



Habitat

By Larry D. Caldwell

A habitat is the place where a particular animal or plant species dwells. Habitats of similar climate and vegetation form land complexes called biomes. The natural habitats on Earth and the great variety of species are a product of the changes that have occurred over long geological time periods; however, not all habitats are natural. Humans can alter nature and thereby promote the welfare of certain species that would otherwise not occur in the same numbers. Some ecologists consider an organism's total physical and chemical surroundings (the environment) synonymous with habitat. No description of habitat is complete without including some environmental parameters such as temperature and dissolved oxygen.

Oceans

Oceans are the largest major habitat and cover 70 percent of the Earth's surface. Along marine coastal areas is a littoral zone. Tidal action, upwelling currents and the influx of fresh water from rivers significantly influence the biota (flora and fauna) that can exist. Tides circulate loose organic particles, or detritus, to detritus feeders such as marine crabs. Detritus is consumed by oysters, zooplankters and barnacles. Phytoplankters thrive where upwelling currents circulate phosphorus into the upper layers of a body of water (the euphotic zone) in which plant growth is possible. Blue crabs have adapted to the coastal river estuary habitat with the associated problems of regulating osmotic pressure. Below the euphotic zone, from parts of the continental shelf bottom down to the abyssal plain of perhaps 5000 m, is an aphotic zone, or light-lacking zone, that is inhabited by glass sponges, lampshells, brittle stars, and microorganisms. Plant life, as humans know it, does not function here. The aphotic zone nekton, or free-swimming aquatic organisms such as fishes, prawns, and squids, have bioluminescent organs or symbiotic bacteria that supply illumination, or both. The angler fish has huge jaws and teeth and uses a luminescent lure that it dangles in front of its jaws. Off the southeastern coast of North America is the Sargasso Sea. This habitat is formed by a brown seaweed that is carried from its shoreward littoral habitat into open water. It grows vegetatively and forms this special habitat that offers food and shelter to many species of zooplankton. Phytoplankton productivity is limited here, apparently because environmental minerals such as iron, nitrogen, and phosphorous are scarce.

Freshwater Lakes

The freshwater lake, or lentic, habitat has a littoral zone that is euphotic and hence may be heavily populated by aquatic plants. Very deep lakes have low phytoplankton density and few rooted aquatic plants because nutrients are scarce and the bottom is dimly lighted. The benthos (bottom) of many lakes consists of oxygen-demanding organic detritus and is thus anaerobic. Benthic life such as bacteria and midge larvae, however, thrive and utilise the organics as food. With time, lakes change physically and chemically. The classic concept of aging in lakes involves a progression of changes. Deep, nutrient-poor oligotrophic lakes with trout, whitefish and cisco evolve into shallow, richly organic eutrophic lakes with blue gills, black bass and pike.



Habitat

By Larry D. Caldwell

Stream Habitats

A current of water is the main physical feature of stream, or lotic, habitats. As a stream flows toward sea or lake level, suspended particles and chemical nutrients accumulate and dissolved oxygen decreases. Algae and mosses attach to rocks and contribute some to community organic production, but basically the lotic habitat depends on the importation of organic foods such as tree leaves. The imported organics form the base of an important detritus food chain populated by snails, midge larvae and mayflies. With a longitudinal change in physical and chemical features, the biota also changes. Trout and various species of darters give way to bass, pike and catfish as the stream approaches sea or lake level.

Terrestrial Habitats

A temperature and moisture complex dictates the major terrestrial habitat types that range from the verdant tropical rain forest to the snow-covered polar regions. Tropical rain forests are tall and highly stratified, and each stratum offers shelter to specialised animal life forms. Temperate climates support deciduous forests of such trees as beech, oak and maple. The deciduous forest once covered eastern North America and Europe. Coniferous forests of pines, spruces and fir most typically occur in cool climates. Further poleward in the Northern Hemisphere is the tundra, a marshy-plain habitat that is frozen for much of the year. The vegetation consists of lichens, grasses and dwarf woody plants with species of animals such as the lemming, snowy owl and Arctic hare.

In North America a moisture gradient extends from the eastern deciduous woodland to the western deserts. The eastern deciduous forest type is considered mesophytic (moist) and is the home of deer, squirrels and opossums. Ungulates such as the pronghorn and bison of North America and the zebra and antelope of Africa typify the pristine grassland habitat. Desert habitats generally receive less than 250 mm of annual rainfall and occur in tropical and temperate regions of the world. Not all deserts are as devoid of life as the Sahara of North Africa. The desert biota has evolved strategies for utilising scant water supplies. Some kangaroo rats of the New World deserts and jerboas of Old World deserts can actually exist without drinking water. The temperature and moisture gradients that occur latitudinally from equator to pole are somewhat duplicated in mountainous areas. As altitude changes, desert or grassland habitat can change, perhaps to tundra.

In all habitats, large or small, the biota has adapted to the physical and chemical features of the environment. Wind, moisture, salinity, concentration gradients of chemicals, and even other organisms affect the habitat and influence the success of a species trying to survive in nature.

Bibliography: Brown, J. H., and Gibson, A. C., *Biogeography* (1994); Buckley, G. P., ed., *Biological Habitat Reconstruction* (1994); Cox, C. B., and Moore, P. D., *Biogeography*, 5th ed. (1993); Hare, Tony, *Habitats* (1994); Howe, H. F., and Westley, L. C., *Ecological Relationships of Plants and Animals* (1990); Sutherland, W. J., and Hill, D. A., eds., *Managing Habitats for Conservation* (1995).