International Journal of Movement Education and Social Science
IJMESS Vol. 7 Special Issue 02 (Jan-June 2018) www.ijmess.org
ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

ECOSYSTEM

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ABSTRACT

Environment is our basic life support system. It provides the air we breath, the water we drink, the food we eat and the land where we live. Environment is a French word Environer/Environner it meaning is neighbourhood. Human being interact with the environment and modify it according to their need. Early humans adapted themselves to the natural surroundings. Aperfect balance is necessary between the natural and human environment. Humans must learn to live and use their environment in a harmonious way. [1]

The ecological consequences of biodiversity loss have aroused considerable interest during the past decade. Larger numbers of species are probably needed to reduce temporal variability in ecosystem process in changing environments. Amajor future challenge is to determine how biodiversity dynamics, ecosystem processes and abiotic factors interact human alteration.of the global environment has triggered the sixth major extinction event in the history of life and caused widespread changes in the global distribution of organisms. [2]. These changes in biodiversity alter ecosystem processes & change the ecosystem to environmental change. This has profound consequences for services that humans derive from ecosystems. The large ecological & minimized to preserve options for future solutions to global environmental problems. [3]

We investigated the relationship between plant nitrogen limitation & water availability in dryland ecosystems. We tested the hypothesis that at lower levels of annual precipitation. Using a literative survey of fertilization experiments in arid, semi-arid and sub humid ecosystems, we investigated geographic gradients, as well as across year to year variation in precipitation with in sites. [4]

Level processes such as primary production and nutrient cycling. We evaluated the effects of plant functional group richness on seasonal patters of soil nitrogen & phosphorus cycling. We conducted plant species removals air temperature manipulations and vegetation and soil transplants in tundra communities to determine the relative importance of vegetation in controlling ecosystem. The relative effects of plant richness and composition on primary productivity & soil nitrogen pools were tested experimentally. Change in the abundance of species especially those that influence water & nutrient dynamics tropic interactions or disturbance affect the structure & functioning of ecosystems. Diversity is also important because it increase the probability of including species that have strong ecosystem and it can increase the efficiency of resources use. Current global environmental changes that affect species composition & diversity are therefore profoundly altering the functioning of the biosphere. [5]

Keyword- Components of ecosystem, Conservation of ecosystem, Functions of an ecosystem, Ecosystem Importance, Objectivity.

International Journal of Movement Education and Social Science
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I. INTRODUCTION –

Ecosystem is a system formed by the interaction of all living organisms with each other and with the physical and chemical factors of the environment in which they live, all linked by transfer of energy and material. All plants, animals and human beings depend on their immediate surroundings. Often they are also interdependent on each other. This relation between the living organisms as well as the relation between the organisms and their surroundings.

The term ecosystem was first used in 1935 in publication by british ecologist Arthur Tansley. Tansley devised the concept to draw attention to the importance of transfers of materials between organisms and their environment. [6]. Ecosystem was defined as a dynamic entiry composed of a biological community and its associated abiotic environment.

The impact of humans has caused a number of dramatic changes to a variety of ecosystem found of the Earth.. The most obvious impact of human on ecosystem is the loss of biodiversity. The number of extinctions caused by human domination of ecosystem has been steadily. Ecosystem composed of a variety of living organisms that can be classified as producers, consumers or decomposers, producers are organisms that can manufacture the organic compounds they use as sources of energy.

1.1.1 Organization of ecosystem –

The term ecosystem was derived from two greek words ‘eco’ and the ‘system’ where eco means environment & system mean interaction or interdependent. The ecosystems is organized by two aspects.

They are –

1.1.1.1. Structural aspect –

The structure of the ecosystem is composed of two main component i.e. biotic & abiotic which are interacting together. Abiotic components include inorganic compounds like gages, water etc. The biotic factors include all the living organism living an environment. E.g. producers, consumers & decomposers.

1.1.1.2. Functional aspect –

The functional aspect of the ecosystem is composed of flow of energy & cycling of nutrilious which makes the ecosystem stable and continues life cycle. [7]

Environmental degradation is a major issue of our time. Abasic environmental building block is the ecosystem. An ecosystem is a combination of two words ecological & system. Together they describe the collection of biotic and abiolic. Components and processes that comprise a defined subset of the biosphere.

II. OBJECTIVES OF ECOSYSTEM –

Examples of cutting edge ecosystem research are the Carnegie Airborne Observatory —an aerial remote sensing system capably of precisely mapping ecosystem carbon and species diversity, and the development

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

of the National Ecological Observatory Network (NEON) , a continentalscale research platform for discovering and understanding the impacts of climate change, landuse change, and invasive species on ecosystems.

(a) Meta-analysis of the ecosystem services of temprate rivers, the ecosystem processes that the organisms that are involved.

(b) Biodiversity-ecosystem process interactions. We will determine the changing biodiversity for the quality and quantity of ecosystem service in response to land –use and climate change.

(c) Land use & climate impacts on biodiversity.

(d) Valuation of ecosystem services (NERC Duress Org).

(e) Determination of relationship between soil biodiversity functioning & ecosystem services.

(f) Erosion, compaction, organic matter decline and contamination. [8]

Natural resource management should be viewed within the context of land use and the quality and value of ecosystem services derived from those natural resources. Ecosystem services range from deriving economic returns, food and fibre, fresh water, natural beauty, cultural services, and environmental regulation and conservation to a desire to bequest structurally sound and functional environments to future generations.

Agriculture is the predominant land use within it impacts a range of ecosystem services important to other land uses, including the capacity of the ecosystem to effectively deliver these services by affecting soil health, water resources and regional climate, resulting in direct and indirect feedback to land management practice. Engaging the agricultural community in broader it will require a focus on the values associated with ecosystem services.In achieving environmental outcomes, it will be important to focus on the appropriate ecosystem services, including a sense of place, climate control and recreational services derived from natural ecosystems within the region.

III. COMPONENTS OF ECOSYSTEM –

Ecosystem are composed of a variety of abiotic & biotic components that functions is an interrelated fashion.

Some important components are-

Soil – It is much more complex than simple sediments. They contain a mixture if weathered rock fragments, highly altered soil mineral particles. Soil provide nutrients, water a home and a structural growing medium for organisms.

Atmosphere – It provide organisms found with in ecosystem with carbondioxide for photosynthesis and oxygen for respiration.

Solar Radiation – It is used in ecosystem to heat the atmosphere & to evaporate and transpire water into the atmosphere. [9]

Abiotic –These include basic inorganic and organic compounds of the environment or habitat of the organism. The inorganic components of an ecosystem are carbon-di-oxide, water, nitrogen all of which are involved in matter cycles.

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ISSN (Online): 2321-3779

An ecosystem consist of two main components

(a) Abiotic or Non-living components – The world of non-living organisms e.g. land

The world of non-living elements

(i) Inorganic substance us

(ii) Organic compounds

(iii) Climatic factors

(b) Biotic or living elements - The world of living organisms e.g. plants & animals

(i) Autotrophs or producers

(ii) Heterotrophs or consumers

(iii) Decomposers

(c) Solar System – It is used in ecosystem to heat the atmosphere and to evaporate water into atmosphere.

Ecosystems include living organisms, the dead organic matter produced by them, the abiotic environment within which the organisms live and exchange elements (soils,water, atmosphere), and the interactions between these components. Ecosystems embody the concept that living organisms continually interact with each other and with the environment to produce complex systems with emergent properties, such that "the whole is greater than the sum of its parts" and "everything is connected". The spatial boundaries, component organisms and the matterand energy content and flux within ecosystems may be defined and measured. However, unlike organisms or energy, ecosystems are inherently conceptual, in that different observers may legitimately define their boundaries and components differently. For example, a single patch of trees together with the soil, organisms and atmosphere interacting with them may define a forest ecosystem, yet the entirety of all organisms, their environment, and their interactions across an entire forested region in the Amazon might also be defined as a single forest ecosystem. Some have even called the interacting system of organisms that live within the guts of most animals as an ecosystem, despite their residence within a single organism, which violates the levels of organization definition of ecosystems. Moreover, interactions between ecosystem components are as much a part of the definition of ecosystems as their constituent organisms, matter and energy. Despite the apparent contradictions that result from the flexibility of the ecosystem concept, it is just this flexibility that has made it such a useful and enduring concept. [10]

Although often described as discrete components, natural resources within the region are in fact intertwined into a series of complex and overlapping ecosystems in functional landscapes. Ecosystems are the expression of the entire biophysical system, consisting of all the biota (living organisms) and abiotic (nonliving) resources, including plants and animals, soil, water, minerals, sunlight and the atmosphere. The structure and function of ecosystems within the region are essentially governed by underlying land use.

The structure of an ecosystem is basically a description of the species of organisms that are present, including information on their life histories, populations and distribution in space. It is a guide to who's who in the ecosystem. It also includes descriptive information on the non-living (physical) features of environment, including the amount and distribution of nutrients.

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

The structure of ecosystem provides information about the range of climatic conditions that prevail in the area. From structural point of view all ecosystems consist of following four basic components:

1. Abiotic Substances:

These include basic inorganic and organic compounds of the environment or habitat of the organism. The inorganic components of an ecosystem are carbon dioxide, water, nitrogen, calcium, phosphate, all of which are involved in matter cycles (biogeochemical cycles).

The organic components of an ecosystem are proteins, carbohydrates, lipids and amino acids, all of which are synthesized by the biota (flora and fauna) of an ecosystem and are reached to ecosystem as their wastes, dead remains, etc, The climate, temperature, light, soil, etc., are other abiotic components of the ecosystem.

2. Producers:

Producers are autotrophic organisms like chemosynthetic and photosynthetic bacteria, blue green algae, algae and all other green plants. They are called ecosystem producers because they capture energy from non-organic sources, especially light, and store some of the energy the form of chemical bonds, for the later use.

Algae of various types are the most important producers of aquatic ecosystems, although in estuaries and marshes, grasses may be important as producers. Terrestrial ecosystems have trees, shrubs, herbs, grasses, and mosses that contribute with varying importance to the production of the ecosystem.

Since heterotrophic organisms depend on plants and other autotrophic Organisms like bacteria and algae for their nutrition, the amount of energy that the producers capture, sets the limit on the availability of energy for the ecosystem. Thus, when a green plant captures a certain amount of energy from sunlight, it is said to "produce" the energy for the ecosystem.

3. Consumers:

They are heterotrophic organisms in the ecosystem which eat other living creatures. There are herbivores, which eat plants, and carnivores, which eat other animals. They are also called phagotrophs or macroconsumers. Sometimes herbivores are called primary macroconsumers and carnivores are called secondary Macroconsumers.

4. Reducers or Decomposers:

Reducers, decomposers, saprotrophs or Macroconsumers are heterotrophic organisms that breakdown dead and waste matter. Fungi and certain bacteria are the prime representatives of this category. Enzymes are secreted by their cells into or onto dead plant and animal debris. These chemicals digest the dead organism into smaller bits or molecules, which can be absorbed by the fungi or bacteria (saprotrophs).

The decomposers take the energy and matter that they harvest during this feeding process for their own metabolism. Heat is liberated in each chemical conversion along the metabolic pathway.

No ecosystem could function long without decomposers. Dead organisms would pile up without rotting, as would waste products. It would not be long before an essential element, phosphorus, for example, would be first in short supply and then gone altogether, because the dead corpses littering the landscape would be hoarding the entire supply. [11]

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

Thus, the importance of the decomposers to the ecosystem is that they tear apart organisms and in their metabolic processes release to the environment atoms and molecules that can be reused again by autotrophic organisms. They are not important to the ecosystem from the energy point of view but from the material (nutrient) point of view. Energy cannot be recycled, but matter can be.

Energy must be fed into ecosystem to keep up with the dissipation of heat or the increase in entropy.

IV. IMPORTANCE OF ECOSYSTEM –

Biodiversity boosts ecosystem productivity where each species no matter how small all have an important role to play.

Ecosystem are communities of organisms and non-living matter that interact together. Each part of the ecosystem is important because this systems are inter dependent. [12]

We know that no living organism can live in isolation. We cannot survive without producers in nature. All living beings depend on other living beings in the biological community. Not only they are dependent on one another, but also each of them exist in a certain proportion. This creates a complete balance in nature amongst living organisms. This is evident from the study of food chains which operate between living organisms.

Resource condition impacts are a direct result of the land use through which the community and industry derive ecosystem services from our environment. Land use (or more specifically, land use practice) is in turn impacted by external factors or stressors such as climate, world economic trends,and government regulation and policy. Land use is also impacted by feedback loops associated with deriving ecosystem services and impacts to natural resources. [13]

Ecosystems are all responsible for keeping the planet as a whole in balance. Animals and other life forms can only thrive if their ecosystems are thriving as a whole. And, the lives of humans are very much dependent on the life of all of the ecosystems in the planet. Though ecosystems can be thought of as distinct systems, they are also all connected with each other and if one ecosystem starts to fail this can have repercussions on other ecosystems all across the world. Ecosystems are very important for many reasons. Below, you will find seven reasons why ecosystems are so important.

1. Biodiversity: All the millions of species that exist on planet earth are sustained by their particular ecosystems. Ecosystems are thus important places for ensuring that biodiversity continues on this planet.

2. Evolution: Organisms within an ecosystem have evolved to subsist within that ecosystem. For example, marine animals have evolved to live in the sea.

3. Interconnectedness: The organisms in any given ecosystem are usually highly interconnected. For example, their relationship may be one of predator and prey, or it may be a bird whose droppings adds nutrients to the soil, enabling different plants and trees to flourish there. As such, it is important to understand that no species exists in total isolation. Rather, their habits and biology are shaped by the ecosystem in which they live. This interconnectedness is actually the reason for some of the flamboyant colors and behavior that we see in many of

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

the world's species. The need to stand out competitively within an ecosystem has led to the elaborate mating dances of spiders, for instance, and the gorgeous plumage of birds.

4. Self sustaining: The delicate balance of organisms within an ecosystem helps to keep that ecosystem going. For example, you might think that removing one species of insect from a forest ecosystem would do no harm, but the presence of those insects could have been sustaining vast numbers of birds and pollinating vast numbers of flowers, trees and shrubs in the ecosystem. Without the insects, the ecosystem would not survive.

5. A reminder of the wild world: Watching how ecosystems work in a perfect balance can remind humans of the fact that nature has its own rules and that we interfere with the workings of nature at great risk. This is why it is worthwhile to listen to the opinions of biologists on how humans ought best to behave in order to preserve the planet for future generations. Observing an ecosystem, and understanding that as humans we are also organisms living within an ecosystem, can give us some useful perspective about our place within the world. Rather than purely autonomous beings, we are deeply connected to the other organisms around us.

6. Regulating the climate: The 'respiration' of forest ecosystems, and the ability of insects to pollinate wide swathes of flower meadows means that many ecosystems help to regulate the amounts of carbon in our climate. In addition, many types of ecosystem protect the earth against extreme weather: forests provide barriers to floods and storms and also prevent the soil from being eroded by the rain. Without the ecosystems that we have now, the world would be made up of very different landscapes, many of them barren.

7. Sources of food and fuel: Plants and fruits are key energy sources (rice is a staple food throughout much of the world, for example) whilst many crops can be used for biomass fuel. Used responsibly, the food and fuel that we get from nearby ecosystems can provide us with sustainable solutions to all of our energy needs. [14]

V. TYPES OF ECOSYSTEM –

(a) Terrestrial – It is much more complex than simple sediments. They contains a mixture of weathered rock fragments, soil minerals particles etc.

(b) Aquatic ecosystem –

(i) Lentic – This is a class of aquatic ecosystem that are found on land such as ponds, rivers, lakes, swamps and streams.

(ii) Lotic – This systems are similar to lentic in that they are part of the aquatic water class & the life they support is similar to that found in lentic ecosystem.

(c) Artificial – It included with terrestrial lentic and lotic some feel it is important to environmentalism to examine man-made system. E.g. – a cropland, garden, park. etc. [15]

Terrestrial ecosystems

Terrestrial ecosystems can be found anywhere apart from heavily saturated places. They are broadly classed into:

The Forest Ecosystems

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

They are the ecosystems in which an abundance of flora, or plants, is seen so they have a big number of organisms which live in relatively small space.

We can see a fantastic diversity in the fauna of the ecosystems, too.

They are further divided into:

Tropical evergreen forest: These are tropical forests that receive a mean rainfall of 80 for every 400 inches annually. The forests are characterised by dense vegetation which comprises tall trees at different heights. Each level is shelter to different types of animals.

Tropical deciduous forest: There, shrubs and dense bushes rule along with a broad selection of trees. The type of forest is found in quite a few parts of the world while a large variety of fauna and flora are found there.

Temperate evergreen forest: Those have quite a few number of trees as mosses and ferns make up for them. Trees have developed spiked leaves in order to minimize transpiration.

Temperate deciduous forest: The forest is located in the moist temperate places that have sufficient rainfall. Summers and winters are clearly defined and the trees shed the leaves during the winter months.

Taiga: Situated just before the arctic regions, the taiga is defined by evergreen conifers. As the temperature is below zero for almost half a year, the remainder of the months, it buzzes with migratory birds and insects.

The Desert Ecosystem

Desert ecosystems are located in regions that receive an annual rainfall less than 25. They occupy about 17 percent of all the land on our planet. Due to the extremely high temperature, low water availability and intense sunlight, fauna and flora are scarce and poorly developed. The vegetation is mainly shrubs, bushes, few grasses and rare trees. The stems and leaves of the plants are modified in order to conserve water as much as possible. The best known desert ones are the succulents such as the spiny leaved cacti. The animal organisms include insects, birds, camels, reptiles all of which are adapted to the desert (xeric) conditions.

The Grassland Ecosystem

Grasslands are located in both the tropical and temperate regions of the world though the ecosystems vary slightly. The area mainly comprises grasses with a little number of trees and shrubs. The main vegetation includes grasses, plants and legumes that belong to the composite family. A lot of grazing animals, insectivores and herbivores inhabit the grasslands. The two main kinds of grasslands ecosystems are:

Savanna: The tropical grasslands are dry seasonally and have few individual trees. They support a large number of predators and grazers.

Prairies: It is temperate grassland, completely devoid of large shrubs and trees. Prairies could be categorized as mixed grass, tall grass and short grass prairies.

The Mountain Ecosystem

Mountain land provides a scattered and diverse array of habitats where a large number of animals and plants can be found. At the higher altitudes, the harsh environmental conditions normally prevail, and only the treeless alpine vegetation can survive. The animals that live there have thick fur coats for prevention from cold and hibernation in the winter months. Lower slopes are commonly covered with coniferous forests.

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

Wetlands: Places in which the soil is inundated or saturated for some lenghty period of time.

The ecosystems are habitats to reptiles, amphibians and around 41% of the world's fish species. The faster moving turbulent waters typically contain a greater concentrations of dissolved oxygen, supporting greater biodiversity than slow moving waters in pools. [16]

VI. CONSERVATION OF ECOSYSTEM –

(a) Forests are important components of our environment. Rapid destruction of this important resource is a cause of concern.

(b) Afforestation, preventing reckless cutting of trees and making everyone aware of the need to conserve it will help forest conservation.

(c) Nature enjoys ecological balance only if the relative number of species is not disturbed. So, conservation of wildlife is important for the future.

(d) National parks, wildlife sanctuaries and biosphere reserves are established to protect and conserve wildlife.

(e) Such measures would ensure that the wildlife does not become extinct.

(f) Conservation of aquatic life would be ensured by removal of industries near water bodies.

Land use impacts capacity of natural resources

Consistent with other parts of this strategy review, water is considered as a combination of water resources and water for the environment. Even though it is all the same water, different land uses seek to utilise water in different ways. Agriculture, urban, peri-urban and mining land uses require access to water resources in deriving ecosystem services. Conservation and traditional land uses also require access to water, but very different indicators are used to determine the effectiveness of ecosystems in providing services demanded by different land uses.

All land use requires access to soil, but agriculture has a specific soil requirement. Agriculture causes soil properties to change from their natural state, resulting in reduced soil water repellence and increased fertility, but can also dramatically reduce soil health, including its structure, biota, pH, cation and anion concentrations, and stability.

All land uses require access to the atmosphere, with agriculture and biota entirely reliant on its capacity to deliver sufficient rainfall to maintain the current structure and function of associated ecosystems. Evidence indicates that agriculture may influence regional atmospheric conditions; the climate of the ARB has already been adversely impacted through the combination of various external stressors that may include the impacts of region deforestation.

Traditional land use requires access to all natural resources. In its historic context, traditional land management in Australia involved active management of the ecosystem in deriving a range of ecosystem services.

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VII. FUNCTION OF ECOSYSTEM –

(a) The Producers, the green plants, fix radiant energy(solar energy) and with the help of minerals take from their edaphic(soil where they grow) or aerial environment and build up complex organic matter. These are their food. So, with the help of solar energy they convert the chemical energy of the food to kinetic energy and finally heat energy.

(b) The animals eat up plants and other animals as food. So, the energy is transferred through food to animals.

(c) When plants and animals die, then decomposers(like certain bacteria and fungi) act on their dead bodies and decompose them into simple materials like carbon dioxide, water and minerals which go back to air, water bodies and soil from where they were taken.

At a basic functional level, ecosystems generally contain primary producers capable of harvesting energy from the sun by photosynthesis and of using this energy to convert carbon dioxide and other inorganic chemicals into the organic building blocks of life. Consumers feed on this captured energy, and decomposers not only feed on this energy, but also break organic matter back into its inorganic constituents, which can be used again by producers. These interactions among producers and the organisms that consume and decompose them are called trophic interactions, and are composed of trophic levels in an energy pyramid, with most energy and mass in the primary producers at the base, and higher levels of feeding on top of this, starting with primary consumers feeding on primary producers, secondary consumers feeding on these, and so on. Trophic interactions are also described in more detailed form as a food chain, which organizes specific organisms by their trophic distance from primary producers, and by food webs, which detail the feeding interactions among all organisms in an ecosystem. Together, these processes of energy transfer and matter cycling are essential in determining ecosystem structure and function and in defining the types of interactions between organisms and their environment. It must also be noted that most ecosystems contain a wide diversity of species, and that this diversity should be considered part of ecosystem structure.

Ecosystems use energy and cycle matter, and these processes also define the basic ecosystem functions. Energetic processes in ecosystems are usually described in terms of trophic levels, which define the role of organisms based on their level of feeding relative to the original energy captured by primary producers.

As always, energy does not cycle, so ecosystems require a continuous flow of highquality energy to maintain their structure and function. For this reason, all ecosystems are "open systems" requiring a net flow of energy to persist over time—without the sun, the biosphere would soon run out of energy!

Energy input to ecosystems drives the flow of matter between organisms and the environment in a process known as biogeochemical cycling. The biosphere provides a good example of this, as it interacts with and exchanges matter with the lithosphere, hydrosphere and atmosphere, driving the global biogeochemical cycles of carbon, nitrogen, phosphorus, sulfur and other elements. Ecosystem processes are dynamic, undergoing strong seasonal cycles in response to changes in solar irradiation, causing fluctuations in primary productivity and varying the influx of energy from photosynthesis and the fixation of carbon dioxide into organic materials

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

over the year, driving remarkable annual variability in the carbon cycle—the largest of the global biogeochemical cycles. Fixed organic carbon in plants then becomes food for consumers and decomposers, who degrade the carbon to forms with lower energy, and ultimately releasing the carbon fixed by photosynthesis back into carbon dioxide in the atmosphere, producing the global carbon cycle. The biogeochemical cycling of nitrogen also uses energy, as bacteria fix nitrogen gas from the atmosphere into reactive forms useful for living organisms using energy obtained from organic materials and ultimately from plants and the sun. Ecosystems also cycle phosphorus, sulfur and other elements. As biogeochemical cycles are defined by the exchange of matter between organisms and their environment. [17]

VIII. CONCLUSION –

An ecosystem is a large community of living organisms in a particular area. The living and physical components are linked together through nutrient cycles and energy flows. An ecosystem is a community of living organisms in conjuction with the non-living components of their environment interacting as a system. These biotic & abiotic components are regarded as linked together through nutrient cycles. The impact of humans has caused a number of dramatic changes to a variety of ecosystem found on the Earth.

Ecosystems are composed of organisms interacting with each other and with their environment such that energy is exchanged and systemlevel processes, such as the cycling of elements, emerge. The ecosystem is a core concept in Biology and Ecology, serving as the level of biological organization in which organisms interact simultaneously with each other and with their environment. As such, ecosystems are a level above that of the ecological community (organisms of different species interacting with each other) but are at a level below, or equal to, biomes and the biosphere. Essentially, biomes are regional ecosystems, and the biosphere is the largest of all possible ecosystems.

Ecosystem science is evolving rapidly in both methodology and focus. Human alteration of ecosystems is now so pervasive globally that ecologists are working to integrate humans into ecosystem science at many levels—including the study of urban ecology, agroecology and global ecology. New techniques for ecosystem modelling are being developed all the time, as are new methods for observing ecosystems from space by remote sensing and aerial platforms, and even by networks of sensors embedded in soils and plants across ecosystems and on towers that can make observations on ecosystem exchanges with the atmosphere on a continuous basis.

People, animals and plants depend on healthy ecosystems. Our everyday lives and luxuries would not be possible without their services and resources (SER).

"We abuse the land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." Restoration gives us an opportunity to improve our relationship to the ecosystems we depend on, and allows us to become a constructive part of the communities that create our region's natural environment. [18]

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