

# **INTRODUCTION TO ENVIRONMENTAL MANAGEMENT**

## **1.0 ENVIRONMENTAL MANAGEMENT – OVERVIEW**

### **1.1 INTRODUCTION**

Environmental Management as a course is of recent origin and its roots are from different disciplines. This is so because the environment covers almost every discipline. It is very difficult to define the term environment because each discipline has its own definition.

Bernie and Boyle (1998) rightly pointed out that any attempt at defining the environment will pose problems because it is difficult both to identify and restrict the scope of such an ambiguous term. “For it could be used to encompass anything from the whole biosphere to the habitat of the smallest creature or organism”.

Albert Einstein defined it as “everything else except himself”.

Buchanan (1983) defined it as “a surrounding, especially the conditions that play a part in determining the growth and development of living organisms”.

According to Cunningham and Saigo (1997), “it is the circumstances or conditions that surround an organism or group of organisms and the complex of social or cultural conditions that affect an individual or community”.

The Black’s Law Dictionary (6<sup>TH</sup> Ed.) 1998 defined the environment as “the totality of physical, economic, cultural, aesthetic and social circumstances and factors which surround and affect the desirability and value of property and which also affect the quality of people’s lives”.

Other dictionary definitions range from something that surrounds us or the whole complex of climatic edaphic and biotic factors that act upon an organism or an ecological community and ultimately determine its form or survival; to the aggregate of social or cultural conditions that influences the life of an individual or a community.

To sum it up, the environment is “the sum total of our being and surrounding such as our habitats, the food we eat, the air, water bodies soil and other resources and its exploitation. The environment comes about as a result of the interactions between the non – living (abiotic) and the living (biotic) parameters where present. The biotic parameters always compete among themselves and their surroundings for survival.

The environment can be classified in many ways. Some of them are:

- ❖ Natural environment - Forest, rocks, climate, water etc.
- Artificial environment - Clothes, houses etc.
- ❖ Physical - Tangible things such as land, forest, house
- Non-physical (social) - Culture
- ❖ Biotic environment - Things that are living and can reproduce self eg. Forest, human beings
- Abiotic environment - Non-living things that cannot reproduce itself eg. Rock
- ❖ Renewable Environment - Those that can be renewed after they have used. eg. biodiversity. Some abiotic things can also be renewable eg. Sun’s energy.
- Non Renewable (Exhaustible)-time - Those that cannot be renewed within a specific span eg. minerals, fuel etc.

The Environment provides us with resources for development and growth. Resources are anything that can be used to satisfy a need.

## 1.2 THE ECOSYSTEM

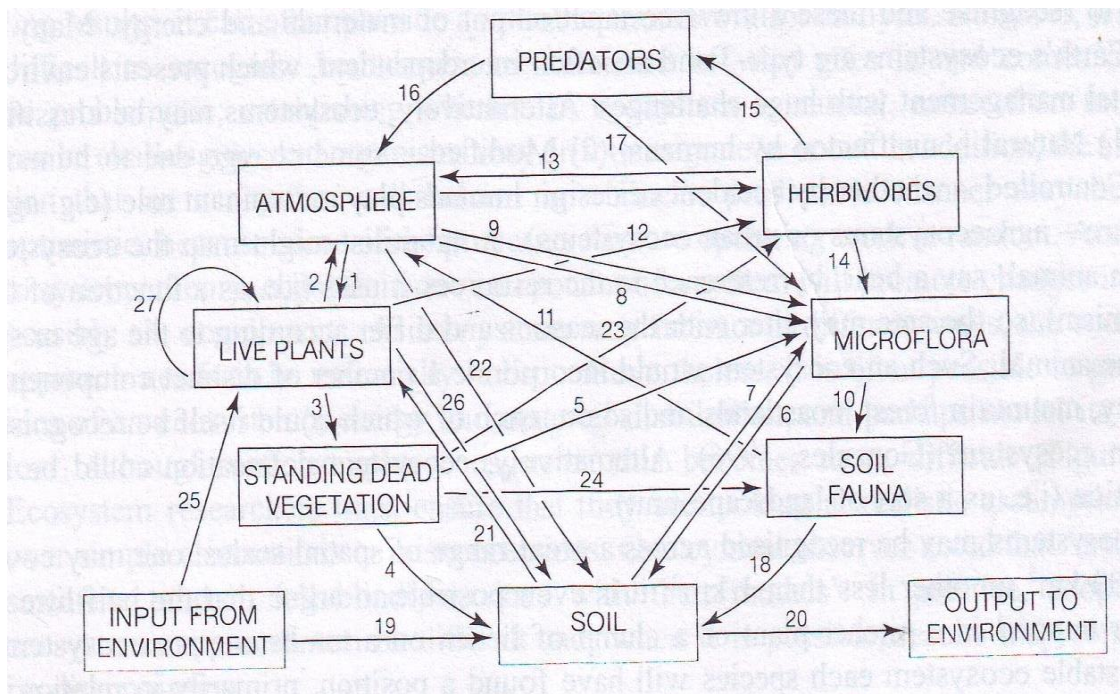
The biosphere (earth) is composed of many interacting ecosystems. An ecosystem is the whole dynamic and interdependent complex of soil, climate and vegetation, with its animal population. That is a community of animals and plants (biotic complex) treated as a unit with its physical environment.

Boundaries between ecosystems are often in distinct, taking the form of transition zones (ecotones) where organisms from adjoining ecosystem may be present together. It is

however, possible for some organisms to be restricted to one ecotone only. An ecosystem boundary may be defined at the organism, population or community level, the crucial point being that biotic processes are sustainable within that boundary. It is also possible to have physical and functional boundaries to an ecosystem.

Ecosystems have some major features: inter dependence, diversity, resilience, adaptability, unpredictability and limits. They also have a set of linked components, although the linkages may not be direct – a network or web with organisms as nodes within it. Some examples of ecosystems are:

- Aquatic Ecosystem
- Agro Ecosystems
- Deserts
- Forest
- Marine Ecosystems
- Pond Ecosystems
- Savanna Ecosystems
- Urban Ecosystems



## The Relations between Ecosystem Components

### 1.2.1 CLASSIFICATION OF ECOSYSTEMS

Ecosystems can broadly be classified in two major ways. These are based on the type of boundaries it has and the effects of human beings on the ecosystems.

Three main types of ecosystems based on boundaries are:

- a. **Isolated Ecosystems -;** This type of ecosystems has boundaries recognizable and more or less closed to input and output of materials and energy from the outside world.
- b. **Closed Ecosystems -;** This type of ecosystem has boundaries that prevent the inputs and outputs of materials but not energy.
- c. **Open Ecosystems -;** This type has boundaries that are very difficult to recognize and it also allow free input and output of both materials and energy. It must be noted that many of the worlds ecosystems fall under this type of ecosystem.

*Another way by which ecosystems can be classified are*

- i. **Natural** – This type is where the ecosystem has not been tampered with or affected in anyway by human beings.
- ii. **Modified** – This is the type that has been changed or modified slightly by the activities of human beings.
- iii. **Controlled** – This is when the elements of the ecosystem have been changed drastically accidentally or intentionally by the activities of human beings.

### **1.3 THE ENVIRONMENT AS AN ASSET**

The environment is viewed as a composite asset that provides a variety of services. Its ability to provide the life-sustaining services (sustainability) depends on how we try to prevent undue depreciation. The productivity of the environment lies in its ability to support and enrich human life and ability to assimilate and render less harmful waste product generated.

All raw materials and energy used for production comes from the environment. There is no substitute for the services provided by the environment.

Definitions of the environment indicate that the environment and the economic system can be considered as a closed system (no inputs are received from outside and no outputs are

transferred out of the system). The close system concept has an important implication on the environment. This is because energy and matter cannot be created or destroyed. This means that the materials that flow into the economic system from the environment has to either accumulate in the economic system or return to the environment as waste. When waste exceeds the carrying capacity, it reduces the quality of service provided by the environment.

The environment is an asset because it performs the following functions;

- i. It provides raw materials for production.
- ii. It serves as a ware house for the keeping of the environmental resources that are no needed now.
- iii. It receives residuals as waste from the production process and renders them harmless.

#### **1.4 CARRYING CAPACITY**

Carrying capacity is the maximum number of individuals that can be supported in a given environment. Others point out that, carrying capacity is the amount of biological matter a system can yield, for consumption by organisms over a given period of time without impairing its ability to continue to produce.

Other authorities define carrying capacity as the maximum population of a given species that can be indefinite in a particular region by system, allowing for seasonal and random changes, without any degradation of the natural resource base. **In its broadest sense, carrying capacity refers to the ability of a system to support an activity or features at a given level without being damaged.**

**Carrying capacities in nature are not fixed or static.** They are contingent on technology, preferences, and the structure of production and consumption. They are also contingent on the ever-changing state of interactions between the physical and biotic environment. A given ecosystem may have more than one carrying capacity depending on factors such as the intensity of use and technology available. Some organisms including humans, adjust to their environment when conditions are favourable and in worst conditions. Some feed and multiply during good times, and in bad times, the population may decline. Some may

migrate or hibernate. Calculating or determining carrying capacity for such situations can be difficult.

The situation is further complicated by the subjective nature of certain limits. For example, the point at which the visual impact of grazing becomes unacceptable is difficult to define and may vary from one location or cultural setting to another. In recognition of this, diverse nature of carrying capacity has been identified. Most of these falls into the following categories: physical, ecological, social and economic

#### **1.4.1 Physical Carrying Capacity**

This is a measure of the spatial limitations of an area and is often expressed as the number of units that an area can physically accommodate. For example, the number of students per a lecture room at IPS. Determining the physical capacity for certain activities can, however, become problematic when subjective elements are introduced. For example, the maximum number of people that can safely swim in a pool depends on human perceptions and tolerance of risk. Another example is the Metro mass bus.

#### **1.4.2 Ecological Carrying Capacity**

This is a measure of the population that an ecosystem can sustain, defined by the population density beyond which the mortality rate for the species becomes greater than the birth rate. In practice, species interactions are complex and the birth and mortality rates can balance over a range of population densities. **In a recreational context, ecological carrying capacity can also be defined as the stress that an ecosystem can withstand, in terms of changing visitor numbers or activities, before its *ecological value* is unacceptably affected.** This approach raises the difficult question of defining ecological value and what constitutes an unacceptable change in it.

#### **1.4.3 Social Carrying Capacity**

This is essentially a measure of crowding tolerance. It can be said to be the maximum visitor density at which people being entertained still feel comfortable and less crowded. In the absence of additional changes, beyond this density visitor numbers start to decline. *The social carrying capacity can, however, be influenced by factors such as the recreational infrastructure, visitor attitudes, and socio cultural norms.*

#### **1.4.4 Economic Carrying Capacity**

This seeks to define the extent to which an area can be altered before the economic activities that occur in the area are affected adversely. It therefore attempts to measure changes in economic terms. An example may be the effects of increased recreational parks affect farming activities in the area

## **1.5 ENVIRONMENTAL MANAGEMENT**

### **1.5.1 Definitions**

We have already attempted a definition of the environment and all of us may be familiar with the term management so we should be able to define Environmental Management. A few of the definition are as follows;

- ❖ It is those aspects of the overall management function that seeks to manage the environmental aspects of a company, plant, building site etc.
- ❖ It is the effective and active measures taken for the protection, conservation and preservation of the environment, heritage and natural resources for which a government, organization or individual is responsible.

Environmental Management seeks to mobilize resources and the use of government powers to control the use, improvement or conservation of both natural and economic goods and services in such a way that conflicts created by that use, improvement or conservation are minimized. It also attempt to reduce environmental impact as measured by some objective criteria.

Environmental Management includes activities such as environmental reporting, environment auditing and the development of environmental policy.

### **1.5.2 Main issues and evolution**

Environmental Management which is an integral part of the overall process of development includes the relationships and interdependencies that exist between people and natural resources. Environmental change is therefore as result of both natural events and anthropological events such as development models, practices and life-styles. Appropriate environmental management is achieved when resources are used efficiently for the benefit of human development and when they are conserved due to the important role they may play in

sustaining the ecosystem. Inappropriate environmental management is therefore the misuse (excessive) of resources by over-utilizing or under-utilizing them as well as not conserving those resources that form the basis for ecological functioning of ecosystems.

Interest in environmental issues began in the middle of the 20<sup>th</sup> century when serious pollutions led to health problems and disruption of ecological balances. It however, became a topical issue and gained popularity in the 1970s with the formation of environmental movements after the United Nations conference on the Human Environment in Stockholm, June 1972. The main aim of the environmental movements then was to prevent or to reduce pollution and the destructive use of natural resources. This focus of the movements changed as the years role by, and by the end of the 20<sup>th</sup> century, the focus was on integrating environmental concerns with economic growth and development. The initial perception that the environment serves as a constraint to economic growth has changed into awareness that economic development in a healthy and sustainable manner can only take place when we respect the functions of the ecosystem. This issue is of particular importance to developing countries whose responsibility of promoting economic growth to improve the living standards of their people is immense.

Though not all environmental problems (acid rain, use of untested chemicals, etc.) have been solved with the gradual evolution of the environmental movements, some important environmental lessons have been learnt. Some of these are:

- Effects of environmental problems are global, even if the cause is restricted to specific geographical areas. Solutions to these problems should therefore assume global dimensions e.g. the production and consumption of chlorofluorocarbons (CFCs) mostly took place in industrial countries and yet its effects of ozone depletion is global.
- Environmental issues are very important due to its economic and social implications. For example, the excessive use of greenhouse gases may lead to global warming. This will lead to flooding along the coast and draught inland. The end result could be famine, outbreak of epidemic, social unrest etc.
- New evidences of the severity of some environmental problems have emerged. For example the destruction of habitats such as wetlands and tropical rainforest has led to the rapid extinction of some flora and fauna species.



- The best way to solve existing and emerging environmental problems is to involve the international community. This should include, making available technical co-operation and financial mechanisms to aid developing countries.

The debate on the environment within the last decade has resulted in general agreement on 3 points. These are:

- ❖ The environment is a common concern to both industrial and developing countries, although the problems resulting from poverty and affluence on the environment are different.
- ❖ The problem of environment can only be solved through international co-operation
- ❖ The integration of economic growth and environmental protection must be done according to a sustainable development approach.

### **1.5.3 Future trends**

The environment has great influence on business. As a result of this, some leading companies in the advanced countries are using environmental issues to add value to their business. However, many more organisations, mostly in the developing countries still focus on environmental management as a functional matter and have not taken the next steps to fully integrate environmental concerns into the business strategy. The current trend, however, is that most of these organisations or institutions have come to terms with the business implication of dealing with environmental matters as a strategic concern. These concerns typically deemed strategic in business - manufacturing, quality, cost, distributions and services, all of which have environmental components are treated as integral part of the overall business plans and decision making process and are managed accordingly. They are therefore moving away from the previous acts like managers acting as if environmental staff, and not themselves are accountable for environmental performance and that there is no intersection between environmental management strategy and the overall corporate planning process

### **1.6 Development and the Environment**

The concept of development is so broad that it is difficult to define it. Definitions of the concept always reflect the values and perceptions of those defining it. In the developed world, development is an ambiguous term for a multi-dimensional process that includes material,

social and organizational change, accelerated economic growth and the reduction of absolute poverty and inequality. However, development is perceived as the economic component of the wider process of modernization.

Modernization in general terms is a change towards economic, social and political systems that developed in Western Europe and North America between the seventeenth and nineteenth centuries and later around the Pacific Rim. Development and modernization at the national, regional and local levels are often linked to external economic or social changes.

Studying of the environment is important to the administrator/entrepreneur because, it is believed that there is a relationship between the environment and growth/development. World Commission on Environment and Development headed by Brundtland stated that there is a positive correlation between poverty and environmental degradation. This is because the environment serves as the main source of raw materials (resources) for development. To them, poverty and environmental degradation is a cyclical phenomenon. In areas where there is poverty, inhabitants turn to depend solely on environment for survival. This leads to environmental degradation which in turn increases poverty. Raw materials for industries come from the environment and if they are destroyed, there will not be raw materials for production. Again, when people are poor, they may not be able to patronize products produced by the industries.

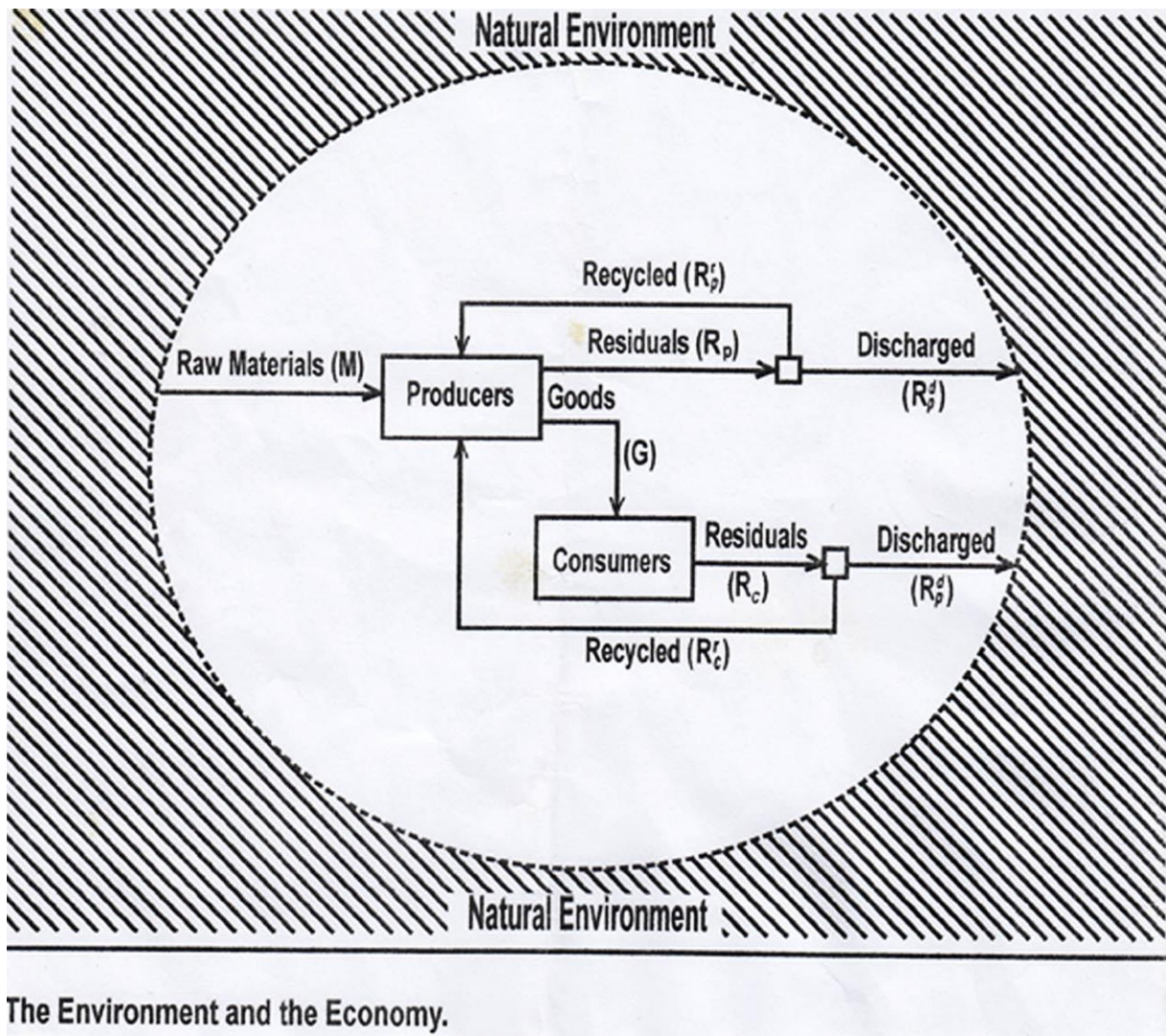
Though it has been observed that there is a relationship between development and environmental problems, that relationship is not as simple as it is always portrayed. Throughout human history, needs and wants have constantly changed and the environment has played a major role in this change to the extent it can limit opportunities for future development. Many organisms, especially human beings alter or change the environment to suit their needs. Human beings however, have the potential to recognize and to consciously respond to these threats (natural and anthropogenic) – perhaps to mitigate or avoid them if possible. In fact, technology could offer humanity an escape from catastrophes which have in the past afflicted the earth. However, it is not clear whether humanity will successfully exploit that potential or continue to destroy both the abiotic and biotic parameters (including human species) of the environment.

At the roots of almost all the world's environmental problems lie with the unsound concepts of development and modernization. Most development can effectively be described an unsustainable state of temporary development that involves consuming more resources than the environment can provide and generating more waste than the environment can accept and render harmless, thus increasing pollution. This improper way of development (maldevelopment) formed the basis for the "Faustian Bargains" which states that human beings sacrifice their long – term well – being for short – term gains

However, developing economies do not put much premium on environmental protection. As far as these economies are concerned, there are a number of important questions about the relationship between environmental issues and the behaviour of the economy. For example, what is the relationship between environmental pollution control measures and the rate of unemployment and economic growth; will stricter policies tend to retard growth and increase unemployment; what impact will environmental regulations have if any on inflation. It has been proved that pollution increases during the early stages of development and then diminishes as the country gains enough resources to combat it. Production and consumption creates residuals (waste) of all types that may be emitted into the air or water, or disposed of on land. All materials eventually end up as residuals even though they may be recycled along the way.

From a purely physical point of view, materials and energy being extracted from the natural environment is discharged back into the environment as residuals. This fulfills the 1<sup>st</sup> law of thermodynamics which states that in the long run these two flows must be equal:  $M = R^d_p + R^d_c$

If the system is growing, it can retain some proportion of the M. Recycling can also delay the disposal of waste, though it will eventually be released into the environment. So to reduce the mass of waste disposed of into the natural environment, a reduction in the quantity of raw materials (M) taken should be considered.



### TUTORIAL QUESTIONS

1. With reference to the Brundtland's report on the environment and the environment as an asset theory, discuss four (4) importance of environmental management to industries in Ghana
2. With reference to specific examples in Ghana, discuss two activities and their effects each on the environment under mining and agricultural activities. Suggest possible solutions to the problems discussed.

## **SOLUTION TO QUESTION 1**

- Definition of environmental management
- Relationship between poverty and environmental degradation with diagram
- Environment provides resources for development and accepts waste and renders them harmless with diagram
- Destruction of the environment may lead to non-availability of raw materials for the industry to produce
- If people are poor, they will not be able to patronize an industry's products
- Excess waste will lead to the environment exceeding its waste carrying capacity, thus destroying the raw materials base