

CYCLURA FOREST HABITAT

The dry forests of the West Indian Islands that evolved in association with rock iguanas

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Xerophytic forests inhabited by large herbivorous lizards have existed in the West Indies for millions of years. They have survived drastic climatic variation, geological activity, and rising and falling sea level throughout their existence. With the arrival of man, this habitat has been changed forever.

The dry forests of the West Indian islands are some of the most endangered habitats of the region. They evolved under harsh conditions and are often less tolerant of disturbance than other vegetation communities. They occur on limestone substrate in areas with highly seasonal rainfall patterns. They are short in stature as a result of their exposure to salt laden winds. Dry forests grow slowly in sand or in sparse rocky soils. They thrive in areas of erratic rainfall and frequent drought conditions. They not only survive hurricanes and tropical storms but quickly recover if they are in good condition. The dry forests of the West Indian islands are tremendously efficient systems, capable of capturing nutrients from infrequent cycles of abundance and able to survive long periods of few resources. These xerophytic plant communities contain some of the world's hardest woods, they harbor many spectacular bird species, and the earth's largest saurian herbivores.

Xerophytic vegetation communities contain plants that are structurally adapted to growing under very dry conditions. Xerophytes often have greatly reduced leaf surfaces to avoid water loss. They are thick and fleshy to facilitate water storage. Many species of plants have hairs, spines, or thorns to provide shade on their surfaces. They are perfectly adapted for the areas where they occur.

The rock iguanas of the genus *Cyclura* are the ideal vertebrate inhabitants of the West Indian dry forest. They are strongly heliothermic and survive long periods of time without fresh water. Rock iguanas thrive on a diet of rough fibrous leaves but

are well suited to take advantage of abundant but short-lived crops of flowers and fruits that most of the plants produce. *Cyclura* inhabit the many holes in the limestone substrate and create their own burrows in areas of sand.

In modern times, the West Indian dry forests have suffered a steady decline. On the larger islands and in populated areas these forests are mostly gone. Some excellent examples do survive in remote or sparsely populated areas, primarily in Cuba and the Bahamas. Excellent fragments remain in a number of other areas but most are under intense pressure and are in danger of being lost in the near future.

This type of habitat has been historically referred to as "Thorn Forest." This is due to the presence of cactus, agave, airplants, thorny or spiny trees and shrubs and the low canopy typical of this forest. Stem densities are extremely high, which helps reduce water loss. This makes moving through this habitat difficult for humans but not iguanas. The surface may be sandy, but more often is sharp pitted limestone full of holes and crevices. Solution holes and sinkholes are common, caused by rain dissolving softer areas in the rock over thousands of years. Sand and organic soils accumulate in these pockets providing places for trees and shrubs to grow. Larger holes may be kept open by the nesting activities of iguanas. Some sinkholes may contain pockets of a lateritic soil, especially on older and larger islands (Dominican Republic, Hellshire in Jamaica). Many of these soils were deposited by winds blowing dust off of Africa over the eons.

The rough nature and appearance of West Indian dry forest along with the heat and rocky terrain have made few people lament its destruction. The absence of permanent fresh water has been the main factor that has prevented destruction. On large islands the availability of water for irrigation has enabled agricultural development.



Giant Columnar Cacti, *Cephalocereus swartzii*, in the Hellshire Hills, August 1990. Photograph: R.W. Ehrig



Jamaican Silver Palms, *Coccothrinax jamaicanensis*, in the Hellshire Hills. Palm fruit provides desirable iguana food. August 1990. Photograph: R.W. Ehrig

Limestone mining has destroyed large areas in Cuba, Puerto Rico, and Jamaica. Woodcutting for the production of charcoal has destroyed vast areas in many countries. Few realize that Haiti was covered with rich dry forests containing massive quantities of mahogany and oak since these forests are 99% destroyed. Most of the soil has washed into the sea, thus depriving the island of its cover. The Hellshire Hills in southern Jamaica (the largest and most biologically diverse dry forest currently in existence in the region) is being consumed at present and will cease to exist in approximately 15 years at the present rate of deforestation.

Goats, burros, sheep, cattle, and other free ranging and feral mammalian browsers have caused untold damage. They have prevented natural regeneration of vegetation in many cases. In many degraded xeric forests non-native trees

such as Australian pine, (*Casuarina equisetifolia*) and jumbie bean, (*Leucaena leucocephala*) will become the dominant species. These trees have very low value for wildlife. Early successional native species such as *Acacia macracantha* will become major components of the forest at the expense of species diversity. Lower diversity of plants translates to reduced food resource for wildlife, which in turn leads to loss of more specialized organisms. The northern border of the Hellshire Hills, Jamaica was a tall dry forest with a 12-15 meter canopy until 1965, (E. Duffus, pers. com.). In 1990 this vegetation was composed of *Acacia macracantha* and *Haematoxylum campechianum* 2-3 meters in height. Although most large tracts of West Indian dry forest have already been destroyed, there are notable exceptions.

The Bahamas, Cuba, Dominican Republic, Virgin Islands, Florida Keys, and the Cayman Islands all have protected areas. In most cases these areas protect only parts of these habitats. Larger areas must be protected and reserves must be established in countries that do not yet have them if viable populations of *Cyclura* and other species are to survive.

Conservation of rock iguanas will be difficult in the face of growing poor human populations. The continued survival of these vegetation communities is the primary factor that will be responsible for the future survival of the West Indian rock iguanas. No other organism is more representative of West Indian dry forest and the continuing survival of both will be dependent on the same factors.

Coexistence of Forest and Iguanas

Cyclura presently survive in scattered locations in the Bahamas, Cuba, the Cayman Islands, Haiti and some offshore islands, Dominican Republic and some offshore islands, Jamaica, Mona Island, Magueyes Island, Anegada, and Guana Island. It is believed that they had a much larger natural range than at present. Lucayan, Caloosa, Taino, and Arawak Indians probably all utilized *Cyclura* as food and had a negative impact on populations. The arrival of Europeans precip-

itated drastic declines in iguana populations and the destruction of the habitats. The arrival of exotic predators and competitors caused drastic declines and extinctions even where habitats were left intact.

Rock iguanas may survive in habitat that is degraded. Mona Island has suffered from grazing by goats for hundreds of years. Iguana densities only appear to be extremely high in areas that are still pristine or very close to pristine. Areas where *Cyclura* naturally occur all have common characteristics. They have limestone as a substrate and a distinct seasonal rainfall pattern. They occur at latitudes between 25° and 16° north. The vegetation is dry West Indian forest with many of the same species and is influenced by the sea.

The vegetation contains cactus, *Opuntia*, *Cereus*, and *Cephalocereus* and *Agave*. It contains xeriphytic palms, *Coccothrinax*, *Thrinax*, and *Pseudophoenix*. Most of the trees and shrubs produce seasonal crops of flowers and fruits which are extremely desirable to iguanas. Some produce flushes of growth of leaves after rains which are

also utilized as food. The reason iguanas have been so successful in this habitat is that they are able to use the resources without damaging the plants. They easily survive the periods of drought. Introduced mammals may survive but with disastrous impacts on the habitat.

There is compelling evidence that herbivorous land iguanas have a positive effect on the dispersal of the seed of many of the plants. The distribution and frequency of many of the iguanas favorite food plants are enhanced by the iguanas foraging. Iguanas and the White Crowned Pigeon are the main seed dispersers in this habitat. Large fruited trees such as 7 year apple, *Casasia clusifolia* and wild dilly, *Manilkara bahamensis* are found growing on the tops of hills where iguanas occur. Without transport by iguana these species would have a very difficult time reaching such sites. When the droppings of iguanas are examined they commonly contain seed of these plants. The scats resemble cigars, sometimes containing whole leaves, making identification of plant species possible.



San Salvador iguana, *Cyclura rileyi*, on Green Cay among the Sea Ox-Eye Daisy. Photograph: Rena Burch