

Abiotic characteristics of aquatic and terrestrial environments

Characteristic	Aquatic Environment	Terrestrial Environment
Buoyancy	Buoyancy helps animals float with only a small expenditure of energy. They can alter their depth by changing the amount of gas inside their body.	Larger plants and animals do not notice buoyancy. However small insects and other invertebrates will experience a greater effect.
Chemical: Carbon Dioxide	Carbon dioxide solubility is low in water, but is more dissolved at low temperatures than at high. Thus there is more available for photosynthesis in colder water (including ocean upwelling's) than in warm tropical waters.	Although carbon dioxide is 0.03% of the atmosphere, it is rarely a limiting factor in plant growth.
Chemical: ions	Generally, the concentration of ions outside of marine animals is higher than inside and they lose water by osmosis. They have to drink large amounts to replace it. Fresh water poses the reverse problem: water enters animals and they have to remove it by constant urination.	The availability of specific ions can vary widely. Excessive salinity is a serious problem in some parts of Australia. Yet some plants and animals suffer because of lack of specific ions in our ancient soils. In some parts of the world, salt licks are visited regularly by various animals.
Chemical: oxygen	Oxygen has low solubility in water but is more soluble in cold water and is thus more available in colder waters. Also mixing air is a factor: water tumbling over waterfalls or rapids contains more oxygen than stagnant water in a swamp.	Oxygen is rarely a limiting factor in terrestrial environments.
Chemical: water	Obtaining water is rarely a problem in aquatic environments. However inland regions may dry out so that animals such as frogs, burrow into mud to survive dry seasons. Animals in salt water have problems keeping water because of osmosis.	Water availability varies a lot in terrestrial environments. Even in rainforests, epiphytes have to survive dry periods in the treetops. In deserts, plants and animals have many adaptations to survive the lack of water.
Light	Light penetration decreases with depth. Photosynthesis occurs only in the upper layers. Thus many animals living below the level of light penetration depend on the 'rain' of food material above.	Generally light is not a limiting factor. However plants living at lower levels in rainforests have leaves adapted to low light levels, or they may only grow quickly to reach upper levels when a 'hole' appears in the rainforest canopy.
Pressure	Pressure increases with depth. Changing depth by large amounts is difficult. And mammals, such as whales and seals, have special adaptations to allow for this.	Pressure has little effect in most animals. Humans who travel to very high regions can experience altitude sickness.
Temperature	Temperature of water has a specific heat and will absorb large amounts with little change in temperature. Land nearby has a much lower specific heat and will change temperature by a much greater amount. Large bodies of water also moderate local terrestrial temperatures. Temperature will vary more in shallow bodies of water and near the surface than at greater depths. Small ponds can have a larger temperature range.	Temperature changes in terrestrial environments are much larger than in aquatic environments. Plants and animals are adapted to this: plants conserve water and have small leaves or change the orientation of the leaf to keep its edge directed to the sun. Animals may burrow into the soil to avoid the intense heat of the day.
Viscosity	Water has high viscosity and energy must be expended for animals to move through water. Plants must be securely fastened if they are to avoid being swept away by moving water.	Large animals are little affected by the low viscosity of air, unless the wind is intense. However small animals, such as insects must be adapted to move through the air.