NATURAL AND ANTHROPOGENIC CARBON IN THE ATMOSPHERE AND OCEANS ON CLIMATE CHANGE: STUDY ON THE ANALYSIS OF SPATIAL PATTERNS AND TIME SERIES OBSERVATION WITH REFERENCE TO CARBON FLUX IN INDIAN OCEAN

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ABSTRACT
The present study made an attempt to analyse the extent of natural and anthropogenic carbon in the atmosphere and oceans particularly with reference to Indian Ocean as major human clusters are responsible for climate change. The study also probes into the spatial patterns and temporal variation using the time series data collected from secondary sources.

INTRODUCTION
The increase in the carbon both by natural ad anthropogenic processes played a significant role in climate change and the causes for such an increase are attributed by the amount of infrared radiation absorbed by the Earth's atmosphere. Prior to the presence of greenhouse gases in the lower atmosphere (particularly water vapor, carbon dioxide, methane, nitrous oxide and ozone), infrared radiation, emitted by the Earth's surface, would have been lost to space. There must be a balance between the energy received from the sun, mainly as visible radiation, and the energy radiated by the Earth back to space (infrared radiation) to maintain a steady climate. Since Oceans act as a place of carbon sink due to increasing impact of human activities and also by addition of carbon from atmospheric processes.

OBJECTIVES
The major objectives of the study are to bring out the impact of natural and anthropogenic carbon in the atmosphere and its interaction subsequently from the oceans and atmosphere particularly with reference to Indian Ocean. In addition the study has made an emphasis on the significance of population clusters around the Indian Ocean, which in turn explained the anthropogenic impacts on the Indian Ocean in a multitude of aspects. The spatial and temporal explanation offered using the time series data emphasized the significance greenhouse gases in the interaction process between the sun, atmosphere and earth as well as from ocean and land since each one is compartmentalized and viewed as an integrated one from the point of view of land-atmosphere-ocean coupling process.

METHODOLOGY
The study was based on the secondary data collected from a detailed review of literature and also selected secondary data were selected judiciously from published and unpublished sources in order to build a conceptual framework to explain the role of natural and anthropogenic carbon in the atmosphere and oceans producing documentary evidences to explain the climate change, The major dimensions were extracted using the multivariate statistical technique factor analysis. The dimensions extracted from the analysis to some extent offer avenues for further research. In addition the analysis of time series data over space and time examines further the extent of climate change influenced by anthropogenic pressures in the Indian Ocean region.

FINDINGS

The variation with the help of time series data collected from various secondary sources. Explained with reference to carbon flux in Indian Ocean offered plausible reasons for climate change as a result of interaction of carbon both from atmosphere and by ocean. The atmosphere and ocean interaction enhanced momentum fluxes increase the strength of the surface equatorial easterlies through intensification of subtropical subsidence and modification of the lower troposphere's meridional pressure gradient. Through atmosphere-ocean interactions, this increases the spatial extent of the tropical Pacific cold tongue in both simulations. The inferences explained that the mean state of the tropical thermocline may be changed in a similar way either by increasing seasonal radiative forcing or by introducing strong topographic forcing. As a matter of fact that ocean and atmosphere couple is chemical, as the ocean is both a source and sink of greenhouse gases. Much of the heat that escapes to the ocean is in the form of evaporated water, the most abundant greenhouse gas on Earth. Yet, water vapor also contributes to the formation of clouds, which shade the surface and have a net cooling effect. In the long run, scientists don't know which process (cloud shading or water vapor heat retention) will exert the larger influence on global temperatures.

Population growth, increased land area, afforestation and carbon dioxide emissions, GDP growth rate and impact of anthropogenic activities on fresh water, Increasing urban population pressure on agricultural growth rate and increasing consumption of fertilizer, Anthropogenic pressure on arable land and forestation and increasing concern on CO_2 emissions, Population growth and its impact anthropogenic pressures on oceans etc., are major dimensions emerged from the factor analysis confirming the fact that the natural and anthropogenic carbon in the atmosphere and ocean further portrayed the significance of climate change. Evidences from Indian studies explained that the trends in temperature over India and have not attributed any particular cause, like increasing greenhouse gas concentrations, to the recorded increase in temperature. It is also evident to show that emissions of carbon dioxide (CO_2) and other greenhouse gases from fossil fuel uses in India is bound to increase. Estimates of CO_2 emissions (million tonnes of carbon) from India from the burning of fossil fuels show that India's total CO_2 emissions will grow considerably in the coming decades. At present 70-72% of commercial energy is generated by using fossil fuels, mainly coal, and this scenario is expected to continue in the coming decades, posing environmental problems at the local, national, and global levels Emissions of greenhouse gases particularly the non- CO_2 gases such as methane, nitrous oxide, carbon monoxide and nitrogen oxides from the agriculture sector are significant in India. 60% of the CO_2 emissions out of the 22% are from cement, steel, bricks, and lime, which are energy intensive. The increase in livestock population further added enteric fermentation emission factors. Hence the increase in population growth and economic activity increased the global consumption of energy to 84%. While the global population more than doubled in the second half of the last century, grain production tripled, consumption quadrupled and economic activity quintripled. Human changes to the earth system are multiple, compelx interacting, often exponential in rate and globally significant in magnitude

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