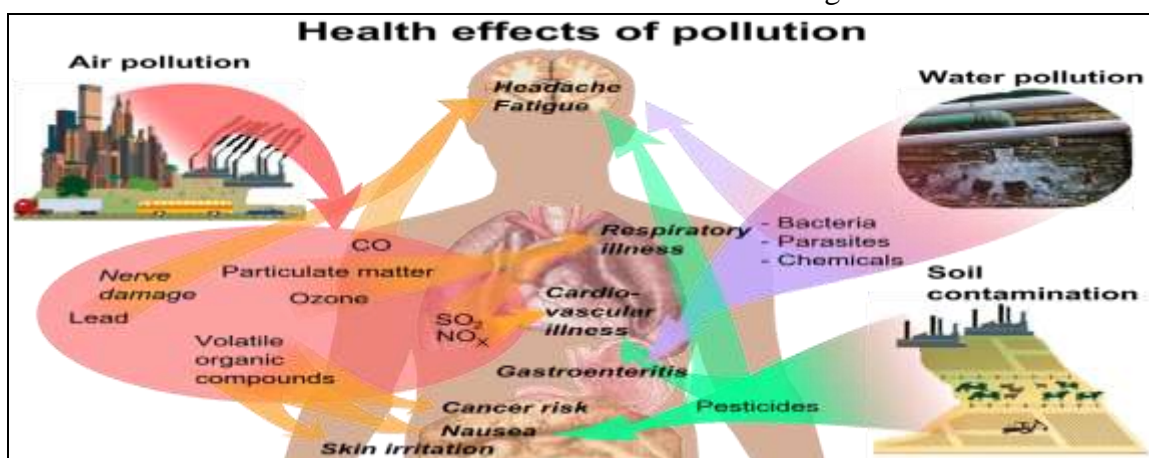


Figure 2: Health Effects of Pollution (Source: www.earthtribe.co)

Extraction of minerals from earth’s core brings out harmful chemicals from deep inside the earth to the earth’s surface. The toxic emissions from mining can cause air, water and soil pollution. The degradation of soil’s surface as a result of human activities like mining, littering, deforestation, industrial construction and Agricultural activities is a major concern to the environment. (Smyth, (2006). It causes adverse effects on human health as highlighted in the table.

Table1: Effects of Pollution

Effects of Pollution
+ Cancer
+ kidney damage
+ liver damage
+ Skin irritation
+ Nervous system damage
+ Throat irritation
+ Birth defects
+ Miscarriages
+ Asthma
+ Chronic bronchitis
+ Developmental problems in children

Climate Change, which is caused by a rise in global warming, is as a result of an increase in temperature of the atmosphere through burning of fossil fuels and release of harmful gases by industries. It has various harmful effects such as change in seasons, diseases, frequent occurrence of floods and change in general weather. Fossil fuel utilization brings about discharge of greenhouse gasses, which cause environmental change. Rising temperatures of the oceans and the earth’ surface trigger melting of polar ice caps, rise in sea levels and also unnatural patterns of precipitation such as flash floods, excessive snow or desertification (Pooley and O’Connor, 2000).

There are many effects of climate change as illustrated.

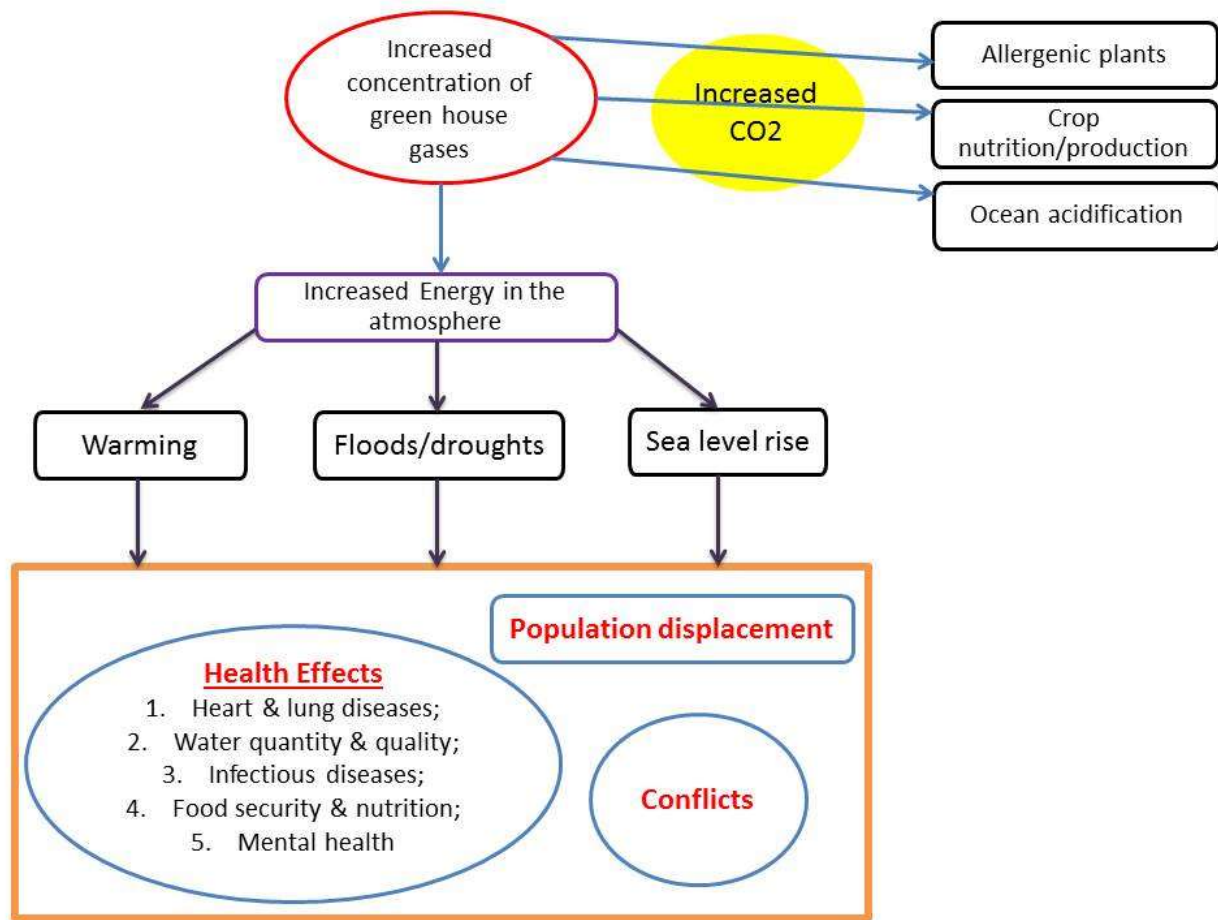


Figure 1: Effects of Climate Change (Source: www.earthtribe.co)

Increased carbon footprint and temperature increases are as a result of human practices, including the use of greenhouse gasses. When the atmosphere changes and the heat increases, it can cause a number of problems and start to destroy the world hence the survival of all living things. Use of machinery by humans increase carbon dioxide levels in the air, prevents heat from escaping, causing wide-reaching temperature increases. Rising water temperatures cause coral bleaching and destruction of aquatic life. *Population explosion* is straining the already scarce resources. Intensive agriculture practiced to produce food damage the environment through use of chemical fertilizer, pesticides and insecticides.

Overpopulation is another environmental concern, a major contributor to deforestation. (UNESCO, 2014b). *Deforestation*, the complete destruction of forest cover, is an enormous problem and continues to get worse. Wooded areas and forests are being lost on a regular basis because globally, people are in need of space, farmland, housing, roads, food, and materials. Forests are natural sinks of carbon dioxide and produce fresh oxygen besides helping in regulating temperature and rainfall. Growing population demand for more food, shelter and clothing causing immense challenge on the natural sinks of carbon dioxide and natural producers of fresh oxygen (Smyth, 2006).

Deforestation causes habitat fragmentation; animals and plants are forced into confined areas. The

importance of forests is summarised in Table 2.

Table 2: Importance of Forests

Importance of Forests	
+	Trees maintain solar radiation balance by absorbing heat from the sun.
+	Approximately 40% of the oxygen is provided by the rainforests in the world.
+	Trees decrease the level of carbon dioxide in the atmosphere, therefore; deforestation contributes to the greenhouse effect and global warming.
+	The burning of the trees contributes to the increase of CO ₂ level in the atmosphere. 20% of global increase in CO ₂ is caused by the destruction of rainforests.
+	Maintains global precipitation patterns (distribution of water supply) as water that is evaporated from the rainforest falls as rain in other regions. Without the tropical rainforests, the hazard of desertification will increase in many areas.
+	Tropical rainforest contains the world's main gene pool. Its bio-diversity is so great that at least 50% of the earth's species are living in it.

Genetic modification of food using biotechnology, genetic engineering, results in increased toxins and diseases as genes from an allergic plant can transfer to target plant. Genetically modified crops can cause serious environmental problems as an engineered gene may prove toxic to wildlife. Increased use of toxins to make insect resistant plant can cause resultant organisms to become resistant to antibiotics. *Loss of Biodiversity* is yet another environmental concern due to the impact of human activities on the environment. Habitat destruction is a chief cause for biodiversity loss. Habitat loss is caused by deforestation, overpopulation, pollution and global warming (Stohr, 2013).

Developed countries produce an excessive amount of waste and dump it in the oceans, seas and, less developed countries, creating a global crisis of *waste disposal*. Nuclear waste disposal has tremendous health hazards associated with it. Plastic, fast food packaging and cheap electronic waste threaten the well being of humans.

Ozone Layer, an invisible film of protection around the planet that protects us from the sun's harmful rays, has also been affected by pollution. Depletion of the crucial Ozone layer of the atmosphere is attributed to pollution caused by Chlorine and Bromide found in Chloro-floro carbons (CFC's). Once these toxic gases reach the upper atmosphere, they cause a hole in the ozone layer. The CFC's are burned in many industries and consumer products. When the Ozone layer is depleted, harmful UV radiation from the sun reach the earth and cause destruction to human beings, plants and organisms as summarized.

Table3: Effects of Ozone Layer Depletion

Effects of Ozone Layer Depletion	
✚	Skin cancer
✚	Eye cataract
✚	Damage of crops
✚	Damage to aquatic fauna
✚	Impairment of the body’s immune system
✚	Degradation of paints, wood rubber and plastics used in construction
✚	Damage of the genetic material (DNA) leading to mutation of the affected organisms

Human activity is leading to the extinction of species and habitats and *loss of bio-diversity*. Eco- systems, which took many years to perfect, are in danger when any species population is lost. Balance of natural processes like pollination is crucial to the survival of the eco-system. The destruction of coral reefs in the various oceans, which support the rich marine life negatively affect ecosystems. *Acid rain* occurs due to the presence of certain pollutants in the atmosphere. Acid rain can be caused by a combustion of fossil fuels or erupting volcanoes or rotting vegetation which discharge sulfur dioxide and nitrogen oxides into the atmosphere. Acid rain is a known environmental problem that has adverse effects on human health, wildlife and aquatic species. *Littering*, disposal of garbage or debris at wrong location instead of disposing them at trash container or recycling bin, can cause huge environmental and economic impact in the form of spending millions of dollars to clean the garbage that pollute the clean air (Pooley and O’Connor, 2000).

Principles of Sustainable Development

The Rio Declaration on Environment came up with *eighteen* principles of sustainability from which sustainable development is defined, stating that: People are entitled to a healthy and fruitful life in harmony with nature; Development today must not undermine the development and environment needs of present and future generations; Nations have the sovereign right to exploit their own resources, but without causing environmental harm beyond their boundaries; Nations shall develop international laws to provide compensation for harm that activities under their control cause to areas beyond their boundaries; Nations shall use the preventive approach to protect the environment; Where there are threats of serious or irrevocable damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation; in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it; Eradicating poverty and reducing disparities in living standards in different parts of the globe are essential to achieve sustainable development and meet the needs of the majority of people; Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command; Nations should lessen and eradicate unsustainable patterns of production and consumption, and promote appropriate demographic policies; Environmental issues are best handled with

the participation of all concerned citizens; Nations shall facilitate and encourage public awareness and participation by making environmental information widely available; Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental harm. Where they have authority, nations shall assess the environmental impact of projected activities that are likely to have a significant undesirable impact; Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an untenable means of restricting international trade. (McKeon, 2002)

For accountability purposes, the polluter should, in principle, bear the cost of pollution. There is need for Nations to warn one another of natural disasters or activities that may have harmful trans-boundary impacts. Sustainable development requires better scientific understanding of the problems, therefore; Nations should share knowledge and innovative technologies to achieve the goal of sustainability. The full involvement of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should be aware of and support the identity, culture and interests of native people. Warfare is naturally destructive of sustainable development, and Nations shall respect international laws protecting the environment in times of armed conflict, and shall collaborate in their further establishment. Peace, development and environmental protection are essential at all times internationally (McKeon, 2002; Gruenewald, 2004.)

Education and Environmental Sustainability

Education for Sustainable Development (ESD) aims at empowering individuals through education to make informed decisions for environmental integrity, social justice, and economic viability for both present and future generations, whilst respecting cultural diversities. (UNESCO, 2014b). Environmental education (EE) refers to organized efforts to teach how natural environments function, and particularly, how human beings can manage behavior and ecosystems to live sustainably. It is a multi-disciplinary field integrating disciplines such as biology, chemistry, physics, ecology, earth science, atmospheric science, mathematics, and geography. The term often implies education within the school system, from primary to post-secondary. However, it sometimes includes all efforts to educate the public and other audiences, including print materials, websites, media and campaigns among others (UNESCO, 2014a).

Environmental Education is the teaching of individuals, and communities, in transitioning to a society that is knowledgeable of the environment and its associated problems, aware of the solutions to these problems, and motivated to solve them. The United Nations Educational, Scientific and Cultural Organization states that EE is vital in imparting an inherent respect for nature among societies and in enhancing public environmental awareness to guarantee sustainable development (UNESCO, 2014a). Focus should be on engaging with all citizens to: think critically, ethically, and creatively when evaluating environmental issues; make educated judgments about environmental issues; develop skills and a commitment to act independently and collectively to sustain and enhance the environment; and, to enhance their appreciation of the environment; resulting in positive environmental behavioral change (bamberg & moeser, 2007; wals

et al., 2014).

METHODOLOGY

The study used qualitative research methodology. It is used in education to gather in-depth understanding of issues that concern education such as curriculum content, reform and outcomes. (Cohen et. al, 2007). It is a flexible approach that seeks to generate and analyze holistic data on an issue ensuring trustworthiness in the research process and observing ethical considerations (Jwan and Ong’ondo, 2011; Mason, 2002). Qualitative researchers are concerned with details of the research process as with the outcome. The paradigm was appropriate for the study because the researcher gathered in-depth understanding of cognition of first year university students about how human beings negatively affect the environment, and the challenges experienced by them as a result of the negative effects.

The study was carried out in one public university in Kenya. It was appropriate because students who perform well in their Kenya Certificate of Secondary Education are admitted in universities. Kenya Universities and Colleges Placement Board admits secondary school leavers who merit to study different courses at the university from all over the country and post them to different universities. Students in any university come from different parts of the country and from different categories of schools. They therefore formed an appropriate sample of the study because they had completed the secondary school curriculum and done a standardized national exam. All of them were above average as per the guidelines for admission to universities in Kenya. The researcher used systematic random sampling to select hundred students from all the faculties. The techniques used to generate data were interviews and audio-recording. To ensure reliability in the study, the researcher conducted a pilot study in one university which was excluded from the actual study. Data was analyzed qualitatively and reported in narration according to the research questions.

FINDINGS AND DISCUSSION

How Human Beings Negatively Affect the Environment

Investigation about the cognition of first year university students about how human beings negatively affect the environment revealed that they were aware of some of the environmental concerns but not all. The ones they were aware about are as summarized in Table 4.

Table 4: How Human Beings Negatively Affect the Environment

Environmental Concerns Mentioned
◆ Pollution of air and water
◆ Domestic and Business Waste
◆ Deforestation
◆ Diseases

They lacked awareness of many other environmental issues caused by human activities such as:

- Ozone Layer Depletion
- Genetic Modification
- Loss of Biodiversity
- Effect on Marine Life
- Climate Change
- Overpopulation
- Global Warming

How the Negative Effects Affect Human Beings and the Ecosystem

The researcher examined the cognition of first year university students about how the negative environmental effects affect human beings and the ecosystem. Respondents were aware of the following effects:

- Diseases
- Flooding
- Loss of fertile land

Although respondents mentioned diseases, they could not explain which diseases apart from malaria and cholera yet there are many diseases caused by environment related problems such as:

- Cancer
- kidney damage
- liver damage
- Skin rashes
- Developmental problems in children
- Nervous system damage
- Throat irritation
- Birth defects
- Miscarriages
- Asthma and Chronic bronchitis

Respondents were interviewed to establish their cognition about the environmental issues not mentioned. It was ascertained that they did not have knowledge about the following environmental concerns and their effects.

- Ozone Layer Depletion
- Loss of Biodiversity
- Global Warming and Climate Change

Ozone layer is essential because it prevents harmful UV radiation from reaching the earth (*McKeon, 2002*). Respondents had no knowledge about the ozone layer and the harmful effects associated with it when it is depleted such as: damage of the genetic material resulting to mutation of the affected organisms,

destruction of the body's immune system, skin cancer, eye cataract, damage of crops and damage to aquatic fauna.

Climate Change is caused by increase in global warming. It is as a result of burning fossil fuels and release of harmful gases by industries. It has various harmful effects such as change in seasons, occurrence of new diseases, frequent occurrence of floods. and change in general weather development.

As earlier discussed, **The Rio Declaration on Environment and Development** advocates for full participation of women which is considered as essential to achieve sustainable development besides creativity, ideals and courage of youth. Environmental issues are caused by the general public hence effective environmental education which should lead to sustainable development in practice should target all citizens.

Some educationists have proposed that such knowledge can be acquired through the instruction of Geography. The problem is that Geography is an optional subject in Kenya hence it is done by a few students who choose to do it. Others have argued that Environmental education is integrated in the teaching of English through comprehension passages. Manyasi and Onchera (2013), reported that teachers of English do not teach all the comprehension passages arguing that it would not add any value. They claimed that value addition according to Quality Assurance and Standards Officers meant enabling learners to score higher marks than the previous score. They therefore use a few comprehension passages to teach learners the skill of answering comprehension questions without much attention to the content of the passage.

CONCLUSION

Most respondents lacked cognition about how human beings negatively affect the environment and the challenges experienced by them as a result of the negative effects. The approach being used in teaching environmental education in Kenya through some comprehension passages in Integrated English as currently designed is not effective. The use of Geography, which is an optional subject is not effective as well and goes against the principle of using the preventive approach to protect the environment by educating learners and all citizens to move from nature appreciation and awareness to education for an ecologically sustainable future.

There is no organized effort to teach learners in secondary schools in Kenya how natural environments function, and particularly, how human beings can manage behavior and ecosystems to live sustainably. It is done at the undergraduate and graduate level targeting just a few students specializing in the field of environmental studies. In order to achieve sustainable development and promote appropriate demographic policies through knowledgeable leaders, environmental education within the secondary school system targeting all learners should be embraced.

IMPLICATION FOR POLICY

- The Kenya Institute of Curriculum Development should alter the curriculum to use one set book in Integrated English Language Teaching as a vehicle for developing awareness about education for sustainable development. This would conform to the six levels of learning: knowledge, comprehension, application, analysis, synthesis and evaluation, according to Benjamin Bloom. These levels can be improved with practice in issues about Environmental Sustainability. Learners would be able to advance from nature appreciation and awareness to education for an ecologically sustainable future.
- Summative evaluation in productive skills should include issues on Environmental Sustainability. What is evaluated inevitably determines what is taught, and how it is evaluated, influences how it is taught.
- Teacher educators should review the curriculum to equip student teachers with skills and knowledge about environmental education to enable them to develop appropriate policies in schools. Learners can study about the environment through experiential lessons, field trips to national parks, after-school green clubs, and school-wide sustainability projects. These can be avenues for disseminating knowledge about environmental education and acquiring skills that lead to behaviour change to ensure sustainable development.

REFERENCES

- Bamberg, S.; Moeser, G. (2007). "Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour". *Journal of environmental psychology* 27 (1): 14–25. doi:[10.1016/j.jenvp.2006.12.002](https://doi.org/10.1016/j.jenvp.2006.12.002).
- Cohen, L. Manion, L. & Morrison, K. (2007). *Research Methods in Education*. London. Routledge Falmer.
- Gruenewald, D.A. (2004). "A Foucauldian analysis of environmental education: toward the socioecological challenge of the Earth Charter". *Curriculum Inquiry*, 34 (1): 71–107. doi:[10.1111/j.1467-873x.2004.00281.x](https://doi.org/10.1111/j.1467-873x.2004.00281.x).
- Education Resources Information ZCentre (ERIC), 2002. Outdoor, Experiential, and Environmental Education: Converging or Diverging Approaches. ERIC Development Team. Available at: <http://files.eric.ed.gov/fulltext/ED467713>
- Jwan, J. O. & Ong'ondo, C. O. (2011). *Qualitative Research: An Introduction to Principles and Techniques*. Eldoret: Moi University Press.
- Kenya Vision 2030 Research Team, (2007). A Globally Competitive and Prosperous Kenya. Government Printers. Nairobi.

Manyasi , N. B. and Onchera, P.O. (2013). "Instruction of Reading for Nationhood: English Language Teachers' Cognition in Kenya" *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)* 4(5): 698-705. © Scholarlink Research Institute Journals, 2013 (ISSN: 2141-6990).

McKeon, R. (2002) *Education for Sustainable Development Toolkit, Version 2, Center for Geography and Environmental Education, University of Tennessee.*

Pooley, J.A.; O'Connor, M. (2000). "Environmental education and attitudes - Emotions and beliefs are what is needed". *Environment and behavior* 32 (5): 711–723. doi:10.1177/0013916500325007. jeteraps.scholarlinkresearch.org

Sessional Paper No. 1 of 2005 on a Policy Framework for Education, Training and Research. Government Printers. Nairobi

Smyth, J.C. (2006). "Environment and education: a view of a changing scene". *Environmental Education Research* 12 (3-4): 247–264. doi:10.1080/13504620600942642.

Stohr, W. (2013). "Coloring a Green Generation: The Law and Policy of Nationally-Mandated Environmental Education and Social Value Formation at the Primary and Secondary Academic Levels". *The Journal of Law and Education* 42 (1): 1–110.

United Nations Educational, Scientific and Cultural Organization., 2014a. *Ecological Sciences for Sustainable Development*. [online] Available at: <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/capacity-building-and-partnerships/educational-materials>.

United Nations Educational, Scientific and Cultural Organization., 2014b. *Shaping the Future We Want: UN Decade of Education for Sustainable Development*. [pdf] Paris: UNESCO. Available at: <<http://unesdoc.unesco.org/images/0023/002301/230171e.pdf>>

Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, (2014): Ch. 2: Our Changing Climate. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT. <http://nca2014.globalchange.gov/report/our-changing-climate>.