

LOCAL FLORA

The flora in Chirripo National Park is one of the most complex and diverse of Costa Rica. The park owes its diversity to its wide altitude range, rising from 1500 m to 3819 m above sea level and to the unique microclimates of the Pacific and Caribbean Slopes. Part of the lower slopes have been denuded as farmers cut down trees for cow pastures or coffee plantations.

In the park we find three distinct life zones: low mountainous rain forest (cloud forest of mid altitudes), mountainous rain forest (cloud forest of high elevations), and sub-alpine rain paramo (tundra-type vegetation in the higher elevations of the range). The lower montane forest canopy reaches heights of 40 meters over the epiphyte-laden understory, where one encounters graceful tree ferns and poor man's umbrella (*Gunnera talamancana*) near streams, and vines, lianas and scandent bamboo of the genus *Chusque* elsewhere. With increasing altitude in the high elevations, the height of the trees decreases sharply. In the highest oak forests we rarely find trees of more than 20 meters.



Stunted bamboo becomes more abundant in the paramo, above 3400 meters of elevation. Dwarf paramo vegetation is distributed along the high mountains of the tropical regions, and represents the northern limit of the Neotropical Paramos. A high percentage of the plants are endemic to this area, having adapted to the harsh climatic conditions.

We are trying to understand the composition of the lower montane oak forest so that reforestation can be done in a manner that matches the neighboring floral diversity. Common cloud forest trees include oak, cedar, elm, magnolia, figs, and a laurel called aguacatillo, which is the quetzal's principal food. Mosses, ferns, heliconias and orchids blanket the soil and trees, and the lower temperature slows the decomposition of organic matter, resulting in an accumulation of debris on the forest floor. Open areas favor pioneer species such as the Cecropia.



A key feature of mid-altitude cloud forest is the abundance of moisture-gathering epiphytes such as bromeliads and orchids. These, it seems, are vulnerable to changes in cloud levels that result from deforestation. Dr. Nalini Nadkarni conducted a study in the Monteverde reserve to determine how susceptible epiphytic species are to changes in temperature and moisture, such as the changes that appear to be taking place in recent years. She moved several epiphytes to various locations at lower elevations, outside of the reserve. She then moved the plants back to their home environment at the end of the dry season and continued to monitor their health. She found that 90% of the species died and did not recover. To ensure that the damage was not due to the disturbance of moving the plants, she conducted a control study in which she removed several epiphytes, drove them in a vehicle around the community, but then replaced them directly into their home environment rather than leaving them at the lower elevations. These plants did not demonstrate

detrimental effects, indicating that the dramatic die-off was, indeed, due to living in a warmer drier climate and not due to the stress of being removed and replaced.