

Semester IV

GEO-A-CC-4-10-TH- Soil and Biogeography

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Topic: Classification of world biomes (Whittaker):

A **biome** is a community of plants and animals that have common characteristics for the environment they exist in. They can be found over a range of continents. Biomes are distinct biological communities that have formed in response to a shared physical climate.

Whittaker classified biomes using two abiotic factors: precipitation and temperature. Whittaker based his approach on theoretical assertions and empirical sampling. He was in a unique position to make such a holistic assertion because he had previously compiled a review of biome classifications.

Whittaker's parameters for classifying biome-types

Whittaker, seeing the need for a simpler way to express the relationship of community structure to the environment, used what he called "gradient analysis" of ecocline patterns to relate communities to climate on a worldwide scale. Whittaker considered four main ecoclines in the terrestrial realm.

1. Intertidal levels: The wetness gradient of areas that are exposed to alternating water and dryness with intensities that vary by location from high to low tide
2. Climatic moisture gradient
3. Temperature gradient by altitude
4. Temperature gradient by latitude

Along these gradients, Whittaker noted several trends that allowed him to qualitatively establish biome-types:

- The gradient runs from favorable to the extreme, with corresponding changes in productivity.
- Changes in physiognomic complexity vary with how favorable of an environment exists (decreasing community structure and reduction of stratal differentiation as the environment becomes less favorable).
- Trends in the diversity of structure follow trends in species diversity; alpha and beta species diversities decrease from favorable to extreme environments.
- Each growth-form (i.e. grasses, shrubs, etc.) has its characteristic place of maximum importance along the ecoclines.
- The same growth forms may be dominant in similar environments in widely different parts of the world.

Whittaker summed the effects of gradients (3) and (4) to get an overall temperature gradient and combined this with a gradient (2), the moisture gradient, to express the above conclusions in what is known as the Whittaker classification scheme. The scheme graphs average annual precipitation (x-axis) versus average annual temperature (y-axis) to classify biome-types.

Biome-types

1. Tropical rainforest
2. Tropical seasonal rainforest
 - deciduous
 - semideciduous
3. Temperate giant rainforest
4. Montane rainforest
5. Temperate deciduous forest
6. Temperate evergreen forest

- needleleaf
- sclerophyll
- 7. Subarctic-subalpin needle-leaved forests (taiga)
- 8. Elfin woodland
- 9. Thorn forests and woodlands
- 10. Thorn scrub
- 11. Temperate woodland
- 12. Temperate shrublands
 - deciduous
 - heath
 - sclerophyll
 - subalpine-needleleaf
 - subalpine-broadleaf
- 13. Savanna
- 14. Temperate grassland
- 15. Alpine grasslands
- 16. Tundra
- 17. Tropical desert
- 18. Warm-temperate desert
- 19. Cool temperate desert scrub
- 20. Arctic-alpine desert
- 21. Bog
- 22. Tropical fresh-water swamp forest
- 23. Temperate fresh-water swamp forest
- 24. Mangrove swamp
- 25. Salt marsh
- 26. Wetland

