

CAUGHT IN A NET

GREEN TURTLES AND THE TURTLE PEOPLE OF NICARAGUA

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Night has fallen in eastern coastal Nicaragua. On the water's surface and rolling with the swells is an assortment of variably colored and often irregularly shaped buoys scattered across Nicaragua's fishing banks. Earlier in the day, while green turtles were off foraging among the area's expansive seagrass pastures, Miskitu Indian fishers set dozens of large-mesh nets above coral and rock outcroppings they call "sleeping rocks," where turtles come to rest during the night. Now, amid thrashing flippers, the buoys of those nets suddenly bob and disappear from view as a turtle becomes entangled and attempts to free itself from the net, descending again with a loud forced exhale. Another unsuspecting green turtle has been caught as it rose from its sleeping place to breathe. The captured turtle will float at the surface, entangled in the net and periodically struggling to escape, until dawn, when the fishers return to check their nets and retrieve their catch.

The extensive, shallow continental shelf of eastern Nicaragua is home to hundreds of thousands, possibly millions, of green turtles that forage on the abundant seagrass that grows there. This green turtle aggregation is a mixed stock from rookeries and developmental habitats throughout the greater Caribbean from Bermuda to Brazil and to the eastern reaches of the Caribbean Sea. Playa Tortuguero, in Costa Rica, is the principal nesting beach from which foraging turtles in Nicaragua originate. Tortuguero is one of the world's largest green turtle rookeries.

The Miskitu Indians of this region are known as the "Turtle People," and they have fished green turtles for hundreds of years on the shoals and banks of Caribbean Nicaragua. So renowned were they for their prowess at striking turtles with a harpoon that pirate schooners made sure to have at least one Miskitu onboard to ensure the availability of fresh meat while they prowled the world's oceans. In the 19th and early 20th centuries, Cayman Islanders introduced the use of entanglement nets to the Miskitu fishers so they could capture more turtles for export to satisfy exotic tastes for green turtle soup among the upper classes in distant lands.

Green turtles are no longer shipped from Nicaragua to Jamaica, the United States, or Europe by Caymanian schooners. Since 1978, when Nicaragua ratified CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), green turtles in Nicaragua have been protected from international trade. However, during the mid-1990s, we documented an annual catch of 10,000 to 12,000 green turtles for local consumption, which rivaled take levels for export from the late 1960s to early 1970s. During that period, Archie Carr, the late professor of zoology at the University of Florida, and Bernard Nietschmann, the late geographer at the University of California, Berkeley, first recognized and documented a decline in both the number of clutches laid by green turtles at Tortuguero and the catch rates on the Nicaraguan foraging grounds. Carr and his colleagues convinced the Costa Rican government to protect nesting females at

Tortuguero. Together, Carr and Nietschmann were able to convince the Nicaraguan president, Anastasio Somoza DeBayle, with added pressure from the president's wife, to close Nicaragua's green turtle processing plants. In 1975, Tortuguero National Park was established in Costa Rica; by 1977, Nicaragua had completely closed its green turtle processing plants.

Although trade in turtles is prohibited, Nicaraguan law still allows the subsistence use of green turtles, and local demand from coastal inhabitants has supplanted the historical export demand. This provision in the law results in the annual capture, sale, and consumption of thousands of green turtles by Nicaragua's Caribbean coastal inhabitants (Miskitu, Rama, and Mayangna Indians; Afro-descendants; and mestizos). In recent years, we have documented an annual green turtle catch of between 5,000 and 8,000 animals, a decline since the 1990s that appears to result from reduced catch rates.

Despite government regulations that prevent the commercial sale of turtle products, local authorities in the coastal towns of Bilwi (Puerto Cabezas), Bluefields, Pearl Lagoon, and the Corn Islands are reluctant to prohibit the sale of green turtle meat on the streets and in the markets because of the high demand and the lack of economic alternatives on the coast. In addition to being caught for sale to local residents, green turtles are also caught to feed fishers working offshore in the Caribbean spiny lobster and sea cucumber fisheries. This uncontrolled green turtle fishery has detrimental effects on other nontargeted turtle species as well, such as hawksbills and loggerheads. Once captured, sea turtles are seldom released alive, although recent efforts to raise awareness have had a positive influence on the behavior of some fishers to safely release the turtles.

Currently, green turtle meat sells for between US\$0.73 and US\$1.27 per pound in coastal communities and towns, compared with US\$1.38–\$2.18 per pound for beef and US\$2.00 per pound for chicken. Most often, turtle products are sold in portions as a mixture

of meat and the various organs, including lung, heart, liver, kidneys, intestine, reproductive organs, and chine (the cartilaginous edge of the carapace). Even the blood is consumed. The only parts of the animal that are not used are the carapace, plastron, and some viscera, which are discarded during the butchering process, the latter being consumed by the many dogs that typically gather for the slaughter. A few older men still process the calipee from the plastron (the main ingredient in the once-prized green turtle soup), then store it dried, with hopes that one day someone from "the outside" will arrive to purchase it, as happened decades ago when they were young men.

What is the future of the green turtle aggregation and the Turtle People of Caribbean Nicaragua? This area is one of the few remaining legal sea turtle fisheries in the world, in large part because of the declining or extirpated turtle populations throughout the region. Recent population modeling indicates that the high take level reported during the 1990s in Nicaragua was not sustainable, and recommendations for a more sustainable take level have been made.

Together with Nicaraguan colleagues, we have worked to improve the management of the green turtle fishery by doing the following:

- Setting a maximum size limit to protect the larger and mature turtles
- Extending the length of the closed season
- Establishing community quotas and allowing only communities with a tradition of turtle fishing to take green turtles
- Prohibiting the commercialization of green turtles in coastal towns
- Prohibiting the transport of green turtles or their meat inland or to the Pacific coast of Nicaragua
- Educating the authorities and engaging them in establishing regulations that work toward more sustainable take levels

The ability of managers to establish and enforce sound management practices is at the discretion of politicians and the political climate in the country. As a result, only a few of the aforementioned measures have been put in place, and even those are inconsistently enforced for a variety of reasons. Fishers and community members are less likely to comply with regulations if they suspect that other communities are not complying. Thus, inconsistent enforcement engenders apathy by all toward the laws. Furthermore, sea turtles are a common-pool resource, and it is logistically difficult for authorities to enforce the law over large areas of open sea.

Green turtles are not likely to disappear from the Caribbean coast of Nicaragua. However, as population declines continue, a time may come when the fishery is no longer economically profitable. In anticipation of that day, efforts must begin now to find appropriate alternative livelihoods to sustain fishers and their families, to reduce their dependence on green turtles for income, and to find alternative and inexpensive sources of protein to support the coastal population. Green turtles foraging in Caribbean Nicaragua need well-conceived conservation programs that look well beyond Nicaragua. Although a few green turtle rookeries in the region are robust (such as Tortuguero), some smaller or depleted nesting populations that feed in Nicaragua may be at great risk of extirpation from this fishery. A scientifically based management plan that is developed in the context of the Regional Management Unit and for the entire green turtle population should be created and enacted among all political regions of Nicaragua's Caribbean coast.

On a positive note, today there is greater awareness among the fishers, the coastal population, and the authorities in Nicaragua about the need to manage the green turtle fishery. But numerous challenges remain in Caribbean Nicaragua to sustainably manage long-term use of this endangered species. ■



Miskitu Indian fishers haul in a green turtle in Puerto Cabezas, Nicaragua. © JEFF ROTMAN / MINDEN PICTURES