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ECOLOGY AND SOIL RELATIONSHIP: THE KEY TO EFFECTIVE ECOSYSTEM INTERACTION

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ABSTRACT

This paper recognizes the fact that soil is an "entity" that has the capacity of integrating all other biological, chemical and mineral properties together with the combination of physical climate elements in providing the needed nutrients for ecological potential that encourages the survival growth and development of both micro-organisms, macro-organisms and other vital plant species found in any ecological habitation. The paper also stress that ecology is that community of species with multiple abundance of living organisms that coordinate interaction between organisms and within organism and their environment-physical abiotic factor which include its climate and soil as well as other microorganisms that shares habitat (micro-organisms and macro organisms). The paper further reveals that the interaction that take place within these various organisms and other physical environment result to interdependent and interconnected relationship between and within components of the environment and maintained that this interconnectivity and interdependent relationship can be compromised by a single introduction of toxic chemicals and vegetation clearing, including change in climate elements; all will amount to change in the soil ability to perform thereby affecting ecological stability that in-turn constitute ecological challenge to ecosystem interdependent relationship. The paper further exposes the values of ecology and soils to both human and the environment and maintain that their values depends on the richness and variability of its biological diversity; as such, the paper canvasses for the protection and affective management of ecological areas for ecological sustainability.

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INTRODUCTION

The inter-relationship among the various organisms and their inter-dependent roles plays major function in the stability of an ecosystems and their surroundings.

The elimination or distortion of any of these organisms affect the effective functioning of that ecological area and by extension leads to unfortunate consequences. Elimination or distortion of species arises when there is either abuse or over or excessive utilization or deleterious applicability of chemical substance that coarse the environment and its organic and inorganic relationship (i.e. the abiotic and biotic minerals), thereby causing damage that collapse the soil nutrients that support living organisms, by so doing reducing the existing number of species found (ecological extinct)in such ecological area, eventually causing the specie to become extirpated such that the area can no longer fulfill its ecological role in the ecosystem.

Ecology which is the community of all species together with the soil combine to form an interdependent relationship that help to maintain the vital ecosystem processes that makes both the possibility of eco-stability and that of human life possible on the plant. The relationship between soil and ecosystem essentially leads to the processes that enhances almost all the life supporting need of man and his environment , this relationship helps in the provision of oxygen for breathing, water to drink and support the breaking process of decomposition of organic and inorganic mater as well as provision of food for human, however , this provisions and services rendered by ecology and soil can be hampered if the relationship between soil and ecosystem is in danger of compromised (Environment Canada, 2003[b]). The uncertainties in the danger of compromise between ecosystem and soil for productive depend on a number of variables; such as the Sun light required for photosynthesis which is invariably dependent on the amount and the length of the day as well as the angle of the Sun's rays, this of course differs with latitude. Photosynthesis is also

affected by factors such as soil moisture, temperature, the availability of mineral nutrients, the carbon dioxide content of the atmosphere and the age of species individual plants (Robert, et al, 2007). The relationship between ecology and soil can be used to demonstrate the potential for environmental and human benefits via the need to protect, conserve and manage our naturally occurring plants species soils and other organisms for effective ecosystem service and function.

The challenges faced by these two parameters of the environment (ecology and soil) needs in-depth inquiries for effective environmental management, protection and preservation of the ecosystem components and functions for not only ecological value but for that of human value and services. Therefore, the objectives of this paper, is to study exploratively the value of ecology and soil to both the environment and humans.

What is Ecology and Soil

According to Enger et al (2002), Ecology deals with understanding and describing of inter-relationships among organisms and between organisms and their surroundings. This science of ecology tries to study and understand the various ways organisms interact with each other in their area of habitation with their non-living surroundings that also influences their mode and services they render to their area of existence and the larger system as a whole. The existence of this complex interacting and interdependent phenomena has frequently been referred to as the biotic complex or "ecosystem", and any change affecting any single element within it, must obviously have repercussions throughout the entire system (Eyre, 1979).

On the other hand soil can be viewed based on the ideological position of two schools of thought, "the chemical and geological school"; these two ideological schools of thought saw soil from different viewpoints; and as such the chemical view point of soil is represented by the works of

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Liebig and German scientist, and Berzelius, a Swedish scientist. Liebig in his work described soil as a "chemical Laboratory of nature in whose bosom various chemical decomposition and synthesis reactions take place in a hiddenmanner"; while the geological or better still ecological school of thought, in their perspective about soil, and so represented by Ramann another German Scientist in 1917 described soil as "rocks that have been reduced to small fragments and as such have been more or less changed chemically together with the remains of plants or animals that live in or on it (Brady, et al 2002). Since the conceptualization of soil from these two ideological perspectives, many other scholars have considered soils as dependently influenced by series of other factors. In a resent time, definitions derived from the works of Dokuchaieve (a Russian) and Hilgard (an American) who independently, established that soils are related in a general way to climate, and that soils could be describe in broad geographical zones universally to coincide with the pattern described by world vegetation and climatic types.

Currently, a more complementary, more systematic and in a classical manner of soil description as put up by Joffehas describe soil as an "entity" that have the advantage and capacity of integrating and combing the physical chemical and biological composition of soils component ; Pointing out, that soil is made up of essential natural body of animal, mineral and organic constituents differentiated into horizons of variable depth which differ from the material below in morphology, physical make – up chemical compositions and properties and biological characteristics (Sharma, 2009). Now, when these soil components which of course include waterorganic materials, soil air and inorganic materials are compromised together with vegetation and its micro-organisms as a result of changes from the forces of nature such as changes in climate elements like temperature duration, amount of rainfall, length of day, and soil mineral contents, moisture range, nitrogen fixation rate, carbon dioxide content; all these ecosystems thereby

affecting plant and animal, and by extension reducing their biotic complex relationship which fundamentally aggravate the forces that alters the structure and general appearance of an ecological process and its entity. Quite apart from the effects of changes in the macroclimate, the activities of man, his applicability in the use of insecticide, pesticide, fungicides, rodenticides and herbicides (biocides all put together) on the environment constitute a major threat to ecological stability and services they provide to both man and his environment; this is not only because of the vulnerability of pesticides to pest death but the fact that this can also kill a large variety of living things including damaging the soil organic and inorganic mineral characteristics, so also does herbicides kills variety of plants (both pests and non-pests) thereby compromising the value of an ecological services and function.

Ecological function and soil relationship can as well be altered and damage when there is a constant removal or modifications of the original vegetation such that leaves such area with necked soil to undergo the influence of denudativeprocesses thereby affecting all other elements in the biotic complex of such ecological function; which also affects the microclimate and water availability budget occasioned by inactive evapotranspirative process of the area.

Environmental Implication of not Managing Ecology and Soils of Species Community:

Basically, both human and natural processes mount – pressure on the ecosystems to undergo change; but these pressure that causes change should always be distinguishable between those that are essentially the result of natural processes and those that are the result of human activities (Bruce et al, 2009).

can constitute potential threat to ecological stability and soil value of that It is important to note that it is the ecosystem that harbors the varying species of biological lives that inter-depend on

each other for survival together with the physical surroundings; and the energy and matter flows here freely to different population of the species in a particular eco-community interacting with the physical environment and these environment range greatly in scale and as such each of this environment weather small, big, large, natural or manmade, terrestrial or aquatic) operate an open system of energy and matter flow and as such exchange materials and organisms with other ecological area. The richness of any species community depends on the availability of different living organism which is its biome). The effectiveness and richness of any ecological area can be hampered or challenged by the effect of climate elements (abiotic components) arising from lack of water availability, ineffective temperature, short duration of light levels, inadequate nutrient availability and moisture content in the soil; together with soil characteristics such as the PH, soil type and nutrient status, all these among other factors accelerate to regulate the rates of photosynthesis within any ecological – set up and of course build an effective biome for ecological service and function.

Ecological potential is again aided by the role played by independent species in any process and services. The coherency in the interdependent relationship among the various species may face challenge arising from the use and applicability of deleterious substances within such ecological area when this happens, species of such community began to face competition for scarce environmental resources; this is because each species needs a specific combination of the physical, chemical, and biological conditions for its growth and survival– (i.e. the niche potential of a given specie)

The difficulties most ecological area face is the challenge pose by the soils of a given species community. Most soil are less potential and as such can't play their critical role for effective ecological interaction. Soils are critical when it comes to determining the vegetation growth and

ecological stability; because, soil is a mixture of inorganic materials such as clay, sand and pebbles, decaying organic matter with the presence of water and air; all that also contains mixture of millions and billions of microorganisms that constantly modifies and develop the soil for ecological richness and function but when the soil is threatened by the introduction of chemicals that pose acid deposition on the environment, it becomes implicatary to the potential performance of ecological components.

The complex ecological process and performance can face environmental challenge the moment such ecological area began to experience acid deposition or chemical pollution. This can change the soil characteristics, thereby causing the soil to leach away the nutrients required for the growth of plants and as such, that area could also face deficient in mineral nutrients, at the same time damaging the bacteria that critically enhance the biogeochemical cycle of the ecological chemistry causing changes in natural soil processes thereby retarding vegetal decomposition and soil humus formation, this effect could also cause the death in many of its organisms both insects, mites, warms, bacteria, fungi and many others critically involved in ecological functioning and biogeochemical cycling and energy flow (Chestmit, 2005).

The Environmental and Human Value of Ecology and Soil

There are several values that the environment and human beings can derive from the ecological area when they are not under any threat or danger. According to Philip et al (2009), these values can be divided into consumptive (i.e. the organism is harvested) and non-consumptive (ie. Theorganism is not harvested or the resources is not destroyed), asserting that there is no universally accepted framework for assigning these ecological value of any biological diversity.

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However, the ecological services rendered to both the environment and human depend on the richness of varying biological diversity of such community; and so these services or value can be measured via the role they play to their ecological setting, Economic value, Ethical value and Cultural value.

(i) Ecological setting (Value):

The interdependent role played by each species requires their protection and conservation in other to avoid their elimination or extirpation that will affect the functioning mechanism of the ecosystem communities; the moment the changes that threatens the effective existence and the symbiotic relationship that exist among other organism that interact to influence the ecological process are not under control, this could lead to unfortunate consequences on both the interdependent relationship that exist between the ecological process and soil relationship.

Consequently, the services provided by all the ecological species combine together to maintain the vital nutrients that improves ecosystem processes that encourages the growth of habitat and niche enrichment for the growth of individual species population growth.

The resultant benefit of soil stability encourages soil compressibility in ecological area where there is soil enrichment and effective vegetation growth which in turn makes life possible and easier for the supply of oxygen for respiration, evapotranspiration for ecosphere connectivities, sub surface water table regulation and the web building process as well as that which provide avenue for decomposition process that enriches the soil matter and energy cycle together with climate element influence; all play ecological service that enhances value.

All species are important and play independent and interdependent roles and therefore should be protected and managed for their continuous, future enhancement for effective genetic

preservational role on the environment. Each of the ecological setting sustains life, filter and purify the environment, conserve soil nutrients, protect species against pests and provide safe ground for their habitation.

(ii) Economic Value:

The economic service or value provided by the ecosystem are so enormous because of the benefit man derives from the conservation of ecological area. Countless products used in agriculture activities and industrial production comes from the ecological communities. The ecosystem provides man with over 90% of the world food supply, construction materials, energy and medications and other essential services (Ackerly et al, 2012).

Most of the ecological plants and other species of the world have not been tested before for human food potential, some of these plants and species may become important food need for the future and so deserves conservation for the benefit of the future generations.

Essentially, some wild animals and other species provide an important source for food and raw material for industrial use and production of other products; example of these are Rubber vegetation for the production of chemicals and caws for the production of corn beef products, corn or Maize, Mango, Orange, Apples, fruits, varying bush meat and other domestic animals. There are also many other chemicals produced by plants that are essentially good for the production of pharmaceutical products.

The economic benefit of many of the species drive from nature is some time difficult to evaluation; take for instance natural gene that generate pools that provides us with the source of material that help to aid in the development of new genetic strains for crop needed to feed the world increasing population.

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The ecological relevance of an ecosystem is such that provide humans with array of economically important services that aid man's survival in a multidimensional provision that even enhance essential service to commercial crops; by providing pollination of flowers to diverse species of wild bees, wasp, butterflies, and other insects; according to Environment Canada (2003b), only honeybees alone account for more down that 30 percent of all food product that human depend upon.

Most ecological value of an area essentially provide natural predator – pre relationship that aid in food production, which help to encourage yield in agricultural product that enhances balance diet in human health; hence, predators such as woodpickers are economically important in the service andcontrol of pests; this kind of predator – pre relationships significantly reduces the effects of pests on valuable ecological services and of course reduce the need to apply biocides to control pests; such biocides that normally degrade and deteriorate ecological status and soil nutrient that reduces its inter-dependent relationship with other Ecosystems.

Ethical Value:

A major role in biogeographical application is the understanding of the various interplay relationship that exist between the various species of a given community which today has added value to the way we view biotic community from an ethical and moral perspective.

Here the need to preserve all species of a given ecological area regardless of their use value to humans is of important because of their role and values to both nature and human beings, and as such these could spell danger if their needed roles is altered. The responsibility of protecting and conserving all ecological species are of great important to man, and as such should have amoral

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right to respect the survival of their existence and protect them from been extinct as a result of various man's activities and substance applicability.

The idea of this thinking (Philosophy) is important in other to allow each of the organisms have a continuous existence for interdependent relationship. This philosophy holds that humans are also part of the larger biotic community, in which case all species have rights to exist, respected and be protected for the benefit of man and his environment. This is one of the reason why anthropologists has propose that all living organism should be protected in other to enhance cultural, ethnical and biological roles for effectivelive inter-dependent for the stability of ecological function and for the benefit of man. This anthropocentric view of life herefavours the protection of species with an economic and or ecological use to sustain humans (Millenium Ecosystem Assessment, 2005).

Conclusion and Recommendations

In conclusion, ecological relationship with soil is as important as the role played by each of soil components and living organisms of that ecosystems, and as such any introduction of substance involving chemicals whether such chemical is liquid, gaseous or solid alters the soil characteristic in terms of pH, nutrient, moisture and organic matter, and as such threatens the soil quality and reduce the inter dependent relationship between soil and its abiotic elements and living organism, these invariably leads to untold consequences on both the environment and man.

The value these two conceptual phenomena (ecology and soil) offers to the environment greatly improves the stability of the ecosphere leads to the generation of effective services and function for interdependence among various organisms whose survival deeply depends strongly on the protection and conservation of the ecosystem. The protection and conservation of the species community will require the management and effectiveconservation of soil and ecological

resuscitation, which will in the long run bring about an improved ecological sustainability and effective soil-ecological relationship that will improve interdependence of the various eco-relationship.

This paper, having diagonals the interplay existing between soil and ecological process that enhance environmental stability, it become obvious that ecological problem and challenge arise from the initiation of disturbance that destroys soil organic status and mineral elements that leads to the extirpation of living organism inhabiting within such ecological area and by extension constituting challenge to the effective interaction and interdependent relationships between them and other functional ecological communities. The paper therefore recommend for an environmental assessment Audits for most of the ecological status of the world; this will bring in monitoring protection and conservation of ecological management for effective eco-interaction and interdependent for efficient ecological stability and services.

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