IJED : Vol. 13, No. 2, July-December 2016

HISTORIC AND PRE-HISTORIC HOLOCENE CLIMATE AND ITS PROGNOSTICATION

Amal Kumar Ghosh*

Abstract: *Classical definition undermines the climate as at least of 31 years average weather phenomena of a place or a region, although longer and even shorter time span climate often be used now a days. Reconstruction of past climatic events or as it was in the beginning is almost impossible for those days of undeveloped written records. Paleontological evidences from fossils of wood, leaves, bones, shells, feathers through almost accurate radiometric dating are helpful to rebuilt the prehistoric climate. Sedimentary layers, underground pollen grains of those days and 'Ice Core' analysis are the essential tools of rebuilding climatic events.*

Key Words*: Pre historic, Holocene, Prognostication.*

Aims and Objectives of the Study

The present study aims at

1. *To make analysis of the events of Pleistocene Glaciations and after.*
2. *To be familiar with the multitude of phenomena of the Holocene Period.*
3. *To draw a future picture of climatic phenomena, so that we can make a prior arrangement to lessen the severity of climate caused by human activity.*

INTRODUCTION

Holocene, the proposed name of the Epoch of 1885 and ratified in 1969 although often bears the synonym of "entirely recent" by Greek nomenclature (holos-entire/whole, kainos-new/recent) but it differs in the later years. It is a part of the Quaternary Period and is subdivided into Preboreal, Boreal, Atlantic, Subboreal and Subatlantic stages as per the Blytt-Sernander Time Scale (Blytt, A. 1876 and Sernander, R. 1908). A series of climatic events have occurred throughout the Holocene. Scientists and researchers have identified at least 18 climatic cycles during this period.

The Holocene period is ever marked with the onset of human race. That 'Age of Man' was characterized with a number of 0.19 to 0.16 million of human species in East Africa. Continuous struggle for existence and compulsion of movement have helped them to be adopted with new customs and traits improved character with the passage of time.

* Associate Professor in Geography, Fakir Chand College, Diamond Harbour, University of Calcutta, *E-mail: amalghoshbdn@gmail.com*

GLACIAL AND INTERGLACIAL EVENTS

The last Glacial Maximum ended about 15,000 years ago in Pleistocene, i.e. in the first Epoch of the Quaternary Period which has lasted 2.588 million to 11,500 years before. The Pre historic Period of before 12,900 to 11,500 mostly corresponded to the "Younger Dryas", i.e. the period of sharp decline of temperature over most of the Northern Hemisphere. Each ice advance or glacial age has been followed by a period of ice retreat or interglacial age.

The Current Period i.e. the Holocene Interglacial Age has witnessed continuous glacial retreat from almost all over the World after the end of the Weichsel glaciation. It has resulted from multiplicity of reasons. The major factors are

1. the movements of the Earth's tectonic plates and associated volcanic and crustal uplift.
2. long-term cyclical variations in solar energy received by the Earth.
3. the condition of the Earth's atmosphere-most importantly its carbon di-oxide and dust content (Dolgoff, A. *et al.* 1998).

The Interglacial Holocene which has emerged from "Younger Dryas" with a sudden warming from the cold period supported the growth and progression of human civilization. Only within a decade, the temperature in Greenland rose to impressive 8^0C.

During the following 1,000 years the temperature has increased, so that climate became several degrees warmer than today. About 8,000 years back, Hunter Stone Age occurred as the hottest period called the Holocene Optimum, which lasted about 4500 years before. The Holocene Climate Optimum (HCO) was a warm period between 9,000 – 5,000 years back. The event has also been known by many other names such as Hypsithermal, Altithermal, Climate Optimum, Holocene Optimum, Holocene Thermal Maximum and Holocene Megathermal.

The temperature continued to drop through Historical Period (3500 BCE), Bronze Age (3300 BCE – 700 BCE) and Iron Age (1200 BCE – 600 BCE) until it reached its lowest point in "The Little Ice Age". Within the last few hundred years the temperature has again increased, but not to such level as in the Hunter Stone Age.

Initiation of agriculture, domestication of animals, dispersal of plants by human activities began in the Holocene by 8,000 BCE.

Holocene extinction or the *Sixth Extinction* is the event of species destruction during the Holocene Epoch around 10,000 BCE. IUCN documented 875 species extinction by human activities between 1500 CE and 2009 CE, although majority are undocumented. According to Species-area-theory the present rate of extinction may be upto at the rate of 1,40,000 species per year. (Kolbert, E. 2014).

PROGNOSTICATION AND HUMAN IMPACT

The term 'Forecast' or anticipation of meteorological events of a specified place, area, routes and time was first applied by Admiral Fitzroy. Four main types of weather forecasting methods are generally used for prognostication. These are 1. Synoptic Method, 2. Statistical Method/ Climatological Method, 3. Physical/Numerical/Dynamic Prediction Method and 4. Ensemble Forecasting Method.

Prognostication of Future Climate may be exerted in various ways

- **Increment of CO_2 –** Present data trend suggests CO_2 increment at the rate of 1.6% annually up to 2025 CE and then declined to a growth rate of 1% per year. If all the fossil fuel reserves are burnt, the CO_2 content in the atmosphere would triple. Saturation of ocean water to absorb excess carbon has already been reached. Once the level goes up, it will remain in the atmosphere for centuries and there is no rapid means of removing it. CO_2, the great absorber of heat, will help to raise the Global temperature.
- **Economic Boom Induced Warming –** Production of consumer goods lead to greater emission of Green House Gases. As a result, latest mean annual global temperature level is 0.87^0C in 2015, compared to the -0.10^0C in 1915 (Figure 1).
- **Sea Level Rise –** Global Warming leading to melting of ice sheets and glaciers and expansion water by volume may cause havoc. By 2100, sea level will likely to rise 15 to 95 centimeters as trend suggests.
- **Glacial Retreat and Melting of Ice and Snow Caps –** IPCC warns in its Fourth Assessment Report that warming would affect retreat of mountain glaciers and melting of snow capped areas.
- **Prolonged Drought –** More intense and longer drought have been observed over wide areas since the 1970s particularly in the tropics and subtropics (Fourth Assessment Report, IPCC, 2007).
- **Change in Precipitation Pattern –** Changes in precipitation and evaporation over oceans will "speed up" water cycle in general. Higher rate of temperature increment will cause huge rainfall in initial phases but there is a maximum possibility of warmer climate in ultimate.
- **Coastal Erosion and Land Cover Alteration –** Increment of water volume will cause coastal erosion. This will engulf wider land areas and in turn affect the internal heat economy of land and ocean.
- **Ocean Acidification –** Ocean waters are becoming acidic by the change of atmospheric composition and addition of adverse substances and thereby change in marine ecosystem through structure of shells and edibility.
- **Erratic Behaviour of Ocean Current –** Temperature, salinity level, depth as well as wind circulation combinedly drive ocean currents. So the resultant sea level rise, changing pattern of precipitation etc. induce changes in behavioral pattern of the ocean current.
- **Change in Ecosystem –** Ocean, the largest sink of CO_2 is becoming saturated with that, hampers the normal upwelling phenomena. It damages marine biota with health and number.
- **Disappearance of Natural Land Cover –** Owing to the continual increment of global temperature as a consequence of the Holocene Period, majority of forest, tropical grassland, snow-crowned surfaces have been facing the danger of disappearance.

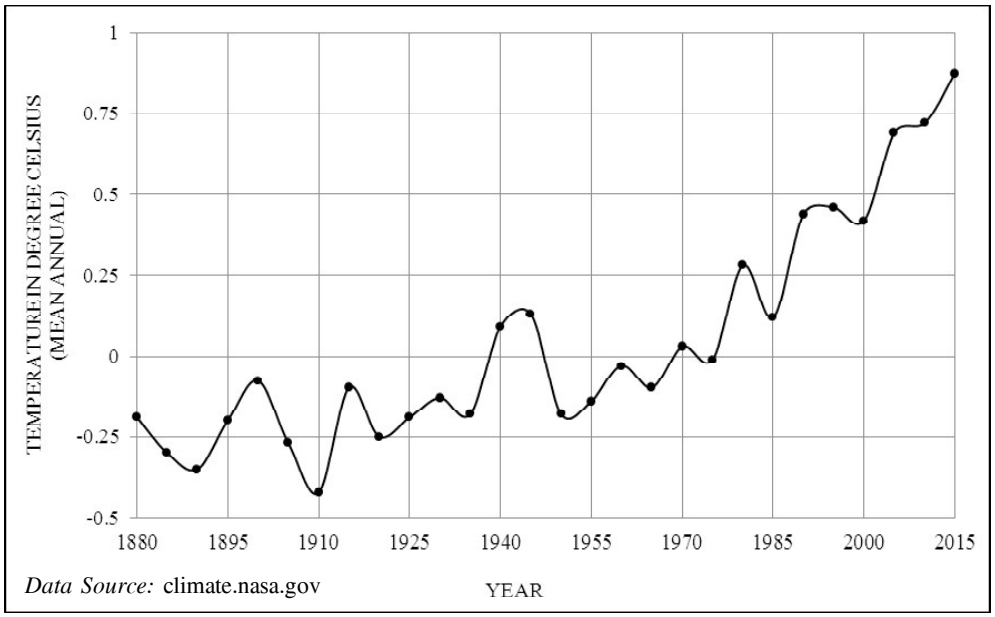

Figure 1: Global temperature scenario (1890-2015)

POLICY TO BE ADOPTED

IPCC warning and worldwide outcome of various conferences have compelled our conscience to adopt different plans and programmes to lessen the evil impact of the predicted climate. These are

- Preparation of a Blue Print at local, national and global level to cut short emissions and discharges from the burgeoning industrial agglomeration.
- Checking of carbon and other Green House Gas addition through the already adopted new technology right now.
- Dependence more and more on alternative and renewable and pollution free energy sources.
- Setting up of green belt in all bare and barren lands.
- Wise use of resources and maintenance of individual consumption level.
- Initiation of Green Technology in all spheres.
- Preservation of our biotic world.
- Introduction of "Polluter Pays Principle" (PPP) through carbon credit systems etc.

CONCLUSION

The then imprint of climatic impact on various historic and prehistoric formations undermines us the erstwhile crucial situation. Last two millennium have witnessed an all over alteration in

all sectors of society, defence and economy. More and more human influenced climate might be emerged as "Anthropocene," as coined by E. F. Stoermer in 1980s. Many more developmental upcoming may gear up the authenticity of the name of newer Epoch in which green technologies are the only alternatives.

References

Bagley, M. (2013), Holocene Epoch : The Age of Man – Live Science in www.livescience.com>History.

Barry, R.G., Chorley, R.J. and Yokoi, N.J. (2004), Atmosphere Weather and Climate. 8th Edition. Routledge, London.

Brown, P. (1996), Global Warming: Can Civilization Survive? Universities Press (India) Limited, Hyderabad, India.

Canadall, J. G. *et al.* (2007), Is the ocean carbon sink sinking in https://en.m.wikipedia.org>wiki>Effe....

Carlson, A. E. (2013), The Younger Dryas Climate Event. Vol. 3. pp.126 – 134.In Encyclopedia of Quaternary Science by Scotta, A.E. & Cary J.M. Elsevier, Amsterdam.

Critchfield, H.J. (2004), General Climatology. 4th Edition. Prentice-Hall of India Private Ltd., New Delhi, India.

Dolgoff, A. and Falcon, M. (1998), Physical Geology (Updated Version). Houghton Mifflin Company, Boston, USA.

Ghosh, A. K. (2016), Climate Change – An Earlier and Contemporary Analysis in International Journal of Multidisciplinary Educational Research, ISSN – 2277-7881; Impact Factor - 4.52' IC Value : 5.16, ISI Value : 2.286, Vol. 5, Issue 11 (3), November 2016, pp. 28-40.

Goudie, A.S. (1983), Environmental Change. Oxford University Press, New York.

Hoppe, T. Van den Berg, M.M. and Coenen, FHJM (2014), Energy, Sustainability and Society. Springer.

IPCC (1990), Climate Change: The IPCC Scientific Assessment. Cambridge University Press.

IPCC (2007), Fourth Assessment Report: Climate Change. Summary for Policymakers.

IPCC (2008), Fifth Assessment Report. 28th Session.

IPCC (2009), Assessment Report. 30th Session.

IPCC I (1996), The Science of Climate Change. Cambridge University Press.

Kolbert, E. (2014), The Sixth Extinction : An Unnatural History. Henry Holt & Company.

Lal, D.S. (1990), Climatology. Chaitanya Publishing House, Allahabad, India.

Mayes, J. and Hughes, K. (2004), Understanding Weather: A Visual approach. Hodder Arnold, London.

Oliver, J.E. (2005), Encyclopedia of World Climatology. Springer-Verlag, Netherlands.

Oliver, J.E. and Hidore, J.J. (2011), Climatology: An Atmospheric Science. Pearson (Prentice Hall). New Delhi, India.

Rowlands, I.H. (1995), The Politics of Global Atmospheric Change. Manchester University Press.

Sellers, W.D. (1965), Physical Climatology. University of Chicago Press, Chicago.

Sharma, R.C. and Vatal, M. (1970), Oceanography for Geographers. Chaitanya Pub. House. Allahabad, India.

Siddhartha, K. (2009), Atmosphere, Weather and Climate: A Text Book on Climatology. Kisalaya Publications Pvt., New Delhi, India.

Singh, S. (1997), Physical Geoggraphy. Prayag Pustak Bhawan, Allahabad, India.

Stoermer, E. F. *et al.* (2009), Diatom Taxonomy, Ultra Structure and Ecology: Modern Methods and timeless Questions: A Tribute to Eugene F. Stoermer. J. Cramer. Berlin. ISBN : 9783443510572.

Sverdrup, H.U., Johnson, M.W. and Fleming, R.H. (1942), The Oceans, Their Physics, Chemistry, and General Biology. Prentice Hall, New York.

The Hindu (1989 to 2012), Environment. Madras, India.

Trewartha, G.T. (1981), The Earth's Problem Climates. 2nd Edition. University of Wisconsin Press.

UNFCCC (1992), [On Line] Available : *https://unfccc.int>files>pdf>conveng. (UN, New York*).

World Commission on Environment and Development (1987), Our Common Future (The Brundtland Report), Oxford University Press.

[On Line] Available: *http://www.esrl.noaa.gov/gmd/ccgg/trends/ful.html*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Blytt*

[On Line] Available: *https://en.m.wikipedia.org>wiki>God...*

[On Line] Available: *https://www.ncdc.noaa.gov/indicators/http://et.al.*

[On Line] Available: *www.davidsuzuki.org>what-you-can-do*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Thre...*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Rob...*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Iron...*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Anthr...*

[On Line] Available: *https://en.m.wikipedia.org>wiki>Holo...*

[On Line] Available: *climate.nasa.gov>vital-signs>global-t…*

This document was created with the Win2PDF “print to PDF” printer available at
http://www.win2pdf.com

This version of Win2PDF 10 is for evaluation and non-commercial use only.

This page will not be added after purchasing Win2PDF.

http://www.win2pdf.com/purchase/