

Topic Page: [Savannas](#)

Definition: **savanna** from *Philip's Encyclopedia*

Plain with coarse grass and scattered tree growth, particularly the wide plains of tropical and subtropical regions. An extensive example is the savanna of the East African tableland.



Image from: [Today's safari-going tourists generally travel... in Encyclopedia of Environment and Society](#)

Summary Article: **Ecosystems: Savannas**

From *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*

Introduction **Savannas** are areas of tropical grassland. They are characterized by a continuous cover of grasses and may have a variety of other plant types present. Savannas cover about one-quarter of the world's land surface and are found between the tropical **rainforests** and the world's great **deserts**. There are savanna areas in many subtropical countries, including Zimbabwe, Zambia, Kenya, parts of Brazil, and India, but the African savannas are the most well known.

The development and maintenance of savannas are the result of a variety of factors including climate, soils, **geomorphology**, fire, and the grazing of animal herds.

Climate There is no such thing as a 'typical' savanna climate. The climate that characterizes savanna areas is tropical with a wet season and a dry season. Rainfall in savanna areas ranges from 500 mm/20 in–2,000 mm/79 in per year, with an annual drought lasting between one and eight months. The presence of this annual drought results in seasons of water surplus and water deficiency. Annual temperatures are high (higher than 25°C). Summers are hot and wet, while winters are hot and dry.

Convictional rainfall occurs in summer. High all-year temperatures lead to high **evapotranspiration** losses. Evapotranspiration is the combined loss of water through evaporation (from the ground or from a water body) and transpiration (loss through vegetation).

Soils: leached ferralitic and ferruginous Savanna soils are affected by distinct seasonal changes in processes. They also vary with topography (for example whether they are on high slopes or low plains). Generally, sandy and/or leached soils predominate on the upper slopes, while **clay**-based soils predominate on the lower slopes. The variations in the soil are mirrored by changes in vegetation. In some places, **laterite**, a hardened layer of iron/aluminium, may limit the quality of the soil and make agricultural development difficult.

There is a very close link between climate and soil. Soils in the savanna are commonly leached **ferralitic** (containing high levels of iron and aluminium) soils. These are similar to the soils of the rainforest, but are not as intensely weathered, are leached to a lesser extent, and show a marked seasonal pattern in soil process. During the wet season the rainfall or precipitation (P) is greater than the potential evapotranspiration (pE_{vt}). This can be written as P > pE_{vt}. This means that soluble **minerals** and small particles will leach down through the soil. These are deposited quite deep below the surface. In contrast, in the dry season potential evapotranspiration is greater than the precipitation (pE_{vt} > P). During this season, silica and iron compounds are carried up through the soil and distributed

close to the surface.

Geomorphology plays an important role too. Soil at the base of slopes and river valleys are enriched by the clay, minerals, and **humus** that is deposited there. In contrast, plateaus, plains, and the tops of slopes lose nutrients by erosion. The differences in soil lead to differences in the vegetation growing there. This influence of soil is known as **edaphic control**.

Vegetation Savannah vegetation includes a variety of grasses, trees, and shrubs. It is **xerophytic** (adapted to drought) and **pyrophytic** (adapted to fire). Grasses predominate on sandy, leached soils while trees may be found in moister areas, such as valleys, where there is more clay. Growth is rapid in the summer. Fire (natural and of human origin) reduces the biomass store (the amount of vegetation and animals). Grasses are well suited to this type of environment because the bulk of their biomass is beneath ground level and they regenerate after burning.

Many grasses have adapted to the drought conditions. Adaptations include:

- deep **taproots** to reach the **water table**
- partial or total loss of leaves, resulting in less need for water and having fewer surfaces through which water can be lost
- sunken stomata on the leaves also to reduce moisture loss.

Savannah grasses have also adapted to fire. Some of these adaptations include:

- very thick bark and thick budding that can resist burning
- the bulk of the biomass is below ground level, making regeneration easier after a fire
- rapid regeneration after fire.

The growth tissue in grasses is located at the base of the shoot close to the soil surface. This differs from shrubs, where growth occurs from the tips. Because of this, burning, and even grazing, encourages the growth of grass relative to other plants.

Typical examples of vegetation in the African savannah include elephant grass, which can grow to a height of over 5 m/16 ft, and trees such as the acacia, palm, and baobab. Such trees can grow to a height of about 12 m/39 ft and are characterized by flattened crowns and strong roots.

Nutrient cycle The biomass store in the savannah is less than that of the tropical rainforest due to the shorter growing season. At the same time, the **litter store** (the amount of nutrients contained in the dead and decaying leaves) is small due to fire. This means that the **soil store** (the amount of nutrients contained within the soil) is relatively large.

The **nutrient cycle** is the cycle between the soil, the vegetation, and the leaf litter. Eventually the leaf litter is broken down and the nutrients are returned to the soil from where they are taken up by the plants. The savannah nutrient cycle differs from the tropical rainforest nutrient cycle because of the combined effects of a seasonal drought and the occurrence of fire. Consequently there is:

- lower nutrient availability
- reduced biomass store

- small litter store
- a relatively large soil store.

Animals Many different types of animal live on the savannah. The African savannah has the largest variety of grazing animals, with over 40 different species, including giraffe, zebra, gazelle, elephant, and wildebeest. **Selective grazing** means that a great variety of **herbivores** can live there. For example, the giraffe feeds off the tops of the trees, the rhinoceros eats the lower twigs, and the gazelle grazes the grass beneath the trees. These animals are largely migratory, which means that they search out water and fresh pastures as the dry season sets in.

There are also a variety of **carnivores** including lions, cheetahs, and hyenas, that feed on the herbivores.

Human activities Human activities are increasing in savannah areas. As the population grows, there is increased pressure on food resources. This means that a large proportion of the natural landscape has to be converted to farmland. In addition, as roads are built, settlements expand, and economic activities increase, savannah areas are built on. Moreover, in areas of savannah that are protected, such as national parks, there may be increased pressures from tourists, as well as large concentrations of animals in small sites. These factors lead to pressures on the savannah, and, ultimately, vegetation destruction.

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