E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2017; 5(6): 198-200

www.fisheriesjournal.com
Received: 19-09-2017
Accepted: 22-10-2017

Raj Vir Singh Ojha
Department of Zoology Raja Balwant Singh College, Agra, Utter Pradesh, India

Correspondence
Raj Vir Singh Ojha
Department of Zoology Raja Balwant Singh College, Agra, Utter Pradesh, India

Effects of global warming on marine ecosystems

Raj Vir Singh Ojha

Abstract
Major oceans of the world, Atlantic, Pacific, Indian, Arctic and Antarctic cover approximately 70 percent of the earth's surface. Each ocean indeed represents a very large and stable ecosystem. Marine ecosystems are very diversified and involved in a complicated net of internal and external intercommunications. Their evolutionary history and present adaptive possibilities strongly depend on variability of climate conditions. Ocean basins in equatorial, tropical, and moderate zones are distinguished by the stability of environmental parameters and less affected by climatic anomalies. On the contrary, polar oceans were the arena of significant ecosystem changes in the geological past, and their response to natural and anthropogenic impacts is essential in many respects. Climate induced changes and other less-understood anthropogenic changes will be superimposed on other impacts resulting from human activities such as over fishing, pollution, damming of rivers and habitat loss in coastal areas. Consequently, the fundamental characteristics of marine ecosystems, some already under stress, will be altered. Whether overall global yield from marine fisheries will decline due to climate change remains unclear; however, regime shift within individual marine ecosystems and trends in fish landing for certain species will likely occur. Calcareous plankton and coral are already suffering because of more acidic and warmer seawater. Global warming as a whole is favourable for primary production and therefore for increase in biological productivity on all ecosystem levels.

Keywords: Marine environment, ecological factors, primary production, trophic chains, zoo-plankton, fishes

Introduction

The present global warming trend is understandably discussed mainly from the "terrestrial" point of view. Land, contrary to marine, meteorology adopts long and comparable series of observations. Various manifestations of warming are more numerous and evident on the continents than in the ocean. Land industrial and agricultural activity depends significantly on climate fluctuations, so all long-term economic forecasts must take into account climatic variability and trends. The "marine" approach to the problem of global warming is different in several aspects. First, the fact itself needs additional proofs because the present system of meteorological and deep-water hydrological observations in the ocean is insufficient to make definite conclusions. It is especially important for the Arctic Ocean where climatic anomalies in the past were more prominent and led to more serious ecological sequences. Second, marine ecosystems in general are more specialized, their trophic structure is more complicated and cycles of organic matter more dynamic than those of terrestrial ecosystems. Any effects of such climate change on fisheries will compound the existing problems of massive over-capacities of usage, and conflicts between fishing fleets and among competing uses of marine ecosystems [1, 2]. Increasing greenhouse gas concentrations are expected to lead to substantial atmosphere warming during this century [3]. As a consequence of atmospheric warming, we expect the warming of oceans and shifts in habitat ranges in addition to changes in algal, plankton and fish abundance in high latitude oceans to follow [3]. In some locations marine temperature has increased [4, 5, 6]; whereas, at other locations, marine are cooling [7].

However, growing human pressures, including climate change, are having profound and diverse consequences for marine ecosystems. Rising atmospheric carbon dioxide (CO_2) is one of the most critical problems because its effects are globally pervasive and irreversible on ecological timescales. Climbing temperatures create a host of additional changes, such as rising sea level, increased ocean stratification, decreased sea-ice extent, and altered patterns of ocean circulation, precipitation, and freshwater input.

Direct effects of changes in ocean temperature and chemistry may alter the physiological func- tioning, behavior, anddemographic traits (e.g., productivity) of organisms, leading to shifts in the size structure, spatial range, and seasonal abundance of populations Ecosystem deterioration is intense and increasing, particularly for coastal systems, with 50% of salt marshes, 35% of mangroves, 30% of coral reefs, and 29% of seagrasses already either lost or degraded worldwide. There is a direct link between global temperature and CO_2. The increased heating in the lower atmosphere/Earth's surface (radiative forcing) resulting from the 'greenhouse' effect caused by increasing atmospheric CO_2, methane and other.

Materials and Methods

Marine and global climatic trends

The study of the sea in all of its aspects i.e. physical, chemical, geological and biological I termed oceanography. The importance of oceanographic factors for the global climate is connected with the unique physical properties of sea water. It exceeds almost all other substances in thermal capacity. The atmosphere is a common property resource to which every human being has an equal right. The people of industrialized countries have more than used up their share of the absorptive capacity of this atmosphere, their high emission levels in the past and in the present. Today the biggest challenge of humanity is to protect the world's climate. Though, climate change may affect different regions of the world in different ways, it is poor to surface the most everywhere. They would not be able to adapt to the disastrous consequences of climate change – floods, drought, storms etc. the world is to be prevented from catching high fever.

Preventing climate change is not just an economic or ecological issue. Above all it is a moral and ethical issue. Climate change has become global cooperative enterprise in which all big and small, rich and poor, powerful and powerless must cooperate to achieve a global objective for the global good. Living organisms in the Arctic Ocean, Antarctic waters, and many Atlantic and Pacific seas are adapted to the ice cover and its seasonal changes [8]. An area of about 8 million km^2 in the Northern Hemisphere is covered by pack ice all year round, and of about 15 million km^2 by seasonal ice of either forms. The variability of ice conditions is in sharp contrast with the relatively uniform marine environment in ice-free areas, and the existence of all species, from microorganisms inhabiting sea ice to sea mammals (polar bears, seals, and others), is affected essentially by this factor. The very important feedback in climate systems is connected with land and marine ice cover. Snow and ice reflect back into the atmosphere and outer space a much greater part of incoming solar radiation than does any other kind of surface (water, soil, vegetation). Therefore, continental ice sheets and sea-ice cover, once they have formed, tend to self-sustain and expand (the real mechanism is more complicated, but this explanation is quite correct as a first approximation). On the contrary, the restoration of ice cover in the case of deglaciation would be hindered by the increased absorbing capacity of an ice-free surface. Total or partial disappearance of ice in the Arctic Ocean is considered one of the most important possible sequences of global warming [9]. Decrease of river runoff from Eurasia and North America caused by less precipitation and growth of anthropogenic losses would act in the same direction because the input of freshened water to the Arctic Ocean provides favourable conditions for ice formation. It is impossible to estimate all of the ecological sequences of these processes without a clear understanding of Arctic marine ecosystems.

Marine Ecosystems

An ecosystem is made up of the living organisms, the habitat they live in, non-living structures and how all of these relate to and influence each other. An ecosystem is one that occurs in or near salt water, which means that marine ecosystems can be found from a sandy beach to the deepest parts of the ocean. An example of a marine ecosystem is coral reef with its associated marine life, such as fish and sea turtles, plus the rocks and sand in the area. Ecosystems may vary in size, but all the parts of the ecosystem depend upon each other - so that if one part of the ecosystem is removed, it effects everything else. The ocean covers 70% of the planet, so marine ecosystems make up most of the Earth. This slide show contains an overview of major marine ecosystems, with types of habitat and examples of marine life that live in each. Human activities are releasing gigatonnes of carbon to the Earth's atmosphere annually. Direct consequences of cumulative post-industrial emissions include increasing global temperature, perturbed regional weather patterns, rising sea levels, acidifying oceans, changed nutrient loads and altered ocean circulation. These and other physical consequences are affecting marine biological processes from genes to ecosystems, over scales from rock pools to ocean basins, impacting ecosystem services and threatening human food security.

Results and Discussion

The rates of physical change are unprecedented in some cases. Biological change is likely to be commensurately quick, although the resistance and resilience of organisms and ecosystem is highly variable. Biological changes founded in physiological response manifest as species range-changes, invasions and extinctions, and ecosystem regime shifts. Given the essential roles that oceans play in planetary function and provision of human sustenance, the grand challenge is to intervene before more tipping points are passed and marine ecosystems follow less-buffered terrestrial systems further down a spiral of decline. Although ocean bioengineering may alleviate change, this is not without risk. The principal brake to climate change remains reduced CO_2 emissions that marine scientists and custodians of the marine environment can lobby for and contribute to. This review describes present-day climate change, setting it in context with historical change, considers consequences of climate change for marine biological processes now and in to the future, and discusses Ocean areas differ significantly by their productivity. In general, coastal and estuarine waters are the more fertile. At the same time, the main environmental parameters (water temperature, total salinity, and chemical composition) are far more variable in the coastal zone than in offshore areas. Climate changes together with chemical pollution, decrease of freshwater runoff, and other anthropogenic impacts may cause negative effects in the first place in these parts of the ocean.

The evolutionary history of marine ecosystems depends on the geological past of different parts of the ocean. Environmental conditions in tropic and moderate ocean zones underwent no significant changes during a period of the order of at least several tens of millions of years. On the contrary, marine ecosystems of high latitudes (North Atlantic, Arctic Ocean) are dynamic and relatively young in geological timescales. Radical environmental changes represented by alternation of glacial and interglacial epochs occurred here during the Quaternary geological period. Warm glaciations, last in the sequence of glacial periods, reached its maximum approximately 18 000–20 000 years ago, and finished about 10 000 years ago. Glacial periods were accompanied by total disappearance of littoral ecosystems in the western Arctic (they were replaced by ridges of shelf glaciers) and an oppressed state of pelagic ecosystems. Even the containing capacity of the Arctic Ocean essentially decreased because a huge mass of water was tied up in ice sheets, and sea level was more than 100 m lower than at present. The response of marine ecosystems to these environmental changes will be shown below, but first we must consider the present environmental conditions affecting the distribution and diversity of marine organisms contributions that marine systems could play in mitigating the impacts of global climate change.

Conclusion

Rising atmospheric CO_2 is causing increasing atmosphere and ocean temperatures, which in turn drive rising sea levels, increased vertical stratification, retreating sea ice, and altered precipitation, runoff, and wind patterns Regional pressures on ocean ecosystems arise from runoff from intensive fertilizer use, coastal and benthic habitat degradation, fish stock overexploitation, growing aquaculture production, and invasive species Climate and CO_2 changes influence many levels of ocean biological organization and function. Climate change will exacerbate the stress on living resources already impacted by pollution, over fishing and other anthropogenic activities.

References

1. IPCC. Intergovernmental Panel on Climate Change, 2001.
2. Halpern BS, Walbridge S, Selkoe KA, Kappel CV, Micheli F, D'Agrosa C, *et al*. A global map of human impact on marine ecosystems. Science (www.sciencemag.org). 2008; 319:948-952.
3. IPCC. Intergovernmental Panel on Climate Change, 2007.
4. Scranton MI, Sayles FL, Bacon MP, Brewer PG. Temporal changes in the hydrography and chemistry of the Cariaco Trench. Deep-Sea Research. 1987; 34:945-963.
5. Freeland HJ. Sea surface temperatures along the coast of British Columbia: regional evidence for a warming trend. Canadian Journal of Fisheries and Aquatic Sciences. 1990; 47:346-350.
6. Bethoux JP, Gentili B, Tailliez D. Warming and fresh-water budget change in the Mediterranean since the 1940s, their possible relation to the greenhouse effect. Geophysical Research Letter. 1998; 25:1023-1026.
7. Read JF, Gould WJ. Cooling and freshening of the subpolar North Atlantic Ocean since the 1960s. Nature (International Journal of Science). 1992; 360:55-57.
8. De Sylva DP. Global warming and potential range extensions of poisonous and dangerous marine organisms. World Resource Review. 1999; 11(2):174-189.
9. Krutskikh BA. Climatic Regime of the Arctic at the Turn of the Twentieth and Twenty-First Centuries. St. Petersburg: Hydrometeorology Publishing House. [in Russian] [Present and past climatic anomalies in the Arctic and their possible causes are discussed.] 1991, 184.