Theories Pertaining To Climax Community

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CLIMAX COMMUNITY

The end product of succession after seral communities is the climax community, and it is a relatively stable community. It is generally believed that once the climax is attained the community does not change at all, but this is not exactly so, climax communities may also be changed by aging, storm, disease and by other biotic and abiotic factors.

Hanson and Churchill (1961) characterized a climax community as:

i. The climax community is in steady state regarding its productivity, structure and population.

ii. There is a diversity, stability, and homogeneity of the species populations within and between the stand of the same climax community.

iii. Each stand is self-maintaining and long persisting.

iv. Replacement and fluctuation changes are operative on a continuous basis within the climax, while all environmental factors determine its composition and population so that there is a mosaic of climax types corresponding to the mosaic of habitats.

There are following three theories related to the climax community:

1. **Monoclimax Theory or Climatic Climax Theory**
2. **Polyclimax Theory**
3. **Climax Pattern Theory**

Monoclimax Theory

This concept was advanced by an American plant ecologist E.E. Clements in 1916. According to him, in a climatic region, only one true climax community is possible which is mainly controlled by the climatic factors. Such a climax is, therefore, climatic climax. It is not affected by soil or topography. Edaphically controlled stable communities are exceptions, and are not true climax.

In order to account for a variety of more or less stable communities but different from regional climatic climax, Clements proposed four other terms:

- **Subclimax**- succession gets arrested at a stage which persists for a long time in response to physiological or edaphic factors, before being replaced by the climatic climax;
- **Disclimax**- the vegetation replacing the true climax as a result of some persistent biotic disturbance in the environment, e.g., the grasslands in the Gangetic Plains which occur due to grazing in a deciduous forest climax;
- **Preclimax**- slightly drier localities in a given climatic climax area may have a self-perpetuating community different from the climatic climax, e.g., some of the pine

forests in the Himalaya;

- **Post-climax**- slightly "better moisture" areas in the climatic climax region may support a different yet self-perpetuating community, e.g., *Terminalia arjuna* community growing near river banks in a dry deciduous forest climax.

The monoclimax concept has been severely criticized on the ground that in the concept regionally prevailing undisturbed vegetation occupying the largest part of the land surface was regarded as real climax and other stabilized plant communities in the same area were recognized as subclimaxes which only theoretically could be replaced by the climax.

Polyclimax Theory

This concept was advocated by Whittaker (1953) and supported by Tansley. According to this concept a climax reflects not only the climatic factors but also other factors of the environmental complex, viz., edaphic, biotic, etc. The climax can be of several other kinds which are different from the climatic climax of the area. Climate is not the only factor that determines the climax in a large area. Other factors like edaphic, topographic, and biotic factors are equally important so that edaphic, topographic and biotic climaxes may occur in localized regions within the same climatic zone.

Tansley (1920) recognized the existence of a number of climax communities, forming a mosaic corresponding to the mosaic of habitats and suggested a polyclimax theory. However, this view too identified a climatic climax community that is the stable and most extensive in different habitats for an area. Tansley recognized following climax types:

i. **Climatic climax:** Climax under normal conditions of climate, soil and topography and no disturbance.

ii. **Edaphic climax:** Substrate peculiarities are well pronounced to produce self-perpetuating vegetation, which is different from the climatic climax of the area.

iii. **Topographic climax:** Changes in the topography enough to cause variant microclimates, each giving rise to self-perpetuating vegetation.

iv. **Fire climax:** Recurrent burning of vegetation eliminates fire-sensitive species and self-perpetuating vegetation develops.

v. **Zootic climax:** Self-perpetuating community in response to zoological factors e.g., grazing gives rise to zootic climax of grassland.

Climatic, edaphic and topographic climaxes are primary climaxes, while fire and zootic climaxes are secondary disclimax.

Climax Pattern Theory

Whittaker (1951) rejected classification approach of describing climax and proposed Climax Pattern theory. He believed that since species composition and the balance of the climax community is determined by the total environment (including both biotic and abiotic factors) of the ecosystem, any change in the environment will shift the balance among populations. As a result, the climax community represents a pattern of populations that corresponds to the changes of environmental gradients forming ecocline (e.g. thermocline). According to this theory, the communities that occupy the largest area in this ecocline are known as the 'Prevailing climax' or climatic climax.

This theory recognizes a spatial pattern of climax vegetation which reflects the spatial variation in the environmental conditions at that point. There is, thus, no discrete number of climax communities and not a single factor determines the structure and stability of a climax community.

Whereas the monoclimax theory allows for only one climatic climax in a region and the polyclimax theory allows several climaxes, the climax-pattern hypothesis allows a continuity of climax types varying gradually along environmental gradients and not clearly separable into discrete climax types. So in a nutshell, we can say that the end point of ecological succession, climax community, is not completely stable. The climate of an area has a significant control on the occurrence of species, but within each broad climatic zones there are other several factors like soil, nutrients, topography, biotic factors, etc. which lead to many climax situations. Climax communities do not necessarily represent a halt to successional change.