



Introduction to climate change and its variability and Geoscience

Rahul Mehtha*

Department of Environmental Science, Maharshi University, Gujarat, India

Abstract

Increasing interdisciplinary, more studies are examining environmental problems from an integrated perspective. This is apparent in the geological sciences and physical geography, which incorporate various disciplinary approaches, including biology, pedology, hydrology, geomorphology, and climatology. This Special Issue of Geosciences is comprised of studies relevant to the biosphere, atmosphere, and hydrosphere, with terrestrial systems also considered.

Keywords: Environmental problems; Geological sciences; Physical geography; Biology

Introduction

Research in these fields is increasingly applied, investigating human impacts on the natural environment and the consequences of environmental change on human systems and resources, including food and water supply. Indeed, the Anthropocene is an increasingly recognized epoch that arguably commenced with the onset of agriculture and accelerated with industrialization over the last few centuries and decades. Evidence of human impacts on the biosphere in terms of pollution and waste, nuclear testing, modification of landscapes, and so on has been accumulating and cannot be ignored in environmental change and landscape studies [1]. The human impact on geomorphological features and processes is already evident, although it varies in degree spatially and between geomorphic domains. The engineering of rivers, for example, affects geomorphological evolution through changes in channel morphology and connectivity and flow ranges and altered sediment deposition.

Although climate change also has natural causes, recent climatic change during the Anthropocene is overwhelmingly attributable to human activities (e.g., greenhouse emissions from industry causing global warming), as expressed by the concept of anthropogenic climate change. Humans are effective agents of environmental change, as for instance evident through global warming, and we are increasingly capable of impacting the global environment [2]. This environmental change threatens a state shift in the Earth's biosphere that jeopardizes human welfare as well as causing the extinction of many species.

Some have argued that continued and increasing engineering of Earth processes and ecosystems is necessary to support economic prosperity that would bring interest in and capability for effective

conservation. However, this is a dangerous gamble, since on the other hand societal instability and ecological disruption could drive economic decline, leaving populations even more vulnerable to rapid shifts in Earth processes, including climate, natural resource depletion, and loss of ecosystem services. In any case, better appreciation of the geological and geographical facts is indispensable for informed decision-making at levels from local to global.

Addressing anthropogenic climate change in landscape and management geoscience contexts is the subject of papers included in this Special Issue. This Special Issue presents relevant geoscience and physical geography research on humans impacting natural landscapes and the development of "human landscapes." This research agenda is central to studies of Anthropocene human impacts on the environment and of human-environment landscape interactions that have been pursued as part of applied geomorphology, including environmental geomorphology, since the 1970s and 1980s [3-4]. A developing part of this subfield has been urban geomorphology, bringing geoscience tools to the city setting, where human interactions and impacts on landscapes are concentrated and focal.

Interactions between the biosphere, atmosphere, and hydrosphere are considered in this Special Issue from various integrated systems approaches.

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*Corresponding author: Rahul Mehtha, Department of Environmental Science, Maharshi University, Gujarat, India, E-mail: rahul.mehtha.11@yahoo.com

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