Opening Doors to Research in Cuba

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Although hurdles remain, the recent thaw in US–Cuba relations has improved prospects for biological research and conservation in Cuba.

Some three dozen people met in a Washington, DC, hotel last fall for an Environmental Defense Fund (EDF)–sponsored session to discuss the challenges and potential for marine conservation and research in Cuba. More important than the topic, however, was the presence of four Cubans plus a half-dozen staffers from NOAA (the National Oceanic and Atmospheric Administration).

"This would never have happened under the previous [Bush] administration," stated David Guggenheim, a marine biologist who has worked extensively in Cuba since 2000. Guggenheim, a senior fellow at the Ocean Foundation and president of 1planet1ocean, both Washington, DC, advocacy groups, notes that the NOAA staffers were not a part of any official negotiations, but their presence represented a rare chance for US government scientists to meet their Cuban colleagues in an informal setting. For many in the room, it also suggested the possibility of future such meetings between Cuban and American scientists.

For the EDF meeting to occur, the US Department of State had to grant visas for the Cubans to attend, and NOAA had to let its scientists participate in the meeting. That happened as the Obama administration was easing some trade restrictions on Cuba, relaxing rules on Americans traveling and sending money to Cuba, and engaging in diplomatic negotiations with Cuba aimed at improving ties between the two nations.

Cuba possesses some of the largest mountain forests in the Caribbean. Pictured here is a forest in the Pico Mogote Ecological Preserve in eastern Cuba. Although disturbed by plantation pines, the preserve contains 14,900 hectares of montane rainforest that form the core zone of Cuba's Bacanao Biosphere Reserve. Photograph: Steve Cornelius.

Why Cuba?

Why should American biologists care about wildlife in Cuba, other than that we care about wildlife everywhere? What makes Cuba special? For one thing, as the largest island in the Caribbean—1200 kilometers (km) long by up to 240 km wide in some places—Cuba is a hot spot for biodiversity. Located at the confluence of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, it features relatively clean waters and pristine beaches, as well as mangrove swamps, dry forests, and remote mountains. Southern Cuba, in particular, "is one of the few

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Some conservationists are worried that pristine beaches like this one at Cayo Levisa could be affected by the building of resorts along Cuba's 765-kilometer coastline, as well as possible offshore energy and other natural resource development. Photograph: Abel Valdivia-Acosta.

places that Columbus would recognize today," says Stephen Cornelius, program officer for Latin America at the John D. and Catherine T. MacArthur Foundation in Chicago.

Cuba ranks 10th in the world in reptile diversity with 91 species, including both American and Cuban crocodiles. Although few mammals inhabit the island, there are some unusual ones, such as hutias, which are capybara-like rodents, and solenodons, which are strange, shrew-like insectivores. Both are found only in the West Indies. Cuba also has some 285 species of birds, including the world's smallest: the bee hummingbird. Twenty-five of Cuba's bird species are found nowhere else, and 17 of these are endangered. Cuba's flora includes about 100 species of palm trees.

Solenodons

Cuba is home to some unusual animals, and one of the strangest is the solenodon. These weird-looking animals are primitive insectivores that many scientists believe evolved from the earliest placental mammals. Weighing about 850 grams, solenodons look a bit like pumped-up shrews. They have a stout body; a long, flexible snout that juts out from their upper jaw to well beyond their lower jaw; a hairless tail; and long, sharp claws. They use their snout and claws to capture insects, earthworms, and other small invertebrates. Solenodons live only on the islands of Cuba and Hispaniola, where, despite a lack of good population estimates, they are listed as critically endangered. Each island has its own species of solenodon, and some scientists think that Hispaniola may have several distinct subspecies.

Although little is known about the animals, scientists are interested in them for two reasons. First, solenodons are the only living mammal that, like snakes, can inject victims with toxic saliva through hollow tubes in specialized teeth. (Two species of shrews and the Australian platypus are also poisonous, but they don't inject their venom through their teeth.) Second, solenodons possess several primitive traits that have been found in fossils of solenodon-like animals from North America that date to more than 30 million years ago. This raises questions about how solenodons got to Cuba and Hispaniola: Were the islands once connected to North America, or did the animals raft there? No one knows. Furthermore, studies of solenodons' DNA by Mark Springer, of the University of California, Riverside, suggest that they diverged from shrewlike animals during the Cretaceous period some 76 million years ago. Their long lineage makes solenodons "one of the most evolutionarily distinct mammals in the world," the Zoological Society of London's Sam Turvey told BBC News in 2008.

Without large native predators to compete with (except crocodiles in Cuba), solenodons were once the top mammalian predators on the islands. The introduction of dogs, cats, rats, and mongooses—along with habitat loss and fragmentation caused by human development—changed that. As a result, solenodons' range and numbers have been severely reduced. A preliminary survey by scientists from the Durrell Wildlife Conservation Trust (DWCT) and the Zoological Society of London (ZSL) in 2007 and 2008 managed to capture only one live solenodon.

The DWCT and ZSL scientists, along with others from the Dominican Republic and elsewhere, have launched a three-year research effort to estimate solenodon numbers, study their genetics and evolutionary history, determine the genetic variation among geographically isolated populations, and develop a conservation plan that allows these primitive creatures to continue to survive. Although some have predicted the imminent demise of solenodons, others are more optimistic, pointing to the discovery in 2008 of a population of solenodons near Duchity, in southwestern Haiti, where the animals had been thought extinct. Solenodons have also been found living in areas with degraded habitat and at lower than expected elevations in mountainous regions.

Photograph: Frank Wouters.

Cuba is also close: Only 145 km separate the Florida Keys from the northern coast of Cuba. As a result, Cuba and the United States share some of the same habitats and wildlife. Cuba's Zapata Swamp, for example, with thousands of herons and other wading and water birds, is strikingly similar to the Florida Everglades. Most North American songbirds and raptors that migrate along the Atlantic Coast on their annual journeys to and from Latin America pass over Cuba, says Eduardo Inigo-Elias, a Cornell University ornithologist. Most stop on the island to rest and feed.

Most important, perhaps, is that US and Cuban waters contain many of the same fish and other marine species. At least 70 species of fish found in US waters also inhabit Cuban waters, Guggenheim says. Although currents, water depths, and weather complicate data collection, computer models and field studies have shown that at least some fish that hatch in Cuban waters can be carried as larvae by prevailing currents east by way of the Straits of Florida, and then north up the US Atlantic Coast. Similarly, some fish that hatch in US waters swim south to feed and breed in Cuban waters.

David Guggenheim has organized teams of Cuban researchers and citizen scientists to study, tag, and monitor green (shown above), loggerhead, and hawksbill sea turtles. The research has shown the turtles travel back and forth regularly between US and Cuban waters. The presence of Cuban researchers and citizen scientists on the beaches helps keep potential egg poachers away, Guggenheim says. Photograph: David Guggenheim.

This is particularly true for large predators like sharks, says Robert Hueter, director of the Center for Shark Research at the Mote Marine Laboratory in Sarasota, Florida. All 54 shark species found in Cuban waters also inhabit US waters. Tagged whale and other sharks are known to have swum from Mexican to Cuban and then to US waters. "Assessing the status of sharks in US waters is not sufficient without knowing how they are doing in Cuba and Mexico," Hueter says.

Nor is biological connectivity limited to fishes. Manatees, large sea turtles, lobsters, and other marine animals have been tracked going between US and Cuban waters. Indeed, Cuba is a major breeding and feeding ground for the endangered loggerhead, hawksbill, and green turtles, says Fernando Bretos, a research fellow at the Ocean Foundation. Improved US–Cuba diplomatic relations could lead to joint programs to conserve sea turtles in both countries, Bretos adds.

Meanwhile, the same coral reefs that dot the southeastern US coast are also found offshore Cuba. The only difference: Many of the US reefs are dead or dying, while most off Cuba are

Healthy brain corals thrive in waters north of Cuba. "These reefs are special," says David Guggenheim. "Why are their reefs healthy while ours are dying? That's an area of research ripe for investigation that the Cubans have not been able to do themselves." Photograph: Abel Valdivia-Acosta.

healthy. "Just seeing those [Cuban] reefs changed my life," said Guggenheim. "We can learn lessons from Cuba on how to protect and restore coral reefs."

In other words, says Daniel Whittle, an EDF senior attorney and director of the conservation group's Cuba program, "What happens in Cuba affects us, and what we do affects them. Even if we did a great job of managing our marine resources it wouldn't be enough if Cuba did not do the same. We want to help Cuba become the next Costa Rica."

The hurdles

For now, just getting to Cuba is difficult. Americans traveling to the island must have both a passport from the state department and also a license from the treasury department. Additionally, those who want to take scientific or other equipment to Cuba must have a permit from the Department of Commerce. They need a visa from the Cuban government, too. In all, the process of obtaining the necessary passports, licenses, permits, and visas—not to mention filling out the forms to get them—is a "slow and bureaucratic battle." So says an understated John Thorbjarnarson, a senior conservation zoologist with the Wildlife Conservation Society in New York who studies crocodiles in Cuba and elsewhere.

But travel is not the only problem facing US scientists who want to work in Cuba. Once there, communications are poor, in part due to the US embargo. Telephone lines are few and expensive—researchers reportedly have to get up at 3:00 a.m. to make international phone calls—and Internet connections are problematic at best. Further, Americans need to bring cash with them; US bank-issued credit cards cannot be used in Cuba.

Travel to Cuba is a bit easier for scientists who plan to publish their research, as well as for those who have personal ties with their Cuban counterparts or who belong to private US groups that have developed similar relations with Cuban groups. They can get a "specific" license from the treasury, as can universities or other groups whose employees participate in meetings in Cuba, says Cornelius.

An additional challenge is the desire of Cuban scientists to be seen by their American counterparts as partners with much to contribute to scientific research. "Cuban scientists are sophisticated, are well read, and do good field work," Cornelius says. Cuba requires American scientists who want to do research in Cuba to have a Cuban partner, usually a research or educational group. "The chances of success [in both diplomacy and scientific research] are much better if we work together," adds Whittle.

"We shouldn't wait for improved diplomatic relations," says Guillermo Garcia Montero, director of the National Aquarium of Cuba in Havana and president of Cuba's National Committee on Oceanography. "Science should be ahead of politics and diplomacy. We have to be willing to solve our mutual environmental problems as part of a broad, collaborative effort."

While the difficulties and lack, so far, of a diplomatic breakthrough have discouraged some US scientists from working in Cuba, others can't wait to go. "I'm chomping at the bit," says Jerald Ault, professor of marine biology and fisheries at the University of Miami. "For me, [Cuban biology] represents a big, black hole that we know little about."

Moreover, "there is nothing that can replace the ability of scientists to have direct access to one another," says Douglas Rader, EDF's chief ocean scientist. "We should be opening doors to scientific exchanges. Restoring normalcy to scientific exchanges should be job one." Toward that end, scientists from the United States, Mexico, and Cuba have met in Veracruz and Cancun, Mexico, and in Havana to help develop a marine research and conservation agenda for Cuba.

Whether US–Cuba diplomatic negotiations will succeed remains unclear. Most observers think they are likely to be difficult, take a while, and yield only piecemeal results at first. Several previous attempts have failed, and numerous political, diplomatic, and ideological obstacles to improved ties remain, including 50 years of mutual distrust.

Guggenheim, who is popularly known as the "ocean doctor," is not alone in welcoming the possibility of improved US–Cuba political and diplomatic relations. If successful, that could mean greater opportunity for and ease of research and conservation efforts in Cuba by US scientists. "There is no better way for Americans and Cubans to begin to engage one another than on the environment," Whittle says. "The environment can serve as a bridge to better relations."

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