

# Anegada Island Iguana (Stout Iguana)

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**Common Name:** Anegada iguana **Scientific Name:** *Cyclura pinguis*

**Order:** Sauria

**Family:** Iguanidae

**Status:** Listed on Appendix I of CITES; Critically Endangered under the IUCN.

**Threats:** Dog and cat predation; competition from feral livestock; habitat degradation and loss; poaching.

**Habitat:** Dry tropical forest and scrub; seasonally found in coastal strand; occasionally found in salt marsh or salt pond environments.

**Distribution:** Currently found on Anegada, Guana, and Necker Islands in the British Virgin Islands (BVI). Formerly widespread on the Puerto Rico Bank (Pregill 1981).

## Description

The Anegada rock iguana is a relatively large and stout member of its genus. Males have been recorded with nose-cloaca lengths of 56 cm and may grow larger. These iguanas have dusty brown backs that are sometimes vertically barred with black. Their legs, sides, and dorsal spines are often a brilliant turquoise blue. Commonly the dorsal spines are quite small, especially on females. Juveniles are most colorful, patterned with a series of black chevrons crossing their green or blue-green dorsal surfaces. When Anegada iguanas are agitated, their eyes flush bright crimson.

## Natural History

The range of *Cyclura pinguis* was reduced to Anegada when the Virgin Islands became densely settled. Anegada is an island made of old, reef-tract limestone and sand. It is honeycombed with holes, caves, and other rocky shelter sites-ideal living quarters, or escape retreats, for iguanas. Anegada's human population has always been relatively low and there are few dogs and cats-and to date no mongooses that have decimated iguana populations on other islands to which they have been introduced. Jointly these qualities made Anegada the last reasonably safe environment for *C. pinguis*. on Anegada, iguana distribution remains; closely tied to the more porous limestone habitats, although the iguana uses adjacent sandy areas for burrowing and nesting as well.

Both Guana and Necker are largely volcanic in origin and have few naturally occurring shelter sites. The iguanas there must dig their own burrows. As a result, on these small islands or cays, fewer burrows are used and animals are more arboreal (i.e., spend more time in trees). Iguanas are much more vulnerable on these privately owned islands, but non-native predators such as cats and dogs are either controlled or are not permitted there.



*C. pinguis* is predominantly herbivorous. Invertebrates such as centipedes (*Scolopendra*), moth larvae (*Pseudosphinx tetrio*), and scarab beetles are also eaten. Iguanas rely heavily on fruit in season. on Anegada, where the iguana's distribution entirely overlaps with feral ungulates, the diet consists mostly of plants that are not favored by livestock; many contain secondary compounds that are produced by the plants to deter grazing and browsing. one such plant, *Croton discolor*, has dramatically increased in abundance since livestock were

released on the cay in the late 1960s. The flora of Guana is quite different. Iguanas there generally inhabit areas where sheep do not graze. Native plants eaten on Guana include large quantities of *Centrosema virginiana* (a tender-leaved pea), flowers of *Tabebuia heterophylla*, seed pods of *Capparis cynoballopbora*, and leaves of *Stigmopbyllon emarginatum* and *Capparis flexuosa*.

Guana and Necker Islands have low-quality iguana forage in most areas. Both islands have been affected by feral sheep, goats, and possibly other grazing ungulates. As with Anegada, the vegetation has shifted in composition to plants rich in secondary compounds that are either distasteful or toxic to livestock. Guana still has feral sheep and goats, although efforts are being made to reduce or eliminate them. Necker's livestock has been removed, but vegetation still resembles that of islands on which livestock grazing occurs.

Along with a decline in population and a change in diet since livestock release in 1968, social organization among iguanas now differs as well. In 1968, the average home range for iguanas on Anegada was less than 0.1 hectare, and male home ranges had free space between them. The sex ratio was 1 male : 1 female. Males and females appeared to be monogamous and lived in separate but closely adjacent burrows (Carey 1975). By 1988, home range size and spacing appeared to differ in two ways: (1) home range size averaged 100 times larger, and (2) male home ranges abutted and overlapped slightly (Mitchell 1999, in press). The number of females declined to a sex ratio of 2 males : 1 female. "Pairs" were no longer clearly definable because several males would enter the home range of the few females present. Males suspected of having a mate had a principal burrow near that of a female, used some of the same burrows as the female, and had noticeably smaller home ranges-presumably to guard the female against wandering bachelors (Mitchell 1999).

Females lay 12-16 eggs between May and June. Females inhabiting sandy areas nest in their principal burrows or in dunes; those in rocky areas travel to find a spot in which to dig. on Guana Island, iguanas nest in seagrape-dominated beach strand. Clutches hatch in August and September as the rainy season commences and vegetation becomes more lush. If conditions are favorable, hatchlings can mature to reproductive size (about 450 mm snout-vent length; Carey 1975) in 3 to 4 years.

### Conflicting Issues

Anegada is no longer a safe refuge for iguanas. Since the late 1960s iguanas there have experienced a massive population decline, and their density in what used to be considered good habitat is almost 10 times lower than former levels. The drop in numbers is probably due to a number of causes: (1) feral dogs, first reported in 1994, are known to kill adult iguanas, (2) an exploding population of feral cats, which prey on juvenile and subadult iguanas, (3) human poachers trafficking exotic pets, and (4) feral livestock. The latter represent Anegada's biggest drawback-the island teems with sheep, goats, donkeys, and cattle that cyclically breed to carrying capacity (i.e., the population size that the island can support), then starve after stripping the landscape of all palatable vegetation. These ungulates compete with iguanas for food. As a result, the iguana's diet has shifted to plant species that livestock do not eat, mostly those with secondary compounds. Many of these plants are poorly digested and therefore of dubious nutritional value.

Attempts have been made to restore iguanas to parts of their former range. Between 1984 and 1986, eight iguanas from Anegada were relocated to Guana. In vegetatively diverse regions of Guana these individuals and their descendants are thriving and reproducing (Goodyear & Lazell 1994); some of the offspring have been relocated to Necker Island.



Prior to the 1960s, the human residents of Anegada--descendants of former slaves and pirates--relied for their livelihoods on a combination of farming, animal husbandry, and fishing. The island was neatly and effectively partitioned by a system of stone walls, painstakingly constructed by residents, that retained livestock, fenced agricultural crops, and defined ownership.

Residents maintain that ownership of the land was granted to them by Queen Victoria. In an 1885 ordinance pertaining to Anegada, the British Crown agreed to grant land with the proviso that landowners have their property boundaries surveyed. Not one Anegadian did so (Renwick 1987). In 1961, under new legislation known as the "Anegada Ordinance", the British Crown assumed administration of most of the island and, along with the government of the BVI, leased all but 607 hectares to a Canadian development firm in 1968. The company began to develop the cay by bulldozing the network of stone walls. Stock animals (goats, sheep, cattle, burros, and swine) escaped to the bush and began to freely range the cay.

In combination with a prolonged drought, crops were raided and failed. Anegadians turned to the sea for a living. The livestock release was also a turning point for iguanas, which now had mammalian herbivores as competitors. Ironically the development firm soon folded, abandoning warehouses, rock crushers, and excavating equipment. Some Anegadians claim they drove the firm off the cay. Shortly thereafter the government began a reassessment of land claims on Anegada, and some titles were granted; (Lands Adjudication Act, 1970).

The idea of creating a national park on Anegada was endorsed by the BVI Executive Council in 1981 and proposed in 1986 in the BVI System Plan (Geoghegan et al. 1986). In 1987 the governor

appointed a one-man commission that recommended an equitable division of lands on Anegada (Renwick 1987). A respected group of community leaders formed the Anegada Lands Committee to mediate and settle remaining land ownership issues. In March 1993 they approved the Anegada National Park concept in principle.

Based on iguana survey work (Mitchell 1999) a joint proposal from the National Parks Trust and the Conservation Agency was Submitted to the Town and Country Planning Department, which recommended establishment of three terrestrial conservation zones on Anegada (Goodyear & DeRavariere 1993). These regions did not include land for which titles were already held.

Town and Country Planning was at that time producing the Anegada Development Plan (Government of the British Virgin Islands 1993), in which the recommended conservation zones were closely adopted. In November 1993 the Development Plan was released to the public. With land claims still unresolved, the maps enraged residents, preventing dialogue when the chief planner arrived to formally introduce the plan. To date, disagreements are still rampant and consensus on ownership and property boundaries remains elusive. Therefore, the Anegada Development Plan and the National Park proposal have been tabled.



The residents of Anegada will not set aside land for iguanas until they have land for themselves. In fact, the prevailing sentiment on Anegada is to disallow or discourage help of any kind for the iguana until the government has given Anegadians land titles.

Several unresolved questions impede establishment of a national park, or form of sanctuary, to protect the Anegada iguana. First, who is entitled to claim land on Anegada: (1) everyone born on Anegada and their descendants (a number of former Anegadians, and

first or second generation offspring, currently living in New York who have submitted land claims), (2) only those born on Anegada, (3) only those born and raised on Anegada, or (4) only those born, raised, and still living on Anegada? Second, should the iguana be granted land before the people's claims are settled. Third, who should decide whether the iguana gets a land allocation, and who chooses which land: (1) the British Crown (an appointed official), (2) the BVI government (locally elected officials), (3) the citizens of Anegada (but see the first issue), or (4) some combination of 1, 2, and 3? Although there are only about 150 residents, Anegadians have swayed elections in the past. Elected BVI officials will not allocate land for iguanas because it would widely displease voters on Anegada.

Complicating these issues is the fact that the general community on Anegada has not been shown how or why a national park would benefit them. The potential benefits of ecotourism should be explained to generate enthusiasm and local support. In addition, although the National Park Trust ostensibly supports establishment of a national park on Anegada, it is rendered ineffective because, as a branch of the BVI government, ultimately it gets its directive from politicians. Finally, because of past interactions with the Crown and government officials, Anegadians are skeptical and suspicious of outsiders. They do not believe anyone has their best interests at heart.

## **Future and Prognosis**

From a conservation standpoint, the first order of business on Anegada is to protect, fence, and remove livestock from land for the iguana. It will probably be necessary to assist the recovery of native plant communities that provide iguana forage. Experiments are currently under way to determine whether livestock exclusion is sufficient to promote recovery of plant communities (a passive effort) or whether restoration is required. Conditions on Necker suggest that active

management will be necessary, as the cay retains a plant community poor in species diversity more than 15 years after livestock removal.

Obtaining a land allocation for iguanas may be more difficult than managing it. To gain approval for an iguana sanctuary, the government should first attempt to satisfy the concerns of residents. It should set a target date for settling all private claims to land on Anegada. If agreements cannot be reached by this deadline, it is of paramount importance that the Crown assume responsibility for *C. pinguis* and, as holder of land-granting privilege as well as lands proposed for the national park, set aside a protected area for iguanas. No residents currently on Anegada claim areas in the proposed national park, except as historical grazing range. Most of the area is lowland or wetland and not buildable.

The Anegada Development Plan (Government of the British Virgin Islands 1993) did not discuss management strategies for proposed conservation zones. Some suggestions follow.

1. A national park should be established and managed to promote recovery and proliferation of the island's rare, indigenous, and endemic species, particularly the iguana. Focus should be on restoring and repairing native habitats that have been damaged by overgrazing. The area should be fenced. Nature trails and boardwalks could be developed, but buildings (except shade shelters and observation platforms) should not be permitted. The park should be staffed with Anegadian wardens and interpretive personnel. Fishing and salt collection in ponds could continue in accordance with BVI regulations but must not interfere with the reproduction or foraging habits of native animals.
2. Conservation areas should be left unfenced but should not be developed. Some eastern regions contain important habitat for relict subpopulations of iguanas and waterfowl. Spectacular, large native trees persist in the east, and on the west end there is sandy nesting habitat for iguanas living in adjacent limestone areas. Nature trails might be considered.
3. A coastal reservation should be managed for iguanas that nest behind dune ridges or in coastal strand Communities, and for sea turtles that nest in sandy seaward regions. Clearing of vegetation and allowing of foot traffic in the dunes should be avoided, and buildings (except shade shelters) should not be permitted in an effort to avoid disruption of nesting sites. The beaches should be left in pristine condition. Designation of a coastal reservation as public domain would ensure that Anegada retains its trademark vast white beaches that attract visitors to the BVI.

The advantage of setting aside these lands must be properly explained to the Anegadians. Establishment would benefit iguanas and Anegadians alike. The iguanas would benefit from management policies that promote their recovery, and the park could provide economic benefits to the Anegadian community in the form of jobs and business expansion. Within the park, positions might include interpretive naturalists and guides, wardens, maintenance personnel, park restoration staff, and construction workers. Outside the park there would be increased demand for service-oriented businesses such as grocery stores, restaurants, bars, gift shops, dive businesses, rental shops, hotel facilities, and taxis. Other benefits might include government training and development of a natural history and historical museum associated with the park (Goodyear & DeRavariere 1993).

It takes capital to develop attractive tourist destinations. Anegadians should quickly gain assistance (e.g., development grants) from the world conservation community to develop a park that they can staff and run if they choose to conserve iguanas and their habitat. This would make Anegada the only British Virgin Island on which profits could be made largely by locals as opposed to outside investors.

In 1997 the National Parks Trust began a headstart program (hatching and raising iguanas in captivity for several years before release to the wild) on Anegada and planning a feral cat removal program--valuable steps to reducing predation pressures on young iguanas. However, without

controlling livestock and restoring habitat, it is unlikely that the island can sustain higher numbers of adult iguanas. It is urgent that decisions to allocate and manage land for iguanas are made rapidly. Without action, the iguanas on Anegada could be extirpated -within the next decade.

In memory of our mothers, who always encouraged us to follow our passions



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***Exploration and discovery:*** We head out into the field, often to remote corners of the world, searching for new species, lost species, critical habitats, and insights into ecological relationships. We do population assessments, animal behavior research, and recovery plans. We get muddy, or sandy, or sweaty, or sometimes thoroughly chilled - or all of those things. We catch animals, collect plant specimens, and document habitats. We write up our results and publish them.

***Conservation and preservation:*** Based on our fieldwork, we produce management plans for individual species, particular habitats, and even whole ecosystems. We get this information into the hands of governmental agencies, land acquisition organizations, and stewardship groups. We even directly manage some sites ourselves, such as Snake Acres in the Lower Florida Keys and the Guana Island Wildlife Sanctuary in the British Virgin Islands.

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