

Environmental Education for all: Ethiopian Context

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Abstract— *Today's environmental challenges urge man to search for possible solution from wider viewpoints. This paper review is persuasive that it stresses relevance of environmental education for all citizens as one of the key tools for stewardship of environmental wellbeing besides policies and actions combating against environmental problems like pollutions and environmental degradation; believing that environmental education can pose positive change in attitude and behavior of society that in turn probably support efforts done towards sustainable development. The paper also attempt to discuss rationale of this review paper, interactions between man and environment, meaning and aims of environmental education, environmental pollution, climate change, pressure on biological diversity, desertification and drought, population growth and resource use, population growth and environment, dimensions and approaches of environmental education. Developing environmental literacy- knowledge, skill, attitude and actions on current environmental challenges particularly like climate change, loss of biodiversity, health problems and suggested solutions of these problems are need commitment to be addressed. Hence, environmentally literate citizens make informed environmentally sound decisions. Further, suitable approach of delivering environmental education, for all learners, in schools or higher institutions probably is generic form.*

Keywords— *approaches, environmental education, environmental problems, sustainable development, environmental literacy, family planning, population and environment.*

I. INTRODUCTION

Man cannot be considered in isolation from his environment. Every human being should be aware, conscious and knowledgeable about his role in the environment as well as necessity of healthy environment for survival. Under natural conditions there should be a balanced relationship between human beings and the environment and it has to be maintained. However, since

the last few decades, it has been increasingly realized that environment- development issues are of great concern not only in developed countries but also in developing countries where there are widespread environmental problems.

Developed industrial countries from many decades releasing wastes in to the environment thereby causing environmental pollutions which are today became irreversible adverse result, for example, climate change, loss of biodiversity, health problems and the like effects. In similar way, if we developing countries let a little room for pollution on precious environmental resources, really tomorrow we will incur inevitable considerable cost. Therefore, different international environmental conferences recommended environmental education as one of the important tools combating against arising environmental problems and to solve already ongoing one. For instance, the Stockholm Conference (UN) on Human Environment (1972) had recommended to establish programmes of environmental education at all levels such as primary, secondary and tertiary levels of educational system and also to motivate the general public in rural and urban areas about environmental awareness. This was followed by Belgrade (1975) and Tiblisi (1977) Conferences on Environmental Education. These laid stress on developing basic concepts of quality of life and environmental knowledge, awareness, attitudes, skills and participation. As a result by understanding man-environment interactions and consequential effects, adopting Environmental Education become more of mandatory than choice to all society. Hence, recognizing necessity of Environmental Education some of world countries adopted it in their education system as Scotland, United States, New Zealand, India, South Africa (Palmer and Neal, 1994; Reilly, S. 2008). In Ethiopian education system also incorporate environmental issues as core course mode and environmental related programs or disciplines such as environmental science in lower grades; environmental science, agriculture, geography and environmental studies in some higher institutions,

environment and development and the like; further Add is Ababa University had been running environmental education program; though possibly only those students who join such programs might be environmentally literate, but environmental literacy adequately addressed and required for all citizens.

II. RATIONALE OF THIS REVIEW PAPER

This paper review provide insight regarding relevance of environmental education for sustainable development because environmental education create environmentally literate citizens who are equipped with environmental knowledge which enable them to combat against environmental problems and take remedial action for affected natural and social environment. As Scott emphasized the importance of environmental education (EE)for enhancing about natural environmental knowledge and sustainability:

“we need education to help us understand sustainability, because our knowledge of the natural environment is imperfect and characterized by risk, there are problems in using educational interventions as levers for particular forms of social change. Although there can be no single way of learning about sustainability, it is argued that there are strong grounds for working through subject teaching” (Scott, W., 2002, p-1).

When citizens are not aware of interactions between man and environment and the consequences of these interactions, they may not consider themselves as part of environment and may not internalize the environmental problems as their concern. Current environmental challenges which have been arise from human impact on the natural environment, affecting social and physical environment in complex relationships, as asocial aspect is also part of system. To this end, every society of the world should be environmentally literate which assist efforts done against local and global environmental problems. Particularly Ethiopia should match its effort towards sustainable development strategies and actions with environmental literacy, which can be achieved through environmental education.

Building house without pertinent corner stone will result in collapse of the house in the unspecified future and otherwise the house should be founded with stronger corner stone. This is to mean that accompanying sustainable development activity with academic curriculum which create environmental literate and resultant responsible

citizens provide great support to achieve goals of sustainable development.

Ethiopia has emphasizing renewable energy sources for green economy and sustainable development, which is appreciable, but environmental issue cannot be addressed in such way only since environmental components are so wide-ranging. Because action or measures to be taken against environmental challenges should be precede by awareness which is function of environmental education.

In order to install green economy development with corner stone, actions of environmental protection must be accompanied with support of academic foundation in curriculum and the education system of the country. Therefore, installing environmental issues in the educational system provide environmental literacy for citizens. According to Reilly, S, 2008, environmental literacy incorporates ecological, scientific, technological, political, economic, social and cultural principles and value systems, as well as the aesthetic, moral, ethical and spiritual understanding needed to create environmentally knowledgeable, sensitive and responsible citizens. Environmental education provides students with the knowledge, skills, and experiences essential to become successful community leaders, as well as making intelligent decisions pertaining to the management of their general environment and natural resources. Palmer and Neal stressed that environmental education provides experience of problem solving, decision making and participation regarding these aspects. Ultimate aim of EE is for each school leaver to have formulated a responsible attitude towards the sustainable development of Planet Earth, an appreciation of its beauty and an assumption of an environmental ethic (Palmer and Neal, 1994). It is also about promoting changes in behaviour that will help to solve existing problems relating to the environment and to avoid the creation of new ones.

The fundamental means of achieving environmental literacy require adopting the principles of environmental education. An introducing environment education for sustainable development into the curricula of the country is necessary for developing environmental knowledge, skill, attitude and actions. Environmental education is not only being recommended for specific country but for all countries of the world whose education system not addressing environmental education for environmental literacy. For this purpose ministry of education, higher education institutions and other stakeholders including NGOs working on environmental matters can cooperate together to foster environmental education.

III. INTERACTIONS BETWEEN MAN AND ENVIRONMENT

Environment includes ecosystems and their constituent parts biotic components including people and communities, plants and animals, and microorganisms. All abiotic natural and physical resources like land, water, air and minerals are also part of environment. In addition, the social, economic, cultural conditions that affect an individual or a community are components of environment.

Man is at the center of the biosphere in dynamic equilibrium with other segments of the environment—air, water and land. His daily life is heavily dependent on his natural environment—he gets food from soil, fruits and timber from trees, medicines from plants, meat from birds and animals, fish from ponds, rivers and seas, water for daily use from springs, rivers and ground water (Kumar and Kumar, 2004).

Those components of environment are always interacting among themselves in endless and in a direct and indirect, or simple and complex path ways. Man exploits environmental resources with support of his culture (technology) and produce waste products from process and utilization of the environmental resources like minerals and living resources. Doing so man strives to bring economic development. Development activities has process of production which not only produce useful commodity but also wastes that deposited back to the environment where causing pollution. Besides, over exploitation of resources and improper dumping of wastes back into the environment pose negative impacts on it leading to degradation in quality. And environmental degradation back fire human and other living resources. Concerning relationships between environment and development, Kuznets in the 1950s developed a curve showing these patterns- environmental Kuznets curve (EKC).

By stating that it is widely observed phenomenon that as economies grow over time, emissions of many pollutants first grow, and then decline. This work suggested an inverted U shape for a cross-country plot of an inequality measure such as a Gini coefficient against income per capita. The EKC hypothesis is that environmental indicator levels first rise (e.g., pollutant levels per capita rise) as per capita income rises; then the relationship reverses after some threshold level of income (Jha, R, and Whalley, J., 2001). This is to mean that cleaner technologies for would become tool so as to improve environmental quality when development reach at some higher threshold. Further, instead of cleaning degraded natural environment, it is more conventional to make development sustainable to achieve

economic development at the same time maintaining environmental quality. Regarding some detail concept of man's activity on the environment will be discussed under "rationale for addressing Environmental Education".

So every of citizens of my country and the world has to aware of those process and resultant effects as well as possible solutions for environmental problems.

IV. MEANING OF ENVIRONMENTAL EDUCATION

Environmental education (EE) is learning processes that increases peoples knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and foster attitudes, motivations, and commitments to make informed decisions and take responsible actions (UNESCO Tbilisi Declaration 1978 cited in Aklilu, 2010). It is also promoting changes in behavior that will help to solve existing problems relating to the environment and to avoid the creation of new ones (Palmer and Neal, 1996).

Environmental education is wide in its scope and the key dimensions of the EE are education in or through environment, education about environment and education for environment.

Education in or through the environment is experiences beyond the classroom in both natural and built environments not only provide opportunities for students to gain first-hand experience in the environment but also enhance classroom-based work. It means using environment as a teaching-learning aid and as the approach to education. These opportunities can be used to develop skills in observation, data collection, practical inquiry and investigation, and the use of specialist technology. Such situations can also require social and co-operative skills, group-work skills, communication skills, and problem-solving skills. Education about the environment is understands about the natural and built environments and appreciating the key social, political, ecological, and economic factors that influence decision making on local, national, and global issues is critical if students are to meet the aims of environmental education. And education for the environment seeks ways in which people can minimize their impact on the environment. In a society that values freedom and choice and where resources are finite, it is important to develop a sense of responsibility about the social and natural environments of local, national, and international communities. According to Aklilu, 2010, education for environment is viewed as having a more explicit agenda of values education and social change. It is also seen in terms

of promoting lifestyles that are compatible with the sustainable and equitable use of resources. Accordingly, Josephy, 2006, the major goals of Environmental Education are to raise consciousness about environmental conditions and to teach environmental appropriate behavior. It also aims to create an environmental ethic that fosters awareness about the ecological inter- dependence of economic, social and political factors in human community and the environment changes in values, attitudes and behavior towards the environment can ultimately result in a better quality life.

V. AIMS OF ENVIRONMENTAL EDUCATION

Education has made many valuable contributions to societies and development globally, and is recognized for the important role it has in improving livelihoods worldwide. Quality education should prepare societies to actively participate in global politics and economics, as well as provide people with the skills necessary to make informed decisions and take responsible actions. Throughout the world, societies have to recognize education as a key component of sustainable development. Sustainable development has been promoted since its inception over 20 years ago as an effective means to abate the degradation of human and environmental systems (Hart, 1997).

The Ultimate goal of environmental education (EE) is developing environmentally literate citizens, with the sensitivity, awareness, skills, and willingness to become knowledgeable and responsible citizens.

Environmental literacy- is about being knowledgeable about how natural systems function and how social-ecological systems interact; and being competent in interrelated attitudes, skills, knowledge, experience and motivation that is drawn upon and applied for social, cultural, global and environmental responsibility. And environmental literacy is the outcome of environmental education (Liza Ireland, 2013).

EE It may include any topic pertaining to the social or personal application of science and technology. These include science and environmental applications related to diet, health, safety, agriculture, transportation, construction, communication, and public policy (Alec M. Bodzin, 2010).

Regarding the principles and objectives of environmental education, Tbilisi Conference of 1977, Final Report sets out three 'goals of environmental education':

1. To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas.

2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.
3. To create new patterns of behaviour of individuals, groups and society as a whole towards the environment (UNESCO, 1977)

For the achievement of the objectives environmental education should take into account particularly the following guiding principles:

- The environment as a common heritage of mankind
- The common duty of maintaining, protecting and improving the quality of the environment, as a contribution to the protection of human health and the safeguarding of the ecological balance
- The need for a prudent and rational utilization of natural resources
- The way in which each individual can, by his own behaviour, particularly as a consumer, contribute to the protection of the environment (*Journal of the European Communities*, 1988 quoted in Palmer and Neal, 1994).

In similar fashion, environmental education is a learning process that helps us:

- ✚ Understand how ecological and social systems and processes are interdependent and influence personal and collective wellbeing;
- ✚ Value the significance of biological and cultural diversity as well as diverse perspectives in developing social, cultural, global and environmental responsibility;
- ✚ Contribute positively in furthering a sustainable society through social, cultural, global and environmental responsibility by fostering attitudes, motivation, and commitment to make informed decisions; and developing investigation and evaluation knowledge and skills and action competence through systems thinking and futures and design thinking (Liza Ireland, 2013).

VI. RATIONALE FOR NEED ADDRESSING ENVIRONMENTAL EDUCATION

6.1 Environmental pollution

6.1.1 Water pollution:

Environmental pollution refers pollution of all types like climate pollution, water and land pollutions.

From recent years Ethiopia has been striving to make its development sustainable by taking measures necessary for

environmental protection. These measures include soil and water conservation through water shade managements, developing renewable energy sources such as hydroelectricity of Renaissance dame on Abay river, Gilgel gibe on Gibe river, Tekeze and Genale Dawa dames; geothermal power in rift valley system and wind power generation in Adama and Ashegoda; instead of encouraging fossil fuel oriented development.

Are these activities only means of enabling the country leading development in line that guarantee for environmental protection? In order to achieve sustainable development goals, developing comprehensive environmental policies and implementing accordingly; promoting renewable energy source and using environmental education as tool for environmental literacy are key aspects.

In addition to above developments, the country also developing different industrial parks in different towns of the country like Hawassa, Debre Bran, Adama and so on. It was said that these industrial parks manage residues properly. In the long run, these and other industrial expansion and development itself evitable will bring environmental problems. For example, health problems, water pollution, general environmental pollution. Here an argument is not to undermine necessity and role of development but balance between economic production and environmental wellbeing should be given due consideration because environmental safety is precondition for human survival.

Some indicators of environmental problems of water pollution with urban wastes in Addis Ababa, water pollution from agro-processing industries like wet coffee as stated here below.

The generation of residues and by-products is inherent in any productive sector, for instance, the agro industrial and the food sectors produce large quantities of waste, both liquid and solid. Coffee is the second largest traded agricultural commodity in the world, after petroleum, and therefore, the coffee industry is responsible for the generation of large amount of residues (Nabais et al. 2008 in Mussatto S. I. *etal.* 2011). If those wastes are not managed properly they affect human health, water resources, ecosystem and general environment.

In the same fashion, in our country, the wet coffee processing industries are generating huge amounts of organic and nutrient rich and acidic wastewater. This huge untreated wastewater is sometimes discharged directly into the nearby pits that are intended to serve as wastewater stabilization but are neither properly constructed nor the

right dimension to accommodate the generated waste during peak processing time. This leads to overflow of raw effluents into natural watercourses and severely damaged the surface waters and aquatic life. Such an alarming pollution calls for an urgent action and seeks a sound effluent management option in order to ensure sustainability of coffee production and to avoid irreversible environmental damage (Dejen Yemane, *etal.* 2015). Not only coffee industries but also bad odor from leather factor around moja town; poor urban wastes management in different towns are some of few examples of environmental problems in the country.

UNEP and WHO stated that contamination of water resources can exacerbate diarrhoeal diseases by lack of access to safe drinking-water. Global environmental changes can impact on agricultural production, exacerbating malnutrition, and spur more extreme weather conditions, causing injuries and deaths also (WHO and UNEP, 2008).

Palmer, 2003 has pointed out the importance of fresh water and the consequence of water pollution has been serious health problem of the world as:

- Fresh water is essential for the maintenance of life on Earth. It is vital for drinking, sanitation, industry, food production, urban developments, power generation, transportation, inland fisheries and recreation. However, in many parts of the world there are widespread shortages of water, coupled with gradual destruction and increased pollution of supplies.
- The main causes of current and projected lack of availability of adequate amounts of fresh water include poor management, linked to lack of adequate conservation, inadequately treated sewage and industrial waste, loss of natural water catchment areas, deforestation, dams, river diversions and irrigation schemes; pollution, linked to poor agricultural practices which release pesticides and other harmful chemicals into groundwater; and rapid local increases in demand in some areas.
- Over 10 million deaths occur each year in the world as a result of water-borne intestinal diseases. It is estimated that 80 per cent of all diseases and one-third of deaths in the developing world are caused by drinking contaminated water.
- In industrial nations, surface and underground water supplies are being polluted by industrial and municipal wastes as well as by surface run-off of toxins from agricultural and urban activities.
- Many of the problems are the result of a development model that is environmentally destructive, and a lack

of public awareness and education about the need and the ways to protect water resources.

- To do this, human activities must be adapted to fit within the limits of nature, so that the healthy functioning of ecosystems can be preserved.
- Better water management will require innovative technologies, including the improvement of indigenous technologies, to make full use of limited water resources and to safeguard the water from pollution.
- It is suggested that various approaches are needed to provide adequate water supplies and sanitation, for example:
 - There should be mandatory assessment of the environmental impact of all major water-resource development projects that have the potential to impair water quality and aquatic ecosystems.
 - Alternative sources of fresh water must be developed. These include de-salting sea water, catching rain water—particularly on small islands—reusing waste water and recycling water (Joy A. Palmer, 2003).

6.1.2 Climate change and environment

Climate change has been threatening biodiversity and agricultural sector; and resulted in increased frequency of drought and floods as well as desertification. Climatic pollution also caused health problems.

Climate models predict negative impacts of climate change on agricultural production and food security in large parts of sub-Saharan Africa. Higher temperatures, the drying up of soils, increased pest and disease pressure, shifts in suitable areas for growing crops and livestock, increased desertification in the Sahara region, floods, deforestation, and erosion are all signs that climate change is already happening and represents one of the greatest environmental, social and economic threats facing Africa: ‘The impact of climate change will fall disproportionate on the world’s poorest countries, many of them here in Africa. Poor people already live on the front lines of pollution, disaster, and degradation of resources and land (DebayTadesse, 2010). Climate change is having widespread impacts across multiple scales of biodiversity including genes, species, communities, and ecosystems (Parmesan, 2006; Bellard, 2012, in Michelle, *etal* 2012). The influence of climate change that synergized with destruction of habitats (forests) lead to extinction of large number of species in the world.

Change in climate variables like mean rainfall and temperate as well as the increase in extreme events will affect agriculture, livestock and forestry. Many

impacts of climate change such as increased land degradation and soil erosion, changes in water availability, biodiversity loss, more frequent and more intense pest and disease outbreaks as well as disasters need to be addressed across sectors (FAO, 2008).

Climate changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment (Thomas R, 2009). In similar, Climate change and shifts in ecological conditions could support the spread of pathogens, parasites, and diseases, with potentially serious effects on human health, agriculture, and fisheries (Shah, 2014).

Climate change almost always exacerbates the problems caused by other environmental stressors including: land use change and the consequent habitat fragmentation and degradation; extraction of timber, fish, water, and other resources; biological disturbance such as the introduction of non-native invasive species, disease, and pests; and chemical, heavy metal, and nutrient pollution (Michelle, *etal* 2012).

Climate change also resulted in shortage of wood products, changes in local and regional climates, depletion of biological resources, further degradation of remaining vegetation and widespread land degradation (UNDP, 2010). One of the major goals of environmental education is to identify and solve environmental problems of the physical and human environment. Today, climate change, pollution, land degradation and loss of biodiversity are very challenging problems of the world. These problems mainly can be minimized through sustainable use of natural resources; planting trees/restoring forests and conserving biodiversity, protecting soil erosion and enhancing its fertility, reducing pollutants, managing wastes properly and so on.

6.2 Pressure on Biological diversity

Information is emerging constantly about not only the mounting risks to health from pollution and ecosystem degradation but also the positive contributions to health from ecosystem services. Looking at health and environment linkages through an ecosystem framework captures a much broader web of interactions which is vital for good development decisions. Ecosystem services provide the essential plant and animal products for food, shelter, clothing and medicines. They purify and replenish air and water resources, ensure soil fertility, and provide leisure and cultural outlets. Other vital ecosystem services include biological systems of checks and balances that

control many dangerous pathogens and disease vectors (e.g. mosquito vectors of malaria) and thus disease transmission, as well as regulating local and global climatic conditions (WHO and UNEP, 2008).

According to Global Ecosystem Assessment 2005, today's ongoing global warming is one of the major threats to biodiversity that it could negatively affect all living organism of the world. It is projected that end of 21st century global atmospheric temperature will rise from 1 to 3 °C which associated with rise of sea level of 1 to 2 meters. Each 1°C rise in temperature will displace the limits of tolerance of land species some 125km towards poles or 150m vertically on mountains. Furthermore, each species has its own limit of body temperature above that its health may be disrupted and this make species vulnerable to variety of diseases and subsequent death. Therefore, current global warming influences species in many ways and consequently leads to extinction of biological resources such as genes, species, populations and ecosystems.

Keating, 1993, indicated that the normal rates of extinction of many of the world's biological resources have accelerated, and still are rapidly accelerating—as a result of the ongoing destruction of tropical forests and other biologically rich habitats; plus over-harvesting, pollution, and inappropriate introduction of foreign plants and animals.

6.3 Desertification and drought

According to Keating, 1993, human impact on the land is causing serious degradation, and increasing poverty and starvation:

- Land degradation in the forms of soil erosion, desertification, and loss of soil fertility is having a most serious impact on food production, and on world levels of poverty and starvation.
- Desertification is the process of land degradation caused by human impacts, notably the use of unsustainable agricultural methods, and variations in climate. Dry lands of the world that are already ecologically fragile are particularly vulnerable.
- The key short-term impacts of desertification and drought are degradation of grazing lands and decline in food production.
- Seventy percent of the entire world's drylands, which amount to some 3.6 billion hectares or a quarter of the world's land, are already affected by degradation.
- From time to time, notably when rains fail for several consecutive years, the problem becomes extremely serious. Drought conditions along with land

degradation contributed to severe famine in sub-Saharan Africa in 1975.

- An estimated 3 million people died in the same region in the 1980s because of drought.
- Much of the land at high risk of desertification is in Africa and Asia, but substantial at-risk areas are in the south-west of the USA, northern Mexico, Australia and South America.
- Desertification is caused almost entirely by human misuse and overuse of land. Major causes are overgrazing by livestock and deforestation for fuel wood. Other important factors include over cultivation of marginal lands and salinisation from poorly managed irrigation. Even in areas of moderate rainfall, overgrazing and the production of livestock feed can lead to serious losses of topsoil from water erosion.
- To stop desertification from spreading, land use, including farming and grazing, must be made environmentally sound, socially acceptable, fair and economically feasible.
- In areas prone to desertification and drought, traditional farmland and grazing styles are often inadequate and unsustainable, particularly in the face of increasing populations. Rural dwellers should be trained in soil and water conservation, water harvesting, agroforestry and small scale irrigation.
- Poverty is a major factor in accelerating the rate of degradation and desertification. To reduce pressure on the fragile lands, it is necessary to rehabilitate degraded lands, and provide alternative livelihoods for people.
- It is necessary to establish an international drought emergency response system equipped with food, healthcare, shelter, transport and finances.

In this line, being part of sub Saharan Africa, the fate of Ethiopia's drylands or range lands particularly in pastoral areas facing serious challenges because of frequent droughts.

The strategy of Ethiopia regarding sustainability of agriculture and natural resources designed well, except ineffective implementation of these strategies.

To ensure sustainable agriculture growth, appropriate natural resources conservation practices that require soil and water conservation works with fully implementation through proactive and organized community participation. Forestry development, protection and utilization will be done with increased effectiveness by the participation of communities (MoFED, 2010).

Ethiopia's Climate-Resilient Green Economy (CRGE) strategy identified priority areas in its green economy plan based on four pillars, among these, the two of them are:

- Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;
- Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks.

With respect to this, the strategy focus on the sustainable management of natural resources by developing activities to protect and restore the potential of production of ecologically fragile areas through ecosystem management. This will encompass using reforestation and agro forestry technologies, activities to improve rangeland, implementation of soil and water conservation techniques, strategies for biodiversity conservation (FDRE, 2012).

Ethiopia is one of the sub-Sahara African countries facing climate change calamities; for instance the recent years (2015-17) El Nino effects-drought and the later opposite flooding in the country affected agriculture, resulted in food shortage, death of domestic and wild animals, destruction of properties with flood hazard and landslides with heavy rainfall. Pastoralists in semiarid and arid lands have been suffered from drought effects though government has trying its best in supply of forage and other needs.

VII. POPULATION GROWTH AND RESOURCE USE

7.1 Two contrasting views on Population growth: Malthus Vs Boserup:

Thomas Robert Malthus (1766-1834), an English economist, who wrote 'An essay in the First Principle of population' first published in 1798, that Human population tends to grow faster than the power in the earth to produce subsistence. Basically he suggested that food production was likely at best to increase at an arithmetic rate whereas population tended to increase at a geometric rate and likely to double every 25 years unless certain checks were imposed on it. Basing this he also suggested positive and Negative checks so as to decrease population growth. The Negative checks (decreased birth rate) are the postponement of marriage and abstinent while Positive checks (increased death rate) were ways to reduce population size by events such as famine, disease, war - increasing the mortality rate and reducing life expectancy (Hornby and Jones, 1993).

Another view was proposed by Esther Boserup 1965, a Danish economist, who offered an alternative theory

regarding relationship between population pressure and agricultural development. Boserup believed that people have the resources of knowledge and technology to increase food supplies for ever growing population. Basic Boserup's suggestion was demographic pressure (population density) promotes innovation and higher productivity in use of land (irrigation, weeding, crop intensification, better seeds) and labor (tools, better techniques). Therefore, population growth will spark innovators who will solve the problems the increasing population has caused, making it sustainable for a growing population. Concern about the consequences of population growth on economic development has generated a debate for decades, starting with Malthus's "Essay on the Principle of Population" in 1798. Two main contrasting views have emerged and remain in recent debate among different scholars; either rapid population growth is a burden for development, or development is primary means to bring about lower fertility. The debate over the relationship between population growth and development continued to encompass concerns about degradation of the environment and natural resources. For Example, in 1987, the World Commission on Environment and Development indicated that the critical issue in achieving sustainable development is the balance between population sizes, the rate of population growth and available resources (WCED, 1987). It is evident that rapid population growth interacts with public education, health, welfare, employment, total food supply, resource and the quality of the environment. Generally, those who view positively population growth argue that a big population would provide a good market for products; a growing population would enable mass production techniques to be used and thus lower price, with a growing population demand would rise and would be strong and finally the burden of social cost would be spread widely. It is further held that a declining or stationary population would bring about economic stagnation. These assumption may conceivably be true if sufficient capital were available and the technological skills, and health to make it. However, the current available evidences strongly suggests that rapid population growth in developing countries has been a decided obstacle rather than an aid to economic growth, and that the more rapid the rise in numbers, the greater the deterrent effects (FGAE, 1991).

7.2 Trends of population growth in Ethiopia

For the first time Ethiopia has conducted its population and housing census in 1984. Based on this data CSA has reconstructed population growth rate. The growth rate in

Ethiopian population increased from less than 0.5% at the turn of the century to about 1.5% in the 1950s, and to 3% in the late of 1980s. At the present [1994], it is estimated at about 3.2%. The doubling time of the population which was 60 years between 1900 and 1960 decreased to 27 years between 1960 and 1987. At the current pace of rate of growth doubling time may less than 23 years. Based on this reconstruction, population of the country was estimated to be 11.8 million at the beginning of the 20th century and it has increased to 19 million in 1950 (Assefa, 1994 p.19; Biellel, 2001). Thereafter, the second census was conducted in 1994. From these two basic data indicators censuses, the population of the country increased over the decade from 42.6 million in 1984 to 53.5 million in 1994. There was a slight decline in the population growth rate over the decade from 3.1% in 1984 to 2.9% in 1994 (CSA, 2001, p.1). Based on 2007 census, the population of Ethiopia reached 73.9 million, with its growth rate about 2.6. Data from the 3 consecutive censuses, each successive Population and Housing Census demonstrates that national population size increased in steady increments of significant proportions. For instance, a comparison of the 2007 census results with those from 1994 shows that the population of the country increased by more than 20 million persons over the last 12 years. Similarly, in the previous decade (1984 to 1994), the population of the country increased by 13.2 million people (CSA, 2008). Fertility rate is also high but declining slowly. According to the 2005 Ethiopia Demographic and Health Survey (DHS), the total fertility rate (TFR) was 6.4 in 1990, 5.5 in 2000 and in 2005 it declined to 5.4 children per woman.

7.3 Population Growth and Associated Problems

According to Keating, 1993 the population increase together with the world's unsustainable consumption pattern is putting ever-increasing stress on the land, water, air, energy and other essential resources of the planet. Rapid population growth is usually accompanied by serious environmental degradation, including soil erosion, desertification and deforestation. It can put a region well beyond its economic and natural resource limits or 'carrying capacity'—threatening its long-term ability to support life. Therefore, countries need to know their national population-carrying capacity. These situations, as developing country, are also happening in Ethiopia.

Special attention should be given to critical resources, such as water and land, and environmental factors, such as ecosystem health and bio-diversity management. These

resources utilizations are associated with human population in developing countries. Thus,

- The world needs to do a better job of forecasting the possible outcomes of current human activities, including population trends, per capita resource use and wealth distribution.
- Sustainable development will require reproductive health programmes to reduce maternal and infant mortality, and provide men and women with the information and means to plan family size.
- Population programmes need to be part of broader policies that also deal with such factors as ecosystem health, technology and human settlements, and with socio-economic structures and access to resources.
- Population programmes will require the support of political, indigenous, religious and traditional authorities, the private sector and the scientific community. The programmes will also need adequate funding, including support to developing countries.
- Every country needs a health action plan that includes a national public health system. All countries should have programmes to identify environmental health hazards and reduce the risks. They need to make environment and health safeguards part of national development programmes, and train people to deal with environmental health hazards.
- Every nation needs its own programme to eradicate such root causes of poverty as hunger, illiteracy, inadequate medical and childcare, lack of employment and population pressures. The actions of individual governments must receive support, including financial assistance, because the struggle against poverty is the shared responsibility of all countries.

7.3.1 Population growth and environment

There has been a growing awareness in the later part of the 20th century of the potential damage to the environment of further increase in population and of various economic activities that have resulted in the rapid consumption of certain world's resources (Hornby and Johens, 1993). In Ethiopia massive environmental degradation has occurred during the last few decades due to population pressure, unwise use of its natural resources, unsound ecological practices and natural factors. The population which is growing at a very rapid rate of about 3% annually has been clearing forests and vegetation at an alarming rate in order to meet its increasing requirements of food, fiber, and energy (Biellel, 2001). For instance, a study in a Dale and Shashemeneworedas, revealed that as a result of population

increase, the demand for agricultural land increased. And therefore, forests were cleared to provide more agricultural land, grazing grounds, steep slopes and marginal lands were brought under cultivation which out not be cultivated (Yebetal, 1994).

According to website of National Population Policy of Ethiopia, Experience over the last couple of decades in Ethiopia has shown that as human numbers increased, the population carrying capacity of the environment decreased. A high population growth rate induces increased demand for resources and the rate at which these resources are exploited. In Ethiopia, where technology has not kept pace with the demands for greater productivity, environmentally harmful and economically counterproductive methods of exploiting land and associated resources (forests, animal resources, etc.) are resorted to in order to meet immediate needs. Because of this, climatic conditions are becoming erratic and soil quality is declining at an alarming rate. <http://cyber.law.harvard.edu/population/policies/ETHIOPIA.htm>

Ever increasing environmental degradation and resourceconsumption have led to state of ecological overshoot, meaningthat humanity is consuming resources faster than they can replace.Human population is placing unprecedented pressure on the planet's lands, water, fisheries, and other natural resources (Alberta, 2002-2009 quoted in Baleynesh, 2010). Daniel (1990) also wrote how population growth induces pressure on the environment: As a result of rural population growth, farm holdings get progressively smaller and production even at subsistence level becomes unsustainable. Intensification of land use and shortening of fallow periods leads to further deterioration in soil fertility. Ecologically marginal and fragile environments are occupied and farmed. Biomass is removed through land clearing for cultivation, overgrazing, and gathering of woods and shrubs of fuel. Shortage of wood fuel supply leads to the substitution of natural fertilizers, such as crop residues and animal waste, for wood fuel; which in turn leads to further deterioration in soil fertility.

The connections between population growth, resource use and environmental quality are too complex to permit strait forward generalizations about direct causal relationships. Further, many of these connections are manifested only at the local level and may be missed when the perspective is regional or global, where much of debate has focused. On the other hand there are those who feel the root cause of most of our ecological problems is population growth, they argue that population growth is indeed is a major detriment to the environment. Another view is that many variables

other than population are critical elements in environmental deterioration, and the use or abuse of technology play significant role in environmental degradation. So that people's impact on the environment can be traced far back into history and their attitudes towards the natural environment have varied considerably, both from time to time and place to place (Peters and Larkinn, 1989).

Hence, always population increase can not be mere causes of environmental degradation. In some southern parts of Ethiopia (for example subtropical climate areas of Sidama zone) despite of dense population the area looks remain intact environmentally, this may depends on several factors like history of settlement, nature of the soil, type of climate, type of land use and so on. In such areas holding 'wonadega' or subtropical climate though populated densely it seems green. Most of those areas farmers practicing of plantation agriculture like coffee and 'enset' which help to resist soil erosion anchoring soil by their roots. Moreover, this does not mean that through long history of land use, lands remain so in its productive capacity and general environmental conditions remain as they are. As population increase, even from those overcrowded areas because of land subdivided into small plots for family members and some individuals from family forced to migrate to urban areas in search of work.

7.3.2 Rural Land holding Reduction

So long as population continues growing faster, per capital land holdings and food production will go on decreasing or in short if rural poverty continues prevailing, seasonal rural out migration world continue as a " safety value" in relieving population pressure (Mulunh W/Tsadiq, 1994). As population growth is rapid arable land per capita declines and the fragmentation and degradation of land through over use increases. To accommodate the landless young generation, frequent redistribution of land occurs resulting in the possession and has an impact on food shortages and family income (Bielletal, 2001). According to the 1999/2000 agricultural sample survey by CSA, the average farm size for the total country is 0.97 hectare. Whereas 29% of the total farming households have half or less hectare of land (CSA, 2000 quoted in Bielletal, 2001,p.1). Whether or not this size is adequate not known in exact terms, because it requires knowledge of productivity of the land, and the availability of agricultural inputs to determine the level of production (Marlkos and Seyoum, 1998). To this effect, studies in some particular areas of the country showed that the increasing population pressure created scarcity of agricultural land, unemployment, and landlessness. For

instance, a study by Yebeltal 1994, p.15, in Dale and Shashemeneworedas, showed that the average farm size were 0.41 and 0.23 hectares respectively. And the smallness of farms and plots has an adverse effect on a adoption of soil conservation structures. Another study in Adaba areas ,Bale zone, revealed that because of population pressure, the existing farm land is not adequate and as a result farmers are looking for farm land from where the land is available either the remaining few hectares of grazing land (Hassen, 2006). The increasing population pressure on agricultural land and the resulting small size holding has created a society of under employed peasants. Plots in these areas have already undergone excessive subdivision and most of the peasants are now left with mini plots which reduced proper utilization of peasant labour (Yebeltal, 1994). Beside, the increasing decline of farm size hinder the application and effectively of the land management practices. According to Dessalegn and Taye, 2006, the increasing decline of farm size leads to reduction of fallowing practices, or shortening of fallow cycle, and rotation, with consequence of decline soil quality and fertility. The application of sustainable land management practices such as rotation, agro-forestry, inter-cropping and soil erosion control are generally influenced negatively by the fragmentations and diminution of farm land. Since such sustainable land management practices need a consolidated and considerably larger farm size. Small farm households face higher overhead cost of application of technology per unit of land area (Dessalegn and Taye, 2006).

7.3.3 Food insecurity

Over the last two decades, Ethiopian agriculture has been unable to produce sufficient quantities to feed the country's rapidly growing population. As a result, the country has been an important recipient of food aid and importer of commercial food grain. In recent years food aid has been accounting for a significant proportion of the total food supply in the country (Belay and Manig, 2004). In Ethiopia high rate of population growth is inversely related with the pattern of agricultural production, which is still essentially small holder relying on expanding the farmland, often into marginal land, rather than adopting intensification techniques (Baleynesh, 2010). Apart from the chronically food insecurity population, an additional population of about three million also faces seasonal hunger almost every year. In 2003, about 14.3 million of people (22%), mainly in rural areas, were in critical food crisis (DPPC, 2003 cited in Dessalegn and Taye, 2006, p.147). Farmers with relatively small farm holding are one who are highly

vulnerable to food and income insecurity, and as a result who turn frequently to trading crop residues and animal manure as fuel sources rather than using them for soil fertility improvement (Dessalegn and Taye, 2006).

7.4 Family Planning to optimize population

Family planning is a voluntary planning technique to use contraception to determine, regulate or control the number of children to have and when to have them. It encompasses both modern family planning methods such as pills, IUD, injectables, foaming, condom and sterilization. And traditional family planning includes methods such as withdrawal, rhythm, periodic abstinence and herbs (Groanwold, etal 1989 cited in Senait, 2008). Family planning is also recognized not only as a key intervention for improving the health of women and children but also as a human right. The basis for action in family planning must be to enable couples and individuals to decide freely and responsibly the number and spacing of their children, to have the information and means to do so, to ensure informed choices and to make available a full range of safe and effective methods (WHO, 1996). To this effect, information about family planning should by made available and should actively promote access to family planning services for all individuals desiring them (Markos and Seyom, 1998). In fact, family planning improves family well being. Family having limited number of children can be able to provide better food, cloth, health care and education to family members. It is an important means for the reduction of fertility, lower maternal death by spacing or preventing pregnancy (Makhos and Seyoum, 1998; Senait, 2009). Family planning services- (dissemination of information and provision of moderncontraceptives) are recent introduction, and therefore new to the majority of thepopulation in the developing countries (Bandarage, 1997, quoted in Simeon,2002). Family planning activities slow population growth by reducing the unwanted fertility caused by women's lack of access to contraceptives. Limiting fertility through family planning is seen as the best way to slow down population growth in any population. Generally, Family planning through reduction high birth rate stabilizes rapid population growth, thereby creating conditions of sustainable use of available natural resources of the country. Hence, the problems that associated with rapid population growth such as reduction in land holdings, deforestations, depletion of soil quality by over use, and so on may be averted, since rapid population growth is one of the key components of escalating those problems.

7.5 Factors affecting family planning

There are several Socio- cultural, socioeconomic and demographic factors that adversely affect the practices of family planning. For instance, African couples are proud of the number of children they have, particularly Sons, because they think they gain social and economic benefit out of it. Children are considered as important sources of old age support for their parents, especially in a society where there are no social welfare and security programs (Bertrand, 1996 quoted in Binyam, 2007). Similarly, in predominantly agrarian societies where the degree of the structural different tradition of the economy is very low children are viewed as economic and social assets. Since, in economically and socially undifferentiated societies, the house hold has to provide its own work force. In such society children are the only sources of labour supply (Seyoum,1990). In some sub- Saharan African countries, there is a tendency for some women to attribute to God the number of children that want to have. For example, the Yoruba's of Nigeria regards children as God's gift or blessings that cannot be refused (Olarye, 1993, Cited in Sewnet, 2008). Traditional values and attitudes resist change. In many developing countries, the belief persists that every new child is not only an extra mouth to feed, but also extra pair of hands to help increase the families resources and to provide for parents in their old age (Salas, 1979). Besides, age at marriage, sex preference, education level, lack of exposure to family planning information and so forth, are factors affecting family planning. Further, in addressing issues of optimum population those factors should be taken in to considerations.

7.6 Family planning services in Ethiopia

A high degree of awareness about the harmful consequences of continuing high fertility for both the individual and the society has existed for quite a while insignificant segments of the Ethiopian population as the result of the weak but sustainable effort that started in 1966, when the family Guidance of Ethiopia was first created as a voluntary organization. But knowledge and awareness of the problem could not be translated in to action due to lack adequate and efficient institutional capacity in the population sector to meet the increasing demands for modern contraceptives generated by the increasing popular knowledge and awareness about the relationship between population dynamics and individuals, family, and the collective welfare of the Ethiopian population (Markos and Seyoum, 1998). According to Ethiopia Health Extension Program (EHEP) document, until 2003, Ethiopia was no

exception to the expansion of higher-level health care services such as hospitals at the expense of primary health care to serve the rural population of the country (more than 84 percent of Ethiopians live in rural areas). But in 2003, the Ethiopian Federal Ministry of Health launched a new health care plan, the "Accelerated Expansion of Primary Health Care Coverage," through a comprehensive Health Extension Program. Recognizing the huge gap between need and health care services available, the Ministry of Health has focused on "providing quality promotive, preventive, and selected curative health care services in an accessible and equitable manner to reach all segments of the population, with special attention to mothers and children. The policy places particular emphasis on establishing an effective and responsive health delivery system for those who live in rural areas. The Health Extension Program (HEP) is an innovative community based introduced programmes. The health extension program aims at creating healthy environment and healthful living by making available essential health services at the grass roots level. The objective of HEP is to improve equitable access to preventive essential health services through community (*Kebele, smallest administrative unit in Ethiopia*) based health services with strong focus on sustained preventive health actions and increased health awareness (Argawu, 2007).

As explained above before 2003, no grass root level health care and at the same time no grass root Family planning services except high light service by Guidance Association of *Ethiopia, and most services are given through existing health institutions such as hospitals, health centers, health stations and clinics*. But thereafter, family planning service is widely offered for rural people through health extension program (HEP) by health extension workers who serve households in grass root level (kebele level), therefore, this program is founded as very essential and problems solving in terms of shortage of facilities and information about family planning and/or modern contraceptives in rural as well as recently in urban areas of Ethiopia.

7.7 Environmental Education and Family planning

The relationships among population, resource and the environment have always been controversial and still remain so. The main concern over environmental issues stem from the perception that we may reach a limit to the number of people whose needs can be met by the earth's finite resources. ...Throughout 20th century, the increasing population density has contributed to sever and accelerating of the very resources that this growing population depended

on for survival (Aklilu, 2010). The scale and complexity of today's social, economic, and environmental challenges demand another look at population, health, and environment relationships and a better understanding of these cross-cutting issues. The relationships between population, environment and health is the diverse that changes in population and health, including population growth, migration, demographic composition, births, deaths, and disease, influence environmental change and how environmental change affects population and health. However, population growth is a product of millions of individual reproductive choices and, fortunately, today's efforts in population and reproductive health focus first on couples' childbearing desires and women's family planning needs (USAID, 2010). Many studies claim that population growth is a significant cause of environmental degradation. But people's perception to environmental degradation and choice of family size is simultaneously important to analyze in considering the concepts as interrelated since people perception to environmental degradation may influence to use contraception and family size (Haqetal, 2010).

Slowing the rate of population growth may give countries time to take measuresto meet people's needs, while protecting the environment through various means. Preventing unplanned births through family planning, and guaranteeing individuals and couples the right to reproductive health, can help slow population growth rates and moderate environmental impact – and it might be one of the most cost-effective ways of doing so. In addition, stabilizing the planet's population is a critical factor in creating a sustainable environment – free individual choice on the size of one's family is the most practicable option for slowing population growth (UNFPA, 2008).

When environmental, agricultural, and rural development organizations understand how population and health factors relate to their sector goals, they can effectively advocate for and integrate the delivery of family planning services into their activities. These organizations can deliver desired services to populations who are beyond the current reach of the health sector and can help advance family planning as a health, development, and environmental priority (USAID, 2010). Many studies explain people perception to family size or environmental degradation independently. Considering both of the concepts as interrelated, how people consider the relation between family size and environmental degradation, and how their perception subsequently influence on contraceptive use in developing countries. People who think their immediate environment such as land productivity, soil fertility, water level and

biodiversity is declining are more concerned about their family size and contraceptive use than who do not think that their environment is declining (Haqetal, 2010).

As the number of family members increases, consumption of the resources such as water supply, biomass based energy supply, use of out of living resources like plants and animals in rural, will increase. This links between a high fertility, degradation of environmental resource base of a rural community and an accentuation of hardship among its members (Munasinghe, 1993). In addition to this, concerning large family size, it has been stated that family size has had certain consequences for children, family unit, and spouses themselves. There are a variety of infant and child physical and mental health and developmental problems that appear to occur more frequently in larger families than small ones more to children of higher birth order than lower order. The effects associated with family size on the well being of individuals in a family are varied, but serious: increased illness, including malnutrition, serious enough in younger to increase mortality rate; less satisfactory growth and intellectual development; increased illness in the parents as well as clear-cut economic and emotional stress (Anvar, 1995). Large family size will consequently result in families' inability to function well in terms of childcare and ability to adequately educate children in the family. Large family size is also noted for its influence on variables such as poverty, literacy, health, education including others. These results are also influenced by environmental, economic, cultural, and social factors within which such a family thrives (Arthur, 2009). Households with smaller family sizes enjoy better social and economic life compared to those with relatively large family sizes (ibid). Here it is necessary to say some thing concerning size of family. According to Anvar 1995, the number of births per couple by the end of their productive life is called the complete family size. Willy, 2006, stated that people also frequently qualified desired family sizes by referring to uncertain future economic and living situations, the mother's health, and other circumstances over which they have little control. Even if it is difficult to put precise number because of it differ from place to place and country to country depending on economic development, educational level and varieties of social factors, in the 21th century when the number of children is more than four, it may be said large family. In addition, one of the our country's stated objectives, in its population policy, is also reducing the current [1980s] total fertility rate of 7.7 children per woman to approximately 4.0 by the year 2015.

Being smallest unit of population, every larger family size also contributes to rapid population growth of the country. Because of problem of rapid population increase exerts pressure over natural resources; and then the quality and quantity of these environmental resources are declining through time, thus, currently escalating problems of the degradation of environmental resources and pollution by human action will back fire man himself.

In this line, as explained above, EE strives to increase peoples knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and foster attitudes, motivations, and commitments to make informed decisions and take responsible action whether the environmental problem is arise from any angle that caused by human activities. At this juncture it is important to note that environmental well-being itself is human well-being as the natural environment is the source of all recourses for the survival of human being. In this perspective, taking care for the environment is taking care for human being.

Here the link between EE and family planning come into being since family planning accompanying with its compatible population policy is taken as essential means in regulating undesirable rapid population growth. Besides, since family planning is sub component of the population policy and issues, as mentioned above, EE itself in its programs encompasses population policy and other population dynamics. EE is also multi-disciplinary and multi-sectoral to include family planning under population issues. In addition, Haqetal, 2010, wrote that the reasons behind the relation between family size and environmental degradation might not be understood simply through the study of particular disciplinary approaches such as sociological or demographic or environmental. So there is needed to incorporate and integrate knowledge based on the multidisciplinary or interdisciplinary approaches.

7.9 Role of education for family planning

Education is a process by which man transmits his experiences, new findings, and values accumulated over the years, in his struggle for survival and development, through generations. Education enables individuals and society to make all- rounded participation in the development process by acquiring knowledge, ability, skills and attitudes (Tekeste, 1996). Education is seen not only as an end in itself but also hoped to serve as one of the most powerful instruments bringing about the changes required to achieve sustainable development (Aklilu, 2010). Raj (2010) also expressed the importance of education as it increases the

awareness about health, hygiene, clinic amenities, and knowledge about development process. Furthermore, Shukla (2006) quoted in Raj (2010) wrote that education is the most dynamic and influential tool for inducing positive attitude among couples towards the methods and measures of family planning. Education also has a great influence on the family size preference and understanding of environmental conditions. On the other hand, lower level of educational attainment negatively affects family planning. Besides, Willy, 2006, wrote that the gender gap in education causes a large number of illiterate females in rural areas, women with no or little understanding of children bearing risks, and other health matters, including how to negotiate timely issues related to reproductive health, in their households. Furthermore, the importance of education, especially the education of women, for falling fertility rate has been widely confirmed by many studies as women aware of childbearing risks.

VIII. DIMENSIONS AND APPROACHES OF ENVIRONMENTAL EDUCATION

8.1 Dimensions of Learning

Dimensions of environmental education are competencies and behavior expected from environmentally literate citizens.

According to Palmer and Neal 1994, environmental dimension can be found in most aspects of education—thus environmental education may be considered to be an approach to education which incorporates considerations of the environment, rather than being a separate part of education. It does, however, have a discrete ‘content’ which must be incorporated into teaching and learning situations. Dimension of environmental learning inextricably interlinked with various threads and elements are the three dimensions of the learning process: *knowledge and understanding, skills, attitudes and action.*

Knowledge and skills

- i) To develop a coherent body of knowledge about the environment, both built and rural, sufficient to recognise actual and potential problems,
- ii) To be able to gather information from or about the environment independently or as part of co-operative activity,
- iii) To be able to consider different opinions related to environmental issues and to arrive at a balanced judgement,
- iv) To appreciate the ways in which environmental issues are interrelated so that one factor affects others,

- v) To be able to evaluate information about the environment from different sources and to try to resolve environmental problems,
- vi) To understand and to know how to use the mechanisms available in society for bringing about environmental change.

Attitudes and behaviour

- i) To develop an appreciation of the environment and critical awareness of the natural and built environment,
- ii) To develop an attitude of concern for environmental matters and a wish to improve environmental understanding,
- iii) To be critical of one's own environmental attitudes and to take steps to change one's own behaviour and actions,
- iv) To have a desire to participate in initiatives to care for or improve the environment,
- v) To participate in environmental decision making and to make opinions known publicly.

8.2 Principles of Environmental Education

Environmental education is the education process dealing with man's relationship with his natural and manmade surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment (Rao and Reddy, 2005). So addressing such variety of issues incorporated in education system several dimensions.

According to Palmer and Neal, (1994), planning for the inclusion of environmental education in the curriculum needs to take account of the three interlinked components which comprise the theme:

- education about the environment
- education for the environment
- education in or through the environment.

These elements are interrelated and are essential components of planning at every level, ranging from whole-school and year-group curriculum planning to the more specific plans for topics, programmes of study and tasks applicable to a class, group of learners or an individual. An integral part of the planning process must take account of the need to develop an understanding of the interrelationship between the three components.

This is likely to be achieved through elaboration of content of the seven areas of knowledge and understanding, and the development of related skills, concepts and attitudes. The dimensions of skills, concepts and attitudes are inextricably bound into the core content of the three structural elements:

- Education *about* the environment has the purpose of developing knowledge and understanding about *values* and *attitudes*.
- Education *for* the environment encourages pupils to explore their personal response to and relationship with the environment and environmental *issues*. This is linked to the development of *attitudes* and *values*, including elements of human understanding and behaviour necessary for the development of sustainable and caring use of the environment.
- Education *in* or *through* the environment uses the environment as a resource for learning. It is a resource which enables the development of a great deal of knowledge and understanding as well as *skills* of investigation and communication.

Anyone and country responsible for planning the curriculum and learning tasks concerned with environmental education needs to take account of all of these interrelated elements.

The inclusion of the development of skills is, of course, vital, not only to planning for progressive schemes of work in environmental education, but also to planning for incorporating skills of a cross-curricular nature into the curriculum as a whole. Environmental education has a critical role to play in skill development.

As a cross-curricular theme, environmental education allows children the opportunity to understand the many and varied environmental issues that surround them, how decisions are made about the environment and how people can have the opportunity of participating in the decision making process. Work in environmental education represents a good opportunity for children to use a whole range of skills in a way which is both relevant to their lives as well as useful to their future as citizens. By stretching children intellectually and creatively, by asking them to communicate ideas and work in a cooperative manner on environmental issues that face them, it is hoped to produce adults provoked and challenged into making a positive and constructive contribution to the future and well-being of the world.

Any sound model for planning the incorporation of environmental education in the school curriculum will clearly need to take account of both content and skills, and also the overall entitlement of pupils, including emphasis on attitudes and value-laden issues (Palmer and Neal, 1994).

8.3 Approaches of Environmental Education

The nature and contents of environmental education entail variety of dimensions; hence, Scott argues that there can be

no single way of learning about sustainability, but that there are persuasive practical and philosophical grounds for supporting learning through subject disciplines where teachers can explore such issues with both subject coherence and professional confidence. There are different cultural and disciplinary traditions, often with no logical link between them (Scott, W., 2002).

This is because diversity of issues that associated with sustainability and variety environmental components. For instance, sustainable development is a distinct component which might contribute three key dimensions to Citizenship:

- ✓ international
- ✓ intergenerational
- ✓ interspecies

Sustainable Development Education

- ✓ interdependence
- ✓ citizenship and stewardship
- ✓ needs and rights of future generations
- ✓ diversity
- ✓ quality of life
- ✓ sustainable change
- ✓ uncertainty and precaution

Philosophy of environmental education (EE), the EE field is quite broad. It includes teaching learners of all ages to appreciate and value nature and to understand natural systems and how they work. EE also helps people develop understandings of how humans interact with their environment, both natural and man-made, and how to take responsible, democratic action to preserve and protect the environment. With such a wide range of goals, it is evident that there is no one "right" pedagogical approach for EE; there are many approaches. The approach that will work best in any given case depends on numerous factors including, but not limited to: student interest, maturity, age, and abilities; the curricular goals being addressed; and the instructional setting including resources and the time available for instruction. It also depends on the knowledge, skills, interests, and educational philosophy of the instructor or instructors involved.

In relation to this, all teacher educators should be equipped with environmental literacy. Educators who work in nature centers, aquaria, and zoos, for example, can provide learners with experiences that classroom teachers cannot provide (Bodzin *et al.* 2010).

Environmental education (EE) is not confined to a single subject matter rather it is interdisciplinary subject and it encompasses social, economic, political and technological aspects in its nature, further it committed to evaluate the

interaction of these elements and to address consequent problems. According to Akilu, 2010, Environmental education is wide in its scope that includes biophysical, socio cultural facets of our environment are inseparable from one another. In this perspective, EE is a broad field that encompasses sciences, humanities, economics, technology, social sciences, and other disciplines. Furthermore, Chowdhury, 2004 wrote that EE should expand into new horizons on the basis that the environment is multi-sectoral, interdisciplinary, and multi- facet. Under this scenario Rao and Reddy explained multidisciplinary nature of the EE as: Its program include various disciplines, some of them are population, economics and technology, environmental decision and environmental ethics. EE program in relation to population includes: causes of population increase, the impact of population on the environment, migration, the use of resources by the increasing population, the life style of the populations, the birth-death rates, and health hygiene. And the other related problems like social, ecological and political implications also included.

Therefore, environmental education on one hand can be addressed through cross-curricular approaches. In this way curriculum of different subjects, primary or higher education, include some components of environmental issues as examples or major topic. But this approach may not cover necessary components to be addressed because one-the objective of these contents are may not in view of aims of environmental education, second- the place given to those issues is very limited.

Another approach of delivering environmental education is providing as separate subject in lower schools of education system or course in higher institutions should be generic or common for all learners both in lower and higher education. In writer point of view, this approach is more acceptable because it overcome the two above mentioned problems. This means when environmental education is given in a full course there would be sufficient time and space to present environmental issues, to impart importance of sustainable development, to create awareness on versatile socio-political and environmental inter linkages and environmental problems suggested solutions as well as learners to participate in efforts for environmental wellbeing, in their own consent since they would have satisfactory knowledge. But mainstreaming environmental components through cross-curricular approaches should support the second approaches, in both cases regarding principles of environmental education. Lastly, one can simply understand that deciding contents of environmental education is

identifying key environmental elements, environmental resources, interaction between man and environment and resultant human impacts, how to minimize negative impacts and bring possible solutions, action of aware and skilled citizens can be involved at local as well as global level.

IX. CONCLUSION

In the 21st century, the world has facing serious environmental problems as climate change-increased temperature, drought and flooding, which impacting agricultural food production capacity and biodiversity. Climatic and other environmental pollutions are also causing human and other species health problems, sometimes lead to the extinction of species. As a result, environmental protection matters becoming mandatory than option.

Therefore, beside of practical actions of environmental protections; in order to achieve target of sustainable development, awareness about the relationships between carrying capacity of environment and increase in size of human population should be addressed through implementation of environmental education and by incorporating those concepts of interactions between man and environment in the environmental education as means of environmental literacy since our knowledge about environment is not adequate.

Every country of the world should create environmentally literate citizens who are equipped with environmental knowledge, skills, attitudes, behavior and ethics; these can be addressed through environmental education. Delivering environmental education is providing as generic subject in lower schools of education system or course in higher institutions is importantly support actions to address objectives of sustainable development.

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