Research Paper

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Need of New Conservation Paradigm Due to Climate Change in the Age of Humans.

Environment Science

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ABSTRACT

In what is being called the Anthropocene epoch, the Age of Humans, we have become a force of nature. Humans have dramatically changed the speed, pathways, and components of the biogeochemical cycles of the Planet. Aquaculture, urbanization adds new habitats that pose novel challenges and opportunities to the survival of organisms and species. The undergoing changes of the biota that result from the environmental shifts affect the rate or speed of ecosystem functioning, but not the fundamental functioning of ecosystems. New paradigm for conservation in the Anthropocene could be applying adaptive conservation to all human activities. This notion is different from traditional conservation in that conservation principles are relevant to all human activities, not to protected areas only.

INTRODUCTION

We share this planet with millions of other living beings starting from micro-organisms and bacteria, lichens to big trees, big animals (Biodiversity). We all human beings along with all living organisms form a complex web of ecological system in which we are only a part and very much dependent on this system for our existence.

In what is being called the Anthropocene epoch, the Age of Humans, we have become so numerous, our technologies so powerful, and our societies so interconnected that we have become a force of nature. The presence of billions of human beings on Earth represents a major source of environmental change. Human-driven climate change is only one of many challenges that our natural resources must face during the 21st century and beyond.

The potential rate and magnitude of future warming driven by continued fossil fuel combustion could be unprecedented during the last 56 million years. Worldwide, 2001-2010 was the warmest decade on record since thermometer-based observations began. Global average surface temperature has risen at an average rate of 0.15°F per decade since 1901 (NOAA,National Oceanic and Atmospheric Administration, 2014) .Our artificial nitrogen fixation now matches or exceeds natural production of available nitrogen worldwide, we change the appearances of continents through land use practices, rising sea levels, and shrinking ice masses, we disperse some species widely while driving others to extinction, and we direct evolution through changes in gene flow, selective breeding, and genetic engineering. The human presence affects the very survival of organisms (e.g. Forests) as well as their distribution, reproduction, and community structure, and it will make the *ecological consequences of future climatic changes unique in the history of the planet.*

The biogeochemical cycles influence all life's processes including the productivity of agriculture and natural ecosystems, and the availability of critical elements to plants, animals, and anthropogenic systems such as cities. These cycles used to be 100 percent under the control of natural forces. Today, humans have dramatically changed the speed, pathways, and components of the biogeochemical cycles of the Planet. Thus, the critical elements that sustain life on Earth are increasingly under anthropogenic control with unexpected consequences. Problems such as those of acid rain, water eutrophication and ocean acidification are examples of unexpected consequences of the alteration of the biogeochemical cycles.

Floods are causing a lot of damage + Droughts are causing a lot of damage! These two extreme weather conditions will occur much more often! Some scientists say that rapid climate shift, climate disruption, climate shock, climate breakdown, climate failure, are better explaining words than the word climate change. In light of these we must look for new paradigms for conservation.

General Approach and Methodology:

A survey was undertaken for fish farmers. The survey was undertaken using the survey questionnaire.

Survey data was extracted from either farmer records. The gathered information was analysed to identify the parameters that influence production and to identify suitable strategies that could improve carp farm profitability. Database was used. **Objective** was to find out how effective our conservation strategies are! What can be new paradigm in the light of changing climate?

Observations

1. Aquaculture:

The State of Punjab is emerging as the major carp farming state of India with several farmers diversifying from wheat and paddy cultivation into aquaculture. Punjab aquaculture has now established itself as a profit making venture and as a means of diversification from agriculture. In surroundings of Barnala, any fish farms are there where **grass carp (*Ctenopharyngodon idella*)** along with other fishes like silver carp, rohu, catla etc. are being cultured. Stocking of grass carp both directly and indirectly influence the water body.

During the past four decades, a fish, Ctenopharyngodon idella (Cuv. and Val.) has received much attention around the world, primarily owing to the potential for its use as a biological control agent of aquatic vegetation (Sutton, 1974). In India, 382 fingerlings of this fish were brought to the Pond Culture Division of Central Inland Fisheries Research Institute, Cuttack (Orissa) from Hong Kong in December, 1959, basically for two purposes viz. to culture as food fish; and to control undesirable aquatic macrovegetation (Jhingran,1991). Farmers have put this fish to their ponds for same purposes as the cost of stocking phytophagous fish is lower than the cost of herbicidal or algaecidal control; secondly, environmentalist groups would prefer to use biological rather than chemical control methods. So, this exotic fish is available in plenty in ponds (even in the vicinity of study area).

It was found from survey that Grass carp feeds on vegetation preferably macrophytes (Fig.1),. Primary consequences of grass carp feeding included a selective decrease or elimination of aquatic plant biomass and the release of nutrient-rich excrements into the water. Nutrient rich faecal pellets can be eaten by other fish and thus increase in their productivity.

Fig. 1: Grass carp feeding on vegetation

Fig. 2: Grass Carp makes water murky

Undigested plant material released in fish faeces caused changes of water quality (Fig.2) and *accelerated eutrophication* thus *also changes in communities of producers including aquatic macrophytes* and phytoplankton and consumers (i.e., zooplankton, zoobenthos, fish, amphibians and water birds. The potential social, environmental and economic impacts of introducing exotic or 'alien' species are well documented. Invasive alien species – those that successfully colonize an ecosystem outside of their natural range – are widely considered to be agents of species and biodiversity loss in ecosystems all over the globe. Diversity does not only mean the number of species, but also their relative abundance (biomass). Both change in this case.

2. Urbanisation:

Grass carp is not one case. It is common observation that even land cover is changing rapidly. The trend is not towards land degradation but there is new trend of increasing urban cover at the expense of decreasing forest and agricultural cover .The urbanization trend expands the urban-wildland interface and fragments forestlands at accelerating rates. Urbanization adds new habitats that pose novel challenges and opportunities to the survival of organisms and species.

Fossil fuels power our civilization and enabled the onset of the Anthropocene (Crutzen, 2002). This powerful energy source is finite and the rate of discovery of new oil fields has declined. A lower level of fossil fuel availability reduces our capacity to sustain energy-intensive interventions in the landscape and forces a greater dependency on ecological processes and systems (Odum and Odum 2001).

Such processes are there in case of forests and water. Actually we have transformed nature into a resource obtaining directly or indirectly from forests and wildlife. The greatest damage inflicted on forests was due to expansion of railways, agriculture commercial and scientific forestry, mining activities, large scale developmental projects like river valley projects etc. All these have depleted forests. But these activities have created new types of habitats for other type of organisms.

Water scarcity may be an outcome of large growing population. But reports show that where water is available people still suffer from water scarcity may be due to bad quality of water. Much water is polluted by domestic and industrial wastes, chemicals pesticides fertilizers etc. Water intensive and commercial crops require more and more water. This has great ecological consequences like salination of the soil which in turn will affect the fauna and flora in the soil.

DISCUSSION

Dealing with the complexity of a changing world requires that all human knowledge be integrated in a new integral way of analyzing complex problems or situations to respond to the complexities of the Anthropocene where both social and ecological systems interact under novel environmental conditions in ways that could not be imagined 100 years ago.

Historical ecosystems might be facing the "living dead" reality. So we need to realize that at this moment, all biota of the world are in a continuous state of change in reaction to altered environmental conditions at local and global scales. There is abundant evidence of the changing environmental conditions and their effects on the biota, so much so that the volume of information can be overwhelming and difficult to interpret. In other words, how do we conduct conservation in the midst of apparent chaotic changes? The fundamental forces that drive the structure, functioning, and species composition of ecosystems are being dramatically affected by human activity. Human activity changes the natural disturbance regime of ecosystems to new disturbance regimes that include both anthropogenic and natural disturbances acting in synergy. Understanding disturbance regimes is important because they affect the successional pathways, the age of forests, and the level of their structural development (Johnson and Miyanishi, 2007). They also affect species composition.

- The resulting environmental conditions after a disturbance are novel such as on degraded lands, inside cities, or at the interface between urban and wild lands. We are surprised after disturbances, particularly anthropogenic ones, because introduced species can replace native ones. Native species lose their "home-court advantage" because the home court is no longer present, and the possibility of species invasions increases, leading to a paradox where local species are less competitive than introduced ones.
- Similarly, changes in land cover and urbanization lead to landscape fragmentation, which in turn affects landscape function and vulnerability to disturbances such as fire or species migration. Dealing with surprises and paradoxes is one of the great challenges of modern conservation. Human activity and disturbances also set the biota in motion as shifts in environmental conditions induce species migrations. The movements are accelerated by introductions of species. As a result, species composition of affected ecosystems changes to novel combinations. The overall expression of life, termed biodiversity, changes in the Anthropocene because of the many changes in the biota and the habitats where they live. Humans enrich the biodiversity of forest stands, landscapes, countries, and regions by creating new habitats and novel plant and animal communities
- Conservation discussion has been on the reduction of diversity by human activity through species extinctions, which obviously represents a serious threat to the conservation of all parts. However, the full range of human effects on biodiversity requires attention because even evolutionary processes are accelerated by human activity as has also been pointed out by (Cox 2004). An accelerated evolution rate through hybridization is an adaptive natural response to novel anthropogenic environments.
- The undergoing changes of the biota that result from the en-

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vironmental shifts discussed earlier affect the rate or speed of ecosystem functioning, but not the fundamental functioning of ecosystems. For example, increased temperature will accelerate the respiration of organisms while changes in the quantities of carbon, nitrogen, and phosphorus will affect nutrient cycles and productivity of ecosystems. This means that rates of ecosystem processes accelerate, decelerate, or maintain the same speed, but the processes themselves might not change.

- When environmental conditions change, or an ecosystem is disturbed, it is normal to observe changes in rates of processes, species composition, and ecosystem structure. This is called ecological succession. USDA Forest Service However, when ecological succession involves introduced species, some conservationists deem the process "unnatural" and thus open to anthropogenic intervention.
- However, in the Anthropocene, before engaging in species eradication we need to understand the ecological processes in progress including the possibility that those species that we wish to eradicate might already be naturalized components of well-established novel communities. The eradication of naturalized species is subject to unexpected ecological risks that could affect the whole ecosystem (Zipkin *et al.* 2009).
- In the Anthropocene, instead of restoring ecosystems we will have to rehabilitate them in the context of new environmental conditions with an emphasis on functioning and ecosystem services rather than species composition. Efforts to modify it should be done cautiously and only when knowledge and resources are available to assure long-term success. Clearly a land ethic is imperative for any era of conservation as is the need to preserve wilderness.
- **New paradigm for conservation in the Anthropocene** could be applying adaptive conservation to all human activities. This notion is different from traditional conservation in that conservation principles are relevant to all human activities, not just in protected areas, and that conservation must be adaptive and dynamic to keep pace with our changing world. The Anthropocene requires that we adapt to novelty and the unpredictability of the environmental context. Thus, a new paradigm of conservation must recognize that all species have a potential role to play when conditions turn uncertain. Moreover, species should not be judged by their geographic origin, but by their function in the communities they occupy (Davis, Chew and Hobbs, 2011). In the Anthropocene, declining energy resources will again make us dependent on the natural productivity of the land (Odum and Odum, 2001), which we must protect at all costs. So conservation principles must shadow all human activities if we are to prosper in the Anthropocene.

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