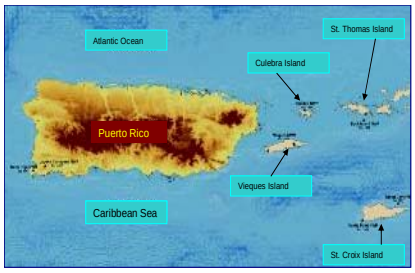
Caribbean: *Puerto Rico and U.S. Virgin Islands*



Introduction and General Description

The Caribbean Islands comprise of one of the most diverse ecosystems within the United States. The U.S. Caribbean is located in the eastern extreme of the Caribbean archipelago half way between the Florida peninsula and Venezuela. Puerto Rico and the U.S. Virgin Islands provide great opportunities to protect and restore tropical forests ecosystems, Neotropical migratory bird wintering grounds, and habitat for more than 75 federally listed species.

In just a few miles, an observer can travel from a tropical rain forest to the sub-tropical dry forest ecosystem. Coral reefs, mangrove swamp, rivers and streams, forested and herbaceous wetlands are among the most prominent ecosystems in the Caribbean Islands. The U.S. Fish and Wildlife Service manage nine National Wildlife Refuges in the Caribbean consisting of the most diverse array of ecosystems within the National Wildlife Refuge System. Five of these are located in Puerto Rico: Cabo Rojo NWR, Laguna Cartagena NWR, Desecheo Island NWR, Culebra NWR, and Vieques NWR. Three are in the US Virgin Islands: Sandy Point NWR, Green Cay NWR, and Buck Island NWR. Navassa Island NWR is located just west of Hispaniola.

Caribbean Activities

- Shade coffee restoration for Neotropical migratory birds and native wildlife species.
- Wetland enhancement and restoration (plugging ditches, building levees, installation of water control structures, etc.)
- Upland forest restoration
- In-stream enhancement and restoration
- Restoration of forested riparian buffer
- Cave gating and fencing to protect cave adapted species
- Restoration, enhancement, protection of habitat for threatened, endangered, or rare species
- Karst forest restoration
- Outdoor classrooms

Habitats of Special Concern

The combination of tropical habitats in close proximity makes the Caribbean Islands an area with unique challenges for habitat restoration and protection. Tropical rain forests are less than 30 miles from mangrove forests and coral reefs. Caves in karst areas are intertwined with underground rivers. Due to this diversity, and the rare and endangered species present, the Service, together with our many partners, has identified some habitats of special concern.

Karst Forest

In Puerto Rico, more than one third of the island is covered by limestone. This region harbors the richest biodiversity on the islands with more than 1,300 species of plants and animals present, including 30 threatened and endangered species. The southern karst contains habitat for a number of endangered plants and wildlife species like the Puerto Rican Crested Toad and the Puerto Rican Nightjar. The northern karst contains more than 500 caves, valleys and ravines important to birds, bats and other wildlife species. This area has been identified as the site for establishing a second wild flock of endangered Puerto Rican parrot (*Amazona vittata*), the only native parrot living within the United States. Urban expansion and industrial development threatens karst ecosystems to be lost at a rapid rate, endangering this important wildlife habitat and the most important aquifer in Puerto Rico. This particular area has been identified as a priority site for the Partner for Fish and Wildlife Program.

Rivers and Stream Habitats

In agricultural and urban areas, the forest fringe along stream corridors may provide the only cover for many species and serve as the only link to other forest areas. Rivers and streams are especially important due to their limited area and relatively small watersheds. These ecosystems provide important functions for society such as moving excess water, supplying drinking and irrigation water, recreation, recharging aquifers, replenishing sand on beaches, and nourishing floodplain farmlands by depositing fertile sediments. Unfortunately, many islands rivers have been modified for flood control, water supply, and hydropower projects. Protection of riparian habitat is important to the conservation of wildlife species.

Shade Coffee

Puerto Rico is the only area within the U.S. where coffee is grown under the shading canopy of tropical forests. This practice provides excellent habitat for many resident and migratory birds, other fish and wildlife. Because of a government sponsored policy, the shading canopy of many coffee plantations was cut to make way for "sun" coffee plantations. This practice destroys the habitat promotes soil erosion, reduces biodiversity and increases pollution due to the heavy use of chemical fertilizers and pesticides.

By restoring the shade canopy of these agro-ecosystems we can enhance Federal trust species habitat on private lands and provide a smooth transition between urban and natural protected areas. Approximately 90,000 acres are covered with coffee plantations, of these about 40 percent are cultivated under forest shade. Funds provided, our goal is to significantly increase the acreage of shade coffee plantations.

Service Biologist showing the Shade Coffee Practice.

Tropical Dry Forest

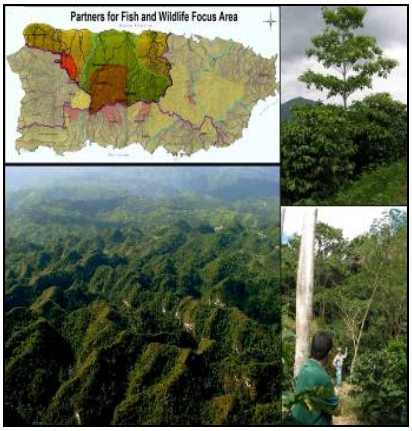
Dry forests in the Caribbean have come under intense pressure from agriculture and urban development. The constant threat of human induced fires adds to the urgency of protection. The protection and restoration of dry forests is essential for reducing the decline of many rare, threatened and endangered species, Neotropical migratory birds, and endemic species. Due to the extreme environmental conditions, natural dry forest regeneration is very slow, and disturbed habitats remain degraded with very little wildlife value for very long periods. Permanent damage to dry forest ecosystems is often observed. National Wildlife Refuges provide unique opportunities for private lands restoration on adjacent areas. The Sandy Point National Wildlife Refuge is home to several endangered species including leatherback, green, and hawksbill sea turtles, the Sandy Point orchid (*Psychilis macconelliae*) and Vahl's boxwood (*Buxus vahlii*). Other refuges with dry forest ecosystems are the Culebra, Cabo Rojo, and Vieques National Wildlife Refuges with many other endangered species including the yellow-shouldered blackbird (*Agelaius xanthomus*). There are other areas on the islands where nonprofit organizations manage and protect conservation properties, providing more opportunities for the Partners for Fish and Wildlife Program in the Caribbean.

Wetlands

The prominent wetland types in the Caribbean Islands include mangrove forests, herbaceous marshes, freshwater swamps, and riparian forests. These wetlands provide habitat that sustains commercial fisheries, many endangered species, migratory and resident birds (waterfowl, wading, shore birds) and reduce the impact of floods in adjacent areas. Because of the close proximity, land practices inland create significant impacts on these habitats. Salt flats, mangrove forest, seagrass beds and coral reefs all string together in a beneficial array that supports numerous species.

Threats

Habitat modification and destruction is the most significant threat to the fish and wildlife resources in the Caribbean. In spite of a natural reforestation of abandoned grasslands and agricultural fields, urban and industrial development projects are jeopardizing these important tropical resources, unique within the U.S. Wetlands in the U.S. Caribbean have been reduced by more than 50 percent, mostly due to drainage for agriculture, flood control projects, and urban and industrial development. Also, the conversion of the traditional shade coffee plantations into "sun" coffee monocultures is destroying perhaps the best example of sustainable agriculture in the tropics. Shade coffee retains much of the wildlife habitat value and at the same time preserves the economic activity of agricultural land. Poor soil management by developers and



Partners Program Focus Area, Karst Zone, and shade coffee

farmers cause excessive sedimentation of rivers and creeks impairing water quality for aquatic fauna. In the Caribbean, everything is so tightly bound that an impact in upland will have immediate repercussions downstream. When conserving resources it needs to be in a concerted way.

Conservation Strategies

Tropical Forest Restoration

Tropical forest restoration is one of the most important activities for the Partners Program. Restoration is accomplished by carefully selecting plant species for reforestation projects while keeping in mind the local conditions at the site. Habitat requirements for trust species present at the site are carefully met to maximize the wildlife habitat value. Tropical forest restoration cost between $400 - $600/acre for humid areas. In coastal dry forests the cost is between $700-1,200/acre due to the extreme environmental conditions.

Shade Coffee

Another important conservation strategy is to convert "sun" coffee plantations back to "shade" coffee. This activity provides excellent habitat on private lands while maintaining the agricultural production on the same parcel of land. These practices are coordinated with the Commonwealth's Department of Natural and Environmental Resources and Department of Agriculture. Approximately 50,000 acres are suitable for the reestablishment of shade coffee. The average cost of this practice is between $300-$600/acre of restoration, enhancement, or protection.

Streams and Riparian Areas

Rivers and streams are the natural highways connecting forested mountains with the coastal plains and the sea. We are developing mechanisms to enhance natural river systems. Conservation practices for these important ecosystems include establishing vegetative buffers along the rivers and stream banks, constructing fish

Partners with PFW sign, certifying the shade coffee practice.

passage structures on dams, and restoring the natural channel of degraded streams. These practices restore the natural functions of rivers and result in a more natural landscape. Riparian buffers cost an average of $400-$600/acre, while stream channel restoration has averages $30,000/mile.

Wetland restoration projects are closely coordinated with other State and Federal agencies and local non-governmental organizations. One of the focus areas for wetland restoration is the northern karst region where thousands of isolated wetlands occur in the valleys of limestone hills. These projects include the restoration of hydrology and the reforestation of adjacent uplands. The average cost of wetland restoration in the Caribbean is $1,000/acre.

Outdoor Classrooms

The Partners for Fish and Wildlife Program and Coastal Program are working with a local NGO and the Natural Department of Environmental Resources with educational and recreational facilities to restore and enhance wildlife habitat in local schools to create outdoor classrooms.

The Partners program leverages

We create team and partnerships in every project.

Partners that received the White House Recognition for Conservation

funds with those groups to restore habitats and create outdoor classrooms.

An Integrated Program

"Working with others" has produced significant challenges and opportunities in conservation of our trust resources. The Service in the Caribbean sees the Partners for Fish and Wildlife and Coastal programs as an opportunity to lead in the conservation arena. Working to the outside, the Service leads a private lands team with agencies and partners to cooperate in identifying areas of opportunity and avoiding duplicity of efforts. Within the Service we looked through technical assistant to federally sponsored and state regulated projects to instill conservation attitudes and promote the conservation of excess lands. We provide recommendations to development projects on conservation of creeks and streams, reforestation, riparian buffer zones, and set aside programs. Service Federal Aid Programs are coordinated with our Partners and Coastal programs to optimize allocation of funds in wildlife, fisheries, coastal habitats and listed species. Our National Wildlife Refuges help us identify other areas important to enhance conservation.

Partners

Puerto Rico Department of Natural Resources
U.S. Forest Service
Natural Resources Conservation Service
Soil Conservation Districts Association Puerto Rico
PR Department of Agriculture
Envirosurvey Inc.
Agricultural Extension Service
Ciudadanos del Karso
Sociedad Ornitológica
Puerto Rico Conservation Trust
Mariposario Las Limas
PR Rural Development Corporation
University of Puerto Rico

Metropolitan University
University of the Virgin Islands Cooperative Extension Service
University of the Virgin Islands Eastern Caribbean Center
The Nature Conservancy Virgin Islands
USVI Department of Agriculture
St. Croix Environmental Association
Green Key Association
Virgin Islands Urban Forestry Council
Friends of the Virgin Islands National Park

Accomplishments

The Partners Program has been working in the Caribbean for the last 6 years. During this short time we have restored or protected:

Over 620 acres of Wetlands
Over 2100 acres of upland
Over 16 miles of riparian buffer

Future Needs

The restoration needs for Puerto Rico and the U.S. Virgin Islands are:

~ 400 miles of riparian habitat.
~ 50,000 acres of wetland
~ 65,000 acres of sun coffee plantations
~100,000 acres of tropical forest habitat.

The Partners Program has been so successful that landowners are conveying the message to neighbors to become partners enhancing the effect of conservation. We have been successful in leveraging at least three non-Federal dollars per Federal dollar spent in the Caribbean. The

Service is the leading agency proposing and conducting private lands restoration projects in the Caribbean.

Contact

Silmarie Padrón
Partners for Fish and Wildlife Program
U.S. Fish and Wildlife Service
P.O. Box 491, Road 301, Km 5.1
Boqueron, PR 00622
787-851-7297
Email:silmarie_padron@fws.gov