
UNIT 2 RECENT PERIOD

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Learning Objectives



Once you have studied this unit, you should be able to:

- learn about Holocene, the present epoch in which we are living;
- understand the climatic change from fluctuating Pleistocene to stable Holocene or recent period;
- understand the present climatic event through various stratigraphic evidences; and
- get a brief outline of nature of adjustment made by man in the changing condition.

2.1 INTRODUCTION

Holocene is the last phase of the Quaternary. It is synonymous to the terms Recent and Post-glacial. It is convenient to maintain a distinctive name for the last 12,000 years (B.P.E.) because the climatic set up in this period was much different from its preceding period. The onset of the Holocene in Europe brought in climatic and ecological conditions similar to those of the present day. During the last 12,000 years (B.P.E.) there were numerous short term fluctuations, as well as, long term trends towards cooler or warmer, moister or drier climate. These were not significant compared to the climatic events which took place by the end of the Pleistocene. In Europe and other temperate regions the climate gradually became warmer. Previously, climate was quite cold. With the rise in the temperature snowline receded pole ward and to a higher altitude on mountain tops. As a result land form changed, patterns of vegetation changed and cold loving animals moved north wards giving way to warmth loving species.

Similar changeover of climate from the Pleistocene fluctuating condition to that of the present day stable climate has also taken place in the tropical countries like Africa and India. It is believed that the Holocene is nothing but a prelude to another glacial or pluvial time. Probably the peak of the recent interglacial/ inter pluvial epoch was reached at c. 12,000 yrs (B.P.E) and we are heading for a changed sequence in another c. 10,000 yrs. The marks of climatic change and the change in the environment are left on the surface of the earth. Geological study of different areas has confirmed that smaller climatic oscillations marked

the post Pleistocene climatic regime. It means that at the early part of Holocene there were shorter cold and warm fluctuations until the present climatic stability was reached. Man reacted to the change by adjusting to the environment with his culture. Culture of early Holocene or Post Pleistocene time period is called the Mesolithic culture. Subsequent stabilisation of climate and development of the modern man gave rise to agricultural economy, which culminated in great civilizations of the world. In fact considering the time span of human history it is the last c. 10,000 yrs that have seen very fast progress in the cultural and economic history of man.

2.2 HOLOCENE GEOMORPHOLOGY

Europe

Europe was under the influence of glaciations during Pleistocene period. Snowline marking the arctic tundra was extended up to the present temperate zone. At the end of Pleistocene period, due to change in solar radiation, Europe was gradually warming up. This led to mass scale change in geography, biology and human culture of Europe.

Deglaciation

By the end of the Pleistocene there was evidence of the retreat of glaciers towards the polar regions of the earth. First warm phase after the last glaciation, that is, Würm, is known as Bölling. Then around 12,000 B. P. another interval came, which is known as Alleröd. Tundra vegetation was replaced by coniferous forests. Climate was warmer during Alleröd times than the main Würm glaciation. Overall climate became continental and on the dry side in Europe. However, there was a short cold phase after the warm phase. Glaciers readvanced in Europe and north America and world sea level dropped by another 5-10 m.

Change in the sea level

In Europe the changes in the sea level is understood in detail in the Baltic region. The evolution of Baltic region to that of the present geographical condition is summarized below:

Baltic Sea	Began c. 2000 B. C.
Littorina Sea	Began c. 5000 B. C.
Ancylus Lake	Began c. 7800 B. C.
Yoldia Sea	Began c. 8300 B. C.
Baltic Ice Lake	Began c. 9000 B. C.

Movements of the sea level, also known as eustatic movement and the land surface movement known as isostatic, took place with the end of the ice age. Sea level rose because large quantity of water was released in the sea due to melting of the ice. With the melting of the ice great mass of weight was lifted from the surface of the earth and land surface was raised upwards. This has been studied in detail in the Baltic Sea region of the Scandinavian Peninsula. Baltic was an Ice Lake by the end of the glacial period. During Pre-Boreal period with the melting of the ice, it became a sea and was known by the name Yoldia Sea. It was named after the molluscan fauna *yoldia artica*. Land surface rose during Boreal

phase and Baltic became a fresh water lake and is known as Ancylus Lake, with the characteristic presence of mollusc, *Ancylus fluviatilis*. During the subsequent Atlantis period the sea level rose again and Baltic became a sea known as Littorina Sea. This phase is identified with the presence of common periwinkle shells known as *Littorina littoria*. Several transgressions and regressions of sea took place in Atlantic period. Transgression means advance of sea and regression means retreat of the sea. Some of the transgressions are dated.

Change in vegetation pattern

The first phase of Holocene is known as Pre-Boreal (8300-7500 B. C.). Boreal means forest and pre-boreal is the period which preceded the full development of forest. At this time environment changed much more. The glaciers were reduced to their present dimensions. The retreat of glaciers was rapid. Climatic changeover from glacial to post glacial went through a gradual process producing an over-all warm condition, gradual retreat of the continental glacier and a climate ultimately warmer than that of the present day. Standard pollen zones were established. From the perspective stages of vegetation, the environmental changes of the early Holocene proceeded gradually.

K. Jessen in 1934 divided Holocene climate of Europe into nine basic zones based on pollen analysis. Pollen analysis provided a picture of forest development in north and northwest Europe. Forest in Scandinavian language is referred to as boreal. Europe was under Park Tundra condition (pollen Zone I-III) by the end of Pleistocene. With warming up of climate park tundra vegetation made way for Birch-pine pollen zone (IV) of the pre-boreal period that is a period through which forest development was taking place. The first phase of forest development is known as early boreal (pollen zone V). This phase was dominated by pine trees, but hazel and birch were also found. This is followed by late boreal (pollen zone VI). Pine and hazel trees dominated the forest, together with some elm and oak in its first phase and lime and alder at its later phase. Pollen VII (a) is known as Atlantic period because the land bridge connecting Great Britain to Europe was submerged and the climate of the area was exposed to the influence of Atlantic Ocean. The forest of this period is characterized by the presence of alder-oak-elm-lime trees. This phase continues into a period known as sub Boreal (pollen zone VII b). In it elm declines slowly and hazel increases (Table.2.1). The climate becomes such as is found today in Europe.

Table 2.1: Pollen profile of Holocene period in northwestern Europe (after Butzer, 1964. P. 407)

Zone	Date (B.C.)	Name	Dominant Vegetation	Inferred Climate
VIII	After 800	Subatlantic	Beech	Maritime
VII	3000-800	Sub-boreal	Oak-beeck	More continental
VI	5600-3000	Atlantic	Oak-elm	Warmer and maritime
V	(7500) - 5800	Boreal	Hazel-pinc oak	Warmer and continental
IV	8300 - (7500)	Preborcal	Birch pine	Warm-continental

Change in the animal world

Forest did not abruptly replace tundra at the close of the Pleistocene. Rather, forest-tundra and parklands, succeeded by open and woodlands, dotted by numerous drained tundra lowlands. The woodlands forest tundra was preferred by reindeer and bison in winter. The Pleistocene tundra fauna gradually became extinct. Large species like mammoth, woolly rhinoceros, giant elk and musk-ox gradually disappeared. The reindeer which provided most of the livelihood in Pleistocene became restricted mostly to Northeastern part of Europe. New animal spectra appeared.

Change in human adaptation

The onset of the Holocene period had a sudden and serious effect on man. The great herds of herbivorous were replaced by more solitary games, such as, deer, wild cattle, boar and similar other animals. The Mesolithic culture was considered a consequence of environmental changes. Human populations adapted themselves with the changed condition. In the Boreal period growth of forest gave rise to forest based culture represented by heavy equipments like axe and adzes, suitable for woodwork. Some of the areas in the central Europe was free from forest because of infertile loess deposits of last glacial epoch. In this area and along the Mediterranean coast microlithic culture flourished.

The Holocene is the name specified to the ~10,000 years of the Earth's history –the moment since the end of the last major glacial epoch, or ice age.

Africa

Leakey found two wet phases intervened by a dry phase during the post pluvial condition in Africa. They are Makalian and Nakuran respectively. The Makalian is the first post pluvial wet phase. Evidence of this phase was found in the lake Nakuru and is represented by a strand line 375 ft above present day Lake Nakuru. Cultures contemporary to this climatic stage are Elmentieta, Wilton and upper Capsian, better known together as Late Stone Age culture in Africa. The Nakuran is the second of two distinct post pluvial wet phases recognised in Kenya. It is represented by a strandline 145 ft above the present Lake Nakuru. The *contemporary* cultures were Late Stone Age cultures of Africa. This phase was preceded by a very dry phase correlated with climatic optimum. That means that in between the wet phases Makalian and Nakuru represented a dry phase.

Holocene in India

Similar to Pleistocene, Holocene geological formations can also be classified into six distinct units depending on the mode of occurrence: (1) Fluvial deposits of river valleys, (2) Aeolian deposits, (3) Shallow marine deposits, (4) Cave deposits, (5) Laterite and (6) Thick deltaic deposits (Prasad, 1999).

1) Fluvial deposits of river valleys

In the Kashmir valley the palaeosol developed at 18Kyr is considered to be the first phase of deglaciation of the valley. Climatic amelioration was suggested by Agrawal (1992) around 18Kyr, 6-5 Kyr and 1 Kyr B. P. This is also correlated with increase in human settlement in Kashmir valley.

In the Potwar region of the Siwaliks last terrace in the rivers of the area, the terrace T (V) belongs to the Holocene period. Even in the peninsular region, wherever identifiable, the last terrace near the river bed belongs to the Holocene.

2.2.1 Sea level Changes

3) Shallow marine deposits

Work in the ocean floor sediments of Arabian Sea and Bay of Bengal suggested a weak monsoon around 20,000 B. P. during the last Pleistocene epoch. Evidence from the Arabian Sea core has shown that there were three cold and arid phases approximately at 18kyrs, 7 kyrs and 2 Kyrs. At Tuticorin bay Zeuner had identified fossil dunes and present day dune along the coast. His study has shown that sea level changed from higher to lower level by early Holocene time. The fossilized dunes were formed at the time of higher sea level. Sea was higher by 20-30 ft at the end of the Pleistocene. Worldwide dry climatic phase led to the formation of dunes and also to lagoons along the coast. These are locally known as *teris*. The Mesolithic people lived on the ancient dunes and exploited the marine resources.

Afterwards the climate changed and weathering occurred. This made the dunes get fixed. They became reddish and cemented. In the next phase wind activity restarted and fresh *teris* and lagoons began to be formed.

2.2.2 Deltas

6) Thick deltaic deposits

The delta regions have shown mainly the sea level changes and also the changes that had taken place due to tectonic movement by the early Holocene period. This is mainly observed in Kutch, the deltas of Arabian Sea.

2.2.3 Deserts

2) Aeolian deposits

In the deserts of Thar the lacustrine formation of Didwana sediment yielded interesting results. The alternating evaporate and non evaporate suggest fluctuating hydrology in response to the slight amelioration of the arid climate of the terminal Pleistocene and the early Holocene (13,000-6000 B. P.). Organic rich clays and domination of *Artemisia* pollens suggest sub-humid climate between c. 6000 and 4000 B. P.

Dunes were formed during late to early Holocene period in the arid areas of Gujarat, especially at the Mesolithic sites of Langhnaj. The dunes were formed after a short wet phase. The low areas around the dunes were inundated and formed lakes. Mesolithic people lived along the lake shores. Their habitation also coincided with gradual desiccation and formation of the dunes.

5) Laterite

In Deccan plateau and other areas the Holocene deposit consisted of red colluviums soil made of pelletic laterite. There are loose kankary deposits found over the gravel of last wet phase.

Special mention may be made of a calcareous deposit known as *ghutin* lying on top of the silt bed or alluvium deposit of late Pleistocene. Geologists found that the *ghutin* layer always suggested Post Pleistocene deposition.

2.3 SUMMARY

Worldwide Holocene heralded the beginning of recent climatic condition. Recent or Holocene is considered as a period of climatic stabilisation. It could very well be another interglacial age. However, this period had experienced a gradual changeover from fluctuating climate of Pleistocene to stable climate of Holocene. Evidences from geography, geology, palinology and palaeontology have clearly shown the dynamicity of climatic change over and subsequent cultural adaptation of man to the changed climatic condition in Europe.

Holocene deposit in India had shown that there were smaller climatic oscillations before the present day condition was reached. In the glaciated and periglaciated regions small advances of cold phases gradually led to the present day condition. This is noticed in the Karewa deposits and in the terrace sequence of Kashmir valley and Siwaliks, respectively. In the Desert area the pollen study had shown alternating short spells of semi-arid condition until the present day arid condition set in. This is also recorded in pollen analysis from lakes in Rajasthan and measuring of the alternation of salinity and fresh condition of the water of the lakes. In the coastal region fossil dunes were formed. In the plateau area kankary lateritic pellets and calcareous ghutin were formed because of the onset of dry condition after a short wet phase.

India is a land of diverse geomorphological features. Similar diversity was maintained in the Holocene period. Man settled in diverse environmental zones and adjusted with his culture in the varied condition and formed ecological niche. In India the culture of early Holocene is known as Mesolithic or Microlithic. In later part of Holocene agriculture developed in river valleys. Hunting-gathering way of life continued in hills and jungles.

Suggested Reading

Agrawal, D. P. 1992. *Man and Environment in India through Ages*. New Delhi: Books and Books.

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Prasad, K. N. 1999. Observations on Quaternary formations in Peninsular India. In Gondwan Gerlogical magazine. Quaternary of India. ed. M.P. Tiwari and D.M. Mohabey, Special Volume 4:361-369.

Sankalia, H. D. 1972. *Prehistory and Protohistory of India and Pakista*. Bombay: Bombay University.

Sample Questions

- 1) Define the geological period known as Holocene.
- 2) What are the stratigraphic evidences for the onset of Holocene in Northwest Europe?
- 3) What kind of climatic changes took place in Europe during Holocene.
- 4) Write short notes on:
 - i) Teris in Coastal region in South India
 - ii) Ghutin in the plateau area
 - iii) History of Baltic Sea
 - iv) Pollen sequence of Post Pleistocene in Europe
 - v) Holocene sequence in Didwana formation

