

CHAPTER 10 – Lecture 24

Low-Latitude Climates

I. Overview of the Low-Latitude Climates: The low latitude climates lie for the most part between the tropics of Cancer and Capricorn. They occupy the equatorial zone, most of the tropical zone, and part of the subtropical zone. This region includes the equatorial trough of the Intertropical Convergence Zone (ITCZ), the belt of the tropical easterlies, and large portions of the oceanic subtropical high-pressure belt. Climates in this region vary between extremely moist to extremely dry. The seasonal temperature cycle also varies among these climates.

II. The Wet Equatorial Climate: An ITCZ climate. The climate is dominated by warm, moist maritime equatorial (mE) and maritime tropical (mT) air masses that yield heavy convective rainfall. Although there is a seasonal pattern to the rainfall, precipitation is plentiful in all months, and the annual total often exceeds 250 cm. Uniform temperatures prevail throughout the year. Both mean monthly and mean annual temperatures are typically close to 27°.

III. The Monsoon and Trade-Wind Coastal Climate: Temperatures show an annual cycle, with warmest temperatures in the high-Sun season. It also experiences abundant rainfall but with a strong seasonal pattern. The trade-wind coastal – rainfall from mE and mT air masses is heavy when the ITCZ moves to the opposite hemisphere. Asian monsoon coasts – dry air flowing southwest in low-Sun season alternates with moist oceanic air flowing northeast, producing a seasonal rainfall pattern on west coasts.

A. *The Low-Latitude Rainforest Environment* - Wet equatorial and trade-wind coastal are quite uniform in temperature and have a high annual rainfall. Streams flow abundantly throughout most of the year and river channels are lined with dense forest vegetation. The abundant rainfall and prevailing warm soil temperatures promote the decay and decomposition of rock to great depths producing a thick soil layer. Low latitude rainforests, possess a great diversity of plant and animal species.

B. *Plant Products and Food Resources of the Rainforest* - Many products of the rainforest have economic value. Important classes of food plants native to the wet low-latitude environment are starchy staples. Some of these are root crops, while others are fruits.

IV. The Wet-Dry Tropical Climate: This climate is noted for its very dry season at low-Sun that alternates with a very wet season during high-Sun. During the low-Sun season, dry continental tropical (cT) air masses prevail. In the high-Sun season, moist maritime tropical (mT) and maritime equatorial (mE) air masses dominate. The wet-dry tropical climate is found at latitudes of 5° to 20° N and S in Africa and the Americas, and at 10° to 30° N in Asia. A characteristic of the tropical wet-dry climate is its large year-to-year variability in precipitation.

A. *The Savanna Environment* - The wet-dry tropical climate is the home of the Savanna Environment. The native vegetation must survive alternating seasons of very dry and very wet weather. The rain-green vegetation enters and dormant phase during the dry period then burst forth into leaf and bloom with the coming rains. Rain-green vegetation consists of two basic types, the savanna woodland and the thorn-tree-tall-grass-savanna.

1. *Animal Life of the African Savanna* - The natural animal life of the savanna grasslands and woodlands is closely adapted to the vegetation and climate. The dry season brings a severe struggle for existence to animals of the African savanna. The ecosystem currently faces the prospect of widespread destruction. The primary threat is the loss of habitat that occurs as human activities claim ever-larger portions of the native savanna. Poaching is threatening the extinction of the elephant and rhinoceros in many areas.

2. *Agricultural Resources of the Savanna Environment* - The agricultural resources and practices of the savanna environment differ significantly between Asia and Africa. The stronger Asiatic monsoon system is a key factor. Rice is the dominant staple grown widely in Southeast Asia. Sugar cane is another important crop that grows rapidly during the rainy season and is harvested in the dry season.

3. *Food and Woodland Resources of the African Savanna* - Because the savanna environment in Africa is a transition zone between rainforest and desert environments, there is a corresponding gradation of plant resources and the ways in which they are used to support human life. In the moister zones, agriculture follows a pattern known as bush-fallow farming. In the drier savanna grassland and thorn-tree-savanna the main subsistence crops of uplands are corn, millet, sorghum, and peanut. Besides the agricultural system of the permanent farmers, there exists a nomadic cattle culture. The cattle provide food in the form of milk, butter and blood. The savanna woodland belt of Africa provides a number of other plant resources besides cultivated food crops. These are cut for firewood, and also provide construction poles for dwellings.

B. *Drought and Land Degradation in the African Sahel* - The Sahel suffers from a natural cycle of droughts and wet periods. Human cultural practices exacerbate the stress in the present system. During wet periods, both farmers and herders increase their farms and herds. When droughts occur much land is lost to desertification, as farmland is abandoned and cattle reduce ground cover dramatically. The stage is set for famine during these droughts.

V. **The Dry Tropical Climate:** Here, air strongly subsides, warming adiabatically and inhibiting condensation. Rainfall is very rare and occurs only when unusual weather conditions move moist air into the region. During the high-Sun period, heat is extreme. During the low-Sun period, temperatures are cooler. Given the dry air and lack of cloud cover, the daily temperature range is very large. The driest areas of dry tropical climate are near the tropics of cancer and capricorn. The broad zones at the

margins of the desert are best described as semiarid. These steppes have a short wet season that supports the growth of grasses on which animals graze. An important variation of the dry tropical climate occurs in narrow coastal zones along the western edge of continents. The cool water moderates coastal zone temperatures and reduces the seasonality of the temperature cycle. Coastal fog is a persistent feature of this climate.

A. *The Tropical Desert Environment* - The tropical deserts and their bordering semiarid zones comprise a global environmental region sustained by subsiding air masses of the continental high-pressure cells. Because desert rainfalls are so infrequent, river channels and the beds of smaller streams are dry most of the time. However, a sudden and intense desert downpour can cause local flash floods. Many desert plants survive the harsh environment because they can quickly take advantage of a rare rainfall that may arrive once in several years. In various places in the dry desert, water can be reached by digging or drilling wells that tap the ground water zones, where porous rock material is saturated with fresh water.

VI. Highland Climates of Low Latitudes: These climates are cool to cold, usually moist, and occupy mountains and high plateaus. Generally, the higher the location, the colder and wetter the climate. Temperatures are lower since air temperatures in the atmosphere normally decrease with altitude. Rainfall increases because orographic precipitation tends to be induced when air masses ascend to higher elevations. The character of the climate of a given highland area is usually closely related to that of the climate of the surrounding lowland.