Definition: precipitation, in meteorology from *The Columbia Encyclopedia*

in meteorology, condensed moisture that falls to the surface of the earth in the form of rain, sleet, snow, hail, frost, or dew.

Summary Article: Precipitation

From *Encyclopedia of Environment and Society*

PRECIPITATION REFERS BOTH to the process by which particles fall from clouds to the earth below, and to those particles themselves. Owing to various chemical and physical actions, cloud droplets that would otherwise remain in the atmosphere can aggregate around an ice or liquid core until they achieve a mass that causes them to fall from the sky. The different forms of precipitation that are possible include rain, snow, hail, and sleet. The type that forms depends on the specific weather conditions prevailing within the cloud and during the time between creation of the particle and its arrival on the ground. For example, cloud conditions may be such that ice particles form and start to fall to the ground, but the air conditions closer to the ground are sufficiently warm enough to melt the ice before it arrives. In any case, the process by which particles form and become larger is primarily the result of collisions with other cloud droplets and coalescence into larger particles. The speed with which this occurs depends upon specific local conditions, but it can take only a few minutes for the one million or so collisions to take place in favorable conditions and for precipitation to begin.

In particularly unusual climatic conditions, it is possible for a large group of small animals like frogs to be swept into the air and deposited as precipitation at a distant location. More commonly and predictably, dust or sand from desert areas can be regularly borne aloft and precipitated in other areas, as occurs with the red dust rain that derives from Xinjiang and arrives in Beijing periodically. The distance between the origin and ending of the precipitation process can lead to complex legal issues of responsibility in those cases where precipitation has, through pollution, led to damage to the environment. An example of this has been the acid rain that was produced by industrial activities in parts of Britain and then fell on Scandinavia.

The level, type, and nature of precipitation can have a significant impact upon the fertility of land on which it falls and, therefore, the ability of the land to sustain human and animal populations. The factors that can influence precipitation include the presence of ocean currents such as the Gulf Stream; the topography of mountains, basins, and depressions; wind patterns; and the distribution of banks of air in the atmosphere. These factors interact with each other in very complex ways, which makes prediction of the impact of attempts to modify weather very difficult.

The impact of future climate change is also very difficult to predict, although intensification of many existing meteorological phenomena is likely. Research suggests that human civilization can adapt to climatic changes within a comparatively narrow range but, especially when urbanization has taken place, will collapse when more extreme changes are indicated. The predictions of future climate changes, based on trends that have already been issued, would include some that exceed the narrow range of survivability of human civilization. Significant levels of resources would be required to withstand the more intense hurricanes, rainfall, and extreme forms of weather that may become more common in future.

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Land areas that receive less than 250 millimeters of precipitation annually are classified as deserts, irrespective of the ground temperature. Much of the polar regions of the world are deserts, along with the very hot lands of the Sahara and the Kalahari. These lands are very dry and consequently sustain comparatively fewer forms of life than other parts of the world—and those life forms are specialized to deal with the conditions. Approximately one third of nonpolar land on the planet is classified as desert.

By contrast, some areas have very high levels of annual rainfall and this helps them support rainforests or tropical rain forests, which sustain a very diverse set of flora and fauna. These areas receive the majority of their rainfall from seasonal patterns, such as the monsoon rains that water much of south and southeast Asia. This includes various parts of India, which are the wettest places in the world, with annual rainfall exceeding 11 millimeters. The islands of Hawaii can also receive extremely high levels of precipitation because of the specific local conditions. The relatively even temperatures of oceans compared to land also tends to ensure that coastal lands receive more precipitation than falls offshore, as in the case of Ireland, which receives a great deal of the precipitation from clouds that have passed across the Atlantic Ocean.

Human activities can also have an impact upon the nature and level of precipitation. Since undergrowth and forest cover help to trap water in the ground, this leads to a cycle of greater fertility, which means that the larger plants can continue to thrive. Should those plants or trees be cut down for agricultural or commercial purposes, then the ability of the land to retain water will degenerate and this can lead to problems with flooding and mudslides and the desertification of forest land. This in turn affects the specific local weather conditions, reducing precipitation and intensifying the loss of plant life.

**SEE ALSO:**
- Acid Rain;
- Desert;
- Rainforests;
- Runoff.

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