

Libya Bio-diversity and Climate ECO-System: Review

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Abstract

The most unique feature of Earth is the existence of life, and the most extraordinary feature of life is its diversity. Approximately 9 million types of plants, animals, protists and fungi inhabit the Earth. So, too, do 7 billion people. Two decades ago, at the first Earth Summit, the vast majority of the world's nations declared that human actions were dismantling the Earth's ecosystems, eliminating genes, species and biological traits at an alarming rate. This observation led to the question of how such loss of biological diversity will alter the functioning of ecosystems and their ability to provide society with the goods and services needed to prosper. In this paper we are review on Libya Bio-diversity and climate eco system.

Keywords: Bio-Diversity, Ecosystem, Environment, Climate, Global

1. Introduction

The word Environment is derived from the French word "Environ" which means "surrounding". Our surrounding includes biotic factors like human beings, Plants, animals, microbes, etc and abiotic factors such as light, air, water, soil, etc. Environment is a complex of many variables, which surrounds man as well as the living organisms. Environment includes water, air and land and the interrelationships which exist among and between water, air and land and human beings and other living creatures such as plants, animals and microorganisms. She suggested that environment consists of an inseparable whole system constituted by physical, chemical, biological, social and cultural elements, which are interlinked individually and collectively in myriad ways. The natural environment consists of four interlinking systems namely, the atmosphere, the hydrosphere, the lithosphere and the biosphere. These four systems are in constant change and such changes are affected by human activities and vice versa. In the past 20 years remarkable progress has been made towards understanding how the loss of biodiversity affects the functioning of ecosystems and thus affects society. Soon after the 1992 Earth Summit in Rio de Janeiro, interest in understanding how biodiversity loss might affect the dynamics and functioning of ecosystems, and the supply of goods and services, grew dramatically.

Major international research initiatives formed; hundreds of experiments were performed in ecosystems all over the globe; new ecological theories were developed and tested against experimental results. Here we review two decades of research that has examined how biodiversity loss influences ecosystem functions, and the impacts that this can have on the goods and services ecosystems provide (Box 1). We begin with a brief historical introduction. We then summarize the major results from research that has provided increasingly rigorous answers to the question of how and why the Earth's biological diversity influences the functioning of ecosystems. After this, we consider the closely related issue of how biodiversity provides specific ecosystem services of value to humanity. We close by considering how the next generation of bio-diversity science can reduce our uncertainties and better serve policy and management initiatives.

2.0 Components of Environment

Environment has been classified into four major components:

1. Hydrosphere,
2. Lithosphere,
3. Atmosphere,
4. Biosphere.

Hydrosphere includes all water bodies such as lakes, ponds, rivers, streams and ocean etc. Hydrosphere functions in a cyclic nature, which is termed as

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hydrological cycle or water cycle. Lithosphere means the mantle of rocks constituting the earth's crust. The earth is a cold spherical solid planet of the solar system, which spins in its axis and revolves around the sun at a certain constant distance.

Lithosphere mainly, contains soil, earth rocks, mountain etc. Lithosphere is divided into three layers-crusts, mantle and core (outer and inner). Atmosphere The cover of the air, that envelope the earth is known as the atmosphere.

Atmosphere is a thin layer which contains gases like oxygen, carbon dioxide etc. and which protects the solid earth and human beings from the harmful radiations of the sun. There are five concentric layers within the atmosphere, which can be differentiated on the basis of temperature and each layer has its own characteristics. These include the troposphere, the stratosphere, the mesosphere, the thermosphere and the exosphere.

Biosphere it is otherwise known as the life layer, it refers to all organisms on the earth's surface and their interaction with water and air. It consists of plants, animals and micro-organisms, ranging from the tiniest microscopic organism to the largest whales in the sea. Biology is concerned with how millions of species of animals, plants and other organisms grow, feed, move, reproduce and evolve over long periods of time in different environments. Its subject matter is useful to other sciences and professions that deal with life, such as agriculture, forestry and medicine. The richness of biosphere depends upon a number of factors like rainfall, temperature, geographical reference etc. Apart from the physical environmental factors, the man made environment includes human groups, the material infrastructures built by man, the production relationships and institutional systems that he has devised. The social environment shows the way in which human societies have organized themselves and how they function in order to satisfy their needs.

The word biodiversity is a combination of two words: "biological and diversity" and refers to the variety of life on the Earth. Biodiversity is the degree of variation of life forms within a given species, ecosystem, biome, or an entire planet. Biodiversity is a measure of the health of ecosystems. The term biological diversity was used first by wildlife scientist and conservationist Raymond F. Dasmann in the 1968. The term's contracted form biodiversity may have been coined by W.G. Rosen in 1985. Biodiversity is usually considered at three different levels:

3.0 The following are different types of biodiversity:

Genetic Diversity: Genetic diversity is the "raw material" that permits species to adjust to a changing world whether these changes are due to natural factors or are caused by human factors. It refers to the variation at the level of individual genes and provides a mechanism for populations to adapt to their ever-changing environment. Eg: Human beings

Species Diversity: Species diversity refers to the different types of living organisms on Earth. This includes the many types of birds, insects, plants, bacteria, fungi, mammals, and more. Many differing species often live together in communities depending on each other to provide their needs. A species can be defined as a group or population of similar organisms that reproduce by interbreeding within the group. Members of a species do not normally reproduce with members of any other species. Members of a specific species possess common characteristics that distinguish them from other species and this remains constant regardless of geographic location.

Ecosystem Diversity: Ecological diversity or ecosystem diversity is the variety of biological communities, such as forests, deserts, grasslands and streams that interact with one another and with their physical and chemical (nonliving) environments. It relates to the different forms of life which are present in any one particular area or site, in more precise terms, it concerns the different species of a particular genus which are present in an ecological community.

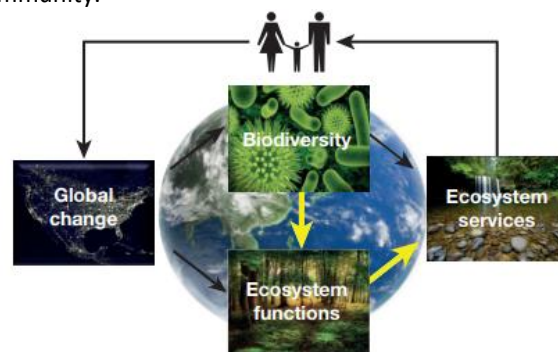


Fig 1.0: Biodiversity & ecosystem

Values of Biodiversity: The value of biodiversity (in terms of its commercial utility, ecological services, social and aesthetic values) is enormous. There are several ways that biodiversity and its various forms are Valuable to humans. The biodiversity value may be classified as follows:

Consumptive Value: Biodiversity is an essential requirement for the maintenance of global food supply. The main sources of human food include animals, fish and plant produces. A large number of plants are consumed by human beings as food. A few animal species are consumed by people which come from cattle, pigs, sheep, goats, buffaloes, chickens, ducks, geese and turkey species. Fish: Many fresh water fish can be grown in ponds. Israel and China already get about half of their fish from aqua culture. Drugs & medicines: About 75% of the world's population depends upon plants or plant extracts for medicines. The drug Penicillin used as an antibiotic is derived from a fungus called Penicillium. Likewise, Tetracycline from bacteria which is used to cure malaria is obtained from the bark of cinchona tree. Fuel: The fossil fuels like coal, petroleum products and natural gas are the products of biodiversity.

Roductive Value: Some of the organisms are commercially usable where the product is marketed and sold. The animal products like tusks of elephants; musk from deer; silk from silkworm; wool from sheep or goats; fur of many animals etc all of which are traded in the market. Eg: Calabar bean was traditionally used as a poison in West Africa. Daisy plants were first used as a lice remedy in the Middle East and this led to the Discovery of Pyrethrum. Mosquito coils made from Pyrethrum are sold in the market. The bacterium *Bacillus thuringiensis* produces toxic proteins that kill certain insects.

Social Value: These are the values associated with the social life, religion and spiritual aspects of the people. Many of the plants are considered to be sacred in our country like Tulasi, Mango leaves, Banana leaves. The leaves, fruits, flowers of some of the plants are used in worship. Many animals like cow, snake, bull, peacock also have significant place in spiritual and thus hold special importance. Thus, biodiversity has distinct social value, attached with different societies.

Ethical Value: The ethical value means that human beings may or may not use a certain species but knowing the very fact that this species exists in nature gives pleasure. For eg: A peculiar species of Pigeon, grey / white bird with short legs is no more on this earth. Similarly, Dodo species is also no more. Human beings are not deriving anything direct from Kangaroo, giraffe but strongly feel that these species should exist in nature.

Aesthetic Value: Every one of us would like to visit vast stretches of lands to enjoy the visible life. People from farther areas, spend a lot of time and money to visit wild life areas where they can enjoy the aesthetic value of biodiversity and this type of tourism is known as eco-tourism. Eco-tourism is estimated to generate 12 billion dollars of revenue annually that roughly gives the aesthetic value of biodiversity. A study of the impact of environment on the psyche was undertaken by Kaplan and Kaplan (1989) in which they found that being near nature relieved working stresses while people who worked in closed environment or human made structures experienced much more job stresses and illnesses.

4.0 Libya as a mega diversity nation

Libya is located in the center of North Africa, bordered to the north by the Mediterranean Sea, east of Egypt and Sudan, west of Tunisia and Algeria, south of Chad and Niger between two longitudes ($25^{\circ} - 9^{\circ} 58' E$) and two latitudes ($18^{\circ} 45' - 33^{\circ} 10' N$). With an area of (1,759, 540) square kilometers. Libya it comes in the fourth rank Africa and the fifteenth globally in terms of area, and it a coast on the Mediterranean Sea up to 1900 kilometers, in the rate of (36%) of the coasts of the Mediterranean basin. From this presentation, it is clear that none of the Libyan borders follow natural borders, which can be considered as a barrier or obstacle separating Libya from its geographical surroundings. Rather, they are actually lines drawn on the map in accordance with international

agreements at different historical stages. (Al-Hajjaji 1989) and (El- Tantawi, 2005) and does not have a natural effect on the Libyan biological map or separate from the nature of biodiversity in its geographical surroundings. Most geological studies show that the Libyan lands are generally located within the Sahara except for the narrow coastal areas and northern mountain ranges (Jabal Nafusa, Al-Jabal Al- Akhdar), Therefore, Libya shares with the Sahara the history of its formation and geological composition, With some local exceptions, sedimentary layers belonging to different geological eras cover the surface of the earth and are based on a base of archaic rocks (pre-Cambrian) of different depths, in some places, the base may appear on the surface due to weathering, (Sharaf, 1995)

In view of the general geological formations that make up the surface of the Libyan territory according to map, The oldest formations are in southern Libya, Generally, the pre-Cambrian, first (Paleozoic) and some second (Mizuzo) formations prevail in the south and center, in the northwest region, the formations of the second geological time (Mizuzwe) prevail, but In the plain of Sirte, the plain of Benghazi, the Green Mountain and the Marmerica plateau, the formations of the third geological time prevail, Ancient geological formations are also found in different parts of Libya covered by layers of sediment that have accumulated during the fourth and modern geological times, or under volcanic rocks resulting from volcanic eruptions at different times.

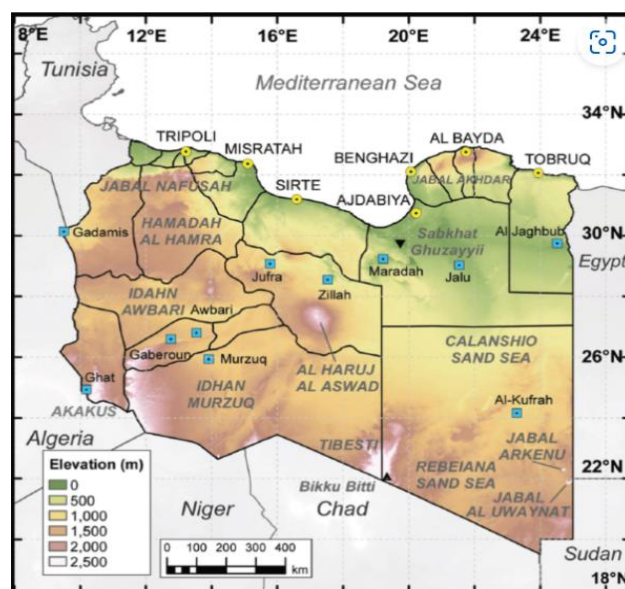


Fig 2.0: Libya map with surrounding nation/state

Libya can be divided into the following terrain sections:

- Coastal Plains Region
- Northern Mountain Region (Jabal Nafousa, Al-Jabal Al-Akhdar)
- Transitional Regions (Sub-Saharan Region)
- Inland Region (Desert, Inner Mountains and Oasis).

5.0 Climate of Libya

Changing climatic phenomena have different effects on biological systems in general and vegetation in particular, and to know the effects of climate on the distribution and spread of ecosystems and natural vegetation cover in Libya, we will explain the most important climatic regions. The impact of geographic location, topography and coast direction is reflected in Libya's climate, which is a mixture of marine and desert climate, and it is difficult to separate neighboring regions due to the overlap and similarity of the climatic components of those regions.

Based on the (Emperger classification), bioclimatic ranges have been identified in Libya where seven regions are evident:

- Semi-humid and warm climate.
- Semi-arid and warm climate.
- Semi-arid and hot climate.
- Semi-arid and temperate climate.
- Semi-arid and warm climate.
- Dry and hot climate.
- Dry and warm climate.

The coastal strip overlooking the Mediterranean is dominated by four types of climate:

The semi-humid and warm climate and unique in Shahat located in the green mountain which receive the highest amounts of rain in Libya (584 mm / year). semi-arid and warm climate in Misrata, semi-arid and hot climate in Darnah and Tripoli & semi-arid and hot climate in Benina, Sirte and Zouara, all located in the former coastal area. We also note the presence of three types of climate in the western mountain region, semi-arid and warm climate in Gharian & semi-arid and temperate climate in Zintan.

This is due to the asymmetry of rainfall in the two previous areas, because the second area (Zintan) falls under the shadow of the rain, while (Gharyan) is subject to mountain impact on the one hand, in addition to its proximity to the area of cyclonic activity on the other. The dry and warm climate prevails in the rest of the western mountain represented by Nalut and Yevern. The dry and warm climate covers most of Libya; it extends to the central coastal area between Sirte and Ajdabiya and the eastern coastal region stretching from Darnah to the Egyptian border, due to low rainfall and high temperatures.

Three geo-thermal regions appear whose boundaries are based on isothermal lines, with a range of two degrees from one line to another. The first region: represents most of Libya except the areas of Al-Jabal Al-Akhdar, the Jabal Nafousa, the Jafara plain and the narrow coastal strip extending from Misrata to Ajdabiya and from Darnah to Tobruk. The annual average temperature in its regions exceeds (20 degrees Celsius) and this region is considered the hottest areas of Libya because of its location within the continental orbit, which

is dominated by dry continental air masses, especially in the summer.

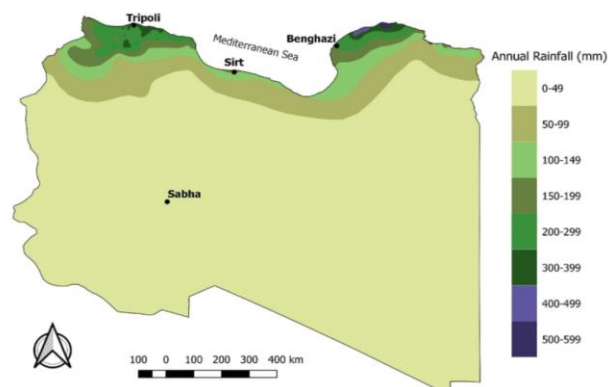


Figure 3.0: Annual rain-fall in Libya region

Second Region: It covered the northeastern regions

Al-Jabal Al-Akhdar, the coastal area extending from Darnah to Tobruk, and the northwestern regions of (the Jabal Nafousa, the plain of Jafara, and the coastal area in the form of a narrow strip from Misrata to Ajdabiya). Where the annual average temperature ranged between (18-20 degrees Celsius) and shows in this region the impact of sea factor on lower temperatures in addition to its location on higher latitudes compared to the previous region, and less affected by dry orbital air masses.

Third Region

It appears in the northern high mountainous areas of Al-Jabal Al-Akhdar and Jabal Nafousa, and has an annual average temperature below (18 degree Celsius) which is less heat than the previous two regions due to the elevation factor and the abundance of vegetation especially in Al-Jabal Al-Akhdar.

6.0 Threats to biodiversity

Extinction or elimination of a species is a natural process of evolution. In the geologic period the earth has experienced mass extinctions. During evolution, species have died out and have been replaced by others. However, the rate of loss of species in geologic past has been a slow process, keeping in view the vast span of time going back to 444 million years. The process of extinction has become particularly fast in the recent years of civilization. Edward O. Wilson prefers the acronym HIPPO, standing for habitat destruction, invasive species, pollution, human overpopulation, and over-harvesting. Following are the major causes and issues related to threats to biodiversity: **Habitat destruction:** Habitat destruction has played a key role in extinctions, especially related to tropical forest destruction. Factors contributing to habitat loss are: overpopulation, deforestation, pollution (air pollution, water pollution, soil contamination) and global warming or climate change. Habitat size and numbers of species are systematically

related. Physically larger species and those living at lower latitudes or in forests or oceans are more sensitive to reduction in habitat area. Conversion to "trivial" standardized ecosystems (e.g., monoculture following deforestation) effectively destroys habitat for the more diverse species that preceded the conversion. In some countries lack of property rights or lax law/regulatory enforcement necessarily leads to biodiversity loss (degradation costs having to be supported by the community).

Poaching: Illegal trade of wildlife products by killing prohibited endangered animals i.e. poaching is another threat to wildlife. Despite international ban on trade in products from endangered species, smuggling of wildlife items like furs, hides, horns, tusks, live specimens and herbal products worth millions of dollars per year continues, the developing nations in Asia, Latin America and Africa are the richest source of biodiversity and have enormous wealth of wildlife. The rich countries in Europe and North America and some affluent countries in Asia like Japan, Taiwan and Hong Kong are the major importers of the wildlife products or wildlife itself. The trading of such wild life products is highly profit making for the poachers who just hunt these prohibited wild lives and smuggle it to other countries mediated through mafia. The worst part is that for every live animal that actually gets into the market about 50 additional animals are caught and killed If you are fond of rare plants, fish or birds, please make sure that you are not going to the endangered species or wild-caught species. Doing so will help in checking further decline of these species. Also do not purchase fur coat, purse or bag, or items made of crocodile skin or python skin. You will certainly help in preserving biodiversity by doing so.



Figure 4.0: Libyan Barbary Sheep

Man-Wildlife Conflicts: We have discussed about the need to preserve and protect wildlife. However, sometimes we come across conflicting situations when wildlife starts causing immense damage and danger to man and under such conditions it becomes very difficult for the forest department to pacify the affected villages and gain local support for wildlife conservation. Instances of man animal conflicts keep on coming to lime light.



Figure 5.0: Libya Hyena

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