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THREATS TO BIODIVERSITY AND THE ROLE OF CONSERVATION BIOLOGY FOR FUTURE SUSTAINABILITY: A REVIEW

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Abstract

More than half the habitable surface of the Earth has already been significantly altered by human activity. Therefore, this review was conducted to show threats to biodiversity and the role of Conservation Biology for future sustainability. Scientists suggested that this planet's species are on the verge of mass extinction while our knowledge of diversity and variability of plants, animals, microorganisms and the ecosystem in which they occurs incomplete. Humans' pressure affect biodiversity by: (1) over harvesting of resources, (2) Habitat destruction, conversion, fragmentation of habitats i.e. degradation and loss, (3) introduction of exotic or invasive organisms and diseases i.e. non- native invasive species (4) Pollution of soil, water and atmosphere, and (5) global environmental change. Conservation Biology is a new stage in the application of science to conservation problems, addresses the biology of species, communities, and ecosystems that are perturbed, either directly or indirectly, by human activities. In addition, it is a multi-disciplinary field that provides 3 overriding principles to guide conservation: First, evolution is the basis for understanding all of biology, and should be a central focus of conservation action. Second, ecological systems are dynamic and non-equilibrial, and therefore change must be a part of conservation. Finally, humans are a part of the natural world and must be included in conservation concerns.

Keywords: Biodiversity Threats; Conservation Biology; Habitat Destruction; Human Population.

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1. Introduction

Biodiversity can be defined more broadly incorporating not only living organisms, but also their complex interactions with one another and with the nonliving aspects of their environment as: The variety of life on Earth at all its levels, from genes to ecosystems, and the ecological and evolutionary processes that sustain it. People aware of biodiversity after they started to ask themselves are we facing biodiversity loss? These and similar questions have been asked due to the accelerating loss of species, populations, domesticated varieties and natural habitats such as tropical rain forests and wetlands (GBS, 1992).Truly asking questions on diversity of life have occupied peoples mind for as long as we have inhabited this planet (GBS, 1992). Recent estimates suggest that more than half of the habitable surface of the planet has already been significantly altered by human activity. These concerns have been coupled with a realization that our knowledge of the diversity and variability of plants, animals, microorganisms and the ecosystem in which they occurs is far from complete (Lovejoy, 1980).

Human activities have been greatly reduced the biological diversity of the world in various ways: Habitat loss by altering land for agriculture, grazing livestock, draining wetlands and deforestation, Polluting the air, soil and water through indiscriminately using of chemical compounds such as herbicides, insecticides are, greatly affect biodiversity. The destruction of forest ecosystem is also heavily continued with alarming rate. Human population growth does much more than simply causes a proportional decline in biodiversity. Each additional person will have a disproportionate negative impact on biodiversity in general. The first farmers started farming the richest soils they could find and utilized the richest and most accessible resources first (Ehrlich and Ehrlich, 2005). Now much of the soil that people first farmed has been eroded away or paved over, and agriculturalists increasingly are forced to turn to marginal land to grow more food.

Habitat loss is particularly acute in developing countries, which are of special concern because these harbor the greatest species diversity and are the richest centers of endemism. Due to this, there is now a pressing need to educate the generation about conservation biology in developing countries, so that hopefully they are in a better position to protect their natural resource (Sodhi and Ehrlich, 2010). Despite increased efforts on conservation is going on, it has not been enough and biodiversity losses are still continuing. The costs associated with deteriorating and vanishing ecosystems will be very high. Being the dominant species on Earth, humans have a moral obligation to ensure the long-term persistence of biodiversity. In addition to this, we (humans) have a selfish reason to preserve nature – it provides society with countless and invaluable goods and absolutely crucial services (e.g. food, medicines, pollination, pest control, and flood protection).

The objective of this writing is therefore, to review threats to biodiversity and the role of Conservation Biology for future sustainability.

2. Human Pressure and Threats to Biodiversity

Globally, humans are now the dominant factor which can influence on biodiversity. Furthermore, the main force driving the global transformation of the biosphere is human population growth,

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together with increasing resource consumption and socio-cultural change. Inevitably, this raises the question of carrying capacity of the planet and whether we can continue to increase our demands on it without limits or not. Strictly speaking, no part of the world is considered truly undisturbed by human. The worlds‟ habitats have been significantly modified by anthropogenic actions and undisturbed or virgin forest is now days considered as a protected lands. Hauff (2002) in his sustainability analysis pointed out that, due to poverty forces many people to strip away too many valuable resources and biodiversity is under threat at alarming rate.

Australian Museum (2005) released a report on earth history and it states that, Earth has 5.5 billion years of history; so far there have been five major mass extinctions recorded. The most recent of which, 65 million years ago and killed the complete populations of all dinosaurs on earth. Currently extinction rates rivaling or exceeding the rate of the prehistoric mass extinctions. Although majority of all animals that once lived on earth are now extinct, the mass destruction attributed to one species (our own) is apparently unique in the earth's history". This indicates that biodiversity loss can be attributed to the resources demands of our rapidly growing human population. In recent times, the human population has increased to almost more than 7 billion today. Like other living beings, humans use the natural resources to survive, but humans are far resourceful and destructive to other life forms than any species previously known.

The major human influences which affect biodiversity can be: (1) over harvesting of resources, (2) Habitat destruction, conversion, fragmentation of habitats i.e. degradation and loss, (3) introduction of exotic or invasive organisms and diseases i.e. non- native invasive species (4) Pollution of soil, water and atmosphere, and (5) global environmental change. As the world human population increases, all the organisms on Earth including humans must have share the same limited resources (food, space, water, and others). Yet there is less and less natural habitats are remaining as land for humans‟ habitation and activities. Humans are one of the components of biodiversity. There was harmonious co-habitation of humans and biodiversity on the primitive earth i.e. dynamic equilibrium existed between biodiversity and humans. Later on because of the following major changes human beings put heavy pressure on biodiversity: (1) Fast in growth of human population, (2) Increasing human needs, (3) Fast in domestication of animals, (4) Increase in human competence with technological advancement to exploit the biodiversity (GBS,1992).

3. Conservation Biology: A Tool for Future Sustainability

Conservation biology is the study and practice of evaluating the status of extant organisms and developing techniques to manage their populations for future sustainability, including methods to bring endangered organisms back from the threat of extinction. It is a new stage in the application of science to conservation problems, addresses the biology of species, communities, and ecosystems that are perturbed, either directly or indirectly, by human activities or other agents. Its goal is to provide principles and tools for preserving biological diversity (Soulé, 1985). Therefore, three overriding principles guide conservation biology. First, evolution is the basis for understanding all of biology, and should be a central focus of conservation action. Second, ecological systems are dynamic and non-equilibrial, and therefore change must be a part of conservation. Finally, humans are a part of the natural world and must be included in conservation concerns.

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Exponential human population growth in the last few centuries has affected the natural world to the extent that massive alteration of habitats and associated biological changes threaten the existence of millions of species and basic ecosystem processes. The field of conservation biology developed as a response of the scientific community to this crisis. The "new" conservation biology differs from traditional resource conservation in being motivated not by utilitarian, single-species issues, but by the need for conservation of entire systems and all their biological components and processes (Soulé, 1986). Conservation practices have a varied history around the world, but generally have focused on human use of resources.

Conservation biology rests upon a scientific foundation in systematics, genetics, ecology, and evolutionary biology. As the Modern Synthesis rearranged the building blocks of biology, and new insights emerged from population genetics, developmental genetics (heritability studies), and island biogeography in the 1960s, the application of biology in conservation was bound to shift as well. This found expression in conservation biology's primary focus on the conservation of genetic, species, and ecosystem diversity (rather than those ecosystem components with obvious or direct economic value).

Conservation biology paid attention to the entire biota; to diversity at all levels of biological organization; to patterns of diversity at various temporal and spatial scales; and to the evolutionary and ecological processes that maintain diversity. In particular, emerging insights from ecosystem ecology, disturbance ecology, and landscape ecology in the 1980s shifted the perspective of ecologists and conservationists, placing greater emphasis on the dynamic nature of ecosystems and landscapes (Pickett and White, 1985; Forman, 1995).

Conservation biology is an interdisciplinary, systems-oriented, and inclusive response to conservation dilemmas exacerbated by approaches that were too narrowly focused, fragmented, and exclusive (Soulé, 1985; Noss and Cooperrider, 1994). It provided an interdisciplinary home for those in established disciplines who sought new ways to organize and use scientific information, and who followed broader ethical imperatives. It also reached beyond its own core scientific disciplines to incorporate insights from the social sciences and humanities, from the empirical experience of resource managers, and from diverse cultural sources (Grumbine, 1992; Knight and Bates, 1995).

4. Conclusion and Recommendation

Few people are familiar with the word "biodiversity," yet everyone is intimately connected with biodiversity in their daily life. Humanity's fundamental reliance on and connection with natural systems creates an imperative to understand and protect biodiversity. To conserve biodiversity, we need to understand what biodiversity is, determine where it occurs, identify strategies to conserve it, and track over time whether these strategies are working. The first of these items, knowing what biodiversity is, and therefore what to conserve, is complicated by the remarkable diversity of living things themselves.

Conservation biologists seek to maintain three important aspects of life on Earth: the natural diversity found in living systems (biological diversity); the composition, structure, and function

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of those systems (ecological integrity); and their resiliency and ability to endure over time (ecological health).

5. Recommendation

Unlike the previous extinction events, which were attributed to natural catastrophes, the current mass extinction is exclusively humanity's fault. Therefore, all interventions should incorporate relevant education and acquisitions of multidisciplinary skills and enhance information exchange at grassroots, regional and international levels. Since it is developing countries where the rates of habitat loss are highest and therefore, biodiversity loss, there is a need to educate the generation about conservation biology and hence, how to protect biodiversity and increase sustainability of life on the Earth.

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