

# Issues in Development



Herath Madana Bandara

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## DEDICATION

To the  
**Smiling People of Sri Lanka and Nigeria**



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## CHAPTER 6

### ENVIRONMENT AND DEVELOPMENT: SUSTAINABLE DEVELOPMENT IN PERSPECTIVE

S.L. Tilakasiri, U.A. Raheem, R. M. Olanrewaju

#### Abstract

*The accelerated pace of development the world over is creating enormous challenges to the environment through eco-system degradation and natural resource depletion. These resources also play crucial roles in ensuring adequate food and water supply as well as other life supporting services to the ever increasing world population. This chapter examines the degenerating relationship between man and nature consequent upon technologies of development in different countries. It reviews the major environmental paradigms related to development with particular references to developing countries. Using the concepts of sustainable development, Global Environmental Change and Global Warming among others, the chapter canvasses for a deliberate effort by national governments in developing countries to redirect development strategies towards a sustainable path by taking appropriate cognizance of the damaging effects of development efforts. Thus, the chapter recommends controlled urbanization, planned industrialization and eco-friendly agriculture as development options towards sustainable development.*

**Key words:** Development, Environment, Climate Change, Sustainable Development



## Introduction

Development has taken place throughout the history of human race which utilized natural resources and modified the environment. In this process, technology was instrumental in changing the face of globe we live. The overall objective of these processes is to effect progressive change to better the life of the people because the purpose of any economic activity is development and it signifies a process targeted to improve the standard of living of people by providing them with sustainable livelihoods. Until the 1950s, the term development was used largely in the context of economic change presupposing an increase in production or consumption of a nation or a region. This leads to increase of such production and consumption by each person on a per capita basis (Morris, 1998). This perspective to development has changed because economic growth often give rise to increase in the status of a nation in the world affairs without making life any easy for the inhabitants of the nation. Thus, since the late 1950s and early 1960s, development has been conceived in the context of the drive for improvement in human conditions, in personal happiness and in social well-being; a paradigm which amplifies other elements that lie within the scope of social action rather than the purely economic sense of growth (*ibid*). Consequently development as a concept became increasingly associated with 'socio-economic development' measurable through a series of complex indicators such as level of education, medical aid, housing and other basic needs. Moreover, the third phase of thinking since the 1980s has expanded the development concept to include aspects of the environment such as freedom from pollution (atmospheric, noise, water and visual landscape), access to country-side and ability to enjoy a healthy lifestyle.

Economic development is desirable for all countries and the world, but it should be carried out in such a way as that it brings benefits to all the inhabitants of the planet earth irrespective of their race, religion, ethnicity, gender, class or origin and not at

the expense of people such that it functions as a process which generates poverty, inequality, unemployment, indebtedness, inflation, ill-health and malnourishment to millions of people. It should also should not cause destruction of the environment for the sake of benefitting a few.

Geography has long recognized that interactions between economic development and environment are reciprocal, each shapes the other by nurturing the history of people, fashioning the evolution of a cultural landscape and in the channeling of patterns of economic activity (Barker and McGregor, 1995). In the contemporary world, as people face up to the enormous challenges of increasing population and improved technology, there is also greater concern for the worsening relationship between environment and man consequent upon economic development.

The effort in this chapter is to synthesize this interrelationship by considering together the twin issue of environment and development as well as examining effects of human activities on the physical environment and how environmental processes modify human activities. This perspective is valid for a variety of scales; either micro scale of the farm, business establishment or the mesoscale of the village, city and the hinterlands; as well as the macro scale of the national level or larger grouping of territories. At every scale, a number of geographical factors are relevant including the nature of human and physical resource base, its location in relation to different environmental variables as well as its location to particular social, economic and cultural circumstances. In this chapter, our interest is on the consequences of the interactions described above. Thus, the chapter presents an overview of environmental problems as the consequences of the interrelationship of the environment and man in the development process. The overview covers the concepts of development and sustainable development, man and environment, population and resources, issues of global warming and climate change in development. These concepts are discussed with a view to

highlighting the impact of human activities on the environment in the process of development.

### **Environment and Development: The changing Paradigms**

The origin of the concept of development dates back to 1665, when some scholars in England made an attempt to estimate the national accounts based on tax information collected. As a further contribution to the discipline of Economics, Adam Smith presented the theory of National Wealth in the 18<sup>th</sup> century and Alfred Marshall introduced the Neo-Classical Economics in the 19<sup>th</sup> century. In the 1930s, writings of Simon Kuznets provided the seeds for the modern thinking. According to him, "Consumption is the driving force behind the economic prosperity of nations." This was also the essence of Keynesian theory (1936). Later Kuznets and Keynes jointly developed the Gross National Product (GNP) as a tool for measuring economic development (Chatterjee, 2008). Thus, it has evolved over decades from growth-based concept to a multidimensional human development concept. It took this journey through parade of themes, formulae and models such as 'population', 'growth', 'basic needs', 'income distribution', 'intermediate and appropriate technology', 'state capitalism', 'state socialism', 'import substitution', 'export promotion', 'structural adjustment', 'Keynesianism' and 'modernism' etc.

Development is therefore a term used with different connotations and different concepts. Development can be defined as an economic component of a wider process of modernization (Mabogunje, 1980). It is a process implemented to promote the welfare and the living conditions of the world population living in a given area or country. Sustainable development in terms of economic, social, political and ecological dimensions plays a crucial role in enhancing the living conditions for the present and future generations. The Brundtland Commission Report (1987) states "the term development characterizes in a broad sense, the desired social and economic progress which is a new era of economic growth, that is forceful and at the same time socially and

environmentally sustainable". Five years later in 1992, the Earth Summit emphasized the conclusion of the Brundtland Commission – the interdependence of environment and development. Agenda 21 called for the "Integration of environment and development concerns and that greater attention to them will lead to the fulfillment of basic needs, improved living standards for all, better protected and managed ecosystem, safer and more prosperous future" (UN, 1992).

A healthy environment is seen as critical to the success of development and to achieving the various goals of the Millennium Development Goals – MDGs (UN, 2005). The livelihoods of more than half of the economically active population in developing countries depend on the environment through agriculture, animal husbandry, fishing, forestry, etc. Environment is therefore a close ally of the human kind. This is because key resources like air, water and minerals are important for man's survival. Man makes use of these resources through different technologies and the result of his activities through these technologies translates to development. According to Chatterjee (2008:348), nature and machine are the two ends of a spectrum with man's position in between. Man-nature relationship is what we understood as 'environment' and man-machine relationship as 'technology'. Development means that man will move further and further away from nature towards machines for production and consumption, and consequently while the technology gets stronger, the environment gets weaker suggesting a deteriorating environment the higher the level of the technology deployed in the process of development. Obviously development will ultimately be self-destructive, because man gradually deprives himself of environmental resources because of his quest for development.

Questions are being raised today about the triumph and benefits of technology and the consequent divorce between man and nature. The increasing negative trend is also undermining everyday life of man due to the conflict arising from man's use

of resources from the environment. Some oblivious symptoms of change in the man and environment interface are the various forms of pollution; poor management of soil, forest and water; uncontrolled urbanization; destruction of existing life support systems and the collapse of the traditional cultures. This is clearer when we consider the opinion of Atapattu (2007), who states that in the process of globalization and economic development factories have been mostly established by multinationals in developing countries. As a result, environmental pollution has increased drastically, fertile lands have become barren and streams, rivers as well as the ocean water are being polluted. Spread of diseases has increased and there are a number of unidentified diseases that cause untold sufferings to millions of poor people who inhabit the developing world. Thus the continuous droughts that affect agricultural areas and flood during rains are examples of the consequences the man – environmental relationship. The expansion of land settlement and continuous deforestation has also affected rainfall pattern and soil structures. The other related issues are soil erosion and landslides which mainly affect the poor (Madduma Bandara, 1989).

As stated by Irungu (2008) major challenges for development in terms of MDGs include the need to reduce poverty, provide energy services without environmental degradation, and provide access to clean water and driving healthy urban environment. Current estimates show that about 800 million of the world population is malnourished with 1.1 billion living on less than US \$1 a day and 2.7 billion on less than US \$ 2 a day. Regardless, the availability of food needs to be doubled in the next 25 years due to population and economic growth. One third of the world population lives in water-stress areas with an estimated 1.3 billion living without clean drinking water. In developing countries, 220 million urban residents lack access to portable drinking water. These numbers are projected to be doubled by 2025. About 2 billion people are without electricity and 2.6 billion of the world population lives without proper sanitation. In developing countries

350 million have no access to sanitation and 1 billion have no solid waste collection services (Irungu, 2008; UNDP, 2010; Todaro et al, 2009). These and several other examples suggest that the way environmental goods and services are used possess practical consequences for sustained development.

The biological diversity of the earth is crucial to the continued vitality of agriculture and medicine and perhaps even to life on earth itself. Many thousands of plant and animal species face the threat of extinction as two out of every three species are estimated to be on the decline (Hinrichsen et al, 2000). Forests provide over US \$400 billion to the world economy annually and are vital to maintaining healthy ecosystem and regular rainfall. The natural forest cover of the world is being devastated rapidly and in this destructive process nearly half of the world forest cover has been lost because each year about 16 million hectares of forest are cut, bulldozed or burned with about 25 billion tones of top soils are eroded annually. The current demand for forests products however exceed the limit of sustainable consumption by 25 per cent as 2/3 of world species are in decline (*ibid*).

The process of development is expected to result in material and cultural wellbeing through progressive structural changes leading to a dynamic equitable and a just social order. In that context, this process cannot be seen in isolation from the environment. The development process unfolds on a people-people-nature continuum (Shanmugaratnam, 1990). People enter into definite relations between each other and with nature under given political, economic and cultural conditions.

Environmental Sustainability Index (ESI) of *The Economist* (2008) grades environmental health of nations based on many indicators from population stress and economic system to social and institutional capacity. It focuses on the link between the state of environmental and human health. Further, it suggests that as poor countries get richer, they make heavy investment in environmental improvements, such as cleaning up water supplies and improving



sanitation, that boost human health. The key to addressing this kind of pollution is good governance as it is indicated by the ESI ranking. Transparent administration, lack of corruption and checks and balances, essential components of good governance, show a clear statistical relationship with environmental performance. Switzerland and Sweden are heading in the rank; while Costa Rica remains far ahead of Nicaragua whose nature and resource are very much similar. As stated in *The Economist* (2008), a mixture of economic growth and transparent governance may offer the only chance of avoiding environmental disasters. Indeed, everyone will gain if poor countries find a way to leap frog over the phases of development, which resulted in terrible harm to the environment in several other places.

There are repeated warnings that environmental problems are reaching alarming proportions and posing serious threats to the survival of the human race. The breakdown of the human and environmental interface has occurred due to natural causes as well as human activities because millions of people are engaged in a struggle to overcome the local environmental problems and improve their immediate environment. Many environmental problems have emerged due to unsound ethics in development and an urgent need exists to promote new development ethics and new approaches to development.

### **Sustainable Development**

As a starting point, the definition of 'Sustainable Development' offered by the Brundtland Report – World Commission on Environment and Development is more encompassing. Accordingly "Sustainable Development is defined as the process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are in harmony and enhance both current and future potential to meet human needs and aspirations" (WCED, 1987:46). The most widely referred definition which was introduced by Brundtland Commission Report; WCED

(1987:43) sees sustainable development as "the development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs".

The concept of sustainable development originated from the older forestry term used in Germany way back in 1713. The concept adopted had been used in similar connotations in relation to household economics by Aristotle in 400 BC. It was used in 1979 by the club of Rome in its report on the 'Limits to Growth' (Sandell, 1988: 55-57; Wikipedia, 2012) and in the context of a growing concern for environmental issues around the world. In 1972, at the UN Stockholm Conference on Human Environment, environmental problems were widely disregarded and environmental protection was commonly seen as a luxury or to conflict with development (Hettne, 1990). However, at the Rio Earth Summit in 1992 and Agenda 21 action programme accepted that environment and development were critically interdependent and associated problems needed urgent attention from all nations. The hope for the Rio+20 is to ensure that climate change and environmental crisis should be less political and that a realistic step be taken to reverse the damaging trend in the man and environment interrelationship.

"Sustainable development as a terminology suggests the convergence of both environmental and developmental discourses. The main concern of the new discourse is to bring environment and development into common focus. The birth of environmental studies and sub disciplines like environmental economics and the on-going debates on sustainable development and ecology and other tendencies to participate are clear evidence of an expanding discourse that has the potential of subsuming the two discourses" (Shanmugaratnam, 1990:13).

This concept includes the idea of cost effective development that neither impair the environment nor restrains productivity in the long run. Sustainable development can be visualized in a Venn diagram with the component of economic development, social

development and ecological development (Barrow, 1995:67; Wikipedia, 2012). Economic development is related to the creation of material wealth in terms of goods and services for the purpose of meeting the human basic needs. Social development on the other hand is expected to guarantee inter and intra generational equity with respect to meeting basic needs. Lastly, ecological development emphasizes the protection and conservation of our natural resource. These three components are interdependent and inconsistent with the Brundtland Commission Report (WCED, 1987) which emphasized the interlinkages between economic development, environmental degradation and population pressure.

The concept of Sustainable development entails the three interrelated concepts of environmental sustainability, economic sustainability and socio-economic sustainability. These concepts operate through the concepts of needs and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. In the UN 2005 World Summit, it was observed that economic and social development as well as environmental protection is interdependent and mutually reinforcing pillars of Sustainable Development. Cultural diversity was added as fourth policy area of sustainable development and considered as a key element of new strategy for sustainable development (Wikipedia, 2012). Agenda 21, also clearly identified information, integration and participation as key areas to help countries achieve development that recognizes these independent pillars. It emphasizes that in sustainable development everyone is a user and provider of information; thus stressing the need to change from old sector centered ways of doing business to new approaches that involve cross-sectoral coordination and the integration of environmental and social concerns into development process. The agenda also emphasizes the broad public participation in development related activities.

Traditional knowledge in all aspects of life (food, housing, health, agriculture and water management) and other environmental

factors are important just as traditional cultural practices are also considered significant to sustainable development. Moreover, the role of trees in nutrient recycling, soil organic matter build-up and erosion control, and water management are important variables in the sustainability agenda (Sandell, 1988; Tilakasiri, 1994; Madduma Bandara et al, 2010).

As argued by Shanmugaratnam (1990), environmental discourse was principally concerned with the ecological consequences of industrialization in the North but because of the need to relate development process to the environment, the vital roles of the supply of natural resources, absorption and recycling of waste generated by production and consumption, sustaining life through the essential ecological processes and natural life support systems; as well as the environment were equally recognized in the development process.

The concept of sustainable development was criticized severally including its vague and abstract nature. At the conceptual level, Steurer (2001) argues that although Sustainable Development contains a nice 'metafix' definition that covers all aspects of human endeavour and planetary survival, the idea was wrongly based on a consensus of fundamental principles of the aim, means and methods of Sustainable Development. Thus, Kadritzke (2000) laments the possibility of including any ideologies in a containing concept of Sustainable Development because it failed to take into account the essential guiding principles of business. Even at the operational level, the concept recognized that societal growth is accompanied by the imperative of resource use and that continuous growth may lead to over use of environmental resources. However, as Dingler (2003) argues, the cause of a problem cannot be, at the same time, its solution. Sustainable development is also said to set limits on the developing world without adequate caution to the 'misdevelopment' of the developed world. For instance, while the countries of the North are responsible for the significant proportion of environmental pollution during their development process, the

countries of the South are constantly urged to reduce pollution thereby, impeding the growth of such countries and negatively impacting the livelihoods of poor people. Thus, while the rich countries get richer, the poor ones get poorer. This justifies the apprehension of Brunel (2008 cited in Wikipedia, 2012) that development the core ideas of sustainable development are a hidden form of protectionism through which developed countries impede the development of the third world countries and hence the idea of sustainable development is to help the ideas of capitalism.

Sustainable development in theoretical terms presupposes economic development and improvement in standards of living which do not impair the future ability of the environment to provide sustenance and life support for a population. The environment and human development are thus the main focus of sustainable development. Sustainable Development is therefore defined as social and structured economic transformations that optimize the economic and social benefits available in the present, without jeopardizing the potential for similar benefits in the future. It implies in strict sense, equitable distribution of economic well-being that can be perpetuated continually for many human generations (Chatterjee, 2008). An unsustainable situation occurs when natural resources are utilized faster than it can be replenished. In order to ensure sustainability, natural resources need to be used at rate at which they can be replenished naturally. Over the past decade's most of the countries have attempted to consolidate their efforts towards sustainable development by recognizing access to clean and productive environment as a fundamental human right for their citizens.

Sustainable economic growth is essential for improving human well-being. It also assumes importance in ensuring the continuous supply of food and other facilities to the population. However, the prevailing tendency to pushing production and consumption beyond the capacity of the nature makes such an achievement impossible.

### **Man and Environment**

Chatterjee (2008) defined environment to mean the complex aggregate of external conditions that affect all living things, it is the interface between man and nature. Environment embraces all the components of climate system which include atmosphere (the world of air), hydrosphere (the world of water), lithosphere (the land together with its reliefs), the biosphere (the world of living things, man inclusive) and cryosphere (the world of ice). Man is also part of the biosphere and does not exist outside its physical and biological constraints. His future comfort and survival require a widespread understanding of the environment and application of this knowledge. Ellen Semple was more deterministic in her explanation of the relationship between man and environment. According to her, man "is a product of the earth surface, a child of the earth, dust of her dust which had entered into his bone and tissue, into his mind and soul" (Semple, 1911 cited in Johnston, 1986). In other words, all human-economic activities take place in the environment which translates to the fulfillment of man's mental, emotional and physical potentiality.

The level and consequences of interaction for development have been in stages since man appeared on the planet earth. The Stone Age (primitive man) witnessed a low level of man-environmental interactions because the population of man was low, his technology was crude and therefore his demand on the environmental resources was mild. The prehistoric era witnessed minimal deforestation caused by cultivation of crops because the technology relied on hoes and cutlasses. Similarly, combustion of hydrocarbon and generation of anthropogenic pollutants into the spheres of climate system was low during this period for the same reason. The relationship between man and his environment during this period can best be described as 'robust' and peaceful however, this peaceful relationship existed at the expense of changes that man required for advancement in life. Rapid growth of human population is synonymous with increase in exploitation of natural resources.



Environment is in distress consequence upon improved technological development. The depression of the environment is reflected in the pollution of every facet of the climate system (air, water, land, living thing, ice) in addition to global warming.

### **Population, Resources and Environment**

Man is in the centre of the development process and forms an integral part of all development strategies because it is both the cause and consequence of development. The essence of sustainable development is the need to achieve equilibrium between the world's basic resources and their continuing exploitation by a growing world population without jeopardizing the chances of the future generations use the same resources. Agenda 21, comprehensive action programme adapted by governments at the Earth Summit, emphasized the links between environment, population and development (UN, 1992).

Increase in population, level of consumption and choice of technology are some of the challenges in the achievements of sustainable development. For instance, demographic change is a major driver of land cover change through opening by new lands for agriculture, settlements and infrastructural development. Many other extractive activities like logging and mining are also important in this context. Arable land remains an important asset as most people, particularly in the developing world, rely on agriculture for their livelihoods. This is because agriculture contributes up to 50 per cent to the economies of most developing world and at least 60 per cent of livelihood depends on it (WRI, 2005). Thus agricultural land is being degraded due to over cultivation and with consequent low productivity and increased use of inorganic fertilizers and pesticides which lead to increasing pollution and contamination (Tilakasiri et al, 1991).

Income and services derived from environmental resources are central to the livelihoods of many rural economies across the world and sustainable livelihoods that guarantee access and entitlement to a range of assets and opportunities are essential

to achieving human well being. However, natural resources are under increasing pressure with increasing threat to public health and development through water shortages, soil exhaustion, and loss of forests, air, water pollution and degradation of coastlines. For instance, at least 48 countries containing 3 billion people will face shortage of fresh water by the year 2025, and half of all coastal ecosystems will face severe pressures and may be extremely vulnerable in the context of high population densities and urban development (Hinrichsen et al, 2000).

### **Global Warming and Climate Change in Development**

Variation in the concentrations of Green House Gases (GHGs) in the atmosphere has been in operation before the appearance of man on planet earth. This variation is attributable to three natural factors of volcanic eruption, fluctuation in biogeochemical cycles and climate change. During the last two centuries, activities of man (combustion of fuels during man's operations, natural gas flaring, dust, soot, aerosols generated from farming activities etc.) have increased significantly the atmospheric concentration of these gases at a rate and to a level which constitute a global threat to man and his environment which include climate.

Some of the emitted GHG include carbon dioxide ( $\text{CO}_2$ ), Methane ( $\text{CH}_4$ ), Carbon Monoxide (CO), Nitrous Oxide ( $\text{NO}_2$ ), Ammonia, Ozone ( $\text{O}_3$ ), Water Vapour, Chlorofluorocarbon (CFCs), Sulphur dioxide ( $\text{SO}_2$ ), among others. Concentrations of these gases were very low before the pre-industrial era. For instance, Odjugo (2010) put the atmospheric concentration of methane before the pre-industrial era at 70ppbv (Parts per billion by volume) by 2005 it has risen to 1750ppbv. This represented 150 per cent increase and a rise was projected to be 3700ppbv by 2100. The present value of atmospheric concentration of Nitrous oxide is 17 per cent above the pre-industrial values. Again the findings initiated during the international geophysical year at Mauna Lao (Hawaii) and at the South Pole reported a rising in the trend of carbon dioxide concentration in the atmosphere since 1750s. According to Iguisi

(2011), in the human history carbon emission was highest in year 2010. A 1-5 per cent rise in the level of carbon monoxide per annual has been reported as well.

Excessive concentration of these gases in the atmosphere results in global warming with its catastrophic effects. IPCC (1996) noted an increase in earth's surface temperature by 0.4°C-0.8°C and projected to increase between 1.6°C and 4.5°C by the year 2100. The study of Bello and Isiguzo (1999) showed a persistent positive temperature anomaly at three locations in the rain forest of Nigeria since 1990. Generally recent scenario analysis for Nigeria suggests trends towards a warmer climate in future. Building Nigeria's Response to Climate Change (BNRCC) 2011 cited in Oladipo (2011) projected an increase in maximum daily temperature over Nigeria at 2.0°C – 2.2°C from south to north for the period 2046 – 2065, with a much more rapid increase in the range of 3.5°C – 4.5°C at the end of the 21<sup>st</sup> century.

Global warming set in motion feedback processes that intensify the tendency either towards a wetter or a drier regime depending on the location of an area relatively to the effect of the event. Anuforom (2010) emphasized the profound influence that global warming has on natural resources, energy use, ecosystem, economic activity and potential quality of life. Adefolalu (2010) showed concern on the recurring drought spell that will characterize the sub-region consequent of global warming. This is revealed presently by receding monsoon rains which will push the critical latitude of Hydrological Growing Season (HGS) further equator ward. However, in some areas because of this beneficial effect of increased carbon dioxide concentration, agricultural production will increase.

Other natural disasters experienced globally that are linked with global warming include droughts, floods, violent storm, high Sea Surface Temperature (SST). (This phenomenon occur most in the Tropical and in Sub-Tropical latitudes), high Sea Level Rise (SLR) in Coastal belts with its resultant effects in storms and ocean

surges together with their attendant problem, shrinking of arctic sea ice etc.

The per capita emission of GHGs by African countries is lowest due to generally low level of industrialization. Incidentally the continent carries the greatest burden of climate sensitive impacts. At the moment 2 billion people have no formal access to modern energy and still use one form of unclean energy or the other. Global climate change not only presents new region specific health risks, but also global ethical challenges.

Global warming is a major component of climate change; any attempt aim at mitigating or at least lowering climate change impacts will also bring down global warming effects thus a reversal of climate change impacts on man and his environment. Such attempts could include improving energy efficiency in man's day to day operations that will diminish carbon emission. This was achieved to a certain extent in Chevron which has improved out energy efficiency per unit output by 33 per cent since 1992 (Chevron Corporation, 2011). Achievement recorded in Chevron can be extended to other economic sectors of nations whose operational activities hinge on combustion of fossil fuel.

Global warming and Climate change are important contemporary issues because they pose serious challenges to socio-economic development programmes. These issues have therefore aroused the interest of researchers in stages of time based on various climate episodes. The period before the global drought of 1969-1973 focused on climate variables while the focus was on climate change during the period of drought (Kellogy, 1979 cited in Adefolalu, 2010) while emphasis was later shifted to global warming which Adefolalu (2010) described as the second stage of climate change.

Earth climate constitutes one of the important global resources which can be harnessed for socio-economic development of nations, however the consequences of man's use of the

environment through different technology has consisted setbacks to economic and social development. Thus, climate change is both an environmental and adevt issues. Both man and the environment are vulnerable to the impact of climate change which is largely anthropogenic. Thus, the monumental economic loss results from its impact (Anuforum, 2011). The annual losses on global scale is estimated to be \$1 billion in 1960s, \$15 billion in 1990s, \$35 billion in 2004 and about double this in 2005 (Anuforum, 2011).

The path ways of Climate change impact include greater vulnerability to poverty, food, insecurity and poor health among others. The IPCC (2007) predicted a rise in atmospheric temperature of 2°C by year 2050. The implications of this for both developed and developing countries may include acute water shortage and poor crop yield due to their lower adaptive opportunity. The vulnerability of these regions to the risks of climate change finds expression in the development of their socio-economic sectors. For instance, a decline in the rainfall regime in all ecological regions of Nigeria has resulted in abnormal dry periods during the rainy season even in the coastal areas (Bello, 2010) while altered climates have affected greatly the location of agricultural boundaries in Nigeria. Spatial shift in cropping patterns occur to compensate for the shift of agricultural boundaries. This has led to alteration in farmland configuration and a mismatch of environment and agriculture. All components of food security which include food availability, accessibility, utilization and stability are vulnerable to the risk of climate change. A number of crops - acha, wheat, millet, bambara nut, shear nut, ground nut and melon - have either become lost to climate change or endangered by it (Olanrewaju, 2003; Bello, 2010). In Nigeria a shift from normal to late onset of rain has taken place which explains the erratic yield observed in these crops. The damage caused by climate change on agriculture is not limited to crop production but also animal production as well. The Sundano-Sahelian drought starved and killed flocks and herds mostly in the northern part of Nigeria.

Most coastal parts of the world are all at risk from sea level rise while inland water suffers flooding with its attendant loss of lives and properties. Drier conditions may cause a drop in water level thus reducing vessel carrying capacity. All these have implications for economic development of affected nations.

On human health the basic requirements which include clean air and water, sufficient food and adequate shelter are at risk on a yearly basis, and about 800,000 people die from causes attributable to urban air pollution, 1.8 million from lack of access to clean water supply, and poor hygiene and approximately 60,000 in natural disasters (Peter, 2010). Control of infectious diseases is also climate determined as increase in malaria transmission is confined to tropical and subtropical regions with high temperature or/and rainfall. However, both floods and droughts increase the risk of infectious diseases like diarrhea and malaria.

In summary climate change is a threat to sustainable development most especially in the developing countries where poverty still remains the major issue. There is the need for continuous monitoring of the earth and man's role in inducing climate change using space technologies in a sustainable manner for early warning and mitigation of its various negative impacts on man and his environment.

### **Conclusion: Need for an Integrated Approach**

The survival of the people is impossible without the resources that the environment provides. However, the indiscriminate activities of the man cause severe damages to the environment which supports him, and by his excessive intervention he had reduced the capacity of the environment to provide him with the basic needs of life. The challenge today is to learn how to manage the environment to ensure its sustainability.

The global environmental degradation has already reached alarming proportions with obvious negative consequences on the present and future generations. It is incumbent upon people to select



environmental priorities and explore environmentally sustainable development solutions. Man and the environment mutually shape each other and thus required to co-exist harmoniously. This co-existence prevailed throughout history before the balance got disturbed with the emergence of industrial revolution in Europe. Man is compelled to exploit the natural resources to meet their basic needs but in order to ensure the continuous survival of the human race, the exploitation of resources need to be carried out with sanity and in a long term perspective. The exploitation of renewable and non-renewable natural resources and urgent need for self-regulation exists, and its failing may spell disaster to the planet earth. No country is capable of thriving alone since the entire globe depends on common resources.

Many of our environmental problems stem from narrow, single purpose approaches of public or private action that affect the human environment both in agriculture, industry as well as urban development. A need for an integrated approach in this regard has been recognized in the Stockholm Convention, and the Brundtland Commission which identified intergrated approach as the basis of sustainable strategies. This was further developed in the Rio Declaration, Agenda 21, UNCED convention and the Rio+20 Conference. However, there is inadequate research that investigates the links between environment and sustainable macro-economic development policies. Such research needs to be undertaken at both regional and national levels. There is also a need to increase awareness of interdependence between human society and the natural environment.

A healthy economic and social development is essential to ensure justice and equality in a highly polarized world and it is dependent on a healthy environment. Any step taken to preserve the environment will be cheaper in economic and social terms than action taken later. It is often cheaper to prevent pollution and environmental degradation than seeking redressed afterwards. Growing population, urban expansion and exploitation of resources

do not augur well for the future. The phenomenon of global warming senses a red signal if mankind fails to take precautions towards controlled energy use, better management as well as sustainable use of water resources.

Working groups need to be established to review policy documents from the perspectives of environmental impact. Policies in the area of economic development, trade, income generation and health may be targeted since all of these policy areas include environmental dimensions. Information with regard to environmental protection needs to be disseminated at all levels of the society in emphasizing the different responsibilities and priorities of the society. Adopting a participatory approach to assess environmental degradation will build the trust and credibility of policies.

Many countries could avoid environmental crisis if they initiate steps now to conserve and manage supply and demand in a better way while slowing population growth. As Hinrichsen et al. (2000) concluded, "If every country made a commitment to resource conservation along with population stabilization, then the world would be better able to meet the challenges of sustainable development. Practicing sustainable development requires a combination of rational public investments, effective natural resources management, appropriate agricultural and industrial technologies, and slower population growth".

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